

# Introduction to the Special Issue: Highlighting AERA's Online Teaching and Learning SIG 2023

Patrick R. Lowenthal  
*Boise State University*

Robert L. Moore  
*University of Florida*

The American Educational Research Association (AERA) is an international society that “strives to advance knowledge about education, to encourage scholarly inquiry related to education, and to promote the use of research to improve education and serve the public good” ([About AERA](#)). AERA members consist of researchers, practitioners, and policymakers who belong to one or more of 12 divisions and more than 150 special interest groups (SIGs). They come together annually to share educational research results and discuss implications for practice. The Online Teaching and Learning (OTL) SIG is a group of over 200 members who discuss and disseminate challenges and possibilities relating to online teaching and learning. SIG OTL and the Online Learning Consortium (OLC) have maintained a long-standing collaboration to advance online, blended, and digital learning theory and practice. The AERA annual meeting in 2023 was place-based in Chicago, Illinois, as well as virtual. The theme of the meeting was “[Interrogating Consequential Education Research in Pursuit of Truth](#).”

Since 2016, the Online Learning Journal (OLJ), the official journal of the OLC, has released a special issue to extend opportunities for SIG OTL members to contribute their expertise in online education research. The 16 papers selected for this issue represent innovative and diverse topics using various research methods. We have tried to group them into five themes: 1. Measurement and analysis; 2. Equity, Inclusion, Advocacy, Embodiment; 3. Modality; 4. Openness; and 5. Philosophy & Theory.

## 1. Measurement & Analysis

Six articles focus to some degree on measurement and analysis. These articles collectively focus on developing measurement tools and models for online and digital learning.

In the first article, “[The Online Teaching Motivation Scale \(OTMS\): Development and Validation of a Survey Instrument](#),” Wiles et al. describe the creation and validation of an instrument aimed at quantifying the motivational factors influencing K-12 teachers in online teaching contexts. The survey consists of 27 items focused on three factors: teacher self-efficacy,

perceptions of online teaching, and perceived administrative support. The study's findings show strong reliability and validity of the OTMS.

In the next article, “**Bridging Theory and Measurement of Student Engagement: A Practical Approach**,” Means and Neisler describe the creation and application of measures for specific components of student engagement, aligned with a theoretical model, to evaluate the effect of instructor practices and learning technology on engagement, particularly for Black, Latine, and low-income students in online learning. They report on the reliability of these measures and the interrelationships among them, offering insights for future educational research and practice.

Then, in “**Course Design Approaches and Behavioral Patterns in Massive Open Online Courses for Professional Learning**,” Marc Egloffstein et al. analyzed learner behavior in 13 business and technology-related MOOCs through lag sequential analysis, identifying common and distinct interaction sequences across lecture, system interaction, and discussion-oriented courses. The results suggest integrating interactive elements and metacognitive interactions into MOOCs to enhance learner engagement and outcomes. They conclude with implications for future research and course design.

Then Gunawardena et al., in “**Deep Learning Models for Analyzing Social Construction of Knowledge Online**,” investigated how two neural networks could predict the social construction of knowledge using Gunawardena’s popular Interaction Analysis Model (IAM). They report on the accuracy of these predictions and discuss the potential this work can have in providing rapid feedback for online course revision. To improve the accuracy, they recommend training the models with larger data sets or focusing on the design of prompts to improve classification accuracy.

Next, in “**Measuring Faculty Engagement in Online Formative or Whole-Person Education: A Revised Instrument and Item Response Theory Model**,” Wortham et al. describe the development of a scale to evaluate faculty engagement with formative or whole-person education principles. They present the psychometrics for the 10-item scale., demonstrating high reliability and validity. They conclude with how the scale might be adapted for other contexts.

In the last article in this first group, “**College Students, Networked Knowledge Activities, and Digital Competence: Implications for Online Curricula and Workforce Preparation**,” Dennen et al. investigated college students' digital literacy skills with knowledge-related activities by surveying 350 college students about their engagement with professional platforms and digital skills like tagging, writing, and creating. The findings suggest that students frequently engage with platforms for personal use but are less active on professional networks or

in content creation, skills valued in the workforce. The authors conclude with strategies for curriculum development to better prepare students for digital tasks in their future careers.

## **2. Equity, Inclusion, Advocacy, Embodiment**

The second group of articles loosely focuses on equity, inclusion, advocacy, and embodiment issues.

In the first article in this group, “**Higher Education Instructor Perception of Helpfulness of Inclusive and Equitable Online Teaching Strategies**,” Martin et al. introduce the Inclusive and Equitable Online Teaching Strategies (IEOTS) instrument. The IEOTS consists of 45 strategies across five categories to assist instructors in fostering inclusivity and equity in online courses. The findings highlight the perceived helpfulness of these strategies and emphasize the importance of student choice in promoting inclusivity and equity.

In the next article, “**Culturally- and Linguistically-Responsive Online Teacher Learning Professional Development**,” Pawan et al. set forth to understand the theories and conceptual models used in responsive online teacher preparation and professional development by conducting a literature review. Their results showed how sociocultural theories, models, and frameworks help address inclusivity and, in turn, help reduce barriers, create online communities, enhance accessibility, and promote engagement. They discuss the importance of teacher education programs and professional development on leveraging cultural and linguistic assets while focusing on equity in design and conclude with ways AI might help.

The next article, “**Conceptions of Time in Educational Technology: Considerations for Equity-focused Design**,” by Fortman et al., also focused on equity in design. In this study, the researchers analyzed marketing materials from Coursera and Microsoft. They found that marketing materials perpetuate a conception of time as a resource and a future-oriented element in learning. Based on the analysis of blog posts and customer success stories, the findings have implications for developing equitable pedagogical designs in technology-enhanced learning environments.

Then, focusing more on advocacy, in “**Emergent Themes from Study of a Highly Flexible Hybrid Learning Program**,” Castañón et al. investigate a hybrid learning program's impact on teachers, students, and parents. The authors discuss the program's unique features, such as individualized schedules and project-based curriculum, and highlight the collective advocacy for accessible instruction and appropriate support. The study also considers the additional challenges teachers face and suggests a need for united efforts to support student learning while addressing teacher needs.

The last article in this group focused specifically on embodiment. In “**I sing the body electric”: Embodied presence in the Community of Inquiry framework**,” Howell investigated the embodied experiences of female “sojourner” teachers who navigate online, face-to-face, and hybrid teaching spaces, revealing their complex relationship with physical presence in virtual teaching environments. Howell challenges the relegation of embodiment to the social presence domain of the Community of Inquiry framework, suggesting a reconceptualization that acknowledges the intersection of physical and intellectual labor in teaching.

### **3. Modality**

While a few other articles (e.g., Martin et al.) in this special issue focus on modality, the following two articles more directly focus on the role of modality.

In “**Instructional Strategies for Engaging Online Learners: Do Learner-centeredness and Modality Matter?**,” Shi et al. conducted a mixed-method investigation into how online instructors use different instructional strategies to engage learners and how course modality (i.e., synchronous versus asynchronous) and instructor learner-centeredness influence this choice. Findings showed that learner-centered strategies, particularly discussions, occur at a high rate regardless of an instructor’s learner-centeredness or modality. Also, instructors with a high learner-centeredness reported more use of lectures regardless of course modality than those with low learner-centeredness.

Then, in “**Comparing Blended and Online Learners’ Self-Efficacy, Self-Regulation, and Actual Learning in the Context of Educational Technology**,” Zhang et al. compared technology integration self-efficacy, self-regulated learning strategies, and learning outcomes between preservice teachers in the same blended and online educational technology course. Students in the online modality reported better time management but sought less help than those in the blended modality. However, they found no significant difference between technology integration self-efficacy or learning outcomes between both modalities. These results can inform the design of educational technology courses to meet the needs of both blended and online learners.

### **4. Openness**

The second to last group of papers focuses on the concept of openness. In the first paper in this group, “**Personalized Learning and Open Education Resources in Multilingual Learner Teacher Preparation**,” Bondie investigated the incorporation of personalized learning and open education resources (OER) in a teacher preparation course, analyzing the effects on standard university course evaluations and the selection of assignments by novice teachers. Findings suggest that personalization and OER may improve perceptions of technology, agency, relevance, diversity, and assessment, despite increased outside class hours and reduced satisfaction with course organization and feedback.



Then in the next paper, “**Building Open Pedagogy in Community Colleges**,” Gilpin et al. investigated the implementation of open pedagogy in community college settings, assessing its influence on student engagement and persistence. They found that while students recognized the benefits of sharing work publicly and valued collective efforts, they had concerns about privacy. The results suggest enhancing media literacy, offering group work options, and ensuring institutional support to mitigate anxiety around public sharing and supporting student identities in the learning process.

## 5. Philosophy & Theory

The last group has just one single article that really focuses on philosophy and theory. In “**Navigating Online Learning Through ‘Technological Frames’: A Qualitative Examination**,” Basdogan and Bonk utilizing Carl Mitcham's typology, analyzed how educational technology scholars perceive technology in learning environments and contexts, revealing a prioritization of technology as volition and activity, followed by object, with knowledge being least referenced. They also uncovered a new category termed “space,” offering both theoretical and practical insights for future research in online and distance learning.

Our gratitude goes out to the OJL editor-in-chief Peter Shea, Mary Rice, the managing editor of OJL as well as the AERA OTL SIG chair, and all the authors. We hope you'll find these articles as enlightening and informative as we did.

Patrick Lowenthal, Professor, Educational Technology, Boise State University;  
patricklowenthal@boisestate.edu

Robert L. Moore, Assistant Professor, School of Teaching and Learning, University of Florida; robmoore@coe.ufl.edu

## Reference

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# The Online Teaching Motivation Scale (OTMS): Development and Validation of a Survey Instrument

Daphne Wiles  
Anna Morrison  
*Clemson University, USA*

Julie Smart  
*Anderson University, USA*

Luke Bennett  
*Purdue University, USA*

Scott Peters  
*Northwest Evaluation Association, USA*

## Abstract

The purpose of the current study was to develop and validate the Online Teaching Motivation Scale (OTMS), a survey instrument designed to reliably measure motivational constructs related to online teaching and learning. The widespread prevalence of online and hybrid teaching modalities, many established during the COVID-19 pandemic, has necessitated reliable, valid measures to better understand factors that impact teachers' motivation for online teaching and learning. The OTMS went through a rigorous validation process, including a pilot survey for content review, digital administration to K–12 teachers (N=379), and confirmatory factor analysis. The result was a 24-item survey designed to measure teacher motivation for online teaching based on three factors: teacher self-efficacy for online teaching, teacher perceptions of online teaching and learning, and perceived administrative support for online teaching. The OTMS was found to have a strong model fit, as well as strong reliability and validity measures. Future research includes wide administration of the OTMS to examine the relationship between K–12 teacher motivation for online teaching and students' achievement and to inform the development of appropriate support models.

*Keywords:* online education, teacher motivation, self-efficacy, teacher perceptions, administrative support

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The widespread prevalence of online and hybrid teaching modalities due to the COVID-19 pandemic has necessitated reliable, valid measures to better understand teachers' motivation for online teaching and learning (Lehrer-Small, 2022; Ascione, 2021; Plitnichenko, 2021). Research indicates that multiple factors influence teachers' motivation for online pedagogy, including efficacy (Eccles & Wigfield, 2002), teacher perceptions about the effectiveness of online learning (Yang, 2020), and perceived administrative support (McLeod & Richardson, 2014). However, an examination of existing literature revealed a need for reliable, valid instrumentation to study the model of these variables on teachers' motivation for online teaching. Gaining an understanding of teacher motivation is important since motivation is tied to student achievement outcomes (Watt & Richardson, 2013). As teachers continue to navigate the increased presence of technology in K–12 classrooms, it is important that administrators understand teachers' motivation for online teaching, and work to provide appropriate support. Though the pandemic has subsided, the current state of technology-supported education in K–12 schools depends on the location and school district. Some schools are continuing to fully embrace online teaching and learning by offering virtual classes as part of the standard curriculum, while others are using online instruction during inclement weather or implementing online learning experiences as part of the regular, in-person school day. Prior to and following the pandemic, online teaching and learning continued to grow in popularity, and this trend is expected to continue (Lehrer-Small, 2022). Therefore, the need for valid and reliable measures of teachers' motivation for online teaching is essential to gaining a deeper understanding of the methods of support needed by K–12 educators to continue their professional development of online teaching skills and to examine possible connections to students' achievement.

The purpose of the present study was to develop and validate the Online Teaching Motivation Scale (OTMS), an instrument designed to measure motivational constructs related to online teaching and learning. The following research question guided our work:

How can we measure the following elements of teachers' motivation for online teaching in a reliable and valid way?

- Teacher self-efficacy for online teaching (operationally defined as teachers' beliefs in their ability to teach online)
- Teacher perceptions of online teaching and learning (operationally defined as teachers' beliefs about the effectiveness of online teaching)
- Perceived administrative support for online teaching (operationally defined as teachers' beliefs about how their administration supports their development for online teaching)

## **Review of the Literature**

There has been significant growth in online teaching and learning in the K–12 sector over the past several years (Lehrer-Small, 2022). Many schools were forced into emergency online teaching during the COVID-19 pandemic (Karaferye, 2022); consequently, the growth of online teaching and learning has continued to accelerate in America's schools. Teachers in America's K–12 classrooms are using technology and online learning in myriad ways, including enrichment for student learning, interactive materials, and other learning platforms (Crossland et al., 2018), as well as fully online classes, instruction during school closures, and in-class instructional tools.

As a result of the pandemic, K–12 schools across the U.S. have increased the availability of online learning resources to support student learning both in and out of the classroom, and many teachers continue to use online teaching as part of their classroom pedagogy (Ascione, 2021; Plitnichenko, 2021). Due to this increased prevalence, it is imperative that we continue to monitor teachers’ motivation for online teaching to best support their developmental and psychological needs.

An initial dive into recent literature revealed that K–12 teachers desired more professional development, training, and resources related to online teaching and learning (An et al., 2021; Ogodó et al., 2021) and that many teachers had low self-efficacy for online teaching and learning (Cardullo et al., 2021; Durak, 2019; Ogodó et al., 2021). Additionally, despite the widespread use of online teaching and learning in K–12 classrooms, many teachers held negative perceptions about the effectiveness of this learning modality (Orhan & Beyhan, 2020; Rahayu, 2020). These insights led to an investigation of existing surveys to examine K–12 teachers’ perceived administrative support (e.g., support for professional development, resources, etc. for online teaching), self-efficacy for online teaching, and perceptions of online teaching and learning within a larger context of motivation for online teaching.

### **Existing Surveys**

A review of the literature revealed several instruments that have been developed to measure motivation for online teaching; however, none of the instruments fully matched the needs or intended applications of the OTMS (Davis, 1989; McFarlane et al., 1997; Nguyen, 2023; Vannatta & Banister, 2009; Zimmerman & Kulikowich, 2016). The convergence of the three constructs (teacher self-efficacy for online teaching, teacher perceptions of online teaching and learning, and perceived administrative support for online teaching) in the OTMS is grounded in the motivational literature and supports a current perspective concerning teachers’ motivation for online teaching. Below we review these existing scales in greater detail to further justify the need for the OTMS.

Davis’ (1989) Technology Acceptance Model (TAM) provides a valid instrument to examine the relationship between users’ behavior and their perception of the usefulness and ease of use of a specific technology. Perceived usefulness and ease of use have been shown to be indicators of an individual’s self-reported system use (Davis, 1989). The items on the OTMS are aligned with the theoretical foundations of the TAM, addressing both “perceived usefulness” and “perceived ease of use” through items corresponding to teachers’ perceptions of online teaching and learning and teachers’ self-efficacy for online teaching. However, the OTMS also includes a third motivational construct, perceived administrative support for online teaching. By addressing all three motivational constructs, the OTMS is a tool educational leaders can use to gather actionable data for informing the development of appropriate support models for online teaching and learning.

Nguyen (2023) used Davis’ (1989) work to develop and implement a survey instrument related to teachers’ attitudes toward online teaching. Her work included a factor called “external assistance,” and her findings supported hypotheses that external assistance has a positive effect on teachers’ perceived usefulness of online teaching adoption and that external assistance has a positive effect on perceived ease of use of online teaching adoption. Her findings provide support for the inclusion of items addressing perceptions of administrative support on the OTMS.

However, Nguyen used a narrower operational definition of online learning than that used to develop and validate the OTMS. She defined online learning as learning that is conducted in an entirely virtual space, with no face-to-face interaction. In the development of the OTMS, online teaching and learning was defined as, “education being delivered in an online environment through the use of the internet for teaching and learning” (Singh & Thurman, 2019, p. 302). This includes students who are participating in fully online, hybrid, or face-to-face classrooms with access to online learning tools. Additionally, Nguyen’s (2023) study surveyed only high school teachers in Vietnam, whereas the OTMS was developed for a broader population (K–12 educators) in the United States.

The Online Teaching Self-Efficacy Scale was published by Zimmerman and Kulikowich in 2016. This scale was developed to measure the self-efficacy of post-secondary students and consists of three subscales: learning in the online environment, time management, and technology use (Zimmerman & Kulikowich, 2016). Although this scale addresses the factor of self-efficacy, it does not measure teachers’ self-efficacy and is not intended for use in the K–12 environment. Although the scale could have been administered to a K–12 teacher population to test for validity, this scale did not measure teacher perceptions of online teaching or perceived administrative support. These two factors, in addition to self-efficacy, emerged initially from an extensive review of the literature when the OTMS being developed. The literature revealed these factors as important components of teacher motivation for online teaching in today’s classroom. Therefore, the Online Teaching Self-Efficacy Scale did not have a large enough scope to assess the factors of motivation offered by the OTMS.

Alternatively, the Technology Attitude Survey (TAS) was developed in 1997 by McFarlane et al. to assess teachers’ attitudes toward using technology in their teaching. This scale was tested on a small sample ( $n = 86$ ) and the population tested was foreign language teachers (McFarlane et al., 1997). Therefore, this scale may not be generalizable to a broader population of K–12 educators. The OTMS was tested with teachers of grades K to 12 and teachers of all subject areas. The Teacher Attitudes Toward Technology Survey could be an option if the goal were to better understand foreign language teachers’ attitudes toward technology. However, due to the recent increased presence of technology in K–12 classrooms across America, the goal of the OTMS was broader in scope. The OTMS offers teachers, administrators, and researchers some insight into the motivation of K–12 teachers on three research-based factors.

Finally, the Teacher Technology Integration Survey (TTIS) was an instrument developed by Vannatta and Banister (2009). Vannatta and Banister synthesized the work of other researchers who developed instruments examining separate aspects of teachers’ use of technology in educational settings. The TTIS bears the most in common with the new OTMS instrument, both including some constructs that overlap, such as teachers’ self-efficacy and perceptions about technology use in the classroom. However, the two instruments diverge significantly in their purpose and applications. While the TTIS provides insight into how teachers use technology, the OTMS examines the underlying motivation for teachers to implement online teaching and learning practices.

## Guiding Theories

With the evolving landscape of online teaching and learning in K–12 education due to post-pandemic technology resources, federal requirements (e.g., Every Student Succeeds Act), and an ever-increasing technology-based society, it is important that K–12 teachers are using the technology resources available and continuing to develop their professional skills and knowledge for online teaching. The development of the current instrument is grounded in the theoretical framework of motivation. Motivation is a psychological construct that can be broadly defined as “the processes that energize, direct, and sustain behavior” (Ormrod, 2006, p. 214). Highly motivated teachers may be more likely to engage in behaviors that enhance their teaching effectiveness (Smart & Linder, 2018; DiPerna & Elliott, 1999; DiPerna et al., 2005; Whang & Hancock, 1994), including effective goal setting, focusing effort, and persisting through challenges (Ormrod, 2006). Highly motivated teachers are also more likely to view instructional tasks as valuable and important (Eccles & Wigfield, 2002). Teachers who report high motivation may also employ more effective metacognitive strategies when approaching a new or challenging instructional task, such as transitioning to or working within an online environment (Pintrich, 2000).

An investigation of the literature revealed three constructs related to teacher motivation for online teaching and learning: teacher self-efficacy for online teaching, teacher perceptions of online teaching and learning, and perceived administrative support for online teaching. To better understand these constructs, an instrument was needed, the development of which was the purpose of this study. Within the literature, the self-efficacy, self-perception, and leader-member exchange theories all served as guiding frameworks for the development of the OTMS.

**Self-Efficacy Theory.** Self-efficacy is a central concept to the development of motivation for a task or skillset (Bandura, 1977; Bandura, 1989). Individuals with high self-efficacy for a task have confidence in their ability to perform the task effectively. In contrast, low self-efficacy is marked by a lack of confidence in one’s abilities to succeed at a given task or domain (Pintrich & Schunk, 2002; Pintrich, 2000).

Bandura (1989, 1997) noted that self-efficacy can be predictive of an individual’s motivation, affect, and behavior. For example, research indicates that self-efficacy can influence individuals’ persistence when faced with challenges and can affect the level of effort expended on difficult tasks (Britner & Pajares, 2001; Pajares, 1996). In addition, individuals who are confident about their ability in a specific area are more likely to attempt challenging tasks, persist at those tasks, and make positive attributions for both their success and failure (Bandura, 1997, 1989).

Bandura (1989, 1997) theorized that several key experiences contribute to an individual’s self-efficacy for any given domain. These experiences included mastery experiences, vicarious experiences, social persuasion, and physiological states. Mastery experiences are small successes with tasks that help foster efficacy for completing similar or related tasks in the future. Vicarious experiences are those in which the individual observes a similar individual successfully complete a task and consequently experiences an increase in personal efficacy for the same tasks. Social persuasion refers to the role of negative and positive feedback in relation to an individual’s ability to facilitate a decrease or increase in efficacy for a related task. In terms of physiological states, Bandura noted that individuals interpret their internal state as positive or negative. This, in

turn, affects the way that individuals perceive their efficacy for completing a task. Bandura (1989, 1997) noted; however, that these four mechanisms work together to influence an individual's self-efficacy; one experience alone is seldom sufficient for long-term effects on an individual's efficacy for a specific task or domain. Self-efficacy has also been shown to be a predictor of motivation for online teaching and learning (Baroudi & Shaya, 2022). Often, teachers who have previous experience with online teaching are more likely to be afforded additional professional development opportunities, and as a result, feel more prepared and demonstrate higher levels of self-efficacy (Baroudi & Shaya, 2022).

**Self-Perception Theory.** Self-perception theory is a psychological theory that explains how people come to understand and interpret their own thoughts, feelings, and behaviors (Deci et al., 1999; Freedman & Fraser, 1966; Bem, 1972). Self-perception theory, proposed by psychologist Daryl Bem in 1972, suggests that people infer their own attitudes and beliefs by observing their own behavior and the context in which it occurs. According to self-perception theory, when people engage in a behavior, they look at their behavior and the context in which it occurred to determine their attitude towards that behavior.

Self-perception theory suggests that people use their behavior as a cue to infer their internal states, and this process is particularly relevant when people do not have a clear or pre-existing attitude towards a particular behavior or situation (Deci et al., 1999). Moreover, self-perception theory also suggests that people can develop attitudes and beliefs about themselves based on the roles they adopt and the behavior that they display in those roles. This process is influenced by the social context in which the behavior occurs, as people use cues from the situation to help interpret their own behavior.

Self-perception theory has been used to explain phenomena such as the foot-in-the-door effect, where people are more likely to comply with a large request after first agreeing to a smaller request (Freedman & Fraser, 1966), and the overjustification effect, where extrinsic rewards can decrease intrinsic motivation (Deci et al., 1999).

**Leader-Member Exchange Theory.** Leader-Member Exchange (LMX) is grounded in Lord et al.'s (1985) and Eden and Leviatan's (1975) formative work on Implicit Leadership Theory (ILT). Although it has many facets and has developed over time, ILT reveals that each individual within an organization has preconceived ideas about leaders based on a set of characteristics that they perceive as good leadership characteristics. When those align with the actual characteristics of the leader they are perceived as a good leader. When there is alignment between the perceived characteristics of good leaders and their actual characteristics, high levels of leadership support are reported, which positively impacts the motivations of the individual to work within the organization. However, it should be noted that each individual holds separate ideas about the characteristics of a good leader.

To better understand how perceptions of leadership impact motivation, understanding the relationship between leaders and those being led becomes critical to the process. Perceptions of leadership are defined by the relationship that exists, or fails to exist, and the nature of the interactions between the leader and those they lead. Leader-Member Exchange Theory (LMX) provides a framework to evaluate both the level and quality of interaction between leaders and those they lead, as well as the characteristics of both leaders and those they lead (Dansereau et



al., 1975). When LMX is high, the relationship is differentiated between leaders and those they lead (i.e., everyone is not treated the same). In low LMX organizational relationships, the leader generally is more homogenous in how each individual under their leadership is treated. Both methods have advantages and disadvantages. Likewise, both impact how individual constituents might rate those in leadership positions (Scandura & Graen, 1984). In K–12 school settings, administrators serve as leaders, and administrative support has been identified as a leading factor in teacher recruitment, retention, and motivation (Tran & Dou, 2019; Demil, 2021).

### **The Present Study**

The purpose of this study was to develop and validate the OTMS, a survey-instrument designed to measure K–12 teachers' motivation for online teaching. The OTMS represents a valid and reliable measure of K–12 teachers' motivation for online teaching by evaluating three constructs: teachers' self-efficacy for online teaching, teachers' perceptions of online teaching and learning, and perceived administrative support for online teaching. This survey is a needed addition to the current educational literature due to the steady increase in online teaching and learning seen in K–12 education during and following the pandemic and the importance of understanding teacher motivation for best using online teaching and learning in an educational context.

## **Method**

### **Initial Survey Development**

Prior to developing the pilot draft of the OTMS, we conducted an extensive review of the literature about K–12 online teaching and learning. During that review, three critical constructs emerged concerning teachers' motivation for teaching online: teachers' self-efficacy for online teaching, teachers' perceptions of online teaching and learning, and perceived administrative support for online teaching. These dimensions were informed by three key theories of motivation: self-efficacy, self-perception, and leadership-member exchange (a thorough discussion of these grounding theories is provided above). Guided by these motivational theories, we developed an initial survey consisting of 45 multiple-choice items. Respondents were prompted to indicate their level of agreement with each statement using a 4-point Likert-type scale (Strongly Disagree, Disagree, Agree, Strongly Agree).

### **Content Expert Review**

After the initial survey was developed, we had four researchers, three instructional leaders, and two measurement experts assess the face validity of the OTMS via a content expert review. We provided each participant with a copy of the items and asked them to assign each item to the construct they believed was the best fit. We then asked them to rate their confidence in their construct assignment on a scale of 1 to 3 (Not confident at all [1] to very confident [3]). Any item assigned by reviewers to the incorrect construct more than 10% of the time or which had a confidence rating of less than 2.5 (Gentry & Gable, 2001) was eliminated. Based on these criteria, eight items were eliminated, and 37 items remained on the instrument. In addition to these 37 multiple-choice items, seven demographic items were included at the beginning of the scale.

### Survey Implementation: Participants and Setting

Data for this quantitative study were collected by administering the OTMS to a total of 379 in-service K–12 public school teachers between 2020–2021 (Table 1). The survey link was emailed to participants and all data were collected in Qualtrics. Due to the timing of the survey (during the height of the COVID-19 pandemic), several teachers were teaching in a fully online environment, while others continued to teach in hybrid and face-to-face environments. Three public school districts in South Carolina agreed to distribute the survey link to teachers via email. Additionally, the survey link was made available to practicing K–12 teachers who participated in an online graduate course at a university in the Southeast.

Respondents reported preschool or elementary (47%) as their primary level of instruction followed by high school (37%) and middle school (15%). Male teachers represented 18% of the respondents, while female teachers represented 82% of the respondents. Finally, 41% of the teachers reported teaching face-to-face only during the past school year, 42% taught both online and face-to-face, and 16% taught online only.

**Table 1**  
*Demographics of OTSM Survey Respondents Between 2020–2021*

	Face-to-Face Only	Hybrid (Online and Face-to-Face)	Online Only
<b>Grade Band</b>			
Preschool/Elementary	71	72	36
Middle	20	28	10
High	66	59	15
Other		2	
<b>Gender</b>			
Male	42	20	6
Female	115	138	56
Non-binary	0	1	0
Not Disclosed	0	1	0

*Note.*  $N = 379$ .

## Results

### Validity of Measures

The construct validity of the OTMS was evaluated by conducting a confirmatory factor analysis (CFA). This analysis was used to verify and validate a predetermined 3-factor structure that was based on the three guiding motivational theories of Self-Efficacy Theory, Self-Perception Theory, and Leader-Member Exchange Theory. Our choice of fit indices (CFI, TLI, RMSEA, and SRMR) was driven by Sun's (2005) guidelines related to the purpose of the CFA and Brown's (2015) recommendations to include one index from the following three classes: absolute, comparative, and parsimony. For this reason, we reported SRMR and robust chi-square test statistics as measures of absolute fit, CFI and TLI as measures of comparative fit, and RMSEA as an indicator of parsimony-adjusted absolute fit. Within these three categories, we followed Sun's guidelines (e.g., SRMR is consistent across different estimation methods, CFI is robust to even small sample sizes). What's more, specifically, when the goal of the study is to contribute to construct validity evaluations (which our study is), Sun recommended SRMR, TLI, RMSEA, and CFI. The results of the CFA are reported below.

Table 2 makes clear that the baseline model of all items on the initial scale was a fair starting place but was not replicated by the observed data. None of the fit statistics met traditional criteria for good fit. This suggested that the underlying structure did not adequately represent the data and that revisions should be considered. Next, we ran a single-factor model. The single-factor model evaluated whether the three latent factors made sense by loading all items onto a single factor. The result was an even worse-fitting model and a significant increase in the chi-square test statistic. As a result, we returned to the three-factor structure and examined modification indices to identify potentially problematic items. Items that cross-loaded heavily onto multiple factors were removed. Additionally, several items showed strong correlations with other items. In these cases, we removed one item from each pair once it was clear that the content did not require two items. After reviewing these changes and being satisfied that the instrument followed the proposed three-factor model and still represented the underlying constructs, the model was run and resulted in a much-improved model fit.

The final three-factor model has a CFI of 0.95, indicating a good model fit (Hu & Bentler, 1999). The TLI is .94, also indicating a good model fit (UCLA, 2021). The RMSEA is 0.3, also indicative of a good model fit (Hu & Bentler, 1999), and the SRMR is 0.5, which is on the lower bound of a good model fit, or the upper bound of an acceptable model fit. Taken together, these fit indices reveal a strong three-factor model for the OTMS. McCoach et al. (2013) argue that reliability levels from affective instruments, like the OTMS, tend to be lower than those from cognitive assessments (e.g., standardized achievement tests) in part because of the stability of the underlying constructs, but also because of the difficulty in crafting effective item wording that will be interpreted consistently across raters. They also note that goodness of reliability should, in part, be based on the purpose of the assessment, with higher-stakes assessments requiring higher reliability and lower-stakes research assessments necessitating lower reliability. As a result, the authors state reliabilities as low as 0.70 are not uncommon. Based on these recommendations, we feel comfortable with the reported reliability levels. The resulting OTMS instrument can be found in the appendix.

**Table 2**  
*Test and Multiple Fit Statistics*

Model	Parameters Estimated	Robust Test Statistic	CFI	TLI	RMSEA	SRMR
Baseline	80	1350.86	.77	.75	.06	.08
Single Factor	74	2529.20	.39	.36	.09	.13
Alt Model	70	724.49	.89	.88	.04	.06
Three Factor	51	354.91	.95	.94	.03	.05

*Note.* Presents the number of parameters estimated, test statistics with robust standard errors, and multiple fit statistics for each model.

Table 3 includes standardized and unstandardized factor loadings for the three-factor model. For each of the three factors, we also examined how alpha reliability would change were any one item to be removed. In nearly every case, removing an item would have had no effect, or made reliability go down.

**Table 3**  
*Unstandardized Loadings (Standard Errors), Standardized Loadings, and Significance Levels for Each Parameter in the CFA Model (N = 379)*

Parameter Estimate	Unstandardized	Standardized	<i>p</i>
Loadings			
Support → Q6	1.00 (0.00)	0.399	--
Support → Q12	1.987 (0.341)	0.730	< .001
Support → Q15	1.539 (0.254)	0.619	< .001
Support → Q21	1.682 (0.276)	0.676	< .001
Support → Q24	1.914 (0.310)	0.753	< .001
Support → Q40	1.486 (0.221)	0.671	< .001
Support → Q25	1.720 (0.285)	0.699	< .001
Support → Q36	1.634 (0.286)	0.610	< .001
Support → Q37	1.574 (0.272)	0.623	< .001
Efficacy → Q7	1.00 (0.00)	0.614	--
Efficacy → Q10	0.984 (0.086)	0.692	< .001

Efficacy → Q14	1.105 (0.108)	0.735	< .001
Efficacy → Q22	0.777 (0.106)	0.530	< .001
Efficacy → Q31	0.974 (0.122)	0.591	< .001
Efficacy → Q35	0.661 (0.099)	0.474	< .001
Efficacy → Q38	1.116 (0.112)	0.678	< .001
Beliefs → Q8	1.00 (0.00)	0.755	--
Beliefs → Q9	0.919 (0.071)	0.679	< .001
Beliefs → Q11	0.914 (0.075)	0.705	< .001
Beliefs → Q23	0.774 (0.083)	0.543	< .001
Beliefs → Q27	0.815 (0.073)	0.565	< .001
Beliefs → Q29	0.901 (0.068)	0.714	< .001
Beliefs → Q33	1.197 (0.072)	0.854	< .001
Beliefs → Q41	1.000 (0.06)	0.804	< .001
Support → Efficacy	0.058 (0.012)	0.445	< .001
Efficacy → Beliefs	0.183 (0.026)	0.686	< .001
Support → Beliefs	0.038 (0.012)	0.233	< .001

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## Discussion

The resulting 24-item OTMS represents a valid and reliable research-based measure of teachers' motivation for online teaching that can be used to collect actionable data for K–12 teachers and educational leaders. When teachers gain insights into their own motivational beliefs, it allows them to identify areas for professional growth and learning. They can seek opportunities for professional development that will challenge them to evolve, cultivate, and advance their knowledge and understanding in targeted areas. When administrators gain insights into the motivational beliefs of the teachers at their schools, they can better align their support structures with the specific needs of each teacher. With limited resources (e.g., time, money, materials, training, and opportunities) administrators and educational leaders must be strategic in the selection of supports in which they invest time and money. By using the OTMS to understand which supports are wanted and needed, administrators and educational leaders can amplify the power of their limited resources by differentiating their support and targeting the specific needs of the teachers in their school or district.

The digital divide refers to the disparity that exists between people and communities living with online access and those living without (van Dijk, 2020). In the context of K–12 education, the digital divide includes both access to computers and the internet, as well as the knowledge to navigate online technology (Chandra et al., 2020). Since the COVID-19 pandemic, there has been an increase in technology accessibility for K–12 students, including an increase in schools using one-to-one technology. It is estimated that as of 2019, one-third of public schools in the U.S. had one-to-one technology programs in place (Gray & Lewis, 2021), and a majority reported having reliable internet access (Gray & Lewis, 2021). Additionally, as of 2019, 88% of 3 to 18-year-olds in the U.S. reported having home internet access via a computer, and another 6% reported having access through a smartphone (NCES, 2022). However, as K–12 schools continue to use the growing number of online resources in teaching and learning, it is imperative that teachers stay up to date on best practices for online teaching to provide the most effective learning experiences for students. The OTMS provides a way for K–12 administrators to learn more about teachers’ motivation for online teaching and learning, thus providing data that can be used to later provide targeted professional development.

The Every Student Succeeds Act (ESSA) was signed by President Obama in 2015 and replaced the No Child Left Behind (NCLB) Act (2002)). The mission of the ESSA is to promote equity in education by protecting disadvantaged students, holding all students to high academic standards, expanding access to high-quality preschool, and maintaining an expectation for positive change in our lowest-performing schools (ESSA, 2015). “Educators can take advantage of the flexibility ESSA provides to expand the focus of their technology initiatives to include the intersection of accessibility, educational technology, and assistive technology. This expansion will enable educators to address gaps in student achievement and improve digital literacy through blended and personalized learning” (Crossland et al., 2018, p. 1). Digital technology is an integral part of our everyday lives and is embedded in our transportation, communications, and computing (Fishman & Dede, 2016). The ubiquity of technology places a responsibility on teachers to prepare students for a life with technology. As schools work to uphold the ESSA through technology-based student enrichment, online courses, social media, and interactive materials (Crossland et al., 2018) teachers must be willing to embrace the learning opportunities that come with the teaching of and with technology. The OTMS can be used strategically by school and district leaders to gather data regarding teachers' motivation for online teaching and learning. This information will allow administrators and school district leaders to make data-informed decisions related to the support, professional development, and training needed by teachers to fulfill the mission of the ESSA and better serve students.

## **Limitations**

The OTMS was developed after examining prior research on online teaching and learning and validated as a tool to examine motivational constructs related to online teaching; however, it has not yet been used in practice to examine the relationships between teachers’ motivation for online teaching and students’ achievement or to predict teacher practice. It should be made clear that the OTMS instrument measures motivation for online teaching. Although the measured motivational factors are predictors of the willingness and readiness of teachers to teach in online learning environments, the instrument is not a predictor of effective practice. In addition, the OTMS is not intended to provide measures of online student achievement. Further, the OTMS

provides insight into possible targeted avenues of professional development but does not predict if such professional development will achieve the intended outcomes.

## Future Research

Amid this rapid increase in the prevalence of online teaching, teachers can become overwhelmed by the quickening pace of progress. In recent years, K–12 schools in the U.S. have increasingly expanded the range and availability of online learning tools to aid student education within and beyond the traditional classroom (Ascione, 2021; Plitnichenko, 2021). With this growing accessibility of online educational resources, teachers are inundated with an ever-shifting landscape of tools to incorporate into their existing pedagogy (Ascione, 2021; Plitnichenko, 2021). While this access opens many pedagogical possibilities, it also brings the potential for teachers to become overwhelmed with the growing prevalence and use of online teaching and learning. When teachers begin to feel overwhelmed with the numerous possibilities offered via online teaching, they may choose to retreat to what is comfortable and known, the traditional face-to-face classroom. But as research has shown, many schools are continuing to use online learning as part of the school day and/or school year (e.g., on inclement weather days) and therefore, teachers need the tools and support to continue to make these online learning experiences as engaging, enriching, and meaningful as their traditional classroom lessons. It is critical to help keep teachers motivated to continue learning about and implementing best practices for online teaching. When teachers complete the OTMS, the results can offer a starting place for a conversation with fellow teachers and/or administrators for sharing ideas, challenges, and effective pedagogical practices.

Future research using the OTMS may open new avenues for exploring teachers' motivation for online teaching. Because multiple factors are assessed using the OTMS, it can be used to provide the foundation for focused investigations into individual factors identified on the scale. Findings from such studies could inform the development of a companion tool designed to guide the differentiated support provided to K–12 teachers engaging in online teaching. Further, exploration of the differences between the motivational needs of those who teach different grade levels could also be examined. The OTMS was administered to teachers of grades K–12 during the development of the instrument; however, as the OTMS becomes more widely used, it will be interesting to note if the reported motivation of teachers differs significantly between grade bands. Additionally, the OTMS could be further tested and validated for use as a supporting tool for those who study motivation for online teaching within international K–12 contexts.

The authors plan to disseminate the instrument widely so that school administrators, district-level specialists, and other individuals with decision-making power may use the instrument to inform the development of professional development and identify needed support systems for educators implementing online teaching and learning in their classrooms.

## Declarations

The author declares no conflicts of interest associated with this article. The Office of Research Compliance at Clemson University determined that this study involving human participants met the criteria for exempt review. The authors would like to thank and acknowledge Clemson University's College of Education for supporting this work through the college's ADR Research Grant Program.



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## Appendix A

### Online Teaching Motivation Scale

Thank you for completing the Online Teaching Motivation Scale.

**Directions:** For each item, please answer to the best of your knowledge.

The first seven items are demographic items. There are then 24 multiple-choice items. For each of these items, think about your current online/virtual/hybrid teaching experience.

When thinking about online/virtual/hybrid, please consider any online teaching you use. This can include (but is not limited to):

\*Virtual instruction

\*e-learning days (e.g., inclement weather days)

\*Students working on Chromebooks, iPads, or other technology devices during learning centers

\*Students using Chromebooks, iPads, or other technology devices for assessment

\*Students using learning apps (e.g., Dreambox, Epic, Kiddle, Flipgrid, Padlet, Google Docs, etc.)

If you utilize any virtual/online instruction in your classroom during normal in-person instructional hours we would consider this to be ‘Online and Face-to-Face’, or hybrid.

For the final 24 items (the non-demographic items), please indicate your level of agreement with each statement by selecting the appropriate response (Strongly Disagree (1), Disagree (2), Agree (3), Strongly Agree (4)).

Item	Question	Rating
	With which gender do you identify?	Male, Female, Non-binary, Other, Prefer not to answer
	In which state do you currently teach?	(write in)
	How many years have you been teaching?	(write in)
	What grade level do you teach?	Elementary, Middle, High, Other
	What is your teaching modality this year?	Face-to-face only Online and face-to-face/hybrid Online only
	In which school district do you teach?	(write in)
	Are you a STEM teacher or a teacher of a STEM content area?	(write in)
1	My administration supports me in modifying my online curriculum as necessary.	1 2 3 4
2	I am confident in my ability to effectively deliver content to my students online.	1 2 3 4
3	I believe that students can learn effectively in an online environment.	1 2 3 4
4	I believe students can learn as effectively through online instruction as through face-to-face instruction.	1 2 3 4

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5	I am confident in my ability to make online learning engaging for my students.	1 2 3 4
6	I believe online instruction allows for meaningful interaction among students.	1 2 3 4
7	My administration provides adequate training to support my development as an online educator.	1 2 3 4
8	I am confident in my ability to respond to students' academic challenges in an online environment.	1 2 3 4
9	My administration provides the necessary materials for online teaching.	1 2 3 4
10	I have the appropriate technical support from my school to effectively deliver online instruction.	1 2 3 4
11	I am confident in my ability to manage my time effectively while teaching online.	1 2 3 4
12	I believe online education has increased equity in education.	1 2 3 4
13	My administration has well-defined expectations of me as an online educator.	1 2 3 4
14	My administration sets reasonable expectations for me as an online educator.	1 2 3 4
15	I believe that online learning is the best fit for some students.	1 2 3 4
16	I believe students are motivated to learn in an online environment.	1 2 3 4
17	I feel confident in my ability to manage student behavior in an online environment.	1 2 3 4
18	I believe online learning is an effective form of instruction for my students.	1 2 3 4
19	I am confident in my ability to use the technology required to teach in an online environment.	1 2 3 4
20	My administration provides constructive feedback about my online teaching.	1 2 3 4
21	My administration ensures I have a support system of other colleagues that I can contact for help during online teaching.	1 2 3 4
22	I am confident in my ability to formatively assess student learning in an online environment.	1 2 3 4
23	My administration is encouraging throughout the process of online teaching.	1 2 3 4
24	Online learning provides a positive learning environment for students.	1 2 3 4



# Bridging Theory and Measurement of Student Engagement: A Practical Approach

Barbara Means  
Julie Neisler  
*Digital Promise, USA*

## Abstract

Learner engagement is well-established as critical for learning online. Professional development for online instructors emphasizes techniques for engaging students, and learning technology products tout features intended to promote engagement (e.g., adaptive content, video, gamification). But the influence of particular instructor practices and of particular learning technology features on theory-based aspects of student engagement is infrequently tested empirically, and even more rarely with Black, Latine, and low-income students, who are more likely to face barriers to learning online. This paper first provides a research-based theoretical model of affective engagement developed in conjunction with ongoing studies of blended learning implementations of courseware designed to enhance learning and engagement among historically and systemically marginalized students. Next, the paper describes development of survey-based measures of four components of affective engagement and the use of responses from over 850 students in introductory statistics courses to evaluate the reliability and factor structure of those measures. We conclude with implications for use of the engagement measures in future improvement-oriented research and practice.

*Keywords:* engagement, online learning, measurement

Means, B., & Neisler, J. (2023). Bridging theory and measurement of student engagement: A practical approach. *Online Learning*, 27(4), 26-47. DOI: <https://doi.org/10.24059/olj.v27i4.4034>

In contrast to blended learning, for which there is ample evidence that the addition of learning technology elements enhances student engagement as well as learning (Means et al., 2013; Venn et al., 2020), online courses often have lower engagement levels and success rates, especially for students from low-income backgrounds and historically and systemically excluded race/ethnicity groups (Xu & Jagers, 2013, 2014). Nevertheless, the flexibility that online courses offer in terms of learning time and place is leading to increasing proportions of undergraduate students to select this modality (D'Agostino, 2022), adding urgency to efforts to enhance engagement to improve student retention and success.

When the COVID-19 pandemic forced a sudden shift to remote instruction, educators expressed concern about their ability to engage their students online (Walker & Koralesky, 2021). Students too perceived themselves to be less engaged (Walker & Koralesky, 2021). Indeed, a study of the perceptions of students who were in college courses with face-to-face meetings that had to shift online at the start of the pandemic found that students regarded maintaining their motivation to engage in the course as the biggest challenge to course completion (Means & Neisler, 2021).

While there is no shortage of exhortations to engage online students and tips on how to do so (Center for Innovation in Teaching and Learning, 2020; Dahl, 2015), evidence of the effectiveness of the recommended techniques for college students in particular course contexts is sparse (Venn et al., 2020). Instructors seeking an evidentiary basis for their pedagogy are faced with the difficult task of trying to draw inferences from the literature on theories of student engagement for their particular course context (Means, 2022). Their efforts are impeded further by a lack of accessible practical measures of course engagement that can be implemented within their own classes to measure the engagement experiences they are trying to enhance (Yeager et al., 2013).

The contemporary literature on postsecondary student engagement typically adopts the tripartite framework suggested by Fredericks, Blumenfeld, and Paris (2004), with affective/emotional, behavioral, and cognitive dimensions. Behavioral components of engagement are observable and hence can be captured by measures such as attendance, homework submission, and—with today's learning technology—the record of interactions with a digital learning system. Similarly, cognitive dimensions of engagement focused on deeper understanding are regularly evaluated in classrooms using formative assessments (e.g., clickers, comprehension checks). Measures of behavioral and cognitive engagement can tell an instructor when engagement is lacking, but not why it is lacking. Most college courses do not regularly measure affective/emotional engagement, and existing instruments for doing so have limitations (Mandernach, 2015).

Much of the academic literature on how to foster affective engagement of postsecondary learners online has been influenced by the Community of Inquiry (CoI) framework of Garrison, Anderson, and Archer (2000), which posits instructor, learner, and social “presences” as mechanisms for increasing engagement in online learning. A CoI survey, designed to measure students' perceptions of the strength of these three types of presence, has been used extensively. Kucuk and Richardson (2019), for example, report that students' perception of each type of

online presence is associated with self-reported engagement and course satisfaction. Course engagement and course satisfaction measures also were significantly correlated with each other.

Martin and Borup (2022) synthesized the literature on engagement in online and blended learning in a recent article for a special issue of *Educational Psychologist*. These authors posit that the essential dimensions of engagement are consistent across learning modalities, but their triggers and supports for engagement, and the behaviors through which they may be manifested, vary in online and in-person learning. For example, measures of behavioral engagement commonly used in studying online learning (e.g., number of modules attempted) differ from those used in face-to-face settings (e.g., attendance) in that some level of technology fluency is needed to engage online. It is also important to note that many online courses are designed to maximize flexibility of learning time as well as place. While this flexibility can lead to greater access for minoritized populations, it also leaves it up to students to pace their learning in a way that allows them to finish the course in time to earn course credit, hence increasing the level of behavioral engagement needed to succeed. Martin and Borup concluded that online learning requires higher levels of cognitive engagement and increased interaction with the instructor to be successful. Blended or hybrid courses that mix in-person and online modalities may help reduce the demand on learners' ability to regulate their own engagement, but from a research perspective introduce further complexity, since obstacles to and supports for engagement in the course's two modalities may interact (Halverson & Graham, 2019).

Outside the field of learning technology, scholars of motivation and engagement focus on psychological constructs and processes, such as expectation of success or sense of belonging (Greenhow, Graham, & Koehler, 2022). In contrast, the literature on engagement in online and blended learning typically defines engagement concretely in terms of what the learner interacts with (e.g., the instructor, course material, or other learners) or the mechanism for interacting (e.g., discussion board, videoconference) rather than internal psychological processes. For example, a meta-analysis by Bernard et al. (2009) examined learning and achievement outcomes for online learning interventions involving student-student, student-instructor, or student-content interactions and found that each of these led to increased learning. The authors interpreted their findings as indications that each kind of interaction increases cognitive engagement.

The Academic Communities of Engagement model developed by Borup and colleagues (Borup et al., 2020) lays out categories of supports for affective and behavioral engagement online, highlighting the importance of a student's personal community as well as their course community. This model suggests that when there are gaps between an online student's level of engagement when learning independently and that which is required for online course success, both their course community (classmates) and their personal community (e.g., friends or family) may help them close that gap.

In short, agreement about the importance of engagement for learning online is widespread, but understanding of the multiple aspects of engagement as they are manifested in online and blended course contexts and knowledge of specific practices that support affective engagement at the college level is more elusive. An easy-to-use approach to measuring affective engagement would enable instructors to collect data as feedback on the effectiveness of instructional practices intended to enhance student engagement.

Many existing student engagement measures have been developed to capture academic engagement in general (e.g., Appleton et al., 2006) or engagement with a student's higher education institution overall (e.g., Bowden et al., 2021; Kuh, 2001). While useful for some purposes, such measures do not inform an individual faculty member about the engagement patterns of students in their course or tell a department chair whether their gateway courses are promoting the kind of affective engagement that can lead to continued study in the department. The instrument development effort described here is part of a larger research effort being conducted with the goal of supporting postsecondary institutions seeking to leverage online learning to achieve better and more equitable outcomes for their gateway courses, leading us to develop measures of student engagement fitted to the context of an undergraduate course with a diverse student enrollment.

We conducted the work described here as part of a broader initiative to support Black, Latine, and low-income college students taking gateway college courses with the goal of enabling them to succeed at the same level as the highest-achieving demographic groups in those courses. Equity issues in gateway courses are of vital importance, given the relationship between performance in those courses and college retention and degree completion (Hughes & Pace, 2003). Although the sources of differences in gateway course success are numerous, many researchers suggest that they include differences in students' engagement with the course, which mediates learning and grade outcomes (Ketonen et al., 2005; Shernof et al., 2017). For our ongoing research on technologies and instructional practices that enhance Introductory Statistics learning and course outcomes, we needed a cost-effective tool for measuring the multiple dimensions of affective engagement that might mediate courseware impacts. This paper describes the development rationale and factor exploration for a set of course affective engagement scales. The resulting measures will be used in studies examining the influence of new learning software and of particular instructor practices on course engagement, statistics learning, and course outcomes for low-income, Black, and Latine students.

## **Conceptualizations of Engagement**

The scholarly literature on motivation and engagement is vast, and there is no single generally accepted theoretical framing of key issues (Kinsella et al., 2022; Mandernach, 2015). Early treatments of learner motivation and engagement often treated these concepts as relatively stable characteristics of individual learners. Differences in learner behavior were ascribed to their having high or low achievement motivation, intrinsic or extrinsic motivation for learning, or performance or mastery goals. These concepts were used to try to explain differences in time on task, which predicts learning outcomes (Carroll, 1963).

Today, there is much broader appreciation for the importance of affective and sociocultural aspects of learning as part of a broader concept of engagement (Ladson-Billings, 2023; National Academies, 2018). There is also growing awareness of the pernicious effects of inequities baked into our educational institutions and our culture more broadly, with students of color, low-income students, and other marginalized groups subjected to low expectations, bias, and stereotype threat.

We will first review three frequently used instruments for measuring engagement in higher education, highlighting their gaps with respect to affective engagement, and then describe the theoretical basis for the engagement measures we developed and explored.

### **Existing Course Engagement Measures for Higher Education**

The widely used *National Survey of Student Engagement* (NSSE) examines student participation in campus life and some of its scales have been shown to predict college persistence (Shinde, 2010). Because the items in *NSSE* ask students to describe their behaviors in general (with items such as “How much does your institution emphasize getting involved socially?”), the instrument is not suitable for use by an individual faculty member or course designer seeking to investigate relationships between particular curriculum features or instructional practices and student engagement. The *Classroom Survey of Student Engagement* (Ouimet & Smallwood, 2005) was developed as an outgrowth of the *NSSE* and elicits student reports of the frequency with which they engage in certain classroom activities (e.g., asked questions during class). While this measure could be used by a faculty member in regard to an individual course, it again homes in specifically on behavioral engagement.

Much less work has been done developing and using measures of the multiple aspects of engagement within a specific college course (Mandernach, 2015). The 27-item *Student Course Engagement Questionnaire*, which was developed with students taking psychology, political science, and mathematics classes at a single institution (Handelsman, Briggs, Sullivan, & Towler, 2005), does ask the respondent to think about a specific course, but the questionnaire items are domain-agnostic. To the extent that stereotype threat or pre-existing beliefs about a particular subject are important for understanding student motivation in a course, the instrument is less than ideal. In addition, *Student Course Engagement Questionnaire* items were generated by asking instructors what engaged students do in class (e.g., coming to class every day, applying course material to my life). As a result, the instrument also has a behavioral rather than an affective emphasis. Moreover, it can be seen as conveying the implicit message (to both students and instructors) that engagement is about actions and the responsibility of the student, rather than something that emerges in the interplay between the student, course content, and the way the course is structured and taught (Cohen, Raudenbush, & Ball, 2003).

### **Theoretical Basis for an Affective Engagement Measure**

Affective engagement is a crucial dimension of Fredericks, Blumenfeld, and Paris’s (2004) tripartite approach, yet it is often assumed to be captured by behavioral and cognitive engagement measures or treated as an outcome rather than as an influence on learning (e.g., Cho, Park, & Lee, 2021; Kirby & Thomas, 2022; Martin & Bolliger, 2018). We seek to build on the extensive prior literature to identify and measure the key components associated with affective engagement.

The majority of our *Course Engagement Survey Items* focus on different aspects of affective engagement emphasized in contemporary theoretical work. In developing our items and examining whether they would form scales, we drew on situated expectancy value theory (Eccles & Wigfield, 2020; Wigfield & Eccles, 2000), interest and identity development research (Renninger & Hidi, 2011; 2022), and research on performance anxiety and stereotype threat (Steele, 1997). The situated expectancy value framework conceptualizes motivation for an

activity as a product of the subjective value of the task and expectations around success with the task if one engages in it. There are multiple kinds of task value (enjoyment, utility for achieving future goals, and attainment of something that is central to the learner's identity). On the negative side of the value ledger are perceived costs of engaging in the task. Costs can include not only time and effort but also opportunity costs (other activities that must be sacrificed) and potential emotional costs, such as fear of failure or of being perceived by one's peer group as doing something inappropriate.

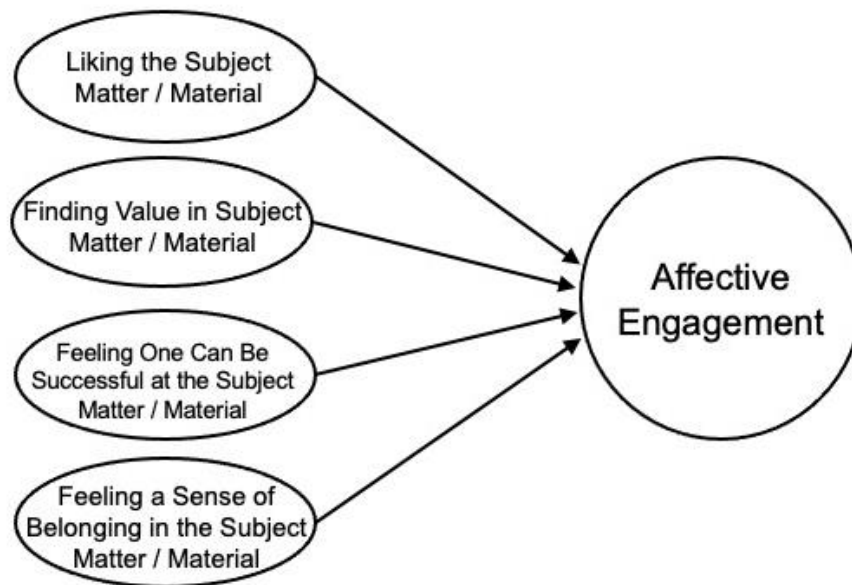
Renninger and Hidi (2022) provide a more developmental perspective in describing how what starts as situational interest in a task or subject (e.g., "this is a cool puzzle") can over time lead to sustained interest in a general activity category and seeking opportunities to engage in it (e.g., "This web site has math puzzles so I might like it."), resulting in ascribing increasing value to the task and even incorporating the interest into one's identity ("I'm a person who likes math puzzles"). The flip side of interest and identity development occurs when a person experiences frustration or boredom with certain activities and develops ideas about not being interested in them, often accompanied by avoiding those activities and sometimes a negative identity with respect to them ("I'm not a math person").

Sense of belonging has been conceptualized as a basic human need. Strayhorn (2018) describes it in the college context as perceived social support, a feeling of connectedness and being cared about, accepted, respected, valued by, and important to others on campus. While sense of belonging is important to everyone, students finding themselves in situations where few others share their identity characteristics are likely to be more vulnerable to feelings they do not belong (Walton & Cohen, 2011). Students are well aware of stereotypes about who does well in different academic content areas, and when engaging in an activity where individuals with their external characteristics are stigmatized and expected not to do well, they feel psychological threat and raised anxiety, which can consume so much of their working memory that they have less capacity available to focus on the task at hand (Schmader, Hall, & Croft, 2015). Stimuli that suggest that they don't belong (for example, consistent depictions of people successful in the subject domain as people who do not look like them) can aggravate stereotype threat and reduce students' sense of belonging in a course, program, or college generally (Walton & Cohen, 2014). Interventions inserted into a course to help students reframe difficulties adjusting to college and feelings of social isolation as normal and short-lived have been shown to raise Black students' grade-point average while not affecting that of White students (presumably because fewer of them suffered from feelings that they did not belong) in a series of experimental studies (Walton & Cohen, 2011; Walton & Wilson, 2018).

A number of researchers have suggested that the modality in which a course is taught can influence sense of belonging. Schaeffer and Konetes (2010), for example, suggest that social isolation is one cause of the higher attrition rate in online courses compared to face-to-face courses. Halverson and Graham (2019) describe widely held optimism around the promise of blended learning for promoting stronger student engagement than either purely online or purely classroom-based learning but note that a lack of measures of individual components of engagement and the conflating of engagement indicators and engagement-inducing practices in instruments like the NSSE impede efforts to develop a strong foundation of empirical research on the topic.

Drawing on the perspectives described above, we posited four components of affective engagement, as shown in Figure 1. These four components are liking the subject matter/material, finding value in the subject matter/material, feeling one can be successful at the subject matter/material, and feeling a sense of belonging in the subject matter/material. Prior studies suggest that many Black, Latine, and low-income students come to their first college courses with self-doubts and a lack of confidence about belonging stemming from past educational experiences and exacerbated by questions about whether college is for them (Meriwether, 2019; Steele, 1997). Though the literature supports the premise that there are differences in the prevalence of self-doubt among different subgroups of students, we do not assume that students can be dichotomized into uniform “privileged” and “non-privileged” groups, nor that all students within a particular demographic group will have the same experiences and motivational profile.

**Figure 1**  
*Theory-based Components of Affective Engagement*



Our purpose in developing the *Course Engagement Survey Items* for Statistics was to make an instrument that would be useful in course improvement efforts and professional development by reflecting the interplay between student characteristics, instructional practices, and disciplinary content. This goal requires both attention to sociocultural and equity issues that impact many students and being specific about the subject domain of the course. There is a considerable body of research on learner attitudes toward different academic disciplines, particularly in STEM areas. Longitudinal studies have documented waning interest in science and mathematics over the secondary school years (Osborne, Simon, & Collins, 2003) as well as anxiety related to mathematics (Ramirez, Shaw, & Maloney, 2018). These affective responses are differentially prominent among young women and students of color (Meriwether, 2019; Shapiro & Williams, 2011), with implications for their expectations and sense of belonging in courses in these fields.



While previous efforts to develop course engagement survey scales have ignored course discipline, we intentionally modified selected items taken from prior instruments to ask respondents specifically about their affective engagement with statistics and mathematics content and activities. This strategy is consistent with prior methodological research showing that engagement self-report instruments work better when they are matched more specifically with the context in which they will be used (Fuller et al., 2018). Finally, we wanted to have engagement scales that would be usable in online courses with synchronous activities as well as in face-to-face and blended or hybrid courses.

## Methods

### Survey Instrument

We reviewed items in prior course engagement instruments, specifically, the widely used *Motivated Strategies for Learning Questionnaire* (Pintrich et al., 1991) and the sense of belonging items used by Ingram (2012) with the goal of identifying three to five items for each of the components of affective engagement shown in Figure 1. A team of four researchers adapted items from the Pintrich et al. and Ingram instruments to refer specifically to a statistics course, taking care to keep items concise and easy to read. The team generated new items in cases where aspects of engagement noted in the research literature were not covered by the desired number of items. A series of successive reviews by the team identified items that appeared to capture the relevant component parsimoniously. Items were grouped and ordered to provide a logical flow for the student respondent, and a small set of response options (e.g., *Strongly Disagree, Disagree, Agree, Strongly Agree*) was used to reduce the cognitive burden that frequent switching of response scales would impose. Table 1 shows the items we used for the four theory-based components of affective engagement. Items that are reverse coded are noted as such, and with an [R] in later tables.

**Table 1**  
*Course Affective Engagement Scale Items for Statistics*

Component	Item
Liking	I am finding this course very enjoyable. I think statistics is interesting.
Value	Getting course credit is the only value I see in taking this course. [REVERSE] Statistics skills will make me more employable. I think I will be able to use what I'm learning in this course in other courses. I think statistics is worthless. [REVERSE] I can use statistics in my everyday life.
Success Expectation	I understand statistics well enough to use it in my everyday life. When I work on statistics problem sets, I get most of the answers right. Taking this course has helped me to understand statistics better. I feel confident that I am mastering the content of introductory statistics. I have trouble understanding statistics. [REVERSE] I feel insecure when I have to do statistics problems involving many calculations. [REVERSE]
Sense of Belonging	I feel respected by the instructor of this course. I feel like other students in this course understand my ideas when I share what I am thinking.

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I feel like the instructor in this course encourages me to do well.  
I feel respected by other students in this course.  
I can be myself with other students in this course.  
If I face academic challenges in this course, I feel comfortable asking the instructor for help.

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Introductory statistics course instructors invited students to participate in the survey about two-thirds of the way into the semester, with several incorporating the student survey into their course syllabus. Students consented prior to beginning the survey, following procedures approved by Salus IRB (and also campus review boards where required). All participating instructors offered students a modest amount of extra credit for completing the online survey, which was delivered via Qualtrics. Student responses were anonymous; after completing the survey students clicked a provided link to go to a separate location to provide their name for the list of students earning extra credit (precluding both the research team and the instructor from connecting an individual student to their survey responses).

### Sample

A total of 17 statistics instructors from 11 institutions (five two-year colleges and six four-year colleges and universities) participated in the study. The research team prioritized recruiting of instructors from broad-access institutions; all but 1 of the 11 participating institutions accepts over 70% of the students who apply; 6 of the institutions use open enrollment. The institutions were located in six different states (New York, California, Ohio, Arizona, Florida, and Kentucky). Six of the 11 institutions had a Minority-Serving Institution (MSI) designation, including 3 Hispanic-Serving Institutions (HSIs), 1 Asian American and Native American Pacific Islander Serving Institution (AANAPISI), 1 Native American Serving Non-Tribal Institution (NASNTI), and 1 with both an HSI and an AANAPISI designation. The proportion of their students who were Pell grant recipients ranged between 17% and 47% for the 11 institutions; the proportion of their students identified as Racially-Minoritized ranged from 17% to 68%.

At the beginning of their semesters, 1,351 students were enrolled in the introductory statistics courses taught by participating instructors; the sum of instructors' estimated student course enrollments at the time they distributed the survey was 1,207. A total of 1,145 students (non-unique) in the 17 courses consented to participate in the research. A student's survey responses were excluded from the analysis if: the first item of the survey was not completed ( $n = 67$ ), Qualtrics flagged the response as a duplicate ( $n = 123$ ), or Qualtrics flagged the response as a fraudulent/bot response ( $n = 26$ ). The final analytic sample represents 928 unique student responses, an unweighted response rate of 77% of the estimated course enrollment. Response rates varied by instructor, ranging from 33% to 100%, with a weighted response rate of 69%.

For factor analysis, responses with incomplete data on the 19 engagement items were also removed, resulting in an additional exclusion of 60 responses. To determine if the removal of these responses influenced the sample composition, a missing data analysis explored the differences between respondents retained and respondents excluded. These groups were not significantly different on variables of race, gender, age, credit hours taken during the term, diagnosed with a disability or impairment, or whether the individual was working. Cell sizes

were not large enough to reliably assess differences based on whether students provided unpaid care during the semester. This suggests that the final retained analytic sample does not significantly differ by student identities and leads to a final analytic sample of N = 868.

Among the student survey sample, 60% self-identified as women and 76% as being of traditional college age (between 18 and 22 years old). Most students (77%) reported not being primarily responsible for providing unpaid care for someone other than themselves; just over half of the student sample (56%) reported performing some work for pay. Only 9% of the student respondents self-identified as having been diagnosed with a disability or impairment.

Students were provided the opportunity to select all that apply among Census race/ethnicity categories: Asian; Black or African American; Hispanic/Latine; Indigenous, Alaska Native, or American Indian; Native Hawaiian or other Pacific Islander; White/European/Caucasian, with an additional blank text box for entering Another Race Not Listed. While there was a total of 33 unique response combinations, most students (85%) identified a single race/ethnicity for themselves with 4% declining to answer the question and 11% selecting multiple options. Response counts and proportions can be found in Table 2. As can be seen in the table, 35.5% of survey respondents included White/European/Caucasian among the race/ethnicity categories they identify with, but only 28.2% of respondents selected White/European/Caucasian as the only race/ethnicity category they identify with.

**Table 2**  
*Self-identified Race/Ethnicity Responses of Survey Respondents*

<b>Race/Ethnicity</b>	<b>% [N] Duplicated Count*</b>	<b>% [N] Unduplicated Count</b>
Asian	30.4% [264]	26.2% [227]
Black or African American	10.6% [92]	7.4% [64]
Hispanic/Latine	25.1% [218]	21.0% [182]
Indigenous, Alaska Native, or American Indian	2.4% [21]	0% [0]
Native Hawaiian or Other Pacific Islander	1.3% [11]	0.2% [2]
White/European/Caucasian	35.5% [308]	28.2% [249]
Another Race Not Listed	2.5% [22]	1.8% [16]
Multi-Racial		10.8% [94]

\* Duplicated count percentages add to more than 100% because students could select all that apply.

## Results

### Exploration of Inter-Component Relationships

The first set of analyses explored the relationships of items within each component. The two Liking component items are strongly correlated with each other ( $r = 0.62$ ), but more items would be needed to investigate the factor structure, the ultimate goal of this analysis.

Analyses of the Value component suggested that the reverse-coded survey items do not correlate well with other items in the Value measure. The inter-item correlations in Table 3

highlight the relatively weak relationship between reverse-coded items and the other Value items ( $r < 0.36$ ). However, the remaining items show correlations that are acceptably high ( $r > 0.50$ ) but not so high as to suggest multicollinearity.

**Table 3**  
*Correlations Among Survey Items Addressing Statistics Value*

	1 [R]	2	3	4 [R]	5
1. Getting course credit is the only value I see in taking this course. [R]	-				
2. Statistics skills will make me more employable.	0.33	-			
3. I think I will be able to use what I'm learning in this course in other courses.	0.34	0.62	-		
4. I think statistics is worthless. [R]	0.51	0.35	0.35	-	
5. I can use statistics in my everyday life.	0.30	0.53	0.61	0.34	-

Similarly, for the Success Expectations items, correlations between reverse-coded items and positively coded items are weaker ( $0.20 \leq r \leq 0.46$ ) than those among positively coded items ( $0.47 \leq r \leq 0.64$ ). All the positively coded items have acceptable levels of correlation for retention in the component, as shown in Table 4.

**Table 4**  
*Correlations Among Survey Items Addressing Statistics Success Expectations*

	1	2	3	4	5 [R]	6 [R]
1. I understand statistics well enough to use it in my everyday life.	-					
2. When I work on statistics problem sets, I get most of the answers right.	0.54	-				
3. Taking this course has helped me to understand statistics better.	0.48	0.47	-			
4. I feel confident that I am mastering the content of introductory statistics.	0.63	0.64	0.58	-		
5. I have trouble understanding statistics. [R]	0.46	0.42	0.30	0.45	-	
6. I feel insecure when I have to do statistics problems involving many calculations. [R]	0.29	0.34	0.20	0.35	0.60	-

Finally, an unanticipated pattern emerged among the Sense of Belonging items, as shown in Table 5. Items dealing with the relationship with the instructor demonstrate strong relationships to each other ( $0.74 \leq r \leq 0.81$ ), and items concerning belonging and acceptance among peers are highly correlated with each other ( $0.53 \leq r \leq 0.61$ ). Sense of Belonging items referring to

instructors and those referring to peers are only modestly associated with each other, however ( $0.26 \leq r \leq 0.38$ ). This finding suggests that the belonging-related items reflect two distinct components—Sense of Belonging as facilitated by instructors and Sense of Belonging as facilitated by peers.

**Table 5**  
*Correlations Among Survey Items Addressing Sense of Belonging*

	1	2	3	4	5	6
1. I feel respected by the instructor of this course.	-					
2. I feel like the instructor in this course encourages me to do well.	0.81	-				
3. If I face academic challenges in this course, I feel comfortable asking the instructor for help.	0.78	0.74	-			
4. I feel like other students in this course understand my ideas when I share what I am thinking.	0.31	0.29	0.35	-		
5. I feel respected by other students in this course.	0.36	0.33	0.34	0.53	-	
6. I can be myself with other students in this course.	0.31	0.26	0.38	0.60	0.61	-

To ensure that there is sufficient internal similarity for items remaining after deleting those with reverse coding, we computed Cronbach’s alpha for each engagement component and then for all Affective Engagement items together. The alpha values, shown in Table 6, suggest an acceptable level of inter-relatedness for each of the components without redundancies. The alpha for the entire set of Affective Engagement items, at 0.811, shows good reliability.

**Table 6**  
*Reliability of Affective Engagement Component Measures*

Component	Number of Items	Cronbach’s Alpha	Cronbach’s Alpha
Value	3	0.787	0.811
Success Expectations	4	0.726	
Sense of Belonging—Instructor	3	0.910	
Sense of Belonging—Students	3	0.804	

**Factor Analysis**

As described above, four potential components of affective engagement emerged from the initial item exploration (Value, Success Expectations, Sense of Belonging—Instructor, and Sense of Belonging—Peers). Given the strong a priori theory underlying the instrument, a confirmatory factory analysis (CFA) was used to test how well the observed data fit the underlying theoretical structure (McCoach, Gable, & Madura, 2013). The CFA was conducted using R version 4.2.2 (2022-10-31) (R Core Team, 2021) and the *lavaan* package version 0.6-16 (Rosseel, 2012). An overall latent model for affective engagement was not explored due to Liking items missing from the theoretical model, though all four components were allowed to

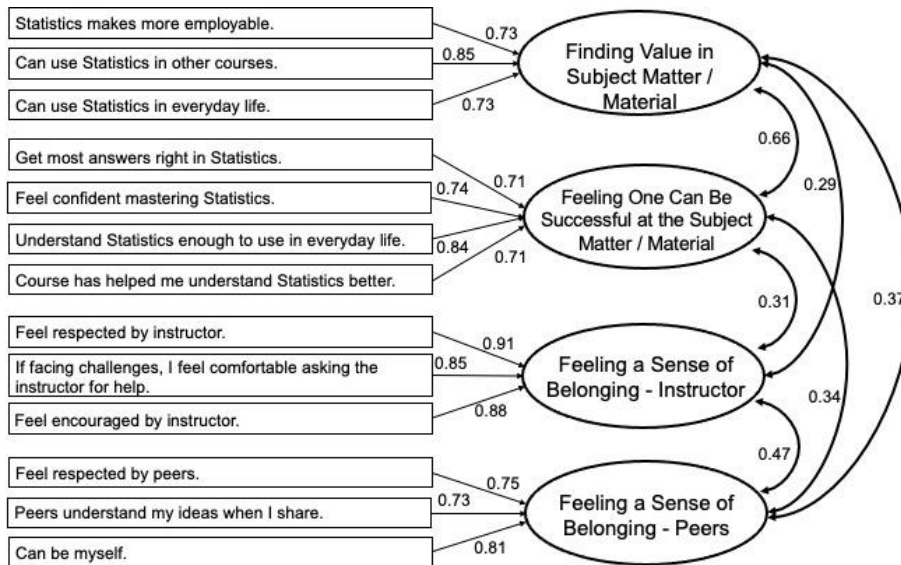
covary to investigate the relationship between them and an initial factor structure without Liking. The model was estimated using the Maximum Likelihood estimator. To assess model fit, three indices were used: absolute fit as represented by Standardized Root Mean Square Residual (SRMR), parsimonious fit as represented by Root Mean Square Error of Approximation (RMSEA), and relative fit as represented by Comparative Fit Index (CFI).

### Model Results

The final model, shown in Figure 2, is based on a confirmatory factor analysis of 13 items representing four theoretical components of affective engagement. Model fit indices are as follows: SRMR = 0.034, RMSEA = 0.053, and CFI = 0.978. According to Hu and Bentler (1999), model-data fit can be considered good if the SRMR value is  $\leq .08$ , the RMSEA value is  $< .06$ , and the CFI value is  $> .95$ . Based on these criteria, the data fit the model well. Additionally, the standardized factor loadings for all 13 items exceed 0.70, suggesting a sufficient relationship between each item and the represented latent construct (Hair et al., 2006; Stevens, 1992). The magnitude of the relationship between components varies by construct. Value and Success Expectations are strongly correlated ( $r = 0.66$ ), and the two Senses of Belonging have a lower, but still noteworthy, relationship to each other ( $r = 0.47$ ). The remaining relationships between constructs demonstrate moderate relationships ( $.29 \leq r \leq 0.37$ ).

**Figure 2**

*Final Model for Affective Engagement in Statistics Courses*



### Modelling for Students of Color

To support our larger research goal of understanding affective engagement among racially-minoritized students, we next explored the factor structure using data from just those students. For this analysis, we removed the survey data for the 28.2% of the survey takers who identified as White/European/Caucasian only. The remaining data subset contains responses from 585 students who selected at least one racially-minoritized identity.

The model results for racially-minoritized students similarly demonstrates good model fit with the following model fit indices: SRMR = 0.040 (below the recommended 0.08), RMSEA = 0.058 (below the recommended 0.06), and CFI = 0.973 (above the recommended 0.95). Additionally, all standardized factor loadings remained above 0.70 (ranging from 0.72 to 0.87). Relationships among factors are comparable to those seen using the entire student sample, with Value and Success Expectations strongly correlated at  $r = 0.68$ , and the two Senses of Belonging correlated at  $r = 0.50$ . The remaining relationships between constructs continued to demonstrate moderate relationships ( $0.31 \leq r \leq 0.38$ ).

## Limitations

The student sample used to test the quality of the survey items was large enough to support examination of item characteristics among the non-White portion of the sample, as reported above, but not large enough for exploration of the factor structure for individual race/ethnicity groups. Future work should explore the factor structure for particular race/ethnicity groups and ideally, for groups defined by the intersection of race/ethnicity and gender categories. In addition, it should be remembered that the survey data reported here were collected at a single point in time, precluding testing of hypotheses about causal relationships among particular components of student course engagement (e.g., whether increases in success expectation lead to increased sense of belonging). Finally, the survey used in this research included only two items addressing student liking and interest in statistics. These two items were sufficient to provide a fairly reliable measure ( $r = 0.62$ ) but were insufficient to support inclusion of the Liking component in the factor analysis. More liking/interest items are needed to build a factor that can be tested as part of affective engagement.

## Discussion

### Advantages Over Prior Measures of Course Engagement

The *Course Engagement Survey Items* address the two key weaknesses of prior measures noted by Halverson and Graham (2019): These survey items provide individual measures of conceptually distinct components of affective engagement, and they deal exclusively with engagement indicators rather than mixing indicators with engagement *practices* (such as participating in small group projects). A third advantage is that these item scales can be tailored to apply to a specific course. Prior research on student engagement interventions has found that they are most effective when they invoke a specific context within a particular course (Hulleman & Harackiewicz, 2020), making engagement items that inquire about college experiences in general less than optimal as outcome measures for course improvement efforts. The *Course Engagement Survey Items* are compatible with course-level interventions because they address a specific course and subject area (in this case, statistics). At the same time, the domain-specific items on the *Course Engagement Survey Items* could be easily adapted for use in courses in different subject areas (in fact, we are currently adapting them for use in chemistry classes). Whatever the academic discipline, the scale items prompt students to think about a specific course in a specific subject area, not their college experiences overall.

A final advantage of the *Course Engagement Survey Items* is that they are usable in courses taught in any modality. In contrast to previous course engagement instruments, we avoided using items pre-supposing in-class meetings, such as “Raising my hand in class,”

“Taking good notes in class” (Handelsman et al., 2005) or “I go to class every day unless I am sick” (Lin & Huang, 2018). An affective engagement instrument that can be used in classes taught in any modality has the advantage of enabling an instructor to gauge whether a shift in course modality is influencing the level of student engagement. Further, if combined with information on student characteristics, a department could use aggregated data from such an instrument to investigate whether a change in course modality has differential consequences on affective engagement for different kinds of students.

Prior research suggests that this may indeed be the case, but that multiple factors of both identity and life circumstances need to be considered. During the first semester of the COVID-19 pandemic, for example, students from historically and systematically excluded race/ethnicity groups reported more barriers to full engagement in online course meetings than White and Asian students did (Means & Neisler, 2020). Nevertheless, the majority of these students (60%) reported that the extent to which they felt included as a member of their class was as good or better when the class shifted online compared to when the class included in-person meetings. In contrast, among White and Asian students, only 39% reported their sense of belonging as staying as strong or stronger when their course shifted to learning online. It is possible that this difference in modality effects on sense of belonging occurs because students from nondominant groups experience more negative affect related to microaggressions or stereotype threat when participating in face-to-face classes (Ogunyemi et al., 2020) than they do when learning online.

### **Consistency with Contemporary Theory on Affective Engagement**

The four theory-based scales emerging from our survey item development and factor exploration are consistent with contemporary approaches to affective engagement in suggesting that it is not a unitary construct. The groups of items selected for measuring Value, Success Expectation, and two forms of Belonging all form highly reliable scales while being distinct from each other. Consistent with theorizing provided by Renninger and Hidi (2020), Valuing and Success Expectation were highly related ( $r = .70$ ) in our survey sample. Neither of these measures was strongly correlated with either of the Sense of Belonging measures, suggesting that the community aspect of a course operates somewhat independently from appreciation of the subject matter or confidence in being able to master it. Our factor analysis also suggests that Sense of Belonging *vis a vis* other student needs to be considered separately from Sense of Belonging *vis a vis* the course instructor. There is a moderate correlation between the two feelings ( $r = .47$ ), but they are distinct enough to suggest treating them as separate course outcomes.

### **Methodological Insight**

An unexpected methodological finding was the fact that reverse-coded items did not correlate as strongly as other items did. These items were included to provide a check on respondents' acquiescence bias, with the intention of slowing the respondent down and fostering careful consideration of each survey item. It is possible, however, that students have difficulty shifting between thinking about the presence of positive aspects of their course and thinking about negative aspects of it. Several empirical studies have found that the inclusion of reverse-coded items in Likert-type survey scales reduces scale reliability and may be especially problematic for respondents with language difficulties (Suárez-Álvarez et al., 2018). The diverse racial/ethnic backgrounds of our student sample make it highly likely that some respondents'



first language was not English and switching from “Agree” to “Disagree” to indicate a positive evaluation of their course may have imposed additional cognitive burden for them.

### **Utility for Improving Engagement in Online and Blended Courses**

The fact that the four affective engagement factors can be assessed efficiently through a brief 13-item survey makes it practical for use in course improvement and professional development initiatives. The scales meet the criteria Yeager et al. (2013) set forth for “practical measurement” for purposes of improvement. An instructor who is introducing a new practice to enhance students’ confidence in their ability to master statistics, for example, could administer the relevant survey items before and after the practice is introduced to evaluate whether the goal has been achieved. Similarly, a professional development program designed to help faculty be more “present” for their online students, might choose to give students the opportunity to respond anonymously to the Sense of Belonging-Instructor items.

Faculty development activities and resources have increasingly dealt with “equity-minded” or “culturally sustaining” teaching practices (Hammond, 2014). These practices are based on the assumption that instructor actions, such as expressing confidence that every student can master the material or explicitly acknowledging diverse student identities, will have positive impacts on the sense of belonging experienced by students who have been historically and systemically underserved. Many of these practices are not straightforward to implement, however, and their impact is likely to depend on the skill and nuance with which they are executed. For example, Hulleman and colleagues have explored the impacts of interventions designed to help students connect course content to their own lives and found that instructor communication of the utility value of content can have unintended negative consequences for some students, leading these researchers to recommend ask students to make connections between course content and their values themselves (Hulleman & Harackiewicz, 2020). An easy-to-administer measure of key components of students’ affective engagement can make it possible for instructors to get feedback on the success of their equity-focused changes in practice as they implement and refine them over the course of multiple semesters.

It is important to note also that the responses of our diverse student sample suggest that fostering a sense of belonging is not entirely a responsibility of the instructor. Students also have perceptions of the extent to which their course peers respect them and accept them as they are. Lave and Packer’s (2008) conception of communities of practice as the fundamental context within which meaningful learning emerges would suggest that full-fledged participation in and identification with a community of peer learners is very important. The faculty role in promoting Sense of Belonging-Peers is not well understood, however. We would conjecture that the use of collaborative active learning with students working in small groups as a significant part of the course could promote Sense of Belonging-Peers, but the way in which the instructor organizes student-to-student interactions, course grading policies, and the particular mix of different kinds of students in the groups could all affect the impact of implementing peer learning. Given the advantages of collaborative active learning techniques for promoting cognitive engagement and learning (Chi & Wylie, 2014), measuring the impact of this teaching approach on Sense of Belonging-Peers in different online and blended learning contexts is an area ripe for future research.

Currently, we are using the affective engagement items in Table 4 along with an expanded set of Liking items in research with 26 introductory statistics instructors who are implementing learning courseware designed to give students carefully structured and scaffolded opportunities to learn and apply statistics concepts and methods. The courseware was specifically designed to foster both engagement and learning for students from groups historically excluded from statistics (Blacks, Latine, and Indigenous) and those from low-income backgrounds. In addition to promoting sustained effort and learning, we believe that affective engagement is important for its own sake: Students should not be bored or anxious in their college courses. At the same time, we conjecture that affective engagement in their statistics course will predict student success in terms of learning and course grades. Our current research, employing the *Course Engagement Survey Items* in the context of a blended learning innovation, will permit us to test this hypothesis empirically.

### **Declarations**

The authors declare no conflicts of interest.

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Salus IRB accepted this study using the exemption review process in accordance with 45 CFR 46.104(d)(2(ii)), Study ID 23003 - 01.

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# Course Design Approaches and Behavioral Patterns in Massive Open Online Courses for Professional Learning

Marc Egloffstein

Muhittin Şahin

*University of Mannheim, Germany*

Dirk Ifenthaler

*University of Mannheim, Germany*

*Curtin University, Australia*

## Abstract

Despite their growing importance, differential, process-oriented research on Massive Open Online Courses (MOOCs) for professional learning is scarce. This paper explores learner behavior in Enterprise MOOCs using lag sequential analysis. Data from 13 MOOCs on business and technology-related topics with a total of  $N = 72,668$  active learners were examined. Starting from consistent high-level behavioral patterns, a deeper analysis reveals variations in interaction sequences according to the underlying course design approach. Lecture-oriented, system interaction-oriented, and discussion-oriented courses share a set of common patterns but also differ in various interaction sequences. Results point towards an isolated role of video playbacks across all course clusters, consumerist patterns in lecture-oriented courses, and a positive influence of metacognitively oriented interactions on learning outcomes. Accordingly, initial design recommendations include integrating interactive instructional elements in videos, promoting learner engagement in lecture-oriented courses, and fostering metacognition. Connecting interaction and achievement data may uncover promising behavior patterns that can be further supported by course design. Based on the initial findings, implications for future research and development are discussed.

*Keywords:* sequential analysis, MOOC, professional learning, learning analytics

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More than ten years after their inception, Massive Open Online Courses (MOOCs) have gained a foothold in academia and have also become a viable alternative for professional learning (Littenberg-Tobias & Reich, 2021) and corporate training (Egloffstein & Ifenthaler, 2017). In this light, current discussions center around the transfer and recognition of MOOC credits between higher education and continuing education (Moore, 2022), as well as the evolution of the course format through modularization to better align with education and training requirements (Serth et al., 2022).

While many companies are not yet fully realizing the potential of MOOCs for training and development (Condé & Cisel, 2019) or lack adequate support for employees taking MOOCs (Hamori, 2021; 2023), others are operating their own platforms, offering corporate (internal focus: courses for employees) or enterprise (internal and external focus: courses for stakeholders) MOOCs (Egloffstein, 2018). For instance, openSAP, an open learning platform for the information technology sector, implements so-called openSAP Enterprise MOOCs (Schwerer & Egloffstein, 2016) to transfer relevant knowledge within the organization as well as to external stakeholders and the public (Renz et al., 2019).

Considering the persisting challenges associated with MOOCs in terms of instructional quality (Margaryan et al., 2015; Egloffstein et al., 2019) or low completion rates (Reich & Ruipérez-Valiente, 2019; Li et al., 2015), openSAP strives to optimize its offering and continuously improve the learning experience based on scientific evidence. Following the idea that learning analytics can be a solution to current MOOC handicaps (Bozkurt, 2021), openSAP initiated several collaborative research projects aimed at improving the learning design of MOOCs (Ifenthaler, 2017) and advancing the state of research on online learning in training and professional development.

This paper reports an exploratory study focusing on learner behavior in different openSAP Enterprise MOOCs. Building on previous research findings (Rohloff et al., 2020; Şahin et al., 2021), the study seeks to (a) identify behavioral patterns in openSAP Enterprise MOOCs and (b) determine differences according to course design as well as learner achievement in order to derive evidence-based design recommendations. The study illustrates how learning analytics approaches can inform course design and facilitation.

## Background

### Research Context: openSAP

SAP is a major multinational software company based in Germany. As part of SAP's digital education strategy, the openSAP learning platform was launched in 2013 to meet the increasing demands of partners, customers, and suppliers for SAP-related knowledge on time. OpenSAP delivers knowledge via scalable online courses based on the xMOOC principles, thus suitable for larger audiences. The main topic areas are technology and software, business, or design; while some additional courses provide insights on corporate social responsibility-related topics. The technical infrastructure is based on a MOOC platform developed at the Hasso Plattner Institute (HPI) in Potsdam, Germany. According to company data provided by openSAP, the platform had more than 1,300,000 registered participants from over 200 countries, of which about 85% had a professional background, with more than six million enrollments in over 200 different courses in 2022.

Concerning instructional design (ID), openSAP Enterprise MOOCs follow an elaborate xMOOC model, providing structured and well-organized course offerings (Bonk et al., 2015). The courses are open to everyone free of charge, providing videos, quizzes, and interaction over a fixed period. Every course has a fixed start and end date with a registration period of several weeks in advance. Once the course has started, new content is released week by week, mostly with video elements of approximately 15 minutes in length. Every video element is followed by a short, ungraded self-test with multiple-choice and multiple-answer questions to reflect on the content. Hands-on exercises can complement this, e.g., in interactive coding assignments in programming courses. Every openSAP course has a course-specific discussion forum available, allowing participants to interact with peers and content experts who are available during the course run. A set of collaborative tools is provided in so-called Collab Spaces, which allow dedicated breakout sessions or working in smaller groups. At the end of each week, a graded assignment about the content enables participants to reflect on and document their learning performance. The average workload per week is four to six hours. A course usually concludes with a final exam covering all the course content, counting for 50% of the highest attainable score. OpenSAP offers two kinds of certificates. Learners receive a “confirmation of participation” (CoP) by accessing at least 50% of the overall course content (= “progress”). Moreover, participants will obtain a “record of achievement” (RoA) when achieving at least 50% of the points available in graded assignments (= “performance”).

### **Related Research: Sequential Analysis of Learning Behavior**

As learning analytics research increasingly focuses on exploring the process nature of learning (Ifenthaler et al., 2021), a plethora of methods are being employed. Examples include epistemic network analysis, temporal process mining, or stochastic process mining (Saint et al., 2020). Approaches for analyzing activity sequences involve sequential pattern mining, Markov chains, and hidden Markov models (Boroujeni & Dillenbourg, 2018). As a long-established method of inferential statistics (Wald, 1973; Bakeman & Gottman, 1997), sequential analysis is also used for investigating the behavior of learners in online learning systems (Hou et al., 2010; Şahin et al., 2020). Identifying latent patterns in learner behavior based on sequences of system interactions can offer valuable insights for aligning course design with individual learning processes, thereby leveraging the use of instructional technologies and ultimately enhancing learning success.

Thus, sequential analysis has been applied in several MOOC settings: Boroujeni & Dillenbourg (2018) detected latent study patterns comparing a hypothesis-driven approach and an unsupervised, data-driven approach. Their methods could be deployed during the course, enabling real-time support and feedback. Shang et. al. (2020) adopted Lag Sequential Analysis (LSA) to explore the factors affecting learning efficiency of adult learners. The study found 92 types of significant behavioral transformation sequences reflecting the characteristics of adult learners, such as task orientation, active exploration, and self-regulation ability, as well as correlations with learning efficiency.

Liu et al. (2021) investigated the differences between certificate achievers and explorers. Eleven behaviors were extracted, with six essential behaviors highly related to certificate achievement. Compared to explorers, certificate achievers exhibited more bidirectional behaviors

in terms of interactive and course-related activities, as well as more repetitive behaviors in terms of course-related and graded assessment activities.

Li et al. (2021) explored MOOC learners' time investment patterns and their relationships with learning performance, session time allocation, and learning sequences by analyzing the data from a Chinese MOOC. Seven time-investment patterns of MOOC learners were defined, and learning performance differed among them.

Most recently, Li et al. (2022) detected the differences in learning engagement and learning patterns amongst three groups of learners with different achievement levels (failed, satisfactory, excellent). The study found differences in both learning engagement and learning patterns among the three groups. All those studies were conducted with the explicit intention of improving the underlying learning environment and advancing instructional design as well as course facilitation. However, none explicitly focused on professional learners, and none employed a differential perspective concerning course design.

## Research Questions

Building upon previous research findings and grounded in the corporate research context, this study aims to investigate behavioral patterns in openSAP Enterprise MOOCs and explore their relationship to the underlying course design as well as to learner performance. The guiding research questions were:

RQ1. Are there behavior patterns in enterprise MOOCs for professional learning?

RQ2. Do interaction sequences differ according to the underlying course design approach?

RQ3. Are there interaction sequences for high-achieving learners?

## Method

### Data Collection and Participants

User events from 13 openSAP Enterprise MOOCs were analyzed with regard to learner behavior patterns. The courses in the sample were intentionally selected by openSAP to represent the full spectrum of their offering. They show variations in terms of length, effort, and design parameters like assessment configuration or additional instructional design elements (e.g., reflection prompts, coding exercises, or team peer assessments). Based on the underlying course design approach, openSAP grouped these courses into three clusters: lecture-oriented courses (strictly following the video-based xMOOC format), system interaction-oriented courses (featuring interactions with the platform as an integral element, e.g., programming courses), and discussion-oriented courses (featuring communication as an integral element). Data collection was carried out in line with openSAP's data protection policy, based on the participants' consent when accessing the platform. Accordingly, no personal data that could have identified individuals was analyzed. The sample reflects the overall population of openSAP learners, who consist predominantly of professional learners with an academic background, aged 25 to 40, participating voluntarily and without financial compensation. Table 1 provides an overview of the sample. Additional information on the courses can be found in Appendix A.

**Table 1**  
*Descriptive Information on the Courses in the Sample*

Course design approach	Course code	Topic area <sup>1</sup>	Course length (wks)	Work-load (hrs)	Assessment configuration <sup>2</sup>	Additional ID elements	Enroll-ments <sup>3</sup>	CoPs issued <sup>4</sup>	RoAs issued <sup>5</sup>
Lecture-oriented	xml	biz	1	3	w	0	4609	1679	1318
	leo2	biz	2	8	w+f	1	10542	2576	1687
	sbw1	biz	6	24	w	1	11664	1274	967
	build1	des	4	16	w+f	2	7749	1429	849
	ieux1	tech	1	4	w	0	13431	3944	2719
System interaction-oriented	java1	tech	5	30	w+e+f	3	21693	2941	2318
	mobile3	tech	5	25	w+f	1	10374	1652	1195
	s4h15	biz	4	16	w+f	0	18265	5149	3884
	sps2	tech	3	12	w+f	1	10940	2607	1896
	sps3	des	5	20	w+p	1	6629	932	651
Discussion-oriented	cwr1-1	des	3	12	w+p	2	1810	412	253
	dafie1	des	5	20	w+p	2	5283	1101	651
	pa1-tl	biz	3	12	w+f	1	6904	1888	1333

*Note.* <sup>1</sup> biz: business; des: design; tech: technology

<sup>2</sup> w: weekly assignment; f: final exam; e: graded exercise; p: peer assessment

<sup>3</sup> at course end

<sup>4</sup> CoP: confirmation of participation

<sup>5</sup> RoA: record of achievement

The dataset consists of learners' interactions with the digital learning environment based on traceable system states and events. In the preceding data preparation step, the event data generated by platform interactions were coded for each learner. A total of  $N_A = 10,454,430$  activities of  $N_L = 72,668$  learners were analyzed.

### Procedure and Analysis

We applied a two-stage procedure, exploring two levels of analysis. At the aggregate level, we followed the predefined system-side mapping of learner events to four global categories, depending on the area of the platform in which the interactions take place: learning (L), discussion (D), progress (P), and announcement (A). We further examined learners' sequential behavior patterns on the more granular level of system interactions. These interactions belong to 20 system event types, such as submitting assignments, downloading presentations, submitting surveys, visiting textual instructions, visiting videos, playing videos from category

(L), posting comments, posting replies for category (D), visiting progress in category (P), and visiting announcements in category (A).

The first phase of the analysis was centered around the process of Lag Sequential Analysis on the aggregate level. In the first step, event sequences were created for each learner based on their interactions with the learning platform. An example of such an event sequence would be: LLLDDLLLPDAALLL. In the second step, transitional frequency matrices were created to represent the number of transitions between system interactions. Subsequently, the transition probability matrices were mapped out, which indicate the statistical probabilities of given transitions between system interactions. Transitional probability is a conditional probability; events occur at different times and ‘lag’ is used to express these time differences (Şahin et al., 2020). To test the statistical significance of the transitions, z-scores were calculated, together with a Bonferroni adjustment to determine the z-score threshold. In the Bonferroni adjustment, the  $\alpha$ -value is divided by the number of cells in the table, a new  $\alpha$ -value is determined, and the equivalent of this value in the two-way critical z-value is calculated. Cells for which the absolute value of the corrected residual is greater than the newly determined critical z-value are interpreted as contributing to significance (Terzi Müftüoğlu et al., 2023). A state transition diagram was generated to display the results in the last step. In addition to the overall view, a differential analysis for the three course clusters was conducted to determine whether the course design approach impacted possible high-level patterns.

The second phase of the analysis includes LSA with the 20 system event types on the level of system interactions. First, LSA was carried out separately for the three course clusters based on the underlying course design approach. Second, LSA was carried out separately for different achievement groups within those clusters. Following the openSAP certification guidelines, we focused on a rather broad group of high-achieving learners (over 50% progress and performance, eligible for both CoP and RoA) in the context of this study.

## Results

### Behavioral Patterns Over All Courses (RQ1)

For the 13 courses in the sample, significant transitions between the four main categories could be traced. Table 2 shows the respective z-scores.

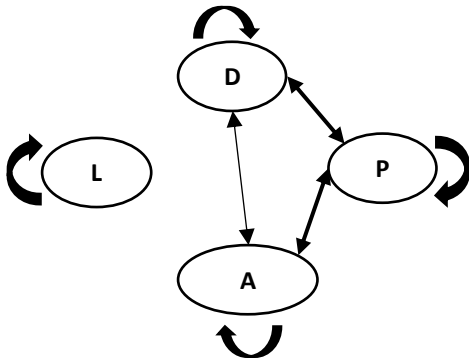
**Table 2**  
*Z-scores Based on Interaction Categories for the Overall Sample*

Categories	Announcement	Discussion	Learning	Progress
Announcement	<b>197.144*</b>	<b>11.319*</b>	-86.617	<b>45.578*</b>
Discussion	<b>8.932*</b>	<b>460.772*</b>	-310.098	<b>35.690*</b>
Learning	-101.585	-304.711	<b>269.246*</b>	-78.470
Progress	<b>70.902*</b>	<b>17.189*</b>	-73.601	<b>60.690*</b>

*Note.* z-score threshold: 2.96; \* statistically significant transitions

The respective state transition diagram for statistically significant transitions is shown in Figure 1.

**Figure 1**  
*State Transition Diagram for the Overall Sample*



The state transition diagram shows significant transitions between all the main categories except for the learning category. From the perspective of high-level interaction categories, the biggest category regarding captured events is rather isolated. We further analyzed these high-level patterns in a differential approach, looking at the high-level transitions in each course cluster (Table 3).

**Table 3**  
*Z-scores Based on Interaction Categories for the Course Clusters*

Categories	Announcement	Discussion	Learning	Progress
Discussion-oriented courses				
Announcement	<b>225.416*</b>	-4.178	-37.202	-2.670
Discussion	-4.251	<b>436.478*</b>	-362.705	<b>59.893*</b>
Learning	-48.962	-377.085	<b>477.399*</b>	-278.262
Progress	-4.523	<b>68.285*</b>	-306.144	<b>376.757*</b>
Lecture-oriented courses				
Announcement	<b>265.408*</b>	<b>6.900*</b>	-88.170	<b>65.215*</b>
Discussion	<b>6.203*</b>	<b>1004.308*</b>	-806.506	<b>55.079*</b>
Learning	-108.899	-781.635	<b>722.747*</b>	-162.965
Progress	<b>98.560*</b>	<b>19.281*</b>	-140.481	<b>167.670*</b>
System interaction-oriented courses				
Announcement	<b>289.587*</b>	<b>34.922*</b>	-104.917	<b>66.849*</b>
Discussion	<b>23.674*</b>	<b>1347.325*</b>	-1042.840	<b>20.147*</b>
Learning	-116.352	-1019.694	<b>852.753*</b>	-92.554
Progress	<b>96.786*</b>	-15.873	-68.575	<b>102.990*</b>

Note. z-score threshold: 2.96; \* statistically significant transitions

Besides some obvious differences related to the course design, the central global pattern, i.e., the “isolated” learning category, can still be found in all course clusters. A closer look at

these results reveals that learners interact primarily within the learning category (e.g., with learning materials) and then log off, rather than interacting with or in the other main categories, announcement, progress, and discussion.

**Interaction Sequences According to Course Design (RQ2)**

On the level of granular interactions, there are twenty interaction categories and numerous subsequent transitions. An excerpt of the table of significant transitions for three interaction categories is presented in Table 4. For our explorative analysis, we purposefully selected *Video play* as a typical MOOC-related learning activity, *Assignment submit* as the main activity for demonstrating performance, and *Progress* (i.e., viewing the progress page) as a metacognitive activity for managing the learning process. Detailed information about the whole set of significant transactions for all interaction types can be found in Appendix B.

**Table 4**  
*Selected Interaction Level Transactions According to Course Cluster*

	<b>Lecture-oriented courses [L]</b>	<b>System interaction-oriented courses [S]</b>	<b>Discussion-oriented courses [D]</b>
<b>Assignment submit</b>	→ Assignment submit [LSD] → Progress [LSD] → Textual discussion prompt visit [LSD] → Textual download visit [LSD] → Textual instructional visit [LSD] → Survey submit [L] → Video download [L]	→ Assignment submit [LSD] → Progress [LSD] → Textual discussion prompt visit [LSD] → Textual download visit [LSD] → Textual instructional visit [LSD] → Announcement [S]	→ Assignment submit [LSD] → Progress [LSD] → Textual discussion prompt visit [LSD] → Textual download visit [LSD] → Textual instructional visit [LSD] → Video visit [D]
<b>Progress</b>	→ Announcement [LSD] → Assignment submit [LS] → Discussion visit [LS] → Final-exam submit [LSD] → Progress [LSD] → Survey submit [LSD] → Textual discussion prompt visit [LSD] → Textual download visit [LSD] → Textual instructional visit [LSD] → Video download [L]	→ Announcement [LSD] → Assignment submit [LS] → Discussion visit [LS] → Final-exam submit [LSD] → Progress [LSD] → Survey submit [LSD] → Textual discussion prompt visit [LSD] → Textual download visit [LSD] → Textual instructional visit [LSD]	→ Announcement [LSD] → Post reply [D] → Post visit [D] → Final-exam submit [LSD] → Progress [LSD] → Survey submit [LSD] → Textual discussion prompt visit [LSD] → Textual download visit [LSD] → Textual instructional visit [LSD]
<b>Video play</b>	→ Video play [LSD]	→ Video play [LSD]	→ Video play [LSD]

*Note.* [xxx] indicates significant transitions for all three course clusters; [xx] indicates significant transitions for two course clusters as indicated by the letters in parentheses; [x] indicates significant transitions that only apply to the respective course cluster

The results show several similarities among the significant interactions. Both for *Assignment submit* and *Progress*, there are significant transitions to *Progress* and the textual interaction categories for the three course clusters. For *Progress*, *Announcement* (i.e., viewing the announcement page) and *Final exam submit* are additional joint transitions. For *Video play*, there is only one joint transition, which is the one to the *Video play* category itself. Notable singularities, i.e., significant transactions that only appear in one single course cluster, are as follows: *Assignment submit* to *Video download* for lecture-oriented courses, to *Announcement* and *Progress* for system interaction-oriented courses, and to *Video visit* for discussion-oriented courses, as well as *Progress* to *Video download* for lecture oriented courses and to the discussion categories *Post reply* and *Post visit* in discussion-oriented courses.

### **Interaction Sequences According to Learner Achievement (RQ3)**

In the differential analysis for the three selected interaction types, several significant transitions could be exclusively associated with high-achievement learners (high “progress” and high “performance”). For lecture-oriented courses, *Progress* to *Textual download visit* is a high achiever pattern. For system interaction-oriented courses, *Assignment submit* to *Announcement* is a high achiever pattern. For discussion-oriented courses, high achiever patterns are: *Progress* to *Final exam submit* and *Progress* to *Survey submit*. The metacognitively oriented interactions *Progress* and *Announcement* are part of all these high-achievement patterns, either as starting or following interaction.

## **Discussion**

### **Findings and Implications**

The findings of this study illustrate how learning analytics approaches can be applied to open online courses in professional learning to provide insights for course design and facilitation. We explored typical behavioral patterns in openSAP Enterprise MOOCs and possible variations according to course design approaches on an aggregate level and the granular level of system interactions. Findings indicate that (1) there are consistent patterns and that (2) several distinctive transitions become evident when a differential perspective is adopted concerning the underlying course design. Among the top-level categories, the learning category, which contains the majority of system interactions, remains isolated from the other categories, both from the holistic and a differential perspective, according to course design. This might be due to a clear learner focus on working through the content and towards the assignments, while the announcement, progress, and discussion categories are more likely to be addressed at the beginning or the end of a learning session. Moreover, announcements are also communicated via additional channels (e.g., via email), and the learner's progress is partly visible in the learning area, too. If there is a need to better connect learning activities to collaborative (e.g., discussions) or metacognitive (e.g., announcements or progress visits) activities, it cannot be decided at this level of analysis.

Hence, the following analysis focused on the interaction level and differentiated courses according to the underlying design approach, where common and distinctive patterns could be found. Perhaps most striking is the isolated role of videos for all course clusters. Following the traditional xMOOC-model, one would expect learners to interact with a video and then with a self-test or other content elements (Li et al., 2015; Ou et al., 2019). However, the findings show that learners play videos without subsequent significant transitions afterward, which does not fit the linear way that learning typically is organized in MOOCs (Chew et al., 2017). From a



research perspective, a more detailed analysis is needed here. For example, video metrics could be considered (Li et al., 2015; Yoon et al., 2021). Based on this result, a preliminary design recommendation could be directly integrating interactive instructional elements like quizzes into the videos.

Moreover, the distinctive transactions in lecture-oriented courses connecting performance display and metacognition with video downloads seem to represent a rather consumerist pattern that needs to be questioned from a learning science perspective (Ogunyemi et al., 2022; Shah et al., 2022) and considering the discussion of instructional quality (Margaryan et al., 2015). A global design recommendation would be to supplement the classic, sometimes rigid xMOOCs model with (mandatory) additional instructional elements to promote learner engagement.

Looking at the high achiever patterns within the scope of this analysis, the role of metacognitively oriented interactions becomes evident. So, another initial design recommendation could be to foster those interactions by integrating metacognitively oriented elements further into the course structure (Zhu & Bonk, 2019), e.g., by adaptive metacognitive prompts or an advanced progress indicator. To sum up, we can conclude that there are typical behavior patterns in openSAP Enterprise MOOCs that differ according to course design and that it seems feasible to connect those patterns to learner achievement to derive evidence-based design recommendations.

### **Limitations and Future Research**

Subsequent research must substantiate those results, extending the scope across interaction categories and additional achievement groups (e.g., low achievers) to gain more comprehensive insights. Bearing in mind that especially for professional learning, course completion (or attrition) does not account for the diversity of learner enrollment motivations (Moore & Blackmon, 2022; Schwerer & Egloffstein, 2016), alternative achievement groups or engagement patterns (Huang et al., 2023) need to be delineated to develop suitable design recommendations for different learner groups.

Within the scope of this research, LSA was conducted based on system events. In addition, other metrics, such as time spent, could be included (Boroujeni & Dillenbourg, 2019), allowing for the discovery of more in-depth patterns and a deeper understanding of the learning process (Ifenthaler et al., 2018; Knight et al., 2017). Despite bringing in various learner data from different course design approaches, our research was limited to only one platform. When platform capabilities strongly influence what is done pedagogically (Blackmon & Major, 2017), it seems rather obvious that platform capabilities also limit the scope of possible learner interactions. Therefore, expanding our research on different providers and platforms for MOOCs for professional learning would be desirable. Methodologically, this would imply a generalization of the current operationalization beyond the context under consideration, with possible changes towards more generic interaction categories.

Finally, our analysis was based on the underlying assumption that learner behavior reflects cognitive and affective learner engagement, and that learner engagement leads to learning success. While this is a common assumption in research on self-directed online learning scenarios, our findings suggest that a deeper analysis of activities and interactions may be needed

to understand the learning processes in enterprise MOOCs better. Following Martin & Borup (2022) and Kimmons et al. (2020), behavioral engagement with technology can be either passive (i.e., using technology to receive information), interactive (i.e., learning activities that require learners' active involvement), or creative (i.e., using technology to create an artifact, commonly to demonstrate an understanding of the course content). The influence of these different behavioral categories on achievement in different course design formats needs to be further researched to derive substantial design recommendations. Likewise, it is important to note that there is more to learner engagement than observable interactions. In our analysis, we mainly focused on learner-content and learner-interface interactions. Other themes for research on environmental affordances for online learner engagement include presence, community, collaboration, and communication (Martin & Borup, 2022). In summary, we hope that the further development of our approach will provide deeper insights into (successful) online learning behavior in enterprise MOOCs and offer starting points for advancing these learning environments.

### **Declarations**

The authors declare no conflicts of interest.

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Correspondence concerning this article should be addressed to Marc Egloffstein, University of Mannheim, L4, 1, 68161 Mannheim, Germany. Email: [egloffstein@uni-mannheim.de](mailto:egloffstein@uni-mannheim.de)

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## **Appendix A**

*Courses Included in the Study*

#	Course code <sup>1</sup>	Course title
1	xm1	The Power of Experience Management
2	leo2	SAP Leonardo IoT for the Intelligent Enterprise
3	sbw1	Enabling Entrepreneurs to Shape a Better World
4	build1	Design Your First App with Build
5	ieux1	Intelligent Enterprise User Experience with SAP Fiori 3
6	java1	Object-Oriented Programming in Java
7	mobile3	Build Mobile Applications with SAP Cloud Platform Mobile Services
8	s4h15	Key Functional Topics in a System Conversion to SAP S/4HANA
9	sps2	Introduction to SAP Screen Personas
10	sps3	Using SAP Screen Personas for Advanced Scenarios
11	cwr1-1	Copywriting: Improve User Experience One Word at a Time (Repeat)
12	dafie1	Design-Led Approach for the Intelligent Enterprise
13	pa1-tl	People Analytics and Evidence-Based Management

*Note.* <sup>1</sup> The courses can be accessed via: [https://open.sap.com/courses/<course\\_code>](https://open.sap.com/courses/<course_code>)



## Appendix B

### *Interaction Level Transactions According to Course Cluster*

	<b>Lecture-oriented courses</b>	<b>System interaction-oriented courses</b>	<b>Discussion-oriented courses</b>
Announcement	<ul style="list-style-type: none"> <li>→ Announcement</li> <li>→ Discussion visit</li> <li>→ Progress</li> <li>→ Survey submit</li> <li>→ Textual discussion prompt visit</li> <li>→ Textual instructional visit</li> </ul>	<ul style="list-style-type: none"> <li>→ Announcement</li> <li>→ Assignment submit</li> <li>→ Discussion visit</li> <li>→ Post subscribe</li> <li>→ Progress</li> <li>→ Textual discussion prompt visit</li> <li>→ Textual hands on visit</li> <li>→ Textual instructional visit</li> </ul>	<ul style="list-style-type: none"> <li>→ Announcement</li> <li>→ Discussion visit</li> <li>→ Final exam submit</li> <li>→ Progress</li> <li>→ Textual instructional visit</li> </ul>
Assignment submit	<ul style="list-style-type: none"> <li>→ Assignment submit</li> <li>→ Progress</li> <li>→ Survey submit</li> <li>→ Textual discussion prompt visit</li> <li>→ Textual download visit</li> <li>→ Textual instructional visit</li> <li>→ Video download</li> </ul>	<ul style="list-style-type: none"> <li>→ Announcement</li> <li>→ Assignment submit</li> <li>→ Progress</li> <li>→ Textual discussion prompt visit</li> <li>→ Textual download visit</li> <li>→ Textual instructional visit</li> </ul>	<ul style="list-style-type: none"> <li>→ Assignment submit</li> <li>→ Progress</li> <li>→ Textual discussion prompt visit</li> <li>→ Textual download visit</li> <li>→ Textual instructional visit</li> <li>→ Video visit</li> </ul>
Audio download	<ul style="list-style-type: none"> <li>→ Audio download</li> <li>→ Presentation download</li> <li>→ Video visit</li> </ul>	<ul style="list-style-type: none"> <li>→ Audio download</li> <li>→ Presentation download</li> <li>→ Video download</li> <li>→ Video visit</li> </ul>	<ul style="list-style-type: none"> <li>→ Audio download</li> <li>→ Presentation download</li> <li>→ Video download</li> </ul>
Discussion visit	<ul style="list-style-type: none"> <li>→ Announcement</li> <li>→ Discussion visit</li> <li>→ Post create</li> <li>→ Post visit</li> <li>→ Progress</li> <li>→ Textual discussion prompt visit</li> <li>→ Textual instruction visit</li> </ul>	<ul style="list-style-type: none"> <li>→ Announcement</li> <li>→ Discussion visit</li> <li>→ Post create</li> <li>→ Post reply</li> <li>→ Post subscribe</li> <li>→ Post visit</li> <li>→ Progress</li> <li>→ Textual discussion prompt visit</li> <li>→ Textual instructional visit</li> </ul>	<ul style="list-style-type: none"> <li>→ Announcement</li> <li>→ Discussion visit</li> <li>→ Post create</li> <li>→ Post visit</li> <li>→ Progress</li> </ul>
Final-exam submit	<ul style="list-style-type: none"> <li>→ Final-exam submit</li> <li>→ Progress</li> <li>→ Survey submit</li> </ul>	<ul style="list-style-type: none"> <li>→ Final-exam submit</li> <li>→ Progress</li> <li>→ Survey submit</li> </ul>	<ul style="list-style-type: none"> <li>→ Final-exam submit</li> <li>→ Progress</li> <li>→ Survey submit</li> </ul>

	→ Textual instructional visit	→ Textual discussion prompt visit	→ Textual instructional visit
	→ Textual discussion prompt visit	→ Textual instructional visit	→ Textual discussion prompt visit
Post comment	→ Post comment	→ Post comment	→ Audio download
	→ Post visit	→ Post subscribe	→ Post comment
		→ Post visit	→ Post visit
			→ Presentation download
			→ Video download
Post create	→ Discussion visit	→ Discussion visit	→ Discussion visit
	→ Post create	→ Post create	→ Post comment
	→ Post visit	→ Post subscribe	→ Post create
		→ Post visit	
Post reply	→ Post reply	→ Discussion visit	→ Audio download
	→ Post visit	→ Post reply	→ Post comment
		→ Post subscribe	→ Post create
		→ Post visit	→ Post reply
			→ Post visit
			→ Presentation download
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Post visit	→ Announcement	→ Announcement	→ Announcement
	→ Discussion visit	→ Discussion visit	→ Discussion visit
	→ Post comment	→ Post comment	→ Post comment
	→ Post create	→ Post create	→ Post create
	→ Post reply	→ Post reply	→ Post reply
	→ Post visit	→ Post subscribe	→ Post visit
	→ Progress	→ Post visit	
Presentation download	→ Audio download	→ Announcement	→ Presentation download
	→ Presentation download	→ Audio download	→ Self-test submit
	→ Video download	→ Presentation download	
	→ Video visit	→ Textual discussion prompt visit	
		→ Textual hands on visit	
		→ Video download	
		→ Video visit	
Progress	→ Announcement	→ Announcement	→ Announcement
	→ Assignment submit	→ Assignment submit	→ Final-exam submit
	→ Discussion visit	→ Discussion visit	→ Post reply
	→ Final-exam submit	→ Final-exam submit	→ Post visit
	→ Progress	→ Progress	→ Progress
	→ Survey submit	→ Survey submit	→ Survey submit
			→ Textual discussion prompt visit

	→ Textual discussion prompt visit	→ Textual discussion prompt visit	→ Textual download visit
	→ Textual download visit	→ Textual download visit	→ Textual instructional visit
	→ Textual instructional visit	→ Textual instructional visit	
	→ Video download		
Self-test submit	→ Self-test submit	→ Self-test submit	→ Self-test submit
	→ Video visit	→ Video visit	→ Video visit
Survey submit	→ Announcement	→ Final-exam submit	→ Final-exam submit
	→ Assignment submit	→ Progress	→ Progress
	→ Final-exam submit	→ Survey submit	→ Survey submit
	→ Progress	→ Textual instructional visit	→ Textual discussion prompt visit
	→ Survey submit	→ Video visit	→ Textual download visit
	→ Textual discussion prompt visit		
Textual discussion prompt visit	→ Announcement	→ Announcement	→ Discussion visit
	→ Discussion visit	→ Assignment submit	→ Final exam submit
	→ Progress	→ Discussion visit	→ Self-test submit
	→ Textual discussion prompt visit	→ Presentation download	→ Survey submit
	→ Textual instructional visit	→ Progress	→ Textual discussion prompt visit
	→ Textual download visit	→ Survey submit	→ Textual download visit
		→ Textual discussion prompt visit	→ Textual instructional visit
		→ Textual hands on visit	→ Video visit
		→ Textual instructional visit	
Textual download visit	→ Assignment submit	→ Assignment submit	→ Assignment submit
	→ Progress	→ Progress	→ Discussion visit
	→ Textual download visit	→ Survey submit	→ Progress
	→ Textual instructional visit	→ Textual discussion prompt visit	→ Survey submit
	→ Video download	→ Textual download visit	→ Textual discussion prompt visit
		→ Textual instructional visit	→ Textual download visit
			→ Textual instructional visit
Textual hands on visit	→ N/A	→ Announcement	→ N/A
		→ Discussion visit	
		→ Textual discussion prompt visit	
		→ Textual hands on visit	

			→ Textual instruction visit	
Textual instructional visit	→ Announcement → Assignment submit → Final exam submit → Progress → Textual download visit → Textual instructional visit → Video visit	→ Announcement → Assignment submit → Final exam submit → Survey submit → Textual discussion prompt visit → Textual download visit → Textual instructional visit → Video visit	→ Announcement → Assignment submit → Final exam submit → Survey submit → Textual discussion prompt visit → Textual download visit → Textual instructional visit → Video visit	→ Final-exam submit → Textual discussion prompt visit → Textual download visit → Textual instructional visit → Video visit
Video download	→ Audio download → Presentation download → Survey submit → Textual download visit → Video download → Video visit	→ Audio download → Post subscribe → Presentation download → Progress → Video download		→ Audio download → Presentation download → Video download
Video play	→ Video play	→ Video play		→ Video play
Video visit	→ Audio download → Presentation download → Video download → Video play → Video visit	→ Audio download → Presentation download → Video download → Video play → Video visit		→ Self-test submit → Textual discussion prompt visit → Textual instructional visit → Video download → Video visit

# Deep Learning Models for Analyzing Social Construction of Knowledge Online

Charlotte N. Gunawardena  
*University of New Mexico, USA*

Yan Chen  
*University of Nevada, Las Vegas, USA*

Nick Flor  
Damien Sánchez  
*University of New Mexico, USA*

## Abstract

Gunawardena et al.'s (1997) Interaction Analysis Model (IAM) is one of the most frequently employed frameworks to guide the qualitative analysis of social construction of knowledge online. However, qualitative analysis is time consuming, and precludes immediate feedback to revise online courses while being delivered. To expedite analysis with a large dataset, this study explores how two neural network architectures—a feed-forward network (Doc2Vec) and a large language model transformer (BERT)—could automatically predict phases of knowledge construction using IAM. The methods interrogated the extent to which the artificial neural networks' predictions of IAM Phases approximated a human coder's qualitative analysis. Key results indicate an accuracy of 21.55% for Doc2Vec phases I-V, 43% for fine-tuning a pre-trained large language model (LLM), and 52.79% for prompt-engineering an LLM. Future studies for improving accuracy should consider either training the models with larger datasets or focusing on the design of prompts to improve classification accuracy. Grounded on social constructivism and IAM, this study has implications for designing and supporting online collaborative learning where the goal is social construction of knowledge. Moreover, it has teaching implications for guiding the design of AI tools that provide beneficial feedback for both students and course designers.

*Keywords:* social construction of knowledge online, interaction analysis model, neural networks

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The exponential growth of online learning during the pandemic added impetus to the exploration of how people learn together online (Ba et al., 2023; Guo et al. 2022; Lee et al., 2023; Lehtinen et al., 2023). Learning together (Dillenbourg, 1999) is grounded in principles of social constructivism (Pea, 1993; Vygotsky, 1978), where knowledge is co-constructed by members of an interacting group through a process of negotiation of meaning and validation of newly constructed knowledge. Traditionally, the co-construction of knowledge manifested in varied online discussion structures has been analyzed by qualitative content analysis examining the meaning of interactions between participants (Rourke et al., 2001). However, given a large dataset, qualitative content analysis becomes a time-consuming task (Silverio et al., 2020) and requires human coders to be experienced in both qualitative coding methods as well as have a good understanding of the conceptual frameworks used to perform the coding tasks (Hu et al., 2020; Megli et al., 2023a; 2023b). These realities mean that while transcripts of online discussions and collaborations could be analyzed weekly, it is not realistic or practical. Further, it makes it difficult to effectively research online knowledge co-construction while a course is in session, so instructors can provide feedback to participants as well as revise courses as they are being delivered.

Perhaps one solution to this issue may lie in exploring alternative techniques for analyzing knowledge construction online, employing methods used in social learning analytics (Kaliisa et al., 2022), machine learning (Ouyang et al., 2023) and the sub-field of Neural Networks (NNs) which can map patterns of interactions (Schmidhuber, 2015) and reveal how a learning algorithm can come close to matching a human coder's qualitative analysis. Of particular interest when trying to match a qualitative coder's analysis of social construction of knowledge are deep learning models based on the large language models (LLMs). "Deep learning is a subset of machine learning in which multilayered neural networks learn from vast amounts of data...Deep learning uses multi-layered structures of algorithms called neural networks to draw similar conclusions as humans would" (Oppermann, 2022, pp. 1–2). We define a LLM as a deep learning model trained on a large corpus of text which then allows it to do classifications, translations, problem solving, create documents and images, etc. Examples of LLMs are BERT, ChatGPT, and LLaMA (see Appendix A).

This paper explored how a basic feed-forward, NN classifier (doc2vec) and a deep learning model (BERT, a transformer and LLM) can predict a qualitative analyst's coding of the Phases of social construction of knowledge in online discussions when the predication is based on the theoretical foundation of social construction of knowledge as specified by the Interaction Analysis Model (IAM) (Gunawardena et al., 1997). The aim was to situate the deep learning model on a sound theoretical base that can explain how people learn in collaboration with each other. The need for grounding analytics on a sound learning theory base that accounts for collaborative interaction and social construction of knowledge between participants in an online environment is highlighted in the review of 36 social learning analytic studies conducted by Kaliisa and colleagues (2022). This study used the IAM as it stipulates the process of social construction of knowledge to predict a qualitative analyst's coding of discussion transcripts. The study will also use the same coded transcripts found in Megli et al.'s study (2023a; 2023b), and demonstrate how a feed-forward NN classifier and a deep learning model could predict the Phases of knowledge construction coded according to the IAM. This study will therefore extend

the research completed by our larger research team (Megli et al., 2023a; 2023b) where a detailed description of the methods used in the qualitative coding of online transcripts can be found.

We want readers to be aware that this paper focuses on using artificial intelligence (AI) models to predict qualitative coders' analysis of online discussions. Therefore, the terminology and descriptors associated with AI models will be technical in nature. We have provided a glossary at the end of this paper to help the reader understand the unfamiliar terms.

## **The Development of Neural Networks (NNs)**

The history of neural networks (NNs) began with McCulloch and Pitts (1943), who described a mathematical model for an artificial neuron and provided mathematical proof that a network of artificial neurons, hereafter “nodes,” could perform any logical operation and, therefore, theoretically any computation. Their work laid the foundation for later research in artificial NNs.

The first implementation of a NN is credited to Rosenblatt (1958). Rosenblatt named his network a “perceptron,” and it consisted of two layers: an input layer and an output layer. Each node in the input layer was connected to every node in the output layer. The output nodes took the inputs, weighted them, summed the weighted inputs, and produced a result if the weighted sum exceeded a threshold. Essentially, each output node performed a task similar to linear regression, with the weights analogous to the coefficients in a regression equation. A perceptron could learn by adjusting the weights of the output nodes, akin to how one fits a regression model by modifying coefficients. Applications of perceptrons include pattern recognition tasks, such as image recognition, and learning linear functions. However, the perceptron's major drawback is its inability to handle non-linear input-output mappings, which many real-world tasks require. As a result, it cannot solve non-linear classification and regression tasks.

The inability to learn non-linear classification tasks, along with the difficulty of programming perceptrons to learn, slowed research in NNs until the mid-1980s. It was then when the Parallel Distributed Processing (PDP) group at the University of California introduced a three-layer network—consisting of an input layer, a hidden layer, and an output layer—and a learning algorithm known as backpropagation (Rumelhart et al., 1986). The inclusion of a hidden layer, combined with the backpropagation learning algorithm, enabled artificial networks to solve non-linear classification problems. This network architecture is commonly known as a *basic feed-forward network*. Applications of 3-layer NNs include image recognition, e.g., classifying images into faces or objects, speech recognition, e.g., converting spoken language to text, natural language processing, e.g., language translation, and machine learning from data, e.g., predictive models. However, there were several drawbacks to three-layer networks: lengthy training times, inadequate availability of big data for training, and the fact that classification algorithms like support vector machines and decision trees were more accurate.

*Deep learning networks*, also known as *deep learning models*, were introduced to overcome the limitations of 3-layer networks. Characterized by multiple hidden layers, these networks have demonstrated performance and accuracy often surpassing those of traditional machine learning algorithms. This is largely attributed to a combination of big data availability, improvements in computational power—notably, GPUs capable of training numerous artificial neurons in parallel u2015, enhanced learning algorithms, and the capability to effectively train

multiple-layered networks. The evolution of deep learning was significantly advanced by the work of Hinton et al. (2006). Their approach centered on a two-phase training strategy for deep learning networks. The first phase, *unsupervised pre-training*, had the NN independently learning statistical relationships between input patterns. The second phase, *supervised fine-tuning*, trained the network to link specific inputs with their respective labels. Specifically, Hinton et al. (2006) used this approach to train a network to associate images of numbers with their correct labels, ranging from 0 to 9. Their innovations have since fueled many advancements in the field of deep learning.

Undoubtedly, one of the most significant advancements in the field of NNs was the *large language model* (LLM), a type of deep learning model predominantly implemented using the transformer architecture (Vaswani et al., 2017). In an approach similar to Hinton's (2006) deep learning network, these LLMs also undergo a two-stage training process. However, rather than being trained on image data to discern patterns in pixels, an LLM is pre-trained unsupervised on a massive corpus of text data, which includes webpages, books, and social media posts. This enables the model to learn the relationships and statistical patterns between words and phrases. Following this, the model is fine-tuned in a supervised manner for specific language tasks. Through this process, LLMs are capable of achieving state-of-the-art performance in various natural language processing tasks, such as classification, question answering, summarization, translation, and more. This combination of unsupervised pre-training and supervised fine-tuning has yielded significant advances in natural language processing tasks. LLMs are a powerful new tool that have the potential to revolutionize the way we interact with computers and how we learn with computers. As LLMs continue to improve, they will be able to perform even more complex tasks.

## **Theoretical Framework for this Study: Social Construction of Knowledge**

Social construction of knowledge explains how learners learn together while dialoguing and collaborating with each other (Chen et al., 2018; Dillenbourg et al., 1996; Resta & Laferrière, 2007; Stahl, 2006). This view of learning has roots in both sociocultural theory and social constructivism (Duffy & Jonassen, 1992; Koschmann, 1996). Sociocultural theory predominantly attributed to Vygotsky (1978) focuses on how culture, context, and social interaction shape and influence learning (Kumpulainen & Wray, 2002), and emphasizes the significance of cultural and historical contexts, social interaction, peer collaboration, and the construction of new knowledge with the guidance of adults and peers. Unlike the cognitive perspective (Piaget, 1971), which emphasizes the individual's mental processes and relationship to a social context, the sociocultural perspective emphasizes the social nature of learning and places the learner within a social context. The sociocultural approach centers on the interdependence of social and individual processes in the co-construction of knowledge (John-Steiner & Mahn, 1996). From a sociocultural perspective, learning takes place within cultural contexts, through sharing and interaction, and via language, signs, and systems.

Piaget and his collaborators' research on cognitive development (Piaget, 1971) propelled the development of constructivism as a learning theory. Constructivism emphasizes the individual's mental processes in the construction of knowledge; the active character of the learner, interacting with the environment either alone or with others, and constructing



knowledge. Constructivists with a growing interest in the social nature of learning and the social context within which learning happens, propelled the development of social constructivist views on learning. Social constructivists subscribed to the constructivist's views of knowledge as constructed, but unlike other hardcore Piagetian constructivists, considered construction of knowledge to be a social process. Social constructivists also focus on the collaborative nature of learning (Koschmann, 1996). Therefore, both sociocultural and socioconstructivist views of learning emphasize the social context in which the individual is acting and in which knowledge is constructed (Kumpulainen & Wray, 2002).

Grounded in sociocultural and socioconstructivist theories of learning, social construction of knowledge online is about a social process contingent on learners' interactions and collaborations with each other in varied online spaces (Gunawardena et al., 1997; Lee et al. 2023; Sammons, 2007). In this social process, learners are actively engaged in learning collaboratively, share information based on their existing knowledge, encourage discourses and dissonance through real-life problem-solving processes, and solidify learning through reflection on co-constructed ideas. This negotiated learning perspective is important to learning online. On one hand, such a learning environment enables the co-existence of multiple realities, and presents new opportunities for individuals to develop higher-order cognition and knowledge co-construction (Rannikmäe et al., 2020). On the other hand, the nuanced dynamics in online collaboration indicate the transformation of learner's identity and engender a new culture for learning (Goodfellow & Hewling, 2005).

### **Social Construction of Knowledge Online**

Research has extensively investigated the process of the learners' social interaction and construction of knowledge in various online contexts (Ahmad et al., 2022; Gunawardena et al., 1997; 2001; Lucas et al., 2014; Tao et al. 2022; Tirado et al., 2015). One of the most frequently used data sources for this investigation is the text-based transcript extracted from asynchronous online discussion forums (Ahmad et al., 2022; Floriasti et al., 2023). The emerging patterns of social construction of knowledge can reveal the effectiveness of social interaction and learning behaviors providing insight for instructor feedback and remediation. Findings from Lin et al.'s (2016) study examining social construction of knowledge in a team-based activity of a group of 78 high school students in Taiwan who engaged in a discussion on "Serving Fisherman Village" for two days on the Moodle platform, indicated that social interaction played an important role in shaping social construction of knowledge through online collaborations for different groups. Students from the high-performing teams showed more adaptive motivation and were more engaged in higher cognitive level practice (e.g., applying constructed meaning and resolving inconsistency). However, students from the low-performing teams showed less motivation and more distractions, (e.g., inadequate online searching skills and interactions with off-topic behaviors). In another study, using a Mann Whitney T-test and GSEQ 5.1, Tao et al. (2022) assessed a group of Chinese college students' social construction of knowledge during a collaborative writing task to develop English writing skills which was supported by the instant messaging application Tencent QQ. Tao et al. found that the cognitive development and conflicts of student groups from different backgrounds, such as high and low performers, exerted an impact on the development of their social construction of knowledge online. To promote students' engagement in higher-level social construction of knowledge in online collaborations, research suggests that instructors structure the activity by considering group size and strategies,

discussion duration, instructional prompts, peer mediation, and incorporating appropriate tools provided through digital applications or online learning platforms (Duvall et al., 2020; Guo & Chen, 2022; Hew and Cheung, 2011; Howell et al., 2014).

## **Analyzing Social Construction of Knowledge Using the Interaction Analysis Model (IAM)**

The Interaction Analysis Model (IAM, see Table 1), developed by Gunawardena and colleagues (1997), has been used as a research method by over 50 researchers nationally and internationally with over 2,551 citing it as a viable framework for analyzing social construction of knowledge in both formal and informal learning environments (Buraphadeja & Dawson, 2008; Megli et al., 2023b; Nguyen & Diederich, 2023; Sanchez, 2019; Valtonen et al., 2022; Lehtinen et al., 2023). Social construction of knowledge as discussed earlier, draws from sociocultural and social constructivist theories that establish the vital role socialization plays in the learning process (Pea, 1993; Vygotsky, 1978). The IAM describes five phases of co-constructing knowledge that correlate with Vygotsky’s (1978) concept of a learner’s movement from lower to higher mental functions. The model begins with participants working at the lower levels of sharing and comparing information, moving through dissonance (Phase II) to higher mental functions of co- construction of new knowledge (Phase III). It is in Phase III that evidence of socially constructed knowledge appears. Phase IV and V represent validation of the knowledge constructed, the testing, and the adoption of new knowledge into the learner’s framework and schema.

**Table 1**

*The Interaction Analysis Model Developed by Gunawardena et al. (1997), adapted from the Original*

<b>PHASE I: SHARING/COMPARING OF INFORMATION</b>	
A. A statement of observation or opinion	[PhI/A]
B. A statement of agreement from one or more other participants	[PhI/B]
C. Corroborating examples provided by one or more participants	[PhI/C]
D. Asking and answering questions to clarify details of statements	[PhI/D]
E. Definition, description, or identification of a problem	[PhI/E]
<b>PHASE II: THE DISCOVERY AND EXPLORATION OF DISSONANCE OR INCONSISTENCY AMONG IDEAS, CONCEPTS OR STATEMENTS. (This is the operation at the group level of what Festinger [20] calls cognitive dissonance, defined as an inconsistency between a new observation and the learner's existing framework of knowledge and thinking skills.)</b>	
A. Identifying and stating areas of disagreement	[PhII/A]
B. Asking and answering questions to clarify the source and extent of disagreement	[PhII/B]
C. Restating the participant's position, and possibly advancing arguments or considerations in its support by references to the participant's experience, literature, formal data collected, or proposal of relevant metaphor or analogy to illustrate point of view	[PhII/C]

**PHASE III: NEGOTIATION OF MEANING/CO-CONSTRUCTION OF KNOWLEDGE**

- |   |           |
|---|-----------|
| A. Negotiation or clarification of the meaning of terms                             | [PhIII/A] |
| B. Negotiation of the relative weight to be assigned to types of argument           | [PhIII/B] |
| C. Identification of areas of agreement or overlap among conflicting concepts       | [PhIII/C] |
| D. Proposal and negotiation of new statements embodying compromise, co-construction | [PhIII/D] |
| E. Proposal of integrating or accommodating metaphors or analogies                  | [PhIII/E] |

**PHASE IV: TESTING AND MODIFICATION OF PROPOSED SYNTHESIS OR CO-CONSTRUCTION**

- |  |          |
|--|----------|
| A. Testing the proposed synthesis against "received fact" as shared by the participants and/or their culture | [PhIV/A] |
| B. Testing against existing cognitive schema   | [PhIV/B] |
| C. Testing against personal experience   | [PhIV/C] |
| D. Testing against formal data collected   | [PhIV/D] |
| E. Testing against contradictory testimony in the literature   | [PhIV/E] |

**PHASE V: AGREEMENT STATEMENT(S)/APPLICATIONS OF NEWLY-CONSTRUCTED MEANING**

- |   |         |
|---|---------|
| A. Summarization of agreement(s)  | [PhV/A] |
| B. Applications of new knowledge  | [PhV/B] |
| C. Metacognitive statements by the participants illustrating their understanding that their knowledge or ways of thinking (cognitive schema) have changed as a result of the conference interaction | [PhV/C] |

## Analyzing Social Construction of Knowledge with Social Learning Analytic Methods (SLAMs)

Social Learning Analytics, a subfield of learning analytics that is informed by social, cultural, and contextual perspectives on learning (Kaliisa et al. 2022) and focuses on learning in an online participatory culture (Buckingham Shum & Ferguson, 2012), provide a set of tools to automate the analysis of interactions in online environments as well as research how a group of people engage, collaborate, and co-construct knowledge. Buckingham Shum and Ferguson (2012) point out that if we view learning analytics from a social perspective, it will highlight the types of analytics that can be employed to make sense of learner activity in a social setting. “As groups engage in joint activities, their success is related to a combination of individual knowledge and skills, environment, use of tools, and ability to work together. Understanding learning in these settings requires us to pay attention to group processes of knowledge construction—how sets of people learn together using tools in different settings. The focus must be not only on learners, but also on their tools and contexts” (Buckingham Shum & Ferguson, 2012, p. 5). NNs, LLMs, and deep learning models fall within the larger umbrella of social learning analytic methods (SLAMs). They are applications generated by developments in artificial intelligence (AI) and machine learning.

Studies (Ba et al., 2023; Hu et al., 2020) have used machine learning algorithms to analyze collaborative constructivist learning based on the Community of Inquiry (COI) model developed by Garrison et al. (2001), which incorporates three types of presences; social, cognitive, and teaching. Hu et al. (2020) trained automated classifiers for different phases of cognitive presence in asynchronous discussions from an archived course of the Logical and Critical Thinking MOOC at the Open University in the United Kingdom. The trained automated cognitive classifiers indicated a 95.4% agreement with a weighted Cohen Kappa of 0.94. This study verified the possibility of machine learning as a method for automated analysis of online discussions. In a similar study, using Garrison’s et al.’s (2006) COI coding framework, Ba et al. (2023) investigated cognitive presence and cognitive development from three online courses delivered in a public university in the Midwest United States. Ba et al. (2023) implemented text classification using the emerging LLM Bidirectional Encoder Representations from Transformers (BERT) and applied epistemic network analysis (ENA) to further “track learners’ learning progressions” (p. 262) for learning assessment. Findings of this study showed that the integrated approach of the BERT-based text classifier along with ENA enhanced the accuracy of the prediction as well as illuminated new patterns of the learners’ cognitive presence where learners “would summarize and build on each other’s comments” in advancing further cognitive development (p. 260).

SLAMs have been employed by researchers to study social construction of knowledge online as stipulated by the IAM. By combining interaction analysis with learning analytics and Social Network Analysis, Gunawardena et al. (2016) were able to conceptualize the process by which knowledge construction takes place in online platforms. They suggest that learning analytics be used by IAM analysts to inform the results of qualitative transcript coding. For example, data scraping, sentiment and social presence analyses, are useful techniques for: (a) highlighting areas that a qualitative researcher should focus on in the data, (b) indicating the socio-emotional context that accompanies knowledge construction, and (c) suggesting hypotheses for future research. Subsequent studies have built on this initial study and used

SLAMs for analyzing social construction of knowledge according to IAM in the Black Lives Matter Twitter platform (Sanchez et al., 2020), and asynchronous discussion forums in nursing (Schaaf, 2020), the learning sciences and nursing (Megli et al., 2023a; 2023b), and provided insights on how SLAMs and IAM based content analysis of transcripts complement one another.

Given the theoretical base of social constructivism on which the IAM is grounded, NNs, and deep learning models, subfields of AI can quantitatively map the process of social construction of knowledge as stipulated by IAM in an online discussion dataset or transcript. Conceptually, machine-learning algorithms can be viewed as searching through a large space of candidate programs, guided by training experience, to find a program that optimizes the performance metric (Jordan & Mitchell, 2015). Many algorithms focus on function approximation problems, where the task is embodied in a function (such as determining social construction of knowledge according to IAM). The learning problem is to improve the accuracy of that function, with experience consisting of a sample of known input-output pairs of the function. NNs, a subset of machine learning, mimic the human brain through a set of algorithms (Kavlakoglu, 2020). This study explored if a basic feed-forward NN classifier and a deep learning model built on multi-layered NNs could predict the Phases of social construction of knowledge as stipulated by IAM.

## Research Questions

We hypothesize that deep learning algorithms should indicate a consistent, similar pattern to classify online posts if human coders “use specific words and phrases within the posting to classify the IAM Phases of a post” (Megli et al., 2023b, p. 7). Therefore, the purpose of this study was to test if a basic feed-forward NN classifier and a LLM (Ahmad et al., 2022; Ba et al., 2023) could accurately predict the IAM Phases of social construction of knowledge, thereby advancing Megli’s et al. (2023a; 2023b) study. We address the following research questions in this study:

1. Can a basic feed-forward NN classifier predict the phases of social construction of knowledge in online discussions according to the IAM?
2. Can a more advanced NN classifier, such as a LLM, improve on the prediction accuracy of the IAM phases?
  - 2a. Can fine-tuning a pretrained LLM improve on the prediction accuracy of the IAM phases over a basic feed-forward NN classifier like Doc2Vec?
  - 2b. Can using prompt engineering on an LLM improve on the prediction accuracy of the IAM phases over a basic feed-forward NN classifier like Doc2Vec?
3. To what extent do the predicted phases match a human coder’s qualitative analysis of social construction of knowledge according to IAM?

Research question 2 has two subquestions that explain the two different ways in which a LLM can be trained to perform categorization on a dataset: (a) Fine-tuning a pre-trained model and (b) using prompt engineering on a pre-trained model. In the fine-tuning approach one takes a language model that was pre-trained on a large corpus of documents, such as Wikipedia, and then trains it on a task-specific, labeled dataset—such as discussion board posts coded according to IAM phases. In the prompt engineering approach, we give the LLM examples of the categories, then give it a new dataset and have it pick the closest matching category.

## Methods

We selected an exploratory sequential mixed-method study design (Creswell et al. 2018) because we are exploring the possibility of predicting qualitative coding using an NN and because the qualitative baseline must be established before the automated quantitative analysis using an NN. This procedure involved three steps. The first step was the qualitative coding of the Phases of social construction of knowledge (according to IAM) in three online discussions that served as the basis for comparison with subsequent quantitative results from NN and LLM analysis. Next, a basic feed-forward NN classifier was used to predict the Phases of social construction of knowledge. This text classification task required choosing an architecture for the NN and providing the NN a training dataset and a testing dataset. The third step was designed to improve on the results of the basic feed-forward NN classifier by using a LLM, which is a more advanced NN classifier. After the three steps were concluded, we compared the basic feed-forward NN predictions and the LLM predictions with the qualitative coding of social construction of knowledge by researchers. The details of the qualitative coding, datasets, and the code used to train and test the NN and LLM are described in the following sections. For this exploratory study, we calculate prediction accuracy by dividing the number of correct NN predictions by the total number of predictions.

### *Qualitative Coding of Social Construction of Knowledge*

Our dataset consisted of transcripts from two-semester long graduate-level online courses from the learning sciences and nursing in a public Research I university in the Southwestern United States. These transcripts were selected because the discussion prompts directed the students to construct knowledge. The discussion activities were initiated by differing instructor prompts. For the Learning Sciences discussion prompt, the faculty asked the students to build on the first posting on definitions of culture and eLearning. The goal was to come to a consensus on a definition and discuss how the definitions are related. The learning activities included collaborative problem-solving, negotiating, researching, and building consensus. The nursing discussion prompt asked students to post one question that came to mind regarding the topic and to research other sources to answer the question.

Six doctoral-level student researchers manually coded the three transcripts in pairs using the IAM coding spreadsheet to identify the Phases of knowledge construction. Each discussion post was one unit of analysis. The doctoral-level student researchers initially coded the transcripts individually, and then in pairs. Once the transcripts were coded, the pairs met to discuss their codes and check for agreement in their coding. Areas of disagreement were reviewed and resolved. We did not conduct a statistical intercoder calculation as it contradicts the interpretative nature of qualitative content analysis. We were able to reach a consensual interpretation of the data working within the common coding framework of the IAM (O'Connor & Joffe, 2020).

We used the three datasets for training the NN: Culture e-Learning 1 (2022a), Culture e-Learning 2 (2022b), Culture e-Learning 3 (2022c). For the text classification task, we chose an architecture for the NN, and provided the NN a training dataset and a testing dataset. For testing the dataset, we used the dataset Culture e-Learning B (2022d). All datasets are available for download at <https://github.com/professorf/IAM-Data-Code>. All three datasets combined had a total of 307 postings.

### ***Neural Network (NN) Analysis***

The quantitative methods included two studies using NNs that are described below as Study 1 and 2.

#### ***Study Design 1: Basic Feed-Forward NN Classifier (Doc2Vec)***

##### *Apparatus*

We used the R programming language for data wrangling, RStudio as our integrated development environment, and the Doc2Vec package to train and test our NN. Finally, we used the lsa package, for its cosine similarity function, to determine the similarity or, how close the test postings were to the NN's representations (embeddings) of the five IAM Phases.

##### *Procedure (NN Model: Doc2Vec)*

The following procedure was followed:

1. Read in training datasets and combined them into a single dataset.
2. Collapsed the IAM subphases in the dataset into just the five main IAM Phases.
3. Formatted the dataset for the Doc2Vec function `paragraph2vec`.
4. Trained the Doc2Vec model.
5. Tested the accuracy of the Doc2Vec model.

We performed this procedure on all five IAM Phases, and on just Phases I-III, which signal the process of knowledge construction. We ran the above procedure in the following four conditions:

1. Trained using all five IAM Phases, each post labeled with the highest IAM Phase score.
2. Trained using all five IAM Phases, each post labeled with all non-zero phase scores. For example, if a post contained Phase I, III, and V elements, the post would have three labels.
3. Trained using just Phases I-III, each post labeled with highest phase score.
4. Trained using just Phases I-III, each post labeled with all non-zero phase scores.

The code can be downloaded at: <https://github.com/professorf/IAM-Data-Code> and is resident in the Culture-eLearning folder.

#### ***Study Design 2: LLM***

##### *Apparatus*

We used the Python programming language for data wrangling, Visual Studio Code as our integrated development environment, and the PyTorch and HuggingFace transformer packages to train and test our NN. The hardware used to train the NNs was a Windows PC with an AMD Ryzen 7 5700X CPU and an Nvidia 3070 GPU.

##### ***Study Design 2a Procedure (Fine-tuning a pre-trained LLM):***

We trained and tested our NN using five main steps:

1. Read in training datasets and combined them into a single dataset.
2. Collapsed the IAM subphases in the dataset into just the five main IAM Phases.
3. Formatted the dataset for general use by the transformers package.
4. Fine-tuned the pre-trained BERT model: *distilbert-base-uncased*.

5. Plotted the accuracy of the BERT model using a confusion matrix.

**Study Design 2b Procedure (Prompt engineering using an LLM):**

We tested three kinds of prompts:

1. The full five descriptions of the IAM Phases from Gunawardena et al (1997; see Table 1).
2. Just the five title descriptions of the IAM Phases from Gunawardena et al (1997; see Table 1 Phase titles).
3. Five short custom sentences that serve as a typical example of the five IAM Phases:
  - 3.1. “I define the concept this way. Or I believe the concept is that.”
  - 3.2. “I disagree with how you have defined the concept.”
  - 3.3. “I want to modify your definition of the concept.”
  - 3.4. “I want to test your definition of the concept.”
  - 3.5. “Let us now apply your definition of the concept.”

## Results

Results of Study 1 using the basic feed-forward NN classifier Doc2Vec is reported first, followed by the results of the two conditions in Study 2 using a more advanced NN classifier, the LLM.

**Study 1: Basic Feed-Forward NN Classifier (Doc2Vec)**

Each condition was trained and tested for accuracy twenty times to get an average accuracy score. The NN trained on all five IAM Phases had better accuracy ( $M = 21.55\%$ ,  $SD = 3.95$ ) when each posting was labeled with multiple scores instead of labeled with a single score denoting the highest IAM Phase detected in the posting,  $t(36) = 3.65$ ,  $p < .001$ . However, there was no significant difference in accuracy when the network was trained on just IAM Phases I-III, between postings labeled with a single versus multiple labels. Finally, the NN had better accuracy when trained on just Phases I-III ( $M = 34.39$ ,  $SD = 4.13$ ) versus training on all five Phases,  $t(74) = 14.85$ ,  $p < .001$ . To summarize, for predicting all five phases, the highest prediction accuracy achieved was 21.55%.

**Table 2**  
*NN Classification Results*

Post Label	IAM Phases Trained	
	I-III	I-V
Single High-Score	34.12%	16.42%
Multiple Scores	34.66%	21.55%

Table 2 shows the prediction accuracy of the basic feed-forward NN. The first row labeled “Single High-Score” indicates the results when only the highest IAM Phase was considered in the analysis in a post that was coded with several IAM Phases. The second row labeled “Multiple Scores” indicates the results when multiple IAM Phase codings for a single post was considered in the analysis.

**Study 2a: Fine-tuning a Pre-trained BERT Model**

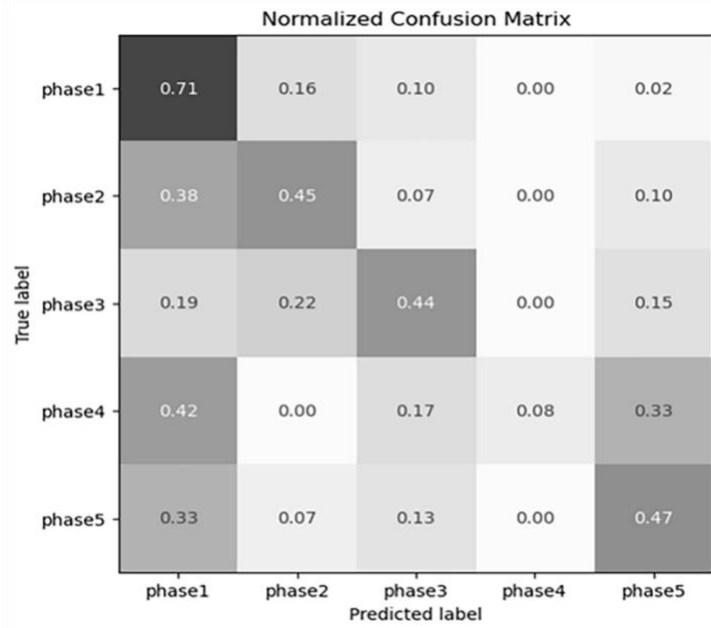
The confusion matrix in Figure 1 depicts the accuracy of the model’s predictions (“Predicted label”) compared to the human coders’ labels (“True label”) in the matrix diagonal.



For example, 0.71 in the upper left corner indicates that the NN was 71% accurate predicting posts that the human coders had labeled as IAM Phase I. The NN’s lowest accuracy was for Phase IV, at 0.08, i.e., only 8% of its posts labeled as IAM Phase IV matched the human coders’ labels. The row values for any IAM Phase in the confusion matrix show what the NN mistook as the correct answer. For example, for Phase IV, the NN mistakenly labeled 42% as Phase 1 and 33% as Phase V. The mean of the diagonal values suggests a 43% prediction accuracy.

**Figure 1**

A Confusion Matrix for the BERT Model Trained on IAM Data. The Diagonal of the Matrix Depicts the “True Label” (Labeled by IAM coders), and the Model’s “Predicted Label”).



**Study 2b: Prompt Engineering Using an LLM**

There are two ways in which we can ask an LLM to categorize a post. One can give the LLM the entire post to categorize, or give the LLM one sentence of the post at a time to categorize, and assign the highest sentence category as the post category. This is similar to what some human IAM analysts do—code the individual sentences in a post, then assign a Phase to the entire post based on the highest sentence Phase. Table 3 shows the results of having an LLM categorize posts based on prompt engineering. The highest prediction accuracy achieved was 52.79%, by prompting the LLM using custom short examples.

**Table 3**

*Categorization of Posts by an LLM based on Prompt Engineering*

Prompt	Accuracy: Post Categorizing	Accuracy: Sentence Categorizing
Full IAM description	16.75%	12.69%
1-sentence IAM description	17.77%	38.01%
Custom short examples	52.79%	24.87%

In Table 3, Row 1 includes all operations in the five Phases of IAM. The results in Row 1 do not indicate high accuracy for the model. Row 2 is in a similar position with results indicating low accuracy. Row 3 instead is far more accurate when the LLM was fed custom short examples as they work best for the model. Just as students seek examples to understand complex phenomena, the LLM did best when it was given examples of IAM Phases. Therefore, mining key examples of IAM Phases and operations from a coded dataset and feeding them into a LLM that will learn with these examples may guarantee more accuracy when trying to match a human coder's analysis.

## Discussion

The two studies demonstrated the viability of using machine learning and deep learning methods employing NNs and LLMs to analyze online social construction of knowledge according to the IAM. The study explained the research procedures for using both a basic feed-forward NN and a more sophisticated LLM for predicting a qualitative coder's analysis of social construction of knowledge. The results of the two studies showed that NNs have a promising ability to predict a human analyst's qualitative coding of the five Phases of IAM—which describes the process of social construction of knowledge online. The two studies demonstrated that when based on a sound theoretical foundation of learning such as social construction of knowledge, the underlying theory in IAM, NNs can quickly analyze Big Data, which is not viable with qualitative approaches alone. While the two studies demonstrated that NNs can predict a human coder's qualitative analysis of the IAM Phases (research question 3), the extent to which a NN can predict differed in the two studies. Therefore, further research with larger datasets is needed to increase the NN prediction accuracy.

More specifically, in Study 1, the low accuracy in all conditions is likely due to (1) an insufficient amount of training data and (2) multiple codes being assigned to single postings. For example, the original Doc2Vec authors (Le & Mikolov, 2014) used a dataset of 25,000 Internet Movie Database (IMDB) postings to train their NN. Much more data is required to train the NN for future studies since our entire study used only 307 postings. An additional challenge in training the NN was the low number of IAM Phase IV and V postings, which signal the higher levels of knowledge construction. The improved accuracy when phase IV and V scores were removed from the training data provides evidence that an insufficient volume of data was used to train the NN on these Phases. Historically, studies using the IAM have found many more occurrences of Phases I-III when compared to Phases IV and V (Kanuka & Anderson, 1998; Lucas et al. 2014; Luebeck & Bice, 2005). This is because IAM Phases IV and V indicate validation of newly constructed knowledge compared to the earlier stages (Phases I-III) of co-construction of knowledge. IAM Phase III needs to occur for Phases IV and V to follow. Therefore, employing a NN when there were fewer frequency of occurrences of Phase IV and V in a dataset was problematic.

In their study, Le and Mikolov (2014) used just two labels: positive sentiment and negative sentiment. When using IAM, a post could represent more than one IAM Phase and/or operation (Commander et al., 2016). This known feature of the IAM increases the complexity for a NN, which must transform text into a high dimensional numerical vector known as an *embedding*, and makes it more difficult for the NN to discriminate between IAM Phases as

compared to binary outputs. However, the insignificant results between postings with single versus multiple labels suggest that giving posts multiple Phase labels may not be necessary if there is enough training data. We had hoped that the basic feed-forward NN would predict IAM Phases with at least 70% accuracy, and are still hopeful that with more data, especially in Phases IV and V, it will be possible for a basic feed-forward NN to automatically predict all IAM Phases.

Given the shortcomings of using a basic feed-forward NN classifier to predict the qualitative analyst's coding of IAM Phases, in Study 2 we used a more advanced NN classifier, a LLM, to improve on the prediction accuracy of the IAM Phases. As the results of Study 2 demonstrate, the LLM did better than the basic feed-forward NN classifier in the prediction of the coding of IAM Phases. Of the two different methods reported in the second study, Study 2a, fine-tuning a pre-trained BERT model did the best. Our findings are similar to other studies that have used BERT. Sebbaq and Faddouli (2022) compared three neural network architecture on the task of classifying MOOC posts according to BLOOMs taxonomy: LSTM, Bi-LSTM, and BERT. They found BERT had the highest accuracy among the three architectures. Wulff et al (2022) also compared BERT's performance to two other deep learning models (FFNN, LSTM) on the task of classifying physics teachers' blog reflections along five categories. BERT once again outperformed the other deep learning models. Our study builds on these initial approaches by applying BERT to classifying discussion posts into the five phases of IAM.

In Study 2b (see Table 3) we found that the LLM did best when it was trained on custom short examples. This corroborates with our experience training students on coding IAM phases. In particular, providing students with specific examples of statements representing the five IAM phases helps them understand how to code the five Phases. Therefore, a table of examples of each of the IAM Phases and the subphases should be created to help both the human coder and AI based NNs and LLMs.

The results of the two NN studies also indicated the need to improve the IAM and better clarify the distinction between the five Phases, specifically Phases IV and V. Further refinement of the IAM may result in distinct embeddings of the text in hyperdimensional space, which may increase the accuracy of the NN predictions of social construction of knowledge. There are several ways to go about improving the IAM. One is to clearly delineate the function of Phases I-III as describing the process of knowledge construction, and the function of Phases IV and V as describing the process of knowledge validation. The sub-Phases of IAM could clarify this distinction. Further, when providing directions for online discussions with the aim of reaching social construction of knowledge, the directions should ask participants to reference the newly constructed meaning when considering its testing and application (Phase IV and Phase V). This way, the LLMs could pick up the cues to newly constructed knowledge when assigning a post to Phase IV and V. In the results of Study 2 we found that the LLM was confusing Phases IV and V with the earlier phases. Therefore, prefacing statements with signaling phrases such as “based on your new proposition,” or “given our new understanding” may help the LLM as well as human coders classify the IAM Phases more accurately.

This study has implications for designing and supporting online collaborative learning where the goal is social construction of knowledge. When groups collaborate online whether in

academic settings or workplaces, one challenge has been the difficulty of determining the extent to which group members negotiate meaning by sharing and comparing ideas, discovering and exploring differences, synthesizing ideas, creating new knowledge and then validating the newly constructed meaning. This is the process of knowledge co-construction that is described in the five Phases of IAM. Sammons (2007) has noted that IAM describes the process of collaborative learning, which also parallels studies of collaboration in face-to-face settings. By developing a NN based on IAM, this study has shown that it is possible to get a snapshot of the process of knowledge construction as group members engage with each other. Traditionally, such a snapshot of collaboration would not be possible without analyzing the interactions qualitatively after the collaboration has ended. The availability of such a snapshot through a NN based on the IAM, enables a group to fine tune its goals and objectives and determine its trajectory during the process of knowledge construction, while also helping instructors provide the necessary prompts and scaffolding to support a group's construction of knowledge. Since group discussions are an important part of the teaching and learning process of an online course, this study is a first step in using NN's to automatically gauge the degree to which social construction of knowledge is taking place in a collaborative group. This enables an online instructor to observe a group's co-construction of knowledge as it unfolds during collaboration, providing additional insight into how one group's collaboration maybe different from another's and how one group's strategies may have reached a higher level of knowledge construction. These insights provide a broader view of collaborative learning rather than merely assessing individual contributions to group collaboration often measured using rubrics of participation.

## Limitations

Here, we reflect on the limitations of our study, some of which we pointed out in our earlier discussion. First, we emphasize that the purpose of using machine learning and deep learning algorithms in this study context was to predict a qualitative coder's analysis of social construction of knowledge among a group of interacting online participants. The aim was to determine if these algorithms could match a qualitative human coder's analysis. Therefore, the results of these predictions should not be used for purposes for which they were not intended, such as grading the performance of a group of students.

Second, while this research presents a novel perspective, we acknowledge that its predictive accuracy leaves room for refinement. However, based on the findings, we made suggestions for improving the prediction of IAM Phases using NNs and LLMs. We wish to emphasize that these findings are exploratory in nature, and should be viewed as a baseline for improvement by further research in this domain. Our study can thus serve as a foundational resource for other researchers aiming to enhance the accuracy and efficiency of such models applied to analyzing social construction of knowledge. It also provides a comparison point for other NN architectures and machine learning algorithms to improve upon.

Third, this particular AI model was trained on data from graduate students in a Research I university in the disciplines of LS and nursing. The model might not be applicable in every context. Since the model enables the determination of the level of social construction of knowledge in online collaborations, it may work well with disciplines that focus on collaboration specifically, education and the social sciences. However, researchers and instructors, need to interpret the results of the AI model based on their own contexts, including discussion prompts that give directions for discussions.

### **Conclusion**

We were able to demonstrate through two separate studies that NNs and LLMs can predict a human analyst's qualitative coding of social construction of knowledge according to the five Phases of IAM, while the extent to which they could make the prediction differed. This approach can guide researchers to analyze large datasets and provide feedback to instructors to improve online learning as it unfolds. This study emphasized the necessity for a sound learning theory base such as social construction of knowledge on which to make predictions using deep learning algorithms. Without a learning theory foundation, the outcome of deep learning algorithms would not be useful for online learning. Future directions should focus on increasing the accuracy of the NN model's predictions and explore social construction of knowledge among diverse groups of learners in diverse disciplines, and contexts.

As a concluding note, we advocate the ethical use of findings from machine learning and deep learning algorithms as they may not be 100 percent accurate nor provide a reasonable picture when devoid of context and learner characteristics. As Garrison (2023) cautions, we must constantly question the educational value of adopting powerful AI tools as powerful technologies also bring severe risks. In their work on ethics in technology-based learning environments, Moore & Tillberg-Webb (2023) recommend that we engage in reflective practice and a critical and theoretically informed analysis of technology use.

### **Declarations**

All the authors have no conflicts of interest to declare.

The authors declare that no approval from an IRB or Ethics Board was needed.

## Appendix A

### Glossary

**Algorithm:** A set of step-by-step instructions for solving a particular problem or performing a specific task. Computers use algorithms, transformed into code by programmers, to process data and transform it into useful information. Algorithms can differ in terms of memory needed, speed of execution, and quality of solutions. They are the backbone of machine learning and neural network applications (see also *machine learning* and *neural networks*).

**Artificial Intelligence (AI):** The capability of machines or software to solve problems and perform tasks that are traditionally thought to require human intelligence. It encompasses many different methods and technologies designed to replicate or mimic human-like problem-solving capabilities. In the context of learning sciences, AI can be employed to enhance personalized learning experiences, assist educators in assessing student progress, and provide insights into the efficiency of instructional methods.

**BERT:** A type of deep-learning model, based on the transformer architecture, designed by Google to understand the context of words in a sentence. BERT stands for "Bidirectional Encoder Representations from Transformers." It's widely used in tasks that require a deep understanding of context, such as search engines or question-answering systems. In learning sciences, BERT can assist in comprehending student inputs, facilitating language-based assessments, or enhancing educational tools that work with text.

**ChatGPT:** An LLM developed by OpenAI. The GPT is short for Generative Pre-trained Transformer architecture. ChatGPT was trained to generate human-like text responses to the input it receives, making it suitable for chatbots, virtual assistants, and other interactive applications. In the context of learning sciences, ChatGPT can be used to simulate educational dialogues, assist students with questions, or provide interactive learning experiences.

**Deep Learning:** An advanced kind of machine learning that uses multi-layer neural networks, which are commonly referred to as "deep neural networks" or "deep learning networks." The term "deep" refers to the depth of the network, as these models can have many layers of interconnected nodes. These deep structures enable the system to create and relate multiple levels of abstraction from data, which has resulted in state-of-the-art solutions for complex tasks like image & speech recognition, language translation, natural language processing, and creating content. In the context of learning sciences, deep learning can be applied to automatically analyze and understand student responses, to classify student learning styles, and to help instructors find patterns in group work. (see also *machine learning*, *neural network*).

**Deep Learning Model:** A computing system that uses deep learning to solve problems and perform tasks.

**LLaMA:** A large language model (LLM) developed by Meta, Facebook's parent organization. It is an acronym for Large Language Model Meta AI. Like many LLMs, LLaMA was trained on a massive corpus of text documents, and can generate text, translate languages, write different kinds of creative content, and answer your questions in an informative way.

**Large Language Model (LLM):** A type of artificial intelligence system designed to understand and generate human-like text based on vast amounts of data. These models are “large” because they consist of billions or more of parameters, enabling them to discover nuanced word and phrase relationships and to produce coherent, contextually relevant responses. They are also large because they have been trained on a vast corpus of documents including web pages, social media posts, books, and software repositories. In the context of learning sciences, a large language model can be used for tasks such as auto-grading essays, providing feedback on writing, generating educational content, or even facilitating interactive learning through simulated dialogue.

**Machine Learning:** A subset of artificial intelligence focused on creating computer applications that are designed to learn from and take actions based on data. By identifying patterns in data, these systems improve and refine their operations over time. In the context of learning sciences, machine learning can help instructors discern students' learning strategies, tailor educational content to individual needs, and offer predictive insights to educators about potential challenges students might encounter (see also *artificial intelligence*).

**Neural Network:** A computing system inspired by the structure of the human brain that is designed to process information in a way that emulates human cognitive processes. Neural networks consist of interconnected nodes, which are analogous to neurons in the brain, that can be trained to recognize relationships and patterns in data. In the context of learning sciences, neural networks can be used to analyze and understand student behaviors, predict learning outcomes, and to develop personalized learning strategies. Neural networks are one approach to designing AI and machine learning systems (see also *artificial intelligence*).

**Pre-trained Language Model (PLM):** A type of artificial intelligence system that has been previously trained (pre-trained) on vast amounts of text data, allowing it to understand and generate language. The “pre-training” means it has already learned from general text data and is available for fine-tuning for specific tasks. In the context of learning sciences, a pre-trained language model can be further tailored for educational applications, such as understanding student responses from a specific class, generating content for a specific class, or assisting in coding transcripts using a particular codebook.

**Transformer:** A specific collection of algorithms, or architecture, commonly used in large language models. The transformer architecture revolutionized the field of natural language processing due to its effectiveness in learning from vast amounts of text data. The name derives from its ability to “transform” input data—from sentences to entire documents—into meaningful outputs like translations or summaries. In the context of learning sciences, transformers can assist in building instructors and learners powerful capabilities that aid in language translation, content summarization, and other tasks that involve understanding or generating text (see also *large language models*).

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# Measuring Faculty Engagement in Online Formative or Whole-Person Education: A Revised Instrument and Item Response Theory Model

Stanton Wortham  
Katrina Borowiec  
Deoksoon Kim  
*Boston College, USA*

## Abstract

The COVID-19 pandemic reinforced the importance of supporting students' comprehensive well-being when teaching online. One promising approach is formative or whole-person education, which emphasizes wholeness, purpose, and community. We created a scale using a polytomous Item Response Theory modeling approach, measuring the extent to which postsecondary teachers engage in formative education online. To our knowledge, this is the first scale designed to measure this construct. The scale was developed within an exploratory sequential mixed methods study on formative education online that also included semi-structured interviews with 37 faculty members. Results from the qualitative analysis were used to develop initial items. This data-informed process increased the construct validity of the scale. We refined the original item pool through a pilot test using a sample of 308 instructors. This article presents psychometric results for the final, 10-item scale using a sample of 245 instructors. Evaluation of item fit statistics, item trace lines, and the total information curve indicate that the graded response model was appropriate for this scale. The Cronbach's alpha and marginal reliability coefficients for the final scale were .90 and .91, indicating good reliability. Future research can explore how this scale might be adapted for in-person learning environments and other contexts.

*Keywords:* Formative education, whole-person education, scale development, item response theory

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The COVID-19 pandemic reinforced the importance of supporting students' comprehensive well-being, especially during uncertain times (Wortham et al., 2020). Concerns about students' mental health were well-documented prior to the pandemic (e.g., Oswalt et al., 2015), as were concerns about other aspects of their well-being, such as food insecurity (e.g., Freudenberg et al., 2019). However, the pandemic exacerbated challenges with students' basic needs (Goldrick-Rab et al., 2020), mental health (Elharake et al., 2023; Healthy Minds Network & American College Health Association, 2020), and technology access (Hart et al., 2021; Quezada et al., 2020), while creating new concerns such as how their careers would be impacted by the pandemic (Zhai & Du, 2020).

One comprehensive approach to supporting students' well-being is *formative or whole-person education*. Formative education emphasizes three central components: 1) *wholeness*, supporting students' integrated development along intellectual, social-emotional, moral/ethical, and spiritual dimensions; 2) supporting the development of students' sense of *meaning and purpose*; and 3) fostering *community* (Boston College, 2007). Given its focus on human connections, formative education has traditionally been associated with in-person learning environments. Emerging research provides promising evidence that formative education can be done online (Kim et al., 2021).

As defined by Mathes (2020), "Online learning uses the internet as a delivery modality to offer thoughtfully designed, quality, student-focused learning experiences, built on proven best practices that create effective interactions between learners, peers, instructors, and content" (para. 5). Importantly, Mathes's definition centers course design and interactions among teachers, students, and content, while it does not foreground particular tools. We think this focus is important, given the rapidly changing nature of technology. Faculty members play a critical role in ensuring successful online learning by adopting multiple roles, including course facilitator, mentor, manager, designer, and content expert (Martin et al., 2019).

Survey measures are commonly used in research and evaluation to understand individuals' perceptions, behaviors, and experiences. To our knowledge, there are no survey instruments that measure postsecondary teachers' engagement in formative education either in-person or online. The purpose of this study is to develop a scale that measures engagement in formative education online.

The current study is part of a broader exploratory sequential mixed methods study (Creswell, 2015) on formative education online that included qualitative interviews with 37 university faculty skilled in formative education online, which occurred before scale development and pilot testing. This paper presents psychometric findings from a revised survey instrument. We address three research questions:

- 1.) Is formative education best measured as a unidimensional or multidimensional construct?
- 2.) Can a graded response Item Response Theory (IRT) model be fit to this scale?
- 3.) Beyond model fit, what other evidence supports the reliability and validity of the new survey instrument that measures faculty members' engagement in formative education online?



## Conceptual Framework and Related Literature

In this section, we provide a foundation for the Concept Map used to develop the Formative Education Online Scale items. Theory and empirical literature about formative education, including our own research and others', were integrated to develop this map. We begin with formative education in general before moving to formative education online.

### Formative Education

Many educational philosophies take holistic approaches including those focused on well-being, civic purpose, and character development (Wortham et al., 2020). These philosophies view intellectual development as just one aspect of broader educational aims. Rooted in Jesuit education, "formative" or whole-person education is one example of a comprehensive approach to education, because it facilitates several key aspects of students' development (e.g., intellectual, spiritual, social-emotional, moral/ethical) (Boston College, 2007; O'Malley, 2015). Jesuit educational philosophy claims that caring for students as whole people—sometimes called "cura personalis"—provides a foundation for them to flourish and to offer the best version of themselves in service of others (Geger, 2014; O'Malley, 2015).

Formative education emphasizes three components: 1) wholeness, 2) meaning and purpose, and 3) community (Boston College, 2007; O'Malley, 2015). "Wholeness" describes how formative education promotes integrated student development along intellectual, social-emotional, spiritual, and moral/ethical dimensions (Boston College, 2007). "Meaning and purpose" describes how formative education helps students identify a sense of meaning and purpose in their lives (Boston College, 2007). Finding meaning and purpose involves a process of "discernment" about where one's talents intersect with the needs of humanity (O'Malley, 2015). One crucial step is encouraging students to look beyond extrinsic, instrumental goals, such as status and money. The third component is community. Formative education recognizes that education is not an isolated activity, but rather occurs within a community (Boston College, 2007). The community helps an individual identify larger goals and also provides one crucial end for ethical action. These three components are interrelated. One crucial aspect of holistic development is the discernment of larger life purpose, because a sense of purpose is connected to multiple dimensions of life, informing emotional reactions, underlying fulfilling relationships, and offering a sense of one's place in the larger, moral order, etc. The process of discerning one's purpose and developing holistically is best accomplished within a community.

These three components of formative education can be connected to postsecondary student development theory. Hence we argue that our Formative Education Online Scale should apply to all postsecondary institutions and is not limited to those with Jesuit roots. Kuh (2018), for instance, promotes a holistic educational approach that goes beyond intellectual aspects of student growth to include spiritual, physical, ethical, social, and emotional aspects of student development (i.e., "wholeness"). Chickering and Reisser's (1993) seven vectors of identity development include those that emphasize finding what is meaningful in one's life (i.e., "meaning and purpose") and developing interconnectedness and interpersonal relationships (i.e., "community") (Chickering & Reisser, 1993; Patton et al., 2016). The importance of community—i.e., feeling emotionally connected to and supported by their school and classroom communities—has been well-established (e.g., McMillan & Chavis, 1986). A sense of

community is important to student formation, since formative education is best accomplished through “the help of a companion on the way” (Kolvenbach, 2007, p. 10).

### **Formative Education Online**

There is limited literature focused on formative education in online settings. However, a recent qualitative study (see Kim et al., 2021) examined how 37 instructors supported students’ holistic needs when teaching online. These instructors included faculty across diverse academic fields, including arts and sciences, business, education, law, nursing, social work, theology, and continuing education. The results indicate that faculty members’ formative practices can be categorized into three main areas: empathic, reflective, and adaptive. First, faculty continuously demonstrated empathy for their students by reaching out to check in on them, modeling their own vulnerability, and building classroom community. Second, faculty emphasized reflective practices in their classrooms, such as creative activities and practices promoting mindfulness. Third, faculty adapted their instructional approaches to meet students’ evolving needs during the pandemic and routinely solicited students’ feedback about what was working well and what could use improvement. See Kim et al. (2021) for a detailed account of how these practices directly connect to wholeness, meaning and purpose, and community. For example, *reflective* practices provide opportunities for students to think about broader social issues and how they might address these issues in their future endeavors, providing insight about *meaning and purpose*.

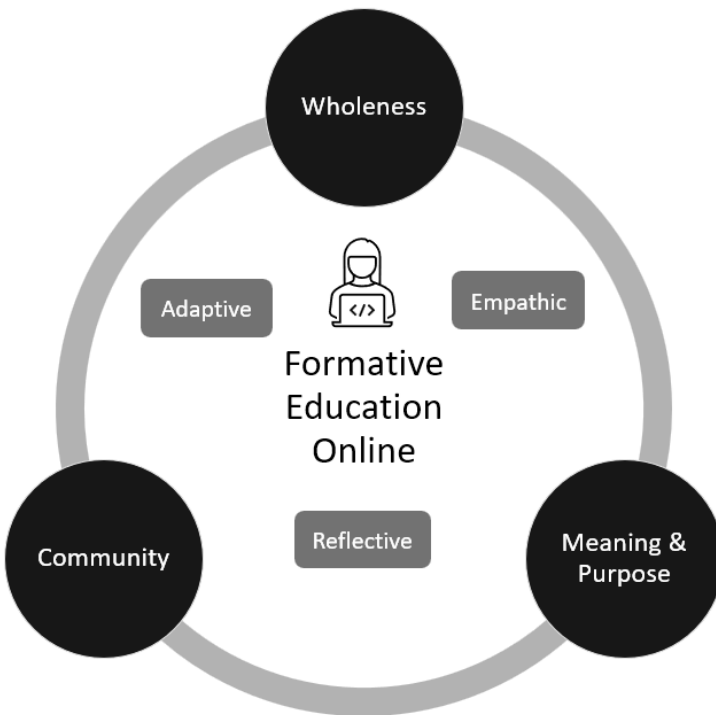
Especially in the context of the COVID-19 pandemic, other scholars have also emphasized the importance of fostering an “ethos of care” (Goin Kono & Taylor, 2021, p. 156) and showing empathy for students’ evolving needs (Conklin & Dikkers, 2021; Miller 2021). Researchers have also highlighted the importance of building a sense of community when teaching online (e.g., Borowiec et al., 2021; Castañeda & Selwyn, 2018; Kauffman, 2015; Kilgour et al., 2019; Robinson & Hullinger 2008; Salmon, 2011). In line with the Community of Inquiry Framework (CoI), when teaching online instructors can foster a sense of community through social, cognitive, and teaching presence (Archibald, 2010; Berry, 2019; Garrison et al., 2010; Garrison & Akyol, 2013; Shea & Bidjerano, 2009). By effectively designing learning environments (i.e., teaching presence), instructors can increase students’ comfort in the classroom (i.e., social presence) and critical thinking about the course materials (i.e., cognitive presence). Clear, direct one-on-one communication is an important tool for establishing a human connection between students and their instructor in online courses (Berry, 2017; Lowenthal & Dunlap, 2018).

### **Formative Education Online Concept Map**

Figure 1 displays the concept map used to frame our understanding of what it means to engage in formative education online. This framework was used to develop the survey items. As seen in Figure 1, formative education online has three components: 1) wholeness, 2) meaning and purpose, and 3) community. When these three components are integrated, successful formative education online can occur. The three components might be considered the aims of formative education online, which are then accomplished through 1) adaptive, 2) empathic, and 3) reflective teaching practices and philosophies, as shown in our prior empirical research (see Kim et al., 2021).



**Figure 1**  
*Concept Map for Formative Education Online*

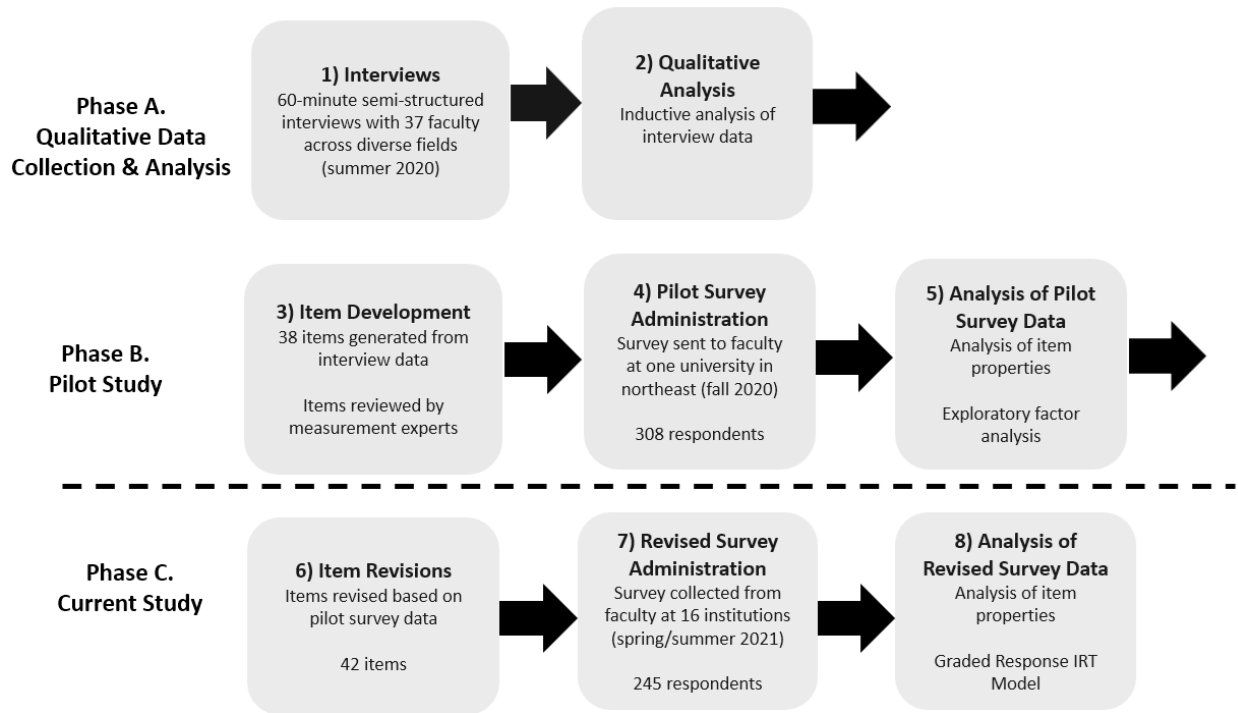


## Methodology

Since the Formative Education Online Scale was developed in the context of a broader exploratory sequential mixed methods study (Creswell, 2015), multiple phases of data collection and analysis informed the final 10-item scale. All components of the mixed methods study were approved by the Institutional Review Board.

The instrument was developed through an eight-step process conducted in three phases, A through C, as displayed in Figure 2. Phases A and B provided a foundation for the current study, Phase C. The Methodology section begins with an Overview of the Instrument Development process, before proceeding to discuss the specifics of Data Collection, Participants, and Data Analysis for the final 10-item scale.

**Figure 2**  
*Overall Exploratory Sequential Mixed Methods Study Design*



### Overview of Instrument Development

The current Formative Education Online Scale represents the first measure of formative education online, as far as we know; nor are there any scales measuring in-person engagement in formative education. This creates an exciting opportunity, but it also raises challenges due to the unknown psychometric functioning of the construct. Based on our Concept Map (see Figure 1), our working theory was that engagement in formative education online has three main components: 1) wholeness, 2) meaning and purpose, and 3) community. From a psychometric perspective, it was not immediately clear whether formative education was a unidimensional construct with wholeness, meaning/purpose, and community acting as three aspects of one unified construct, or whether it was a three-dimensional construct with wholeness, meaning and purpose, and community constituting their own dimensions. Nevertheless, we knew it was important for these three aspects of formative education to be represented in the survey items.

In Phase A, Step 1, we interviewed 37 faculty members at one private research university in the United States to understand how faculty provided a formative or whole-person educational approach online (see Kim et al., 2021, for more information about the study). Purposive sampling was used to select these interview participants. Department chairs across the university selected faculty who were exemplary in formative education online, based on their reading of course evaluations and anecdotal information. Formative education is an explicit and widespread part of mission and practice at the university. A qualitative inductive data analysis (Step 2) indicated that faculty members' practices could be organized into three areas: 1) adaptive (i.e.,

faculty were willing to change their courses in response to students' needs), 2) empathic (i.e., faculty recognized the importance of attending to students' social-emotional needs), and 3) reflective (i.e., faculty emphasized teaching practices that encouraged student reflection about course content and the broader world; see Kim et al., 2021, for more information). As discussed in the Conceptual Framework section and depicted in the Concept Map, these themes are also present in related research.

In Phase B, we developed (Step 3), pilot tested (Step 4), and analyzed data from (Step 5) the initial survey instrument. We used the interview data from Phase A to derive item content that reflected the themes of adaptive, empathic, and reflective behaviors that can facilitate wholeness, meaning and purpose, and community. For instance, one item was: "I use material from my class to help students connect how their individual sense of purpose relates to serving other people." This item captures teaching practices that encourage students to reflect on their larger purpose in relation to a community beyond themselves. Items were preceded by the question stem: "When teaching online, how often do you do the following activities?" The 38-item pilot survey was administered online using Qualtrics, and 308 teachers at one university in the northeastern United States completed the survey. No incentive was offered to participate. Items were presented along a five-point Likert scale with the following response options: "never" (1), "rarely" (2), "sometimes" (3), "often" (4), and "very often" (5). Higher scores indicated increased engagement in formative education online.

A Classical Test Theory (CTT) approach was used to analyze the pilot test data (Crocker & Algina, 1986; DeVellis, 2016). The average item difficulty was 3.91, on a scale of 1 to 5, suggesting that the items were "easy" to endorse. Item difficulty was computed as the mean response across all respondents. For the exploratory factor analysis, we explored extraction based on Kaiser's rule to extract factors with eigen values greater than one (DeVellis, 2016), as well as one-factor and three-factor solutions, in accordance with our possible theories about the construct being unidimensional or multidimensional with three categories. Kaiser's rule suggested that eight factors should be extracted, but this solution was ruled out since there was no substantive interpretation of the factors. The one- and three-factor solutions indicated that many items shared a small amount of variance with the other items. We decided to revise the scale before making any decisions about the psychometric structure. Specifically, we wanted to write more "difficult" to endorse survey items. Furthermore, we also wanted to administer the scale to faculty members at diverse institutions.

Phase C represents the current study, which includes item revisions (Step 6), another round of data collection (Step 7), and data analysis using Item Response Theory-based methods (Step 8). Additional details on Steps 6 through 8 are explained below.

### **Data Collection**

Data for the revised survey were collected during spring/summer 2021 from instructors at 16 institutions across the United States, including public community colleges, private four-year colleges, private universities, and public universities. The survey was administered online using Qualtrics. Convenience sampling was utilized. Instructors were invited to participate in the survey via email, and no incentive was offered to participate. A screening question at the beginning of the survey was used to verify that the potential participant had previously taught or

was teaching at least one online, hybrid, or blended course. Most instructors met this qualification because they taught during the COVID-19 pandemic.

The main survey instrument included demographic (e.g., gender, race/ethnicity) and background questions (e.g., years of teaching experience, academic department), the revised 42-item Formative Education Online Scale, and supplemental questions about instructors' experiences teaching online (e.g., benefits, challenges, practices). The supplemental questions are not part of the current study. Several revisions were made to the Formative Education Online Scale between the pilot and the current study. First, five items were dropped and nine items were added. Items were dropped due to lack of clarity. Some items were added to clarify ideas that were poorly captured in the dropped pilot survey items. Based on the pilot test results, we also developed more psychometrically "difficult" items. We added more items related to spiritual and moral practices, since these tended to have lower item means in the pilot test. No changes were made to the question stem or response options.

After the survey administration, we also decided to remove 12 additional items from consideration in the final instrument, yielding 30 items for the data analysis. The project team brainstormed about which items best represented our target construct, in accordance with the Concept Map. A key aim was to remove items that captured more "generic" aspects of good teaching rather than aspects of formative education specifically. From a statistical perspective, we wanted to remove construct-irrelevant variance from the final scale scores by focusing on the most construct-relevant items. In other words, we wanted questions on this measure to be distinct from those that might appear on a general measure of "best teaching" practices. Analogously, a mathematics test that includes reading-heavy tasks may measure both mathematics skills and reading skills. This makes it difficult to know how much of the student's score represents mathematics skills and how much represents reading skills. Our goal was to reduce our measure's item pool and focus on engagement in formative education online, without tapping heavily into related constructs. For example, community is one component of engagement in formative education, but a specific type of community building is most relevant to our construct. Thus, "I strive to create a sense of community in the classroom" was removed, because it reflects general community building. In contrast, the following item was retained: "I encourage students to share their personal life experiences." In this case, the instructor is supporting community building by encouraging openness and vulnerability among students, thus also supporting social-emotional development. Ideally, we would have removed the more "generic" items before the survey administration. But in this case, as in others, scale development was an iterative process.

## **Participants**

A total of 291 instructors responded to the survey. However, to be included in this study, the respondent had to answer at least 15 of the 30 items. 245 instructors met this qualification.

Table 1 presents detailed information about faculty demographic and other characteristics. To summarize: 37% of instructors identified as men, 56% as women, and <0.5% as non-binary. The remaining 7% either preferred not to answer or offered no response. With respect to race/ethnicity, 4% of instructors identified as Asian, 3% as Black or African American, 5% as Hispanic or Latinx, 73% as White, 3% as multiracial, and 1% as some additional race. Eleven percent preferred not to answer or gave no response. When asked

whether they identified as spiritual and/or religious; 32% reported being spiritual; 7% said religious; 24% said both; 31% said neither; and 7% provided no response.

**Table 1**  
*Respondent Characteristics*

Characteristic	Count	Percent	Characteristic	Count	Percent
<i>Total Participants</i>	245	100%			
<i>Gender</i>			<i>Academic Discipline</i>		
Man	91	37%	Arts & Humanities	40	16%
Woman	136	56%	Business	14	6%
Non-binary	1	<.5%	Education	69	28%
I prefer not to answer.	4	2%	Medicine, nursing, other health	34	14%
No response	13	5%	Social sciences	34	14%
<i>Race/ethnicity</i>			Social work	7	3%
Asian	11	4%	STEM	37	15%
Black/African American	7	3%	Additional fields	7	3%
Hispanic/LatinX	12	5%	No response	3	1%
White	180	73%	<i>Teaching Experience</i>		
Multiracial	7	3%	0-2 Years	18	7%
Additional races	2	1%	3-5 Years	30	12%
Prefer not to answer	12	5%	6-10 Years	39	16%
No response	14	6%	11-15 Years	41	17%
<i>Spiritual or Religious Identity</i>			16-20 Years	33	13%
I am a spiritual person.	78	32%	21+ Years	84	34%
I am a religious person.	17	7%	No response	0	0%
Both	58	24%	<i>Works at Jesuit Institution</i>		
Neither	76	31%	Yes	75	31%
No response	16	7%	No	170	69%
<i>Tenured or Tenure- Track</i>					
Yes	107	44%			
No	120	49%			
No response	18	7%			

With respect to their academic background, 44% of instructors were on the tenure track, 49% were not, and 7% did not answer the question. Education was the most commonly reported discipline (28%), followed by the arts and humanities (16%), STEM (15%), medicine/nursing/ other health (14%), social sciences (14%), business (6%), and social work (3%). Thirty-one percent of instructors worked at Jesuit institutions.

Instructors were also diverse with respect to their teaching experience: 19% had five years of teaching experience or fewer, while 34% had 21 years or more of teaching experience (see Table 1). Table 2 provides information about the number of completely online and hybrid courses that instructors had taught. All instructors had to have taught at least one course in an online, hybrid, or blended format to participate in the study. Only 5% of instructors never taught a completely online course. The highest proportion of instructors, 27%, reported teaching two-to-three completely online courses. In comparison, the highest proportion of instructors reported teaching zero hybrid courses (47%), although 20% had taught two-to-three.

**Table 2**  
*Online and Hybrid Teaching Experience*

Number of Courses	Completely Online Courses (Asynchronous or synchronous)		Hybrid Courses	
	Count	Percent	Count	Percent
0	12	5%	115	47%
1	33	13%	30	12%
2-3	66	27%	49	20%
4-5	48	20%	18	7%
6-10	50	20%	16	7%
11-15	14	6%	3	1%
16-20	7	3%	4	2%
21 or more	14	6%	7	3%
No response	1	0%	3	1%
Total	245	100%	245	100%

**Data Analysis**

Data analyses were conducted using IBM SPSS 28 (IBM Corp, 2021) and IRTPRO 6.0 (Vector Psychometric Group, 2022) software. We began the analysis by computing descriptive statistics for each of the 30 items. These included basic frequencies to ensure that all response categories (i.e., “Never” to “Very often”) were being utilized by respondents, as well as item difficulties and discriminations using a Classical Test Theory (CTT) approach (Crocker & Algina, 1986; DeVellis, 2016). Using CTT, item difficulty refers to how “difficult” it is for respondents to endorse an item and is computed as the mean response across all respondents. Item discrimination corresponds to how well the item differentiates between respondents of various trait levels and is computed as the corrected item-total correlation—that is, the correlation between the item response and the total test score, excluding that item. From a CTT lens, discrimination below 0.20 is “poor”; between 0.20 and 0.29 is “marginal”; between 0.30 and 0.39 is “reasonably good”; and 0.40 or higher is “very good” (Ebel & Frisbie, 1991, p. 232).

The next series of analyses focused on exploring whether a Graded Response Model (Samejima, 1969) was appropriate for these data. The Graded Response Model (GRM) is part of the family of polytomous Item Response Theory (IRT) models (de Ayala, 2009). Polytomous IRT models are statistical models, also known as latent trait models, that use ordinal regression

to predict a respondent's likelihood of endorsing an item at a certain level (e.g., "Never," "Rarely"), given their overall trait level. For the Formative Education Online Scale, the latent trait is "engagement in formative education online."

The GRM can be represented statistically as follows (de Ayala, 2009, p. 219):

$$P^*_{x_j}(\theta) = \frac{e^{\alpha_j(\theta - \delta_{x_j})}}{1 + e^{\alpha_j(\theta - \delta_{x_j})}}$$

A separate GRM is computed for each item in a scale. This formula represents an individual's probability,  $P^*$ , of responding to a specific item,  $j$ , at a response level of  $x_j$  or higher, given their estimated trait level,  $\theta$ . The parameter,  $\alpha_j$ , represents the item discrimination parameter, which indicates how well the item differentiates between respondents of different trait levels (i.e., higher  $\alpha$  values indicate improved discrimination). Finally,  $\delta_{x_j}$  is the boundary or threshold between two adjacent response categories,  $x$  and  $x-1$ . For the Formative Education Online Scale, an example would be the boundary between "Sometimes" and "Rarely." Additionally,  $\delta_{x_j}$  represents the amount of engagement in formative education online (i.e., the trait level) at which a respondent has a 50% probability of responding at that category,  $x$ , or higher for item  $j$  (de Ayala, 2009).

IRT models also have three major assumptions (de Ayala, 2009; Hambleton et al., 1991). The first assumption is unidimensionality, which means that there is one underlying trait. This assumption will be examined using principal axis factoring in SPSS. There should be one underlying factor or one dominant factor that explains a large proportion of variance (Hambleton et al., 1991). Some level of violation is often observed in practice (de Ayala, 2009). If the construct is multidimensional, then a multidimensional IRT model must be used or a separate GRM can be computed for each dimension. The second assumption is conditional independence, which means that a person's response to each item is not dependent on their responses to other items in the scale. This assumption will be examined using Local Dependency Chi-square statistics provided by IRTPRO. Values above 10 indicate that there may be issues with local dependency that deserve further examination (Vector Psychometric Group, 2020). The third assumption is that there is alignment between the data and the GRM model, which will be examined using overall model fit statistics, item fit statistics, and examination of the item trace lines. Overall model fit will be examined using the Root Mean Square Error of Approximation (RMSEA) statistic. Hu and Bentler (1999) suggest that an RMSEA statistic of .06 or below indicates "good" fit. Item fit will be examined using chi-square item fit diagnostics. Typically, an alpha level of .05 is used to detect some degree of misfit; however, if the p-value is above .01, then the misfit can be considered negligible (Vector Psychometric Group, 2020).

Finally, the overall reliability and validity of the final scale will be examined. Reliability will be examined using both Cronbach's alpha as a measure of internal consistency (DeVellis, 2016) and marginal reliability, which indicates the average reliability of the scale across the latent trait (de Ayala, 2009). Cronbach's alpha of 0.7 or higher is considered acceptable (Nunnally, 1978). We will use a comparable standard to evaluate marginal reliability. The construct validity of the scale is supported through its rigorous development process. The Concept Map was developed using both theory and empirical research. An early version of the

items was reviewed by psychometricians and their feedback was integrated into the survey. Finally, we will test the “known groups” validity (DeVellis, 2016) of the scale by comparing mean IRT-based total scores for instructors at Jesuit institutions to those at all other institutions using an independent samples t-test. We anticipate that this scale will have utility at all postsecondary institutions. However, we expect that instructors at Jesuit institutions will score higher, on average, given that the scale was developed based on a Jesuit approach to formative education online. Hence, instructors at Jesuit institutions are expected to engage in these practices more often, on average, as part of their institutional cultures.

## Results

The results are organized into two main sections. The first section reviews the initial analysis of the revised scale, and the second section provides descriptive statistics, reliability, and validity evidence for the final scale.

### Initial Analysis of 30 Items in the Revised Scale

Table 3 provides descriptive statistics for the 30 items in the revised scale, including item difficulties (i.e., means) and discriminations (i.e., corrected item-total correlations) using a CTT approach. Item difficulties ranged from 2.70 to 4.51, with an average of 3.80. The average item difficulty for the revised scale was slightly lower than for the pilot (3.80 vs. 3.91). Item discrimination ranged from 0.44 to 0.74, with an average of 0.58. All items had “very good” discrimination (Ebel & Frisbie, 1991).

Frequency statistics for the 30 items resulted in two items, formed26 and formed36, being removed from consideration for the final scale. The first item was removed because no respondent utilized the “never” category. A second item (formed36) was removed because only one respondent utilized the “never” and “rarely” categories, respectively. We opted to remove these items because the response categories did not seem appropriate for the items, given the low utilization of certain categories.

**Table 3**

*Descriptive Statistics for 30 Items in Revised Scale*

<b>Item</b>	<b>N</b>	<b>Min.</b>	<b>Max.</b>	<b>Mean</b>	<b>SD</b>	<b>Corrected Item-Total Correlation</b>
formed01	244	1	5	4.12	0.92	0.58
formed03	245	1	5	3.80	1.04	0.58
formed04	245	1	5	3.13	1.17	0.57
formed06	241	1	5	3.70	1.09	0.64
formed07	244	1	5	2.70	1.27	0.57
formed08	244	1	5	3.88	0.99	0.61
formed10	244	1	5	2.92	1.26	0.59
formed11	244	1	5	3.91	1.04	0.50
formed12	245	1	5	3.96	1.04	0.67



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formed13	245	1	5	3.83	1.11	0.52
formed15	243	1	5	3.57	1.21	0.74
formed17	245	1	5	4.04	1.01	0.46
formed18	245	1	5	3.20	1.23	0.49
formed20	245	1	5	3.58	1.09	0.74
formed21	245	1	5	4.25	0.87	0.58
formed22	243	1	5	4.06	1.18	0.48
formed23	244	1	5	4.11	0.98	0.57
formed24	243	1	5	4.15	0.89	0.58
formed26	244	2	5	4.05	0.84	0.59
formed32	240	1	5	3.60	0.97	0.44
formed33	240	1	5	4.30	0.90	0.63
formed34	240	1	5	3.90	1.22	0.51
formed35	239	1	5	3.72	1.13	0.45
formed36	240	1	5	4.38	0.67	0.52
formed37	239	1	5	3.93	1.02	0.68
formed38	238	1	5	3.87	1.01	0.60
formed39	237	1	5	3.73	1.16	0.68
formed40	236	1	5	4.51	0.81	0.50
formed41	235	1	5	4.20	1.01	0.55
formed42	234	1	5	2.87	1.35	0.66

**Table 4**  
*Principal Axis Factoring Results for 28-Items Without Rotation*

Item	Factor					
	1	2	3	4	5	6
formed15	0.77					
formed20	0.76					
formed39	0.70					
formed37	0.70					
formed12	0.69					
formed42	0.69		-0.36			
formed06	0.66					
formed33	0.65					
formed08	0.64					
formed38	0.63					
formed10	0.62					
formed23	0.60	0.50	0.40			
formed04	0.60	-0.37				
formed03	0.60					

formed07	0.60			-0.32	
formed24	0.60	0.41	0.33		
formed21	0.59				
formed01	0.59				
formed41	0.58				
formed13	0.56	-0.56	0.35		
formed11	0.53				
formed34	0.52				-0.46
formed40	0.52			0.36	
formed22	0.50	0.35	0.33		
formed18	0.50				
formed35	0.48	-0.36	0.34		
formed17	0.47				
formed32	0.45				

*Note.* Only factor loadings of .3 or higher are displayed.

Table 4 displays the principal axis factoring results. Six factors were extracted using Kaiser’s rule, to extract based on the number of eigen values greater than 1 (DeVellis, 2016). The findings support the idea of a dominant factor, since all 28 items loaded on the first factor with a loading of 0.45 or higher. Moreover, the first factor explained 37% of the shared variance, while the other five each explained 5% or less variance. Notably, the fourth, fifth, and sixth factors were weak, explaining 3% or less variance each. Zero items loaded on the sixth factor. A solution with more than three factors did not seem appropriate. A forced three-factor solution with a Promax rotation indicated that all three factors are moderately to strongly correlated with one another (factors 1 and 2:  $r=.67$ ; factors 1 and 3:  $r=.61$ ; and factors 2 and 3:  $r=.49$ ). This provides further support for a dominant first factor. Any violations of the unidimensionality assumption of IRT seem modest. As de Ayala (2009) noted, there is typically some level of violation of this assumption in practice.

Based on these results, we proceeded with an assumption of unidimensionality in the formative education online construct. It was then appropriate to proceed to IRT-based modeling. After further consideration, the idea that the construct was unidimensional also aligned better with theory. Although engagement in formative education online contained three key components (wholeness, meaning/purpose, community), these components best capture the nature of formative education online when working harmoniously together.

Through an iterative process, we removed 18 additional survey items and this yielded a final scale of 10 items. Since the construct was presumed unidimensional at this point in the development process, we could reduce the number of total items since we only needed to compute one score. It was also important to reduce respondents’ burden, so that the scale can more easily be utilized. When selecting the final 10 items, we balanced a variety of considerations. We first reduced the item pool to 16 items based on the aforementioned psychometric analyses (e.g., item difficulties and discriminations, factor analysis results) and the item content, so that selected items would still capture wholeness, meaning and purpose, and

community while embodying adaptive, empathic, and reflective teaching practices. After selecting these 16 items, we ran an initial GRM in IRTPRO 6.0 and plotted trace lines. We then selected the final 10 items based on their content and the trace lines. The ideal trace lines were those in which each category clearly had a range of theta where a respondent was most likely to select that category, suggesting that the categories were being utilized by respondents as intended.

**Table 5**  
*Overview of Item Revision Process*

Study Phase and Specific Survey Task	Number of Items and Explanation for Reduction
Pilot Survey Administration	<b>38 items</b>
Revised Survey Administration	<b>42 items</b> Of the original 38 items, five items were dropped due to lack of clarity. Nine items were added to capture missing aspects of the construct and to add more psychometrically “difficult” items.
Revised Survey Post-Administration	<b>30 items</b> Of the 42 items in the Revised Survey, the research team removed 12 items that seemed too “generic” and potentially captured construct-irrelevant variance.
Revised Survey Data Analysis: Item Difficulties, Discriminations, and Frequencies	<b>28 items</b> Of the 30 items, two were removed because respondents were not using all response options, suggesting that the response categories were not appropriate for the items.
Revised Survey Data Analysis: Initial Item Reduction Phase	<b>16 items</b> Through an iterative process, we reduced the 28 items to 16. After deciding the construct was unidimensional, 28 items were not needed. It was important to reduce the number of items in order to reduce respondents’ burden. Item reduction was done with reference to a combination of item content, item difficulty, item discrimination, and factor analysis results.
Revised Survey Data Analysis: Additional Item Reduction Phase and IRT Model	<b>10 items</b> We selected the final 10 items with reference to their content combined with the item trace lines produced through IRT modeling. The ideal trace lines were those in which each response category had a range of theta where a respondent was most likely to select that response.

**Final 10-Item Scale**

In this section, we provide information about the reliability and validity of the final 10-item Formative Education Online Scale. The scoring procedures for the final 10-item scale can be found in the Appendix. The final score is scaled on the T-Score metric with a mean of 50 and a standard deviation of 10.

The final 10-items are presented in Table 6, along with their item difficulties (i.e., item means) and discriminations (i.e., corrected item-total correlations) using a CTT-based calculation. The item difficulties ranged from 2.70 to 3.96, with an average difficulty of 3.41. As desired, this represents a more “difficult” scale than we had after the pilot test. Item discrimination ranged from 0.59 to 0.76, with an average of 0.66. These discrimination values are all considerably higher than the 0.40 criterion for “very good” discrimination suggested by Ebel and Frisbie (1991).

**Table 6**  
*Descriptive Statistics for Items in Final Scale*

<b>Item Description</b>	<b>Item</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>	<b>Corrected Item-Total Correlation</b>
I incorporate assignments that ask students to consider moral dilemmas.	formed04	245	3.13	1.17	0.59
I encourage students to share their personal life experiences.	formed06	241	3.70	1.09	0.63
I welcome students to contribute their spiritual or religious beliefs and values in classroom discussions.	formed07	244	2.70	1.27	0.63
I provide opportunities in class for mindfulness and/or contemplation.	formed10	244	2.92	1.26	0.63
I encourage students to incorporate what matters to them in the course assignments.	formed12	245	3.96	1.04	0.63
I use material from my class to help students connect how their individual sense of purpose relates to serving other people.	formed15	243	3.57	1.21	0.76
I design assignments and facilitate conversations that help students identify what is meaningful in their lives.	formed20	245	3.58	1.09	0.72
I structure my courses to encourage students to think beyond their personal experiences and toward their ultimate contribution to a greater good.	formed37	239	3.93	1.02	0.64
I encourage students to develop their own moral compass.	formed39	237	3.73	1.16	0.66
My course attends to the integration of mind and spirit as a component of self-discovery.	formed42	234	2.87	1.35	0.71

A graded response model was then computed for these 10 items using IRTPRO 6.0. Table 7 displays the factor loadings for each item in the final scale. The factor loadings were high, ranging from 0.64 to 0.85.

**Table 7**  
*Factor Loadings for Final 10-Item Scale*

Item	$\lambda_1$	s.e.
formed04	0.64	0.08
formed06	0.70	0.08
formed07	0.68	0.08
formed10	0.70	0.08
formed12	0.74	0.08
formed15	0.85	0.06
formed20	0.84	0.06
formed37	0.75	0.08
formed39	0.74	0.08
formed42	0.81	0.06

The RMSEA for the overall model is 0.06, indicating good overall fit (Hu & Bentler, 1999). Table 8 displays item level fit statistics. Only one item, formed04, had a p-value below .05, which indicates misfit. However, p-values above .01 indicate that the misfit can be considered negligible (Vector Psychometric Group, 2020).

**Table 8**  
*S-X<sup>2</sup> Item Level Diagnostic Statistics*

Item	X <sup>2</sup>	d.f.	p
formed04	91.78	68	0.029
formed06	56.04	56	0.475
formed07	67.56	62	0.293
formed10	73.18	63	0.178
formed12	59.89	51	0.184
formed15	49.16	48	0.428
formed20	50.86	45	0.253
formed37	52.91	48	0.290
formed39	69.05	55	0.096
formed42	62.79	56	0.248

Table 9 provides a standardized local dependency chi-square statistic, LD  $\chi^2$ , for each item pair. Values above 10 indicate that there may be issues with local dependency that deserve further examination (Vector Psychometric Group, 2020). The highest value for these data is 3.5, indicating that local dependency is not a problem with this scale.

**Table 9**  
*Standardized LD X<sup>2</sup> Statistics*

Item	1	2	3	4	5	6	7	8	9
formed04									
formed06	1.5								
formed07	-0.7	-0.8							
formed10	0.3	-0.0	-0.0						
formed12	-0.8	0.0	-0.9	3.5					
formed15	-1.2	-0.8	3.0	0.9	0.9				
formed20	0.3	-1.6	0.8	2.3	1.9	2.4			
formed37	-0.9	-0.2	1.9	-0.1	-0.9	-0.4	-0.7		
formed39	-0.3	-1.2	1.8	0.8	0.2	0.6	0.9	1.9	
formed42	-0.3	-0.7	2.1	0.6	3.7	1.0	0.8	0.4	2.2

Table 10 provides information about the item parameters: discrimination,  $a$  item thresholds,  $b_1$  to  $b_4$ , and item intercepts,  $c_1$  to  $c_4$ . This information can be used to predict an individual’s likelihood of providing a particular response (e.g., “Never”), given their latent trait level (i.e., amount of engagement in formative education online). Item formed15 has the highest discrimination, meaning that answering this item provides the most information about an instructor’s amount of engagement in formative education online.

**Table 10**

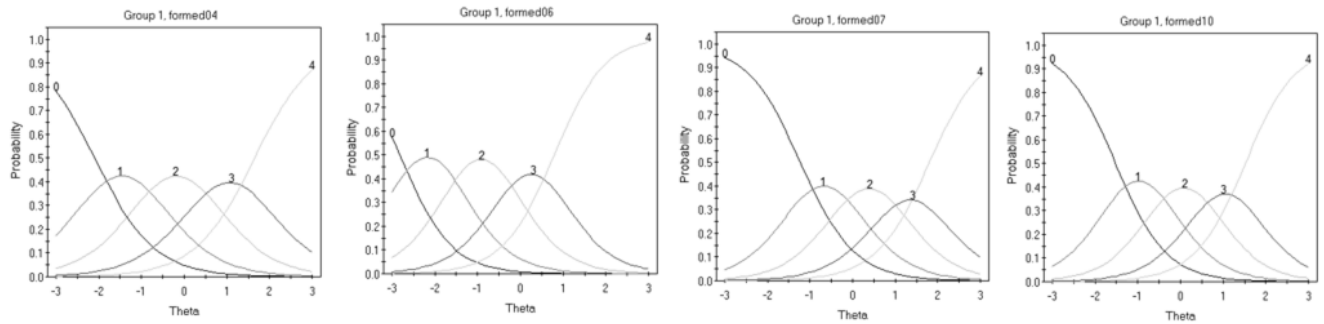
*Graded Model Item Parameter Estimates for Final 10-Item Scale, logit:  $a(\theta - b)$  and logit:  $a\theta + c$*

Item	<i>Item Discrimination</i> [SE]		<i>Item Thresholds</i> [SE]				<i>Item Intercepts</i> [SE]			
	<i>a</i>	<i>b</i> <sub>1</sub>	<i>b</i> <sub>2</sub>	<i>b</i> <sub>3</sub>	<i>b</i> <sub>4</sub>	<i>c</i> <sub>1</sub>	<i>c</i> <sub>2</sub>	<i>c</i> <sub>3</sub>	<i>c</i> <sub>4</sub>	
formed04	1.41 [0.18]	-2.10 [0.25]	-0.82 [0.14]	0.46 [0.17]	1.65 [0.26]	2.97 [0.30]	1.15 [0.22]	-0.66 [0.21]	-2.34 [0.26]	
formed06	1.67 [0.22]	-2.82 [0.33]	-1.54 [0.17]	-0.28 [0.13]	0.79 [0.18]	4.71 [0.50]	2.57 [0.30]	0.47 [0.23]	-1.31 [0.24]	
formed07	1.57 [0.21]	-1.22 [0.15]	-0.14 [0.13]	0.90 [0.19]	1.81 [0.28]	1.92 [0.26]	0.22 [0.21]	-1.42 [0.23]	-2.84 [0.29]	
formed10	1.67 [0.22]	-1.52 [0.17]	-0.43 [0.12]	0.58 [0.16]	1.51 [0.24]	2.53 [0.29]	0.71 [0.23]	-0.97 [0.23]	-2.53 [0.28]	
formed12	1.86 [0.25]	-2.78 [0.33]	-1.66 [0.17]	-0.75 [0.12]	0.48 [0.15]	5.16 [0.56]	3.09 [0.35]	1.39 [0.27]	-0.89 [0.24]	
formed15	2.77 [0.39]	-1.74 [0.15]	-1.03 [0.10]	-0.23 [0.10]	0.71 [0.16]	4.81 [0.58]	2.87 [0.44]	0.64 [0.34]	-1.96 [0.32]	
formed20	2.58 [0.35]	-2.06 [0.20]	-1.16 [0.11]	-0.17 [0.10]	0.92 [0.17]	5.33 [0.59]	2.99 [0.42]	0.43 [0.30]	-2.38 [0.32]	
formed37	1.90 [0.27]	-2.73 [0.33]	-1.76 [0.18]	-0.74 [0.11]	0.55 [0.16]	5.19 [0.58]	3.35 [0.38]	1.41 [0.27]	-1.05 [0.23]	
formed39	1.88 [0.26]	-2.24 [0.25]	-1.34 [0.15]	-0.35 [0.11]	0.68 [0.16]	4.21 [0.45]	2.52 [0.32]	0.66 [0.24]	-1.27 [0.23]	
formed42	2.37 [0.31]	-1.05 [0.12]	-0.27 [0.10]	0.59 [0.14]	1.22 [0.19]	2.48 [0.34]	0.63 [0.28]	-1.39 [0.28]	-2.88 [0.33]	

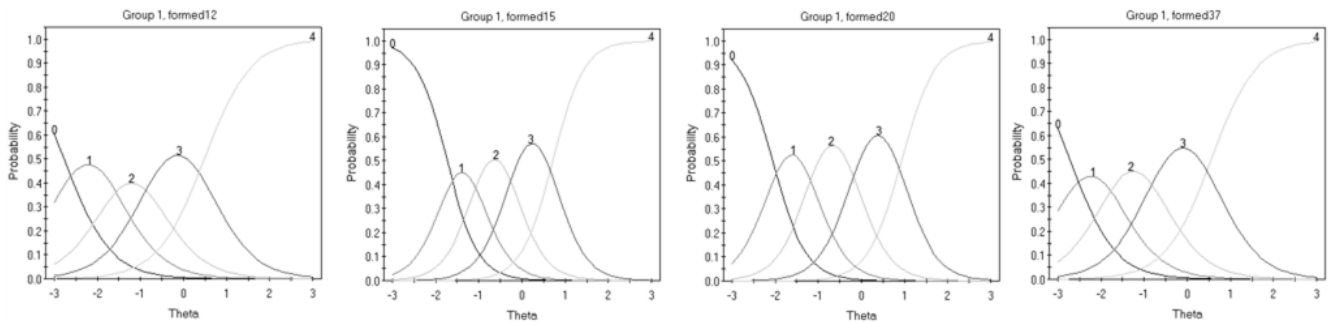
*Note.* The standard error [SE] for each parameter is presented in brackets. The subscript 1 corresponds to “Rarely,” 2 to “Sometimes,” 3 to “Often,” and 4 to “Very Often.”

The trace lines for all 10 items are presented in Figures 3a through 3b. The categories of 0, 1, 2, 3, and 4 correspond to the response options “Never,” “Rarely,” “Sometimes,” “Often,” and “Very Often,” respectively. For example, the leftmost chart in Figure 3a corresponds to item “formed04.” The most probable response to this item for a postsecondary teacher with a theta (i.e., amount of engagement of formative education online) of around -2.0 or below is “Never.” In comparison, postsecondary teachers with a theta level around 1.5 or higher are most likely to respond “Very Often” on this item.

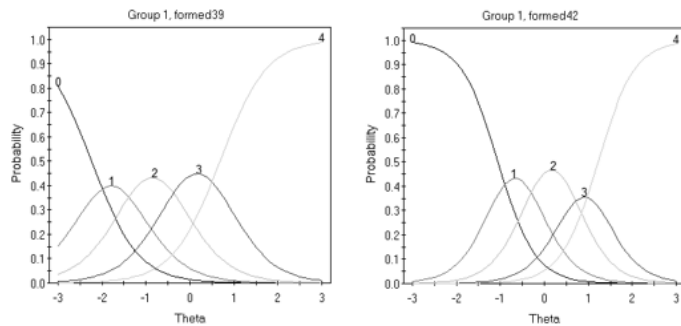
**Figure 3a**  
*Trace Lines for Items: Formed04, Formed06, Formed07, and Formed10 (Respectively)*



**Figure 3b**  
*Trace Lines for Items: Formed12, Formed15, Formed20, and Formed37 (Respectively)*



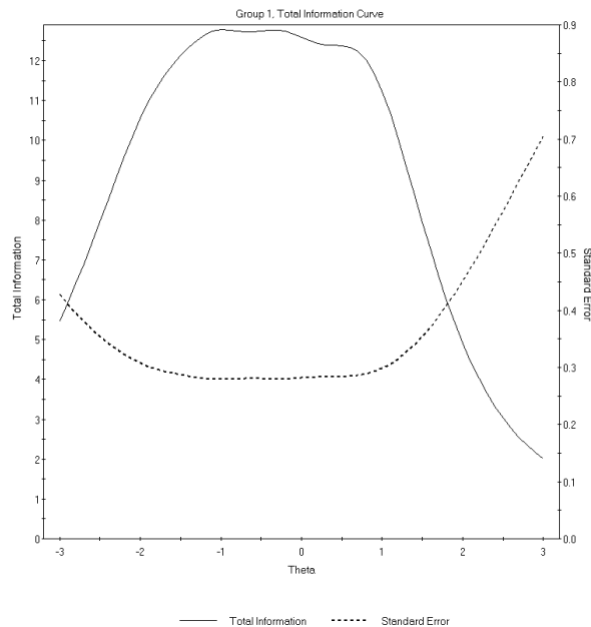
**Figure 3c**  
*Trace Lines for Items: Formed39 and Formed42 (Respectively)*



Cronbach’s alpha reliability and marginal reliability were both high at .90 and .91, respectively, indicating very good overall reliability for the scale. Figure 4 displays the Total Information Curve for the Formative Education Online Scale. From this graph, we can see that the scale provides a high amount of information relative to the amount of error. The only range of the trait where more information might be needed is at the upper range of the scale. In other words, more psychometrically “difficult” items are needed to better capture very high trait levels.



**Figure 4**  
*Total Information Curve for the Formative Education Online Scale*



The known-groups validity was supported. The independent samples t-test indicated that instructors from Jesuit institutions ( $N=75$ ,  $M=54.55$ ,  $SD=8.91$ ) had significantly higher scores on average than those from non-Jesuit institutions ( $N=170$ ,  $M=47.97$ ,  $SD=9.03$ ) ( $t=5.27$ ,  $df=243$ ,  $p<.001$ ). On average, instructors at Jesuit institutions scored 6.58 points higher on the formative education online scale than instructors at other institutions (Cohen's  $d=0.73$ ).

## Discussion

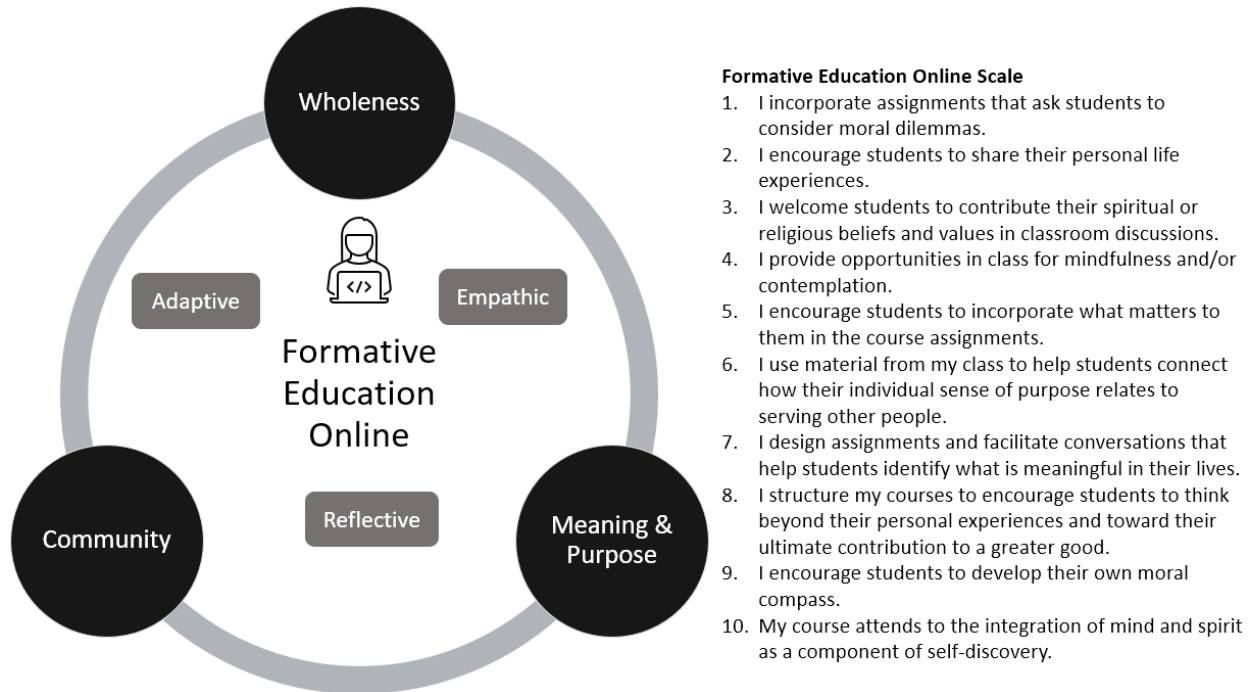
The COVID-19 pandemic brought considerable challenges to educators, but it also created opportunities to embrace new teaching practices. The pandemic also made clear the importance of attending to students' holistic needs when teaching online (Borowiec et al., 2021; Conklin & Dikkers, 2021; Goin Kono & Taylor, 2021; Kim et al., 2021; Miller 2021). Formative or whole-person education provides one promising framework for supporting students' well-being online (Wortham et al., 2020).

Colleges should evaluate the extent to which faculty members engage in these formative practices when teaching online. A survey is perhaps the most straightforward and cost-effective approach to evaluating such practices. To our knowledge, our work represents the first scale designed to measure the extent to which faculty members engage in formative education online. Results indicate that a psychometrically sound measure of engagement in formative education online can be developed with strong psychometric properties. Specifically, the Graded Response Model (Samejima, 1969) was fit to the data, which is an IRT-based model. Our empirical results, together with our theoretical understanding of the construct, suggest that engagement in

formative education online is unidimensional. Wholeness, meaning/purpose, and community (Boston College, 2007) represent specific aspects of one unified construct.

**Figure 5**

*Formative Education Online Scale Concept Map and Items*



The scale had high reliability, as measured via both Cronbach’s alpha and marginal reliability. Moreover, the Total Information Curve indicated that the scale provided a high level of information across a broad range of the trait. The construct validity of this measure is supported through the development process, in which both theory and empirical data were used to develop a Concept Map that was the foundation for item development. Figure 5 displays the Concept Map and the final 10 items to the right. A review of the item content in the final scale shows strong alignment between the Concept Map and the scale. Some elements may be more explicit, but all are represented. For example, “I encourage students to incorporate what matters to them in the course assignments” reflects meaning and purpose, but also adaptive practices. Instructors are incorporating pedagogy that is flexible. This flexibility allows students to explore their interests with one goal development of a sense of meaning and purpose. Known groups validity was also supported in that instructors at Jesuit institutions had higher engagement in formative education online, on average, than instructors at other institutions. While this scale may have particular relevance to Jesuit institutions, our conceptual framework and review of the related research indicates that the concepts represented in the Concept Map are supported in the general postsecondary research literature and theory (e.g., Castañeda & Selwyn, 2018; Chickering & Reisser, 1993; Conklin & Dikkers, 2021; Goin Kono & Taylor, 2021; Kauffman, 2015; Kilgour et al., 2019; Kuh, 2018; Miller, 2021; Patton et al., 2016; Robinson & Hullinger 2008; Salmon, 2011).

While the scale has many strengths, two limitations should be noted. First, although robust enough to support our analyses, the sample size is relatively small for IRT-based psychometrics ( $N=245$ ). Nevertheless, there were no issues with model convergence. It may be helpful to replicate these findings using a larger sample. Second, as with any self-report measure, these data rely on the perceptions of the respondents.

## Conclusion

The current study provides promising evidence for the reliability and validity of our first-of-its-kind Formative Education Online Scale. Future research can explore how this scale might be adapted for in-person learning environments and other contexts, such as K-12 education levels or in educational institutions outside the United States. Additional data can be collected to explore how this scale correlates with other measures that are of interest to educators, researchers, and policymakers—e.g., those measuring students' sense of belonging in the classroom, student course outcomes, and persistence to graduation.

Educators, policymakers, parents, and students increasingly recognize the importance of a whole-person approach to education. Young people are simultaneously undergoing consequential development along various dimensions—intellectual, emotional, relational, ethical, spiritual, etc. If educators ignore this and focus only on content knowledge and vocational skills, young people often suffer. Recognizing this, countries around the world are increasingly attending to student well-being and whole-person development. The rapid growth in online learning, spurred in part by the pandemic, complicates these recent efforts, however. We now have evidence that whole person education can be done in online environments, but in order to do so effectively educators and policymakers need better data. Our Formative Education Online Scale can provide one useful tool in this important effort.

## Acknowledgements

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## Declarations

This study was approved by the Boston College Institutional Review Board. The authors declare no conflicts of interest.

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**Appendix**  
**Formative Education Online Scale**

When teaching online, how often do you do the following activities?

	Never [1]	Rarely [2]	Sometimes [3]	Often [4]	Very often [5]
I incorporate assignments that ask students to consider moral dilemmas.					
I encourage students to share their personal life experiences.					
I welcome students to contribute their spiritual or religious beliefs and values in classroom discussions.					
I provide opportunities in class for mindfulness and/or contemplation.					
I encourage students to incorporate what matters to them in the course assignments.					
I use material from my class to help students connect how their individual sense of purpose relates to serving other people.					
I design assignments and facilitate conversations that help students identify what is meaningful in their lives.					
I structure my courses to encourage students to think beyond their personal experiences and toward their ultimate contribution to a greater good.					
I encourage students to develop their own moral compass.					
My course attends to the integration of mind and spirit as a component of self-discovery.					



**Figure A1**  
*Calculating Raw Score*

- If the respondent answered at least 5 out of 10 items, then:
- For each “Never” response, assign a point value of “1.”
  - For each “Rarely” response, assign a point value of “2.”
  - For each “Sometimes” response, assign a point value of “3.”
  - For each “Often” response, assign a point value of “4.”
  - For each “Very often” response, assign a point value of “5.”
  - Sum all responses to obtain point total.
  - Compute:  $\frac{\text{Point Total}}{\text{Items Answered}} * 10$
  - The raw score will range from 10 to 50.
  - The raw score can be converted to an IRT Score that has been scaled to have a mean of 50 and a standard deviation of 10 (i.e., T-Score distribution) using Table A1.
  - Round the raw score to the nearest whole number before converting to an IRT Score.

**Table A1**  
*Raw Score to IRT Score Conversion Table*

Raw Score	IRT Score	Raw Score	IRT Score	Raw Score	IRT Score
10	18	25	41	40	56
11	22	26	42	41	57
12	24	27	43	42	58
13	26	28	44	43	59
14	27	29	45	44	61
15	29	30	45	45	62
16	30	31	46	46	64
17	32	32	47	47	65
18	33	33	48	48	67
19	34	34	49	49	69
20	35	35	50	50	73
21	36	36	51		
22	37	37	53		
23	38	38	54		
24	40	39	55		

# College Students, Networked Knowledge Activities, and Digital Competence: Implications for Online Instructors

Vanessa P. Dennen

Dan He

Hui Shi

Dawn Adolphson

*Florida State University, USA*

## **Abstract**

Amid the landscape of digital literacies and frameworks is a common assumption that contemporary youth, frequently dubbed “digital natives,” intuitively understand and use online technologies. While their use of these technologies may be frequent and highly skilled in some respects (e.g., communicating with friends), their use and abilities in other areas, such as those valued in school settings and the workforce, may differ. This survey of 350 college students examines how they use an array of online platforms for everyday life information-seeking purposes, including the frequency with which they engage in different networked knowledge activities. Findings show that while students often use platforms associated with personal networking, such as Instagram, professional platforms like LinkedIn are less commonly used. Students are much more likely to engage in passive online activities than active ones. In particular, skills related to tagging, writing, and creation are infrequently used. Additionally, about half of these college students do not believe social media, which fosters these networked knowledge activities, is relevant to their careers. These findings show opportunities for better developing college students’ digital skill sets, with guidance for skills that might be targeted, taught together, and supported through learning activities in online spaces to prepare college students for digital information tasks in the workplace.

*Keywords:* college students, digital literacy, digital natives, networked knowledge, social media

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Contemporary life finds people engaging in online information-seeking and communication activities, all while managing their digital identities (Sime & Themelis, 2020). The internet fosters participatory culture, enabling individuals to build networks that connect them, their knowledge, and their creations with other people and resources across varied aspects of life (e.g., home, work, and school; Rainie & Wellman, 2012). There are several low-barrier ways that individuals can engage in participatory culture (Jenkins, 2006), and even seemingly small acts such as bookmarking or sharing an online resource can lead to more robust engagement in networked knowledge activities (Dennen et al., 2020). Youth who are active online creators engage in a broad range of transmedia activities (Scolari, 2018; Scolari et al., 2018), but not all youth are active online creators.

Traditional-aged college students in the 2020s are often referred to as digital natives. This moniker, which refers to their birth at a time rich in digital technologies, has been erroneously conflated with having inherent digital abilities. Beliefs that these students have fundamentally different cognitive and technological abilities than other generations are not sufficiently supported by empirical data (Kirschner & De Bruyckere, 2017). Still the digital native myth persists, along with assumptions that youth can be motivated by integrating their leisure technologies into other settings. However, just because youth use technologies like social media in heavy numbers for personal reasons (Anderson & Jiang, 2018) does not mean that they desire to or excel in using it across different contexts such as online learning (Dennen & Burner, 2017).

To succeed in online courses, students need to use a variety of digital competencies. Digital skills are related to learner self-efficacy in online classes, which in turn affects constructs related to learner outcomes (Prior et al., 2016). During the first year of the COVID-19 pandemic, when many courses transitioned online, it became clear that many learners lack the digital competencies to succeed as online learners (Vishnu et al., 2022). This finding is supported by many studies, which indicate that college students typically have basic, but not strong, digital competencies, with confidence that varies by task (Zhao et al., 2021). To that end, youth are full of contradictions in their assessment of their technology skills. On the one hand, they believe themselves more capable than earlier generations based on their self-taught technology experiences, but on the other hand they report situations in which they have been reliant on others to teach them specific technology-related skills (List, 2019). Essentially, although they undeniably have some level of digital skills, those skills vary in their strength and how they were acquired. Additionally, those skills may not be sufficient to truly thrive in an online learning context.

The conundrum caused by this lack of intergenerational understanding combined with varied levels of youth digital competencies can be summed up as follows: Youth use social media with great regularity and frequency for personal purposes. Higher education instructors, who are aware of this social media use, tend to overestimate youth digital competencies without deeply understanding what skills youth are and are not developing through their social media use. The result may be a missed opportunity, particularly by online instructors who encounter youth in a digital environment, to foster the development and transfer of digital competencies that will help learners succeed in their online coursework and to build pathways to the application of digital competencies in the workforce. This study seeks to address the first part of this situation by examining how college students use social media for everyday purposes and their beliefs about

how useful these skills will be as they prepare for their eventual careers. The findings of this study offer insights for online instructors, who need to better understand the tools and skills youth use—or do not use—in their everyday lives.

## Literature Review

One aim of education is to develop digitally competent citizens who are proficient in applying a range of information and communication technology (ICT) use (Spante et al., 2018). Numerous frameworks, varying in scope, lens, and context, have been developed to guide and measure the development of ICT knowledge, skills, and attitudes measured by varied frameworks (Marín & Castañeda, 2022). For example, The International Society for Technology in Education has developed standards to guide technology use by students, teachers, and educational leaders (International Society for Technology in Education, n.d.). In the European Union, the DigComp framework broadly delineates competencies for citizens (Vuorikari et al., 2022). Both frameworks, and others like them, address topics ranging from the use of technologies for specific tasks (e.g., writing, communication, information seeking) to digital safety, citizenship, and leadership.

People in all age groups lack digital competence (Oh et al., 2021), including youth who are college students. Most youth have developed digital skills in the course of using social media to support personal social activities. Prior research has found that skills developed through personal social media use do not effectively transfer to academic environments (Nwangwa et al., 2014), and the same may be true for work environments. Youth primarily engage in entertainment and social networking (Ting, 2015) and develop intricate rules that guide participation in personal social media networks (Malvini Redden & Way, 2019). However, they do not perceive these social media spaces as potentially work-related ones (Kim & Malek, 2017), and do not have opportunities to develop work-related skills in these settings. In other words, youth do not typically see how skills they develop for personal reasons might transfer to other settings.

In a learning setting, college students may lack digital confidence or skills, particularly those associated with information literacy, digital creation, and digital research (Martzoukou et al., 2020). Current efforts to teach these digital skills have been criticized. For example, popular checklists for evaluating online content are outdated and do not reflect how experts approach the task (Breakstone et al., 2018). Although at the forefront in policy settings, in practice digital competence remains a “loose” concept and can become inappropriately focused on teaching technology as a content area rather than as a tool to support performance (Ilomäki et al., 2014). This approach overlooks rich opportunities to incorporate the development of digital skill development in online classes, and in domains where digital skills enable broader learning and, eventually, professional development opportunities.

In online classes, the development and application of digital competencies can be done in a way that is authentic and immediate. Certain baseline communication and technology skills are necessary for success in online classes (Martin et al., 2020), and for some students these skills must be fostered explicitly because they are not part of a pre-existing technology repertoire (Ng, 2012). In one study, college students indicated that they developed their digital literacy skills independently, as they were provided with technology, and as they needed to complete specific

projects (List, 2019). Participants in this study shared that many of their autonomously developed skills were surface-level, just sufficient for performing the tasks posed to them. Similarly, a recent systematic review found that prior experience and training play a role in college students' competency levels (Zhao et al., 2021). Although self-developed skills are important, college students need intentional skill development and support to truly thrive in digital learning environments and in the increasingly digital workforce.

A recent report from the National Skills Coalition indicated that the U.S. workforce, including professional and quasi-professional occupations, is lacking in digital skills, and younger workers often have fragmented digital knowledge (Bergson-Shilcock, 2020). Left to develop professional digital competencies on their own, some employees are agile and will succeed, while others will not (Pitafi et al., 2020). Where social media is concerned, individuals struggle to navigate the divide between personal and professional tasks, relationships, and boundaries (Farivar & Richardson, 2020; Kühnel et al., 2020). Benson, Morgan, and Filippaios (2014) proposed that university students need to be taught, explicitly, how to engage in business-related social networking. This assertion was based on their findings from a study of college students in the United Kingdom. Their study showed that students typically created accounts on social networking sites for personal reasons, not professional ones, and when they created professional accounts those accounts quickly became dormant.

In sum, the literature suggests that college students independently develop the skills required to navigate their social media worlds, in whatever manner suits them individually. However, they are not necessarily able to apply or transfer these skills to other contexts, such as academic learning and the workforce, without assistance. Their pre-existing skills should not be assumed, but if known could serve as a starting point for opportunities to develop and practice workforce digital competencies related to using networked knowledge environments.

## **Purpose and Research Questions**

The purpose of this study was to examine college students' use of social media in their everyday lives, with a focus on the types of networked knowledge activities they engage in. In other words, it seeks to describe the frequently engaged in online activities so online educators can better understand what skills youth might be developing and using on their own, and what skills are likely underdeveloped or underpracticed. This study was guided by the following research questions:

1. How frequently do college students use different social networking sites to support everyday life information needs?
2. Which networked knowledge activities are college students most likely to use to support everyday life information needs? Do skills vary by user type?
3. How do college students perceive the relevance of social media to their careers? Does perceived relevance vary by user type or year in school?

The first research question seeks to establish a baseline understanding of how active participants are on various social networking sites, where they may engage in different networked knowledge activities. The second and third research questions explore specific networked knowledge activity use and perceived career relevance as well as the variance of use among subgroups in the

study population. Together, these questions are used to understand competencies that college students develop and practice in the context of their everyday life needs so that areas with low use and opportunities for skill transfer can be identified. The findings can inform the design of online learning curricula, taking advantage of the opportunity to help students develop new competencies and facilitate existing skill transfer.

## Method

### Study Design and Frameworks

This exploratory study uses a cross-sectional survey design to study college students' use of social media for specific networked knowledge task areas and perceptions of relevance to their eventual career. The intent of the survey is primarily descriptive, although relationships between social media user type and the likelihood of engaging in an activity or finding social media relevant in a career context are also explored.

Two frameworks guided this study. First was Savolainen's (1995) Everyday Life Information Seeking (ELIS) framework, which focuses on non-work related information and expression-focused tasks. In the case of youth, school-related information-seeking searching may represent ELIS because their school and personal lives are tightly intertwined (Agosto & Hughes-Hassell, 2005). ELIS may be employed for solving personal problems, pursuing hobbies, or just satisfying general curiosity or entertaining oneself. When individuals engage in ELIS, they are driven by their values and beliefs (Savolainen, 1995), and the activity is voluntary.

The second framework is the Networked Knowledge Activities (NKA) framework (Dennen et al., 2020), comprising seven major activities that individuals participate in within online settings: collect, curate, share, broker, create, negotiate, and network. We used this framework to guide the development of survey items about specific categories and tasks related to social media activities in ELIS contexts. This framework was originally developed to guide instructors engaged in lesson design by grouping and labeling different tasks one might undertake in a networked learning environment. It has previously been used to determine how college students perceive the function of different social media activities (Dennen et al., 2023).

### Participants

Participants in this study are 350 college students, after excluding 34 incomplete responses from the initial pool of 384. They were recruited through a research participation pool at a large public university (see Table 1 for an overview of participant demographics). In this study pool, students may participate in research for a small portion of their course grade at the discretion of their instructor. Instructors provide optional course activities for students who do not wish to participate in research, and students can choose from among several studies. The study was approved by the researchers' Institutional Review Board and all participants consented before participating.

The participants represent majors across the university, and the majority of them are undergraduate students in their senior (113; 32.29%), junior (101; 28.86%), and sophomore (100; 28.57%) years. The presence of relatively few freshmen may reflect the number of dual enrollment and advanced placement credits that incoming students bring to the university, resulting in many first-year students who attain sophomore standing in their first or second

semester of study. The sample skews female (266; 76%), which has been typical of our experience surveying this age group both via this study pool (Dennen, Bagdy, et al., 2021; Dennen & Burner, 2017; Dennen et al., 2023; Dennen et al., 2022) and through other means (e.g., social media recruitment; Dennen, Rutledge et al., 2021).

**Table 1**  
*Participant Demographics*

<b>Demographic</b>	<b>%</b>	<b>Count</b>
Gender		
Male	23.14%	81
Female	76.00%	266
Non-binary	0.86%	3
Year in School		
Freshman	9.14%	32
Sophomore	28.57%	100
Junior	28.86%	101
Senior	32.29%	113
Graduate	0.86%	3
Other	0.29%	1
Major		
Health Sciences	26.00%	91
Social Sciences	24.29%	85
Business	12.29%	43
Education	11.43%	40
Humanities	6.57%	23
Physical Sciences	4.00%	14
Two or more majors	9.14%	32
Other	6.29%	22

### **Instrument and Data Collection**

The survey contained four sections: (1) demographics, (2) frequency of social networking site (SNS) platform uses for ELIS, (3) likelihood of using NKA skills to support ELIS needs, and (4) perceptions of social media use for career purposes. In the demographic section, social media

user type was collected via a single item asking participants to describe their social media activity as follows:

1. Consumer (more likely to look for information resources and support than to offer them)
2. Prosumer (an equal mix of consuming and producing)
3. Producer (more likely to offer information resources and support than to look for them)
4. Infrequent (do not frequently use social media for ELIS)

The second section listed the most popular social networking sites per Pew Research (Auxier & Anderson, 2021), plus a few others that are commonly used in school and work settings. Perceptions of career relevance were measured via two Likert-style items, one asking about personal career relevance and the other about perceptions of the intended career area.

To develop the items related to NKA skills in the third section of the survey, the research team began with the NKA framework. Each part of the framework was broken into potential tasks and component skills for accomplishing a task. For example, people who collect (NKA category) need to save (potential task), which may be accomplished via bookmarking and downloading (skill areas). As the list of tasks for each scale category was developed, there were certain skills that were cross-cutting and appeared in multiple categories. Additionally, the original NKA categories were reorganized into seven categories (see Table 2), each consisting of a scale with three to nine items, starting with the prompt: “When you engage in everyday life information needs, how likely are you to do the following WRITING activities?” The word in capitals was changed relative to each scale. Participants used a five-point scale to indicate their likelihood of performing an activity. The internal consistency of each scale was tested using Cronbach’s alpha, with the  $\alpha$  ranging from 0.772 to 0.896. Specific scale items appear in tables in the findings section.

**Table 2**  
*Overview of Activity Scales*

<b>Activity Scale</b>	<b>Related NKA Categories</b>	<b>Number of Items</b>	<b>Cronbach’s alpha</b>
Collect	Collect, Curate	8	0.772
Tag Content	Collect, Curate, Share	6	0.880
Tag People	Curate, Share, Negotiate	3	0.788
Share	Share	8	0.871
Communicate	Negotiate	3	0.798
Write	Create, Negotiate	6	0.887
Create	Create	8	0.896

Prior to deployment, the survey was reviewed by two experts and five members of the target population for ease of use, clarity of language, and face validity. After initial tests, the activity scales were refined and then reviewed again using a think-aloud protocol with eight members of the target population. The final version of the survey was hosted online via Qualtrics. A description of the study and a link to the survey appeared in the study pool. The survey was available for study pool participants for five months during 2021. The mean response time was 609.72 seconds, or just over 10 minutes.



## Data Analysis

Frequencies were calculated for all survey items. For each activity category, after confirming internal consistency (see Table 2), an overall scale score was calculated from the average of all items in that scale. To explore differences in activity scale scores between prosumer and consumer groups in different activity areas (research question 2) and to explore differences related to perceptions of career relevance (research question 3), Mann-Whitney U tests and Kruskal-Wallis tests were used because Shapiro-Wilks test revealed that the data were not normally distributed. All of the statistical analyses in this study were performed with SPSS 26.0. For all tests of significance, an alpha level of 0.05 was used.

## Findings

### Frequency of Platform Use for ELIS

To help better understand college students' opportunities to engage in networked knowledge activities, the participants were asked to indicate the frequency with which they use popular social networking sites. Instagram and Snapchat were the most regularly used platforms used for everyday life information seeking, used daily by most participants and at least weekly by more than 85% of the sample (see Table 3). Other SNS that are frequently used by this age group, such as TikTok, Facebook, and YouTube, were used multiple times per week by more than 50% of the sample, as was GroupMe, a popular messaging service. SNS platforms associated with work environments and professional activities (LinkedIn, Slack) were among the least-used platforms. Other infrequently or never used SNS included blogs, Discord, WhatsApp, and Reddit, with more than half of the participants reporting non-use for ELIS and daily use ranging from a low of 0.57% (blogs) to a high of 7.43% (Reddit).

**Table 3**  
*Frequency of SNS Use*

Tool	Daily	4–6 times a week	2–3 times a week	Once a week	A few times per month	Less than once a month	Never
Instagram	79.71%	9.14%	5.14%	1.43%	1.14%	0.57%	2.86%
Snapchat	74.00%	6.86%	4.86%	1.14%	3.43%	2.00%	7.71%
TikTok	57.71%	7.14%	3.14%	2.86%	2.86%	3.14%	23.14%
GroupMe	39.43%	19.14%	14.00%	7.71%	4.00%	4.86%	10.86%
Facebook	36.00%	10.86%	9.43%	8.86%	6.29%	12.00%	16.57%
YouTube	31.43%	20.57%	16.29%	10.00%	13.71%	5.71%	2.29%
Twitter	26.57%	10.57%	12.29%	6.29%	7.14%	10.57%	26.57%
Reddit	7.43%	3.43%	4.57%	7.14%	10.00%	12.29%	55.14%
WhatsApp	6.00%	3.14%	3.43%	3.14%	4.57%	8.86%	70.86%
Discord	5.43%	1.71%	2.29%	2.57%	3.43%	6.57%	78.00%
Pinterest	4.00%	5.71%	4.86%	12.00%	19.14%	18.86%	35.43%
LinkedIn	2.86%	3.14%	6.29%	7.71%	9.71%	14.29%	56.00%
Slack	2.29%	2.00%	2.29%	2.00%	2.29%	5.43%	83.71%
Blogs	0.57%	0.86%	5.71%	5.71%	9.14%	11.71%	66.29%

### Use of Networked Knowledge Activities for ELIS

Using a five-point Likert scale (from “Extremely unlikely” to “Extremely likely”) participants were asked to share their likelihood of engaging in different networked knowledge tasks for everyday life information seeking. These tasks were clustered into seven scales, each representing different networked knowledge activity areas (collect, content tagging, people tagging, sharing, communicating, writing, creating). Table 4 summarizes the descriptive statistics for each item on the activity scales.

**Table 4**

*Descriptive Statistics for Individual Items on Activity Scales (N = 350)*

<b>Activities</b>	<b>Extremel y likely (5)</b>	<b>(4)</b>	<b>(3)</b>	<b>(2)</b>	<b>Extremel y unlikely (1)</b>	<b>Median (IQR)</b>
<b>Collect Activities</b>						
Use search engines to find resources	77.71%	17.43%	2.29%	0.86%	1.71%	5.00 (0)
Use social media to find resources	39.14%	37.14%	9.71%	9.43%	4.57%	4.00 (1)
Add new people to my social media network	32.29%	41.71%	13.43%	7.71%	4.86%	4.00 (1)
Bookmark interesting resources in my browser	33.14%	38.00%	8.29%	15.71%	4.86%	4.00 (2)
Bookmark interesting resources in a shared space / using a social bookmarking tool	24.00%	27.43%	16.00%	20.29%	12.29%	4.00 (3)
Bookmark/save interesting resources in my social media accounts	35.43%	39.71%	9.43%	8.57%	6.86%	4.00 (1)
Organize bookmarked or saved items into categories	22.86%	25.43%	16.29%	18.29%	17.14%	4.00 (2)
Download interesting resources to my computer	16.29%	28.57%	20.86%	20.57%	13.71%	3.00 (2)
<b>Content Tagging Activities</b>						
Search using tags to locate resources shared by others	17.43%	37.14%	13.71%	14.86%	16.86%	4.00 (2)
Search through tags to locate resources saved for myself	16.00%	31.43%	14.00%	15.71%	22.86%	3.00 (2)
Apply tags to resources to attract other people	12.00%	19.14%	15.14%	19.14%	34.57%	2.00 (3)
Apply tags to resources for organizational purposes	9.71%	18.00%	16.00%	22.00%	34.29%	2.00 (3)
Apply tags to resources to help describe them for myself	9.14%	21.14%	17.14%	21.14%	31.43%	2.00 (3)
Apply tags to resources to help describe them for other people	7.43%	19.14%	20.00%	18.57%	34.86%	2.00 (3)

<b>People Tagging Activities</b>						
Tag another person to respond to them	63.14%	21.14%	7.43%	4.00%	4.29%	5.00 (1)
Tag another person to give them credit for their work	61.43%	22.29%	7.71%	4.57%	4.00%	5.00 (1)
Tag another person to call their attention to a resource	57.71%	23.71%	7.14%	5.71%	5.71%	5.00 (1)
<b>Sharing Activities</b>						
Share resources that I have found	46.57%	36.00%	8.29%	6.86%	2.29%	4.00 (1)
Share resources that I have created	29.71%	31.43%	15.71%	16.00%	7.14%	4.00 (2)
Share posts from one social media platform to another (e.g., share a tweet on Facebook)	23.43%	31.71%	14.86%	16.00%	14.00%	4.00 (2)
Share resources from my online network to my face-to-face network	21.14%	36.57%	18.29%	15.14%	8.86%	4.00 (1)
Share resources from one social media platform to another (e.g., share a YouTube video on Facebook)	21.14%	32.57%	18.57%	15.43%	12.29%	4.00 (2)
Share my opinions via social media posts	19.71%	29.14%	13.43%	22.57%	15.14%	3.00 (2)
Share resources from my face-to-face network with my online network	16.00%	28.00%	22.86%	19.43%	13.71%	3.00 (2)
Share my expertise via online posts	15.14%	24.86%	19.71%	26.00%	14.29%	3.00 (2)
<b>Communication Activities</b>						
Respond to a conversation in a group forum or threaded conversation	20.57%	39.14%	13.71%	15.71%	10.86%	4.00 (2)
Initiate a conversation in a group forum or threaded conversation	16.57%	28.86%	12.86%	22.57%	19.14%	3.00 (2)
Participate in a live chat	12.86%	23.43%	14.29%	27.14%	22.29%	3.00 (2)
<b>Writing Activities</b>						
Write a persuasive essay or commentary on a topic	9.14%	15.43%	10.86%	25.71%	38.86%	2.00 (3)
Write a response essay (e.g., responding to someone else's essay/post)	7.14%	20.00%	12.29%	21.71%	38.86%	2.00 (3)
Write a work of fiction	6.00%	10.86%	12.00%	21.43%	49.71%	2.00 (2)
Apply a copyright or Creative Commons license to something you have written	6.00%	8.86%	15.43%	18.57%	51.14%	1.00 (2)

Write something in collaboration with others	5.43%	19.43%	16.86%	22.00%	36.29%	2.00 (4)
Write a “how to” essay on a topic	4.57%	8.00%	14.86%	26.86%	45.71%	2.00 (2)
<b>Creation Activities</b>						
Create image-based media (photos, graphics)	17.71%	33.14%	12.57%	15.14%	21.43%	4.00 (2)
Create something in collaboration with others	11.71%	26.57%	17.71%	17.43%	26.57%	3.00 (3)
Assemble a collection of resources on a topic	11.14%	28.29%	15.43%	21.14%	24.00%	3.00 (2)
Create new resources for the purpose of sharing online	9.14%	16.57%	18.57%	26.00%	29.71%	2.00 (3)
Create a remix or mashup of existing items	8.29%	15.71%	17.14%	26.57%	32.29%	2.00 (3)
Create a video on a topic	7.14%	13.71%	14.00%	23.43%	41.71%	2.00 (2)
Apply a Creative Commons license to something you have created	5.71%	8.57%	16.57%	17.43%	51.71%	1.00 (2)
Create a podcast on a topic	4.86%	5.71%	12.86%	24.57%	52.00%	1.00 (1)

Collecting is a core information-seeking activity in which one locates a source of information and finds a way to save it or locate it again. Participants indicated that they were most likely to seek resources via search engines, followed by seeking resources on social media and connecting to new people/resources (i.e., collecting people/resources in their network). They were least likely to download resources to their own computer, with social media accounts and browsers serving as most likely used bookmarking spaces.

Content tagging and people tagging activities were separated into two scales, recognizing that the former serves an organizational function, whereas the latter serves a networking function. The content tagging items were designed to determine how likely participants were to search for content using tags and to apply tags. Tag application occurred with less frequency than tag searching or any of the collecting activities, with over 50% indicating that they were somewhat or extremely unlikely to do so. In contrast, the frequency for all three of the actions involving people tagging items had over 80% of participants indicating that they were extremely or somewhat likely to engage in these activities (see Table 7). The only activity across all scales that had a higher frequency (77.71%) was using search engines to find resources (collecting activity).

Among the eight sharing activities, participants were most likely to share resources that they found, followed by sharing resources they had created, and less likely to share their opinions and expertise in posts to social media. Sharing was more likely to occur across social media platforms or from online to offline networks than from offline to online networks.

The three items on the Communication scale highlight show that participants are more likely to participate in asynchronous forms of communication than synchronous communication. Additionally, they are more likely to respond to a conversation than to initiate a conversation.

Similarly, writing and creation activities were among the activities in which participants were least likely to engage.

### Differences by User Groups

Most participants reported being consumers (177, 50.57%) or prosumers (142, 40.57%), with only a few reporting that they were producers (8, 2.29%) or infrequent users (23, 6.57%). Group means for each scale appear in Table 5. Notably, prosumers had the highest mean in each category and infrequent users had the lowest means. Means for people tagging, sharing, and collecting were above the scale mid-point for all groups, whereas means for content tagging, writing, and creation were below the scale mid-point for all groups.

**Table 5**  
*Group Mean Scores for Different Activity Scales*

	<b>Prosumer (n = 142)</b>	<b>Consumer (n = 177)</b>	<b>Producer (n = 8)</b>	<b>Infrequent (n = 23)</b>
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
Collect <sup>1</sup>	30.98 (5.77)	29.82 (5.66)	26.88 (7.06)	23.96 (4.72)
Content Tag <sup>2</sup>	17.72 (6.63)	15.47 (6.36)	14.38 (5.13)	14.43 (6.40)
People Tag <sup>3</sup>	13.32 (2.24)	12.74 (3.03)	13.25 (1.75)	11.30 (3.20)
Share <sup>1</sup>	30.37 (6.45)	25.32 (7.08)	26.00 (8.11)	23.00 (7.74)
Communicate <sup>3</sup>	10.06 (3.22)	8.66 (3.40)	10.00 (3.12)	7.96 (3.69)
Write <sup>2</sup>	14.86 (6.53)	11.79 (5.50)	14.00 (7.39)	10.74 (5.14)
Create <sup>1</sup>	22.31 (8.33)	18.09 (7.22)	18.00 (8.38)	16.43 (7.37)

*Note.* Higher scores indicate greater likelihood of engaging in the activity.

<sup>1</sup> Scale score range = 5–40, midpoint = 25

<sup>2</sup> Scale score range = 5–30, midpoint = 17.5

<sup>3</sup> Scale score range = 5–15, midpoint = 10

To investigate whether there are differences in likelihood to engage in an activity category, Mann-Whitney U tests were conducted, comparing the consumer and prosumer group. The other two groups were not used for comparison due to small cell size. Results show a significant difference between the two groups for every activity category except collect and people tag (see Table 6), with prosumers reporting higher scores and thus greater likelihood of engaging in the activity on each scale.

**Table 6**  
*Results of Mann-Whitney U tests Comparing Scale Scores for Consumer and Prosumer Groups*

<b>Activity Scale</b>	<b>Consumer N = 177 M (SD)</b>	<b>Prosumer N = 142 M (SD)</b>	<b>U</b>	<b>p</b>
Collect	29.82 (5.66)	30.98 (5.77)	11044.0	0.062
Content Tag	15.47 (6.36)	17.72 (6.63)	10197.5*	0.004
People Tag	12.74 (3.03)	13.32 (2.24)	11602.0	0.211
Share	25.32 (7.08)	30.37 (6.45)	7477.0**	< 0.001
Communicate	8.66 (3.40)	10.06 (3.22)	9676.0**	< 0.001
Write	11.79 (5.50)	14.86 (6.53)	9063.5**	< 0.001
Create	18.09 (7.22)	22.31 (8.33)	8834.0**	< 0.001

*Note.* \*  $p < 0.01$ , \*\*  $p < 0.001$

### Social Media and Perceived Career Relevance

Participants were asked to report whether they believed social media would help in their careers and was used by others in their career areas. Table 7 shows the frequency distributions, medians, and interquartile range for these items, with roughly half of all participants reporting some level of agreement, and around one-quarter choosing the mid-point. Notably, the median is higher and interquartile range smaller in response to the item about social media's use in their chosen career versus beliefs about how social media might help participants personally in their career.

**Table 7**  
*Descriptive Statistics for Perceived Career Relevance*

Item	Strongly Disagree (1)	Somewhat Disagree (2)	Neither agree nor disagree (3)	Somewhat Agree (4)	Strongly Agree (5)	Median (IQR)
Social media will help me in my career	36 (10.29%)	61 (17.43%)	87 (24.86%)	106 (30.29%)	60 (17.14%)	3.00 (2)
People in my chosen career use social media for professional support	29 (8.29%)	44 (12.57%)	98 (28.00%)	107 (30.57%)	72 (20.57%)	4.00 (1)

Consumer and prosumer group responses to these items were compared using Mann-Whitney U tests. Findings showed that group medians were the same and standard deviations were similar, and thus there was no statistically significant difference between the groups (see Table 8).

**Table 8**  
*Results for Mann-Whitney U Tests Comparing Perceived Career Relevance for Consumers and Prosumers*

Item	Consumer (N = 177) Mdn (SD)	Prosumer (N = 142) Mdn (SD)	U	p
Social media will help me in my career	3.00 (1.23)	3.00 (1.17)	11195.5	0.085
People in my chosen career use social media for professional support	4.00 (1.16)	4.00 (1.13)	11369.5	0.130

Additionally, a Kruskal-Wallis test was conducted to explore differences based on class standing. The rationale for running this analysis was that students with higher class standing (juniors and seniors) would be more likely to have experienced university-level instruction that supports or mentions workforce-related uses of social media. Although median values for career usefulness were higher for freshmen and sophomores than juniors and seniors, these differences were not significant (see Table 9).

Table 9

*Results of Kruskal-Wallis Test Comparing Perceived Career Relevance by Class Standing*

<b>Item</b>	<b>Freshman (N = 32) Mdn (SD)</b>	<b>Sophomore (N = 100) Mdn (SD)</b>	<b>Junior (N = 101) Mdn (SD)</b>	<b>Senior (N = 113) Mdn (SD)</b>	<b>p</b>
Social media will help me in my career	4.00 (1.14)	4.00 (1.41)	3.00 (1.15)	3.00 (1.21)	0.200
People in my chosen career use social media for professional support	4.00 (1.08)	4.00 (1.19)	3.00 (1.08)	4.00 (1.21)	0.135

## Discussion

Overall, these findings suggest that college students' online skills and dispositions, while presumably well-suited for meeting their everyday life needs, may not prepare them to be sophisticated users of social tools in the workforce. By considering the current state of college student social media use and the anticipated workforce context, higher educators can identify opportunities to prepare students with a set of digital competencies that will enhance their career readiness.

### Social Networking Sites

The first research question focused on the social networking sites frequently used by college students. Among these participants, the use of SNS typically associated with social and leisure activities, like Instagram and TikTok, was much higher than the use of SNS with a heavier focus on work-related networking and productivity, like LinkedIn and Slack. These findings are consistent with other cross-sectional surveys of youth in the U.S. (Anderson & Jiang, 2018). Additionally, LinkedIn has a smaller overall use rate across the adult population when compared to social-focused SNS, regardless of age, with higher rates of use among college graduates (Auxier & Anderson, 2021).

Although most SNS offers a core collection of similar features, such as sharing and messaging, each has its own set of norms and different primary uses. For many people, leisure and professional use are different (Benson et al., 2014). Privacy and context collapse can be a concern for users as they contemplate broadening their networks and scope of use (Davis & Jurgenson, 2014; Dennen & Burner, 2017). This phenomenon explains why someone might post about their work project on LinkedIn, but their child's accomplishment on Facebook. Both SNS offer feeds where people post life updates that may be restricted to their networks, but the former fosters a distinctly professional network whereas the latter is typically used among family, friends, and communities.

More than half of the participants reported never having used work-related SNS, which is similar to findings in other studies of Slack (Menzies & Zarb, 2020) and LinkedIn (Badoer et al., 2020) in higher education. When youth transition into the workforce, they encounter these tools, which represent areas of opportunity for higher education. Faculty could address or incorporate tools like Slack and LinkedIn in their classes to promote familiarity and use, or workshops could be offered to help students develop their professional networking and communication skills as they near graduation.

### **Networked Knowledge Activity Use**

In this sample, passive activities like searching and saving outpaced activities related to resource classification and organization, sharing, creation, and engagement in public conversations. Most of the sample classified themselves as either consumer or prosumer, and activities associated with producing content online were among the lowest rated ones. Thus, while some individuals engage in content tagging, writing, or otherwise creating, others do not engage in them very much at all. From a leisure-use perspective, this finding is not problematic. The world needs both content creators and audience members; without one, the other would not function. From a professional perspective, however, a question remains: If new college graduates needed to engage in these tasks professionally, would they be able to do so effectively and efficiently? Prior research suggests that those who already use these skills regularly might, but others might not (Martzoukou et al., 2020), and that content creation is a generally underdeveloped competency area among college students (López-Meneses et al., 2020).

This study asked about the likelihood that an individual would engage in a task, not whether they are capable of it. Writing has a regular place in the college curriculum, and all participants would have experience with academic writing, but writing curricula do not commonly address the types of writing skills and dispositions that are needed for writing on social media professionally (Novakovich et al., 2017). Social media has become popular among foreign language instructors as a means of motivating students to write (e.g., Aziz et al., 2019; Putri & Aminatun, 2021) and college students who enroll in online classes are likely to gain experience writing short messages in academic discussion forums, but neither of these activities would directly prepare students for either the professional writing genres associated with social media or the multimodal messages that professional communicators use on SNS.

Participants also were unlikely to engage in content tagging. Other studies have found that content tagging and, relatedly, social bookmarking are confusing to many college students (Dennen et al., 2023), although formal instruction and practice can help (Dennen et al., 2018; Dennen et al., 2017). Although college students frequently use hashtags on social media, their use of hashtags may be largely performative or crudely aggregative (McCosker, 2017). In other words, students' leisure use of social media tagging does not inherently transfer to professional information classification tasks.

### **Career Relevance**

Half of the participants did not consider the career relevance of social media, suggesting that they are not prepared to develop professional networks such as those used in professional development (Bedford, 2019; Trust et al., 2017; Trust et al., 2016) and career-focused networking (Benson et al., 2014). The similar beliefs regardless of class standing further suggests that throughout their college experience these participants are not being introduced to ways that social media and networked knowledge are used in professional settings.

There are several ways students might be prepared for workforce networked knowledge activities. These include informal conversations in class, formal assignments, and referrals to third parties like career centers (Daniels & Dempsey, 2021). Integrating a specific SNS in a class may seem like an easy solution to this problem—e.g., popular workforce networking tools like



Slack have been effectively integrated into higher education (Menzie & Zarb, 2020), and scaffolded use of LinkedIn in a class was found to greatly increase future student use and confidence with the platform (Badoer et al., 2020). Still, caution is warranted before assuming this path. Not all professions use these tools equally, and some students may have privacy concerns (Healy et al., 2023; Tuhkala & Kärkkäinen, 2018). Educators should always consider privacy and other ethical concerns related to sharing in digital environments before requiring students to use social media for coursework (Dennen & Burner, 2017), and can also seize the opportunity to discuss issues related to online privacy and identity management in professional networking contexts.

## **Implications**

This study has implications for online instructors, particularly those who teach courses within the professional disciplines who can address social media use and its associated literacies and skills as part of professional preparation. Specifically, these findings suggest that college students would benefit from instruction on how and why they might use tags, writing and creating in multimodal online genres, and online intellectual property issues.

Online classes provide an ideal opportunity for addressing digital competencies related to networked knowledge activities. For example, instructors could incorporate opportunities for students to collect and share digital resources with a class, simultaneously creating opportunities to tag that content for organizational purposes and to call people's attention to it. Students could be engaged in writing in a variety of short form genres or to create multimodal digital assignments. These work products could take the form of renewable assessments (Wiley & Hilton III, 2018), which in turn could be digitally shared and tagged with a broader learning audience. Additionally, instructors might introduce students to profession-specific forms of online content creation and sharing and encourage the development of professional learning networks. In this way they not only fulfill the technological aspects of their instructor role, but by using the technology also support the network dimension (Dennen & Jones, 2023).

Although students' social accounts and experiences are different from professional accounts and experiences (Benson et al., 2014), online instructors could nonetheless help college students draw parallels between familiar tasks in their social worlds and target tasks and concepts in their future professions. Similar to how educational technologies can be leveraged to support the transfer of content knowledge (Galoyan et al., 2021), with creative pedagogical planning these technologies also can be leveraged to support the transfer of digital competencies. There is, however, a major caveat to consider before this idea becomes a reality: instructors also may need assistance to transfer their knowledge of social media, likely based on personal or scholarly use, to the applied contexts in which their students will be employed.

## **Limitations**

This study's limitations relate to the sample, the use of non-parametric tests, and the survey instrument. First, the sample is not representative of the overall population of college students, and the proportions of consumer to prosumer to inactive students should not be considered an indicator of proportions in the larger population. Still, readers may consider that all types of users are present in the population and should be the concern of educators.

Non-parametric tests were used in this study because the data were not normally distributed. Additionally, the data used to address the third research question were ordinal. Non-parametric tests are not as powerful as their corresponding parametric tests.

The survey instrument measured the likelihood that college students would apply a skill for everyday life purposes, but not whether they could apply that skill. It is possible that participants who reported that they were unlikely to engage in an activity were nonetheless capable of engaging in that activity. Additionally, the survey lacked a robust scale to measure career relevance. Future research might inquire more thoroughly about perceptions of career relevance. Finally, this study did not examine the ability to transfer skills across platforms or functions. Still, the findings show the limited application of information organization, communication, creation, and networking skills by college students. Future studies might explore the transfer of these skills more directly.

## **Conclusion**

In conclusion, this study continues to dispel the digital natives myth that young people inherently use technology in general (Kirschner & De Bruyckere, 2017; Sorrentino, 2018), and social media platforms in particular, to engage in learning, communication and creation transactions. Instead, these findings confirm the diverse skill and activity levels and dispositions that college students develop independently in social media environments, and highlights areas where skill use may be underdeveloped. Additionally, it confirms that higher education instructors should not only be concerned with the transfer of content knowledge (Galoyan et al., 2021), but also of digital competencies when preparing students for their future careers.

For online educators, this study represents initial work to stimulate interest in developing college students' digital competencies through course activities, and ideas about the types of networked knowledge activities that might be familiar and frequently used or alternatively unfamiliar and infrequently used by their students. Online educators may find that their own digital skills are underdeveloped in some of these areas as well, leading to opportunities for professional development.

## **Declarations**

This study was approved by the Florida State University, USA Institutional Review Board.

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# Higher Education Instructor Perception of Helpfulness of Inclusive and Equitable Online Teaching Strategies

Florence Martin

*North Carolina State University, USA*

Beth Oyarzun

Ayesha Sadaf

*University of North Carolina Charlotte, USA*

## Abstract

Online learners are increasingly diverse (NCES, 2022), which underlines the need for instructors to be inclusive and equitable in online teaching. Inclusion refers to providing opportunities for all learners in the online course, so they can actively participate and feel welcomed and belong in the course, and equity ensures that all learners have fair treatment and access to the opportunities and resources needed to succeed. In this survey-based research, we developed an Inclusive and Equitable Online Teaching Strategies (IEOTS) instrument with 45 strategies and examined instructor perceptions of the helpfulness of these strategies. These strategies focused on instructor self-awareness and commitment, getting to know the learners, course design, course facilitation, and evaluation. Based on the 478 online instructor survey responses, descriptive statistics showed that the instructors rated the strategies between somewhat helpful and helpful. In the open-ended question, student choice was described as an important aspect of the online course being inclusive and equitable. Analysis conducted based on the learner (student level), instructor (gender, ethnicity, teaching experience and teaching expertise), course (delivery modality), and organizational differences (required training, collaboration with instructional designer) found that instructor perceptions of helpfulness was higher for the course design subscale for instructors who taught online asynchronously rather than synchronously; higher for the *know your learner* subscale for instructors who taught graduate students rather than those who taught undergraduate students, and between those who attended training for online teaching compared to those who had not. In addition to supporting diverse online students, this study has implications for online instructors, instructional designers, and administrators who provide support to integrate these strategies effectively.

*Keywords:* Inclusive online learning, equitable online learning, online teaching strategies, higher education

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The onset of the COVID-19 global pandemic has broadened the use of online teaching and learning but also highlighted the inequities in education. Ongoing systemic racism towards marginalized groups of individuals and immigrants also brought to light the continuing struggles for equity and inclusion. Though college campuses have focused on inclusion and equity efforts on campuses recently, there is still limited research on equity and inclusion strategies in online teaching (Martin et al., 2020). Research has shown that there are equity issues in online learning regarding attendance and achievement for low-income and minority students (Tate & Warschauer, 2022). It is critical for instructors to be intentional in order for online teaching and learning to be inclusive and equitable to all learners. For online instructors to develop competency in inclusion and equity, strong foundations in multicultural education, social justice, and critical inquiry (Grant & Lee, 2014) are required and also build effective technological competence (Montelongo & Eaton, 2020). Though some university centers for teaching and learning recommend inclusive and equitable strategies for online teaching, there is limited research that has proven that these strategies are effective. To address this need, this research study focuses on identifying inclusive and equitable online teaching strategies that instructors could intentionally use in online courses.

## **Literature Review**

### **Inclusive and Equitable Strategies in Online Learning**

The term inclusion is defined as “the act or practice of including and accommodating people who have historically been excluded or marginalized (because of their race, gender, sexuality, or ability)”(Merriam-Webster, n.d). In online learning, this can refer to providing opportunities for all learners in the online course, so they can actively participate, feel welcome and belong in the course. Equity is defined as “justice according to natural law or right and freedom from bias or favoritism” (Merriam-Webster, n.d). In online learning, this can refer to ensuring that all learners have fair treatment and access to the opportunities and resources needed to succeed. Therefore, inclusive and equitable strategies in online teaching and learning would provide opportunities for all learners to become active and engaged learners and have equal treatment.

Research has identified some opportunities and challenges regarding inclusion and equitable strategies in online learning. For instance, Passey (2017) conducted a literature review on online learning inclusive practice and found that instructors might be better served with teaching and learning strategies that move beyond cognitive outcomes and strategies to include social and emotional teaching and learning. Specific strategies mentioned are collaborative learning, active learning, and problem-based learning and are student-centered and structured for learners to have autonomy and flexibility. Online course discussions provide both students and instructors an opportunity to be included and share perspectives about race, class, disabilities, and gender. However, these online discussions can perpetuate microaggressions and bias incidents (Licona & Gurung, 2011; Ortega et al., 2018). When these discussions are effectively facilitated, they can present opportunities for learners to co-construct new meanings around various identities (Grant & Lee, 2014). However, perceptions of anonymity also provide room for increased offensive statements in online discussions (Ortega et al., 2018), which can exclude learners from participating in the online course. This research highlights the need for online

learners to engage with one another through instruction that is designed and facilitated to create meaningful interaction.

Inclusive strategies that have been recommended in online courses are to get to know the learner's identity, such as their preferred pronoun, and understand the learner's needs if they have the essential technology devices and reliable internet so that the instructor can support them accordingly (Comer et al., 2015). Instructors are also advised to create a welcoming environment by using a caring tone and cultivating a sense of connectedness that fosters inclusion (Martin et al., 2018). Furthermore, it is critical for instructors to include instructional materials that are accessible to all learners (e.g., closed captioned, transcripts, image descriptions, alt-text) through various devices such as desktops, tablets, and smartphones (Bolliger & Martin, 2021) while including diverse representation and perspectives (e.g., varied race, gender, religion, ability, multicultural) (Howard & Navarro, 2016). It is also important to ensure that all cultural references utilized can be meaningfully interpreted by all students, opportunities are provided for autonomy (Passey, 2017), and resources are provided to support their learning (Pedro & Kumar, 2020).

Research has shown that to deliver an equitable course, it is important to support learners with disabilities or English language learners who need specialized instruction and related services (Ortiz et al., 2020). Online instructors should also collectively establish communication norms such as netiquette guidelines for equitable participation (Stephens & Roberts, 2017). Since learners have various needs, it is important to record lectures and virtual meetings to be viewed later since some of them may not be able to attend live synchronous sessions. Additionally, these recordings can benefit some students who may prefer to re-watch them again (Martin et al., 2017). It is also critical to provide multiple opportunities for learners to improve their work based on instructor feedback and provide flexible deadlines for learners in need (e.g., technology challenges). Being available to support learners using various communication channels (e.g. virtual office hours; being responsive to learner emails, chats, or messages; and periodically checking in with learners) grading anonymously to reduce bias, and collecting feedback from learners anonymously or privately for their concerns and course improvement will make the online course more equitable and engaging (Bolliger & Martin, 2018). This emphasizes the instructor's need to commit to the values of equity and inclusion while designing the course to meet learner needs.

Specific marginalized groups have expressed how they feel online learning is inequitable. For instance, Reedy (2019) called for new online course design methodologies to ensure equity after yarning with 19 indigenous students. *Yarning* is a colloquial term used to describe chatting or talking. Some specific concerns that emerged were that students were having difficulty establishing relatedness with others, university services being not attainable, course content not reflecting diverse perspectives, cultural identity and racism impacting their learning, and poverty and poor internet service impacting their success.

Equitable and inclusive definitions and online teaching strategies may vary due to different perspectives, disciplines, and populations of learners. For example, Ismailof and Chiu (2022) implemented Universal Design for learning strategies to develop a 15-week asynchronous online course to provide a more inclusive and equitable learning environment. Although the

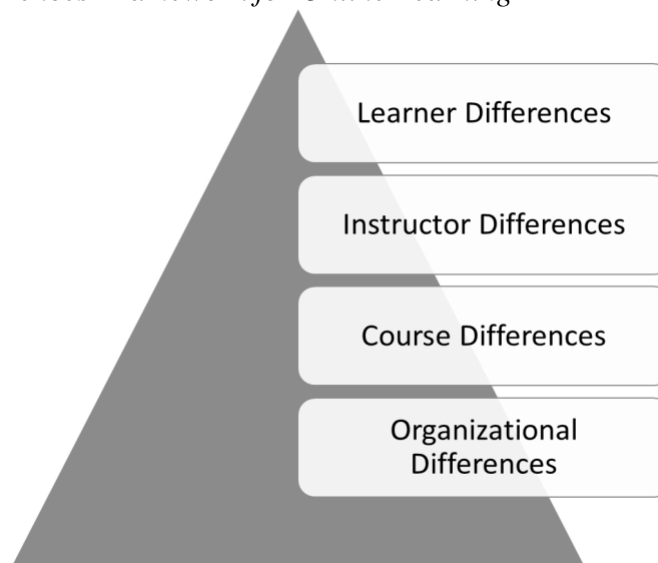
strategies were found to be useful for inclusion and equity, the learning outcomes were different due to varying disciplines. No set of strategies will result in a perfectly inclusive and equitable learning environment, but the effort of the instructor to use some of these strategies will create an environment in which students feel comfortable to express their individual needs.

### **Differences Based on the Learner, Instructor, Course, and Organization**

The following section details inclusion and equity research examining differences around various levels of characteristics: learner, instructor, course, and organizational levels. These levels are aligned with the Martin et al. (2020) review, which categorized research on online teaching and learning on the learner, instructor and course, and organizational levels.

Figure 1.

*Inclusion and Equity Differences Framework for Online Learning*



Focusing on learner characteristics, Baker et al. (2022) examined bias through field experimentation and found evidence of both race and gender bias in discussions in a Massively Open Online Course (MOOC). White male learners were most likely to get responses, followed by white female learners. Baker and colleagues encourage exploring various designs that promote equitable forms of engagement. Researchers have also examined and found differences in how students from different ethnic groups perceive the effectiveness of online courses differently. Garris and Fleck (2020) found that Black students rated course quality significantly lower than students from other ethnic groups. Similarly, Ober et al. (2021) examined undergraduates' perceptions and experiences in a fully online course and found student attitudes toward online learning varied by ethnicity; Black/African American and Hispanic/Latinx students held a more negative attitude than students in other ethnic groups.

Focusing on instructor differences, Conoway and Bethune (2015) examined instructor implicit bias toward stereotypical student names and found that implicit bias existed to a small degree. They recommend that instructors face and explore biases as awareness creates the avenue to training and resources to help overcome existing implicit biases. It is important for instructors to examine their own biases and the cultural backgrounds of their students (Tapanes et al., 2009).

Focusing on course design when engaging around complex topics like identity, equity, and social justice, researchers suggest that synchronous modalities are most effective, allowing for important interpersonal connections (Grant & Lee, 2014; Licona & Gurung, 2011) rather than using written modalities which can exclude some learners (Madden, 2020). However, researchers have found that asynchronous online discussions provide both students and instructors an opportunity to be included and share their personal viewpoints (Licona & Gurung, 2011; Ortega et al., 2018).

Focusing on organizational differences, such as working with an instructional designer, may introduce faculty to concepts related to equity and inclusivity issues and help them learn about the appropriate teaching approaches to promote the inclusion of students (Hanson & Burke, 2021). Stone et al. (2019) examined the experiences of online students in rural settings and found that university policies and processes prevent students from a distance from accessing university services. Recommendations included more flexibility in terms of access to materials and university policies to allow for equal treatment of all students, including those in other locations.

### **Frameworks for Inclusion and Equity**

Some frameworks and models have emerged to guide the design of inclusive and equitable practices in online and face-to-face instruction, including Universal Design for Learning (UDL) (CAST, 2018) and culturally responsive teaching (Gay, 2018). UDL includes three main principles that guide learners to become purposeful and motivated, knowledgeable and resourceful, and strategic and goal-directed principles and has been most frequently utilized for supporting learners with disabilities. The principles require multiple means of representation, action and expression, and engagement. The UDL principles relate to the culturally responsive pedagogies of multiple pathways to success and student agency of choice. Ismailov and Chiu (2022) examined UDL strategies in online courses and found that the framework supported autonomy and competence but failed to satisfy all learners' needs. Morong and Desbiens (2016) conducted a literature review and proposed guidelines for culturally responsive pedagogies in online learning. The guidelines are categorized into strategies for outcomes, assessment, facilitation, learning resources, and scheduling. Explicit instructions include affective learning outcomes, self-assessing cultural awareness, attitudes, and values, and cultural safety criteria are some of the recommended pedagogies. Additionally, Woodley et al. (2017) identified best practices for incorporating culturally responsive teaching in online learning environments. They recommend validating students' prerequisite knowledge with relevant activities, providing comprehensive and multi-dimensional learning opportunities, transforming student learning with synchronous opportunities, and empowering students with leadership opportunities.

Though these frameworks exist, there is still a need for practical, inclusive, and equitable strategies that can be directly used by instructors in their online courses to support learner differences based on language, race, ethnicity, gender, and other identities. Kieran and Anderson (2018) suggest that these frameworks overlap, and blending the strategies could be useful in creating equitable and inclusive online learning courses. In addition, there is a need for research to examine inclusion and equity based on learner, instructor, course and organizational differences. We use the inclusion and equity differences framework (Figure 1) focusing on

learner, instructor, course, and organizational differences to understand inclusion and equity for online teaching to guide the analysis in this study.

### **Purpose of the Study**

Though there are best practices recommended by several universities, and a few frameworks proposed for universal design for learning and culturally responsive pedagogies, there is limited research examining strategies for inclusive and equitable online teaching. There is a need to identify inclusive and equitable online teaching strategies that are helpful specifically for online instructors. Survey-based research is a commonly used research methodology for identifying human social behavior and attitudes (Nardi, 2018). Hence, a cross-sectional survey was used to collect instructor perception on the helpfulness of IETO strategies. In this survey-based research, we examine inclusive and equitable online teaching strategies by developing an Inclusive and Equitable Online Teaching (IEOTS) instrument and implementing it with online instructors. The following research questions are addressed in this survey-based study.

1. How do instructors rate their perception of helpfulness on the inclusive and equitable online teaching strategies?
2. What differences exist in instructor responses based on learner differences (graduate vs undergraduate); instructor individual differences (gender, ethnicity, teaching experience, teaching expertise), course differences (course modality) and organizational differences (organizational training for online teaching, and for inclusion and diversity and collaboration with instructional designer) for Inclusive and Equitable Online Teaching ( IEOT)?

## **Methods**

A cross-sectional survey with several quantitative and one qualitative item was used to examine instructors' perception of helpfulness of the IEOT strategies. The first research question focused on descriptive research whereas the second research question focused on exploratory research (Nardi, 2018). Descriptive research helped us understand basic information through descriptive statistics on instructors' perception of helpfulness of IEOT strategies, and exploratory research assisted in understanding relationships through the lens of differences. Thus, survey-based research was used to be able to perform both descriptive and exploratory research (Nardi, 2018). This survey-based research with online instructors was carried out in two phases. The first phase focused on the development of the IEOTS instrument, and the second phase focused on implementing the survey.

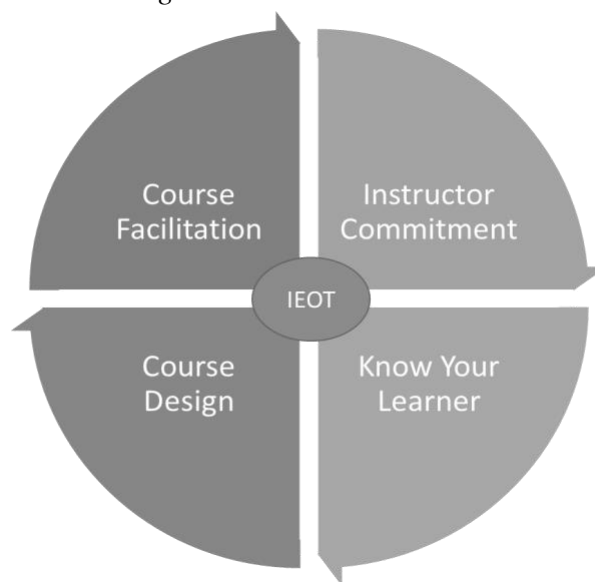
### **Survey Development**

During the first phase, the research team developed the instrument. The inclusive and equitable online teaching strategies instrument was developed for this study after reviewing the research literature and existing guidelines from centers for teaching and learning or similar centers from eight universities. Several centers for teaching and learning were leading efforts in IEOTS in online learning during the initial search that was conducted at the time of survey development. These universities were identified to include a combination of private and public institutions and institutions with very high research activity and high research activity. Seven universities were identified and these included the University of Michigan, Iowa State

University, University of North Carolina Charlotte, Columbia University, New York University, Rice University, and Stanford University. From reviewing the guidelines proposed by these universities and from research, an IEOTS instrument with 47 items was initially drafted. This draft instrument was then shared with nine experts for an expert review process. This included four instructional design experts, three DEI experts, and two research methodology experts. All nine of them had expertise in online teaching and practice. A few items were collapsed, dropped and added during the expert review process. The final instrument included a total of 45 items in four categories: Instructor self-awareness and commitment, know your learner, course design, course facilitation and evaluation (Figure 2). From the initial implementation of the survey, Cronbach alpha was found to be high at 0.977 for the 45 items, and for each of the four subscales suggested reasonable internal consistency, instructor self-awareness and commitment (0.926), know your learner (0.859), course design (0.933), and course facilitation and evaluation (0.930). There were also 10 demographic and background questions and one open-ended question. The open ended question read “Are there any inclusive and equitable strategies that has been helpful to you that was not included in this survey?”

**Figure 2**

*Inclusion and Equity Online Teaching Factors*



### **Survey Implementation**

The Institutional Review Board (IRB) approval for distributing this survey was obtained at the researchers' institution. The survey was distributed through Qualtrics electronic survey administration tool to the distance education email list of students at a Southeastern research university of high research activity, to the email list at another southeastern research university with very high research activity, and to the division of distance learning email list of the Association for Educational Communications (AECT) Organization. Convenience sampling was used to collect data from accessible and available participant groups. The researchers had access to distribute surveys to the professional organization listed as well as the universities listed. The participants reviewed and provided their consent before completing the survey. The participants were asked to respond to the 45 items based on the following question “Please rate the

helpfulness of the following inclusive and equitable online teaching strategies.” The respondents rated the items based on a five-point Likert scale: 0=Not Used, 1=Not Helpful, 2=Somewhat Helpful, 3=Helpful, 4=Very Helpful.

### Participants

There were a total of 540 responses received from online instructors. However, 62 responses had missing data, with more than 50% of the fields missing. These responses were deleted, which resulted in 478 responses that could be used. Among the responses that were completed, only 168 respondents completed demographic information. Instructor participant demographics and characteristics are included in Table 1 for the 168 participants who provided their demographic and background information.

**Table 1**  
*Participant Demographics and Background Characteristics*

Participant Characteristic	Frequency	Percentage
<b>Gender</b>		
Do not wish to respond	4	.8
Man	62	13.0
Other	2	.4
Women	100	20.9
<b>Race</b>		
African American	8	1.7
Asian or Asian American	20	4.2
Caucasian	84	17.6
Do not wish to respond	5	1.0
Latino or Hispanic	8	1.7
Multiracial	4	.8
Native American	24	5.0
Native Hawaiian or Pacific Islander	12	2.5
Other	3	.6

<b>Rank</b>		
Assistant Professor	20	4.2
Associate Professor	15	3.1
Clinical Faculty	7	1.5
Full Professor	32	6.7
Full-time Lecturer	58	12.1
Instructor	8	1.7
Other	11	2.3
Part-time Lecturer	17	3.6
<b>Primary Teaching Method</b>		
Blended or Hybrid (blending online and face to face)	49	10.3
Online asynchronously	31	6.5
Online bichronously (blending asynchronous and synchronous)	29	6.1
Online synchronously	55	11.5
Other	4	.8
<b>Teaching Level</b>		
Graduate courses	48	10.0
Other	7	1.5
Undergraduate courses	113	23.6
<b>Worked with an Instructional Designer</b>		
No	37	7.7
Not sure	7	1.5
Yes	124	25.9



<b>Institutional Training for Online Teaching Required</b>		
No	56	11.7
Not sure	6	1.3
Yes	106	22.2
<b>Institutional Training Required for Inclusion and Diversity</b>		
No	56	11.7
Not sure	6	1.3
Yes	106	22.2
<b>Online Course Design Expertise</b>		
Advanced beginner	47	9.8
Competent	65	13.6
Expert	18	3.8
Not sure	2	.4
Novice	3	.6
Proficient	33	6.9
<b>Online Teaching Expertise</b>		
0 years	2	.4
1-5 years	102	21.3
11-15 years	13	2.7
6-10 years	39	8.2
More than 15	12	2.5

### **Data Collection and Analysis**

Data was collected anonymously through the online Qualtrics survey. Online instructor participants were invited to participate in a random drawing for three \$25 Amazon gift cards at the end of the survey. Data Analysis used primarily quantitative research methods with the exception of the one question that used qualitative research methods for analysis. Descriptive statistics (means and standard deviations) are reported both at the item level and the subscale level. Cronbach's alpha was used to check the internal consistencies of the responses to the

survey items. T-tests were used to examine the differences between gender and race. One-way Analysis of Variance (ANOVA) was used to compare teaching modality, teaching experience, and teaching expertise. A T-test was also used to compare teaching levels, required training, and collaboration with instructional designers. We used effect sizes (small = .01; moderate = .06; large = .14) to document the size of obtained differences (Cohen, 1988). An open-ended question on additional strategies that were helpful to the instructors was analyzed for themes.

## Results

The results from the various analyses of the survey data are included in this section.

### Data Screening

From the initial sample of 540 online instructor responses, missing data was screened. Little MCAR's test was conducted, and it was found that data was missing at random. Sixty-two responses were missing more than 50% of the data; these were deleted, and this resulted in 478 responses. However, among the 478 responses, only 168 instructor respondents provided demographic data. For the descriptive analysis, we report the data from the 478 responses (Table 2). For the inferential analysis based on demographics, we use the data from the 168 respondents who provided the demographic data.

### Descriptive Statistics of Inclusive and Equitable Online Teaching Strategies

Means (M) and standard deviations (SD) for the 45 inclusive and equitable online teaching strategies are included in Table 2. Aggregate means are also provided for each of the four categories, instructor self-awareness and commitment, know your learners, course design, and course facilitation and evaluation.

**Table 2**

*Descriptive Statistics of Inclusive and Equitable Online Teaching Strategies*

IEOTS (n=478)	Not Used Frequency	Mean	SD
<b>Instructor Self-Awareness and Commitment</b>			
1. Examine own assumptions and expectations about learner behavior and performance	18	2.91	1.03
2. Participate in professional development on diversity, equity, and inclusion	17	2.86	1.01
3. Include a diversity, equity, and inclusion statement in your syllabus	19	2.79	1.05
4. Review syllabus and consider what changes might be needed to make it equitable (e.g., grading weights and course policies)	17	2.85	1.01

5. Identify any assumed prior knowledge, skills, or abilities that are embedded in the course assignments	15	2.87	1.01
6. Affirm commitment to each learner's ability to learn	16	2.90	1.01
7. Set an example by prominently displaying preferred pronouns in course (e.g., she/her, they/them)	27	2.67	1.09
8. Prepared to handle online class dynamics that perpetuate systemic inequities (e.g., microaggression in group projects)	21	2.77	1.07
9. Informed of the ways in which life events can impact learners in different ways	23	2.77	1.08
10. Model self-care practices (e.g., taking time off during breaks)	24	2.73	1.09
11. Prepared to handle learner requests for course flexibility equitably	15	2.87	0.98
12. Avoid making assumptions that may not include all learners (e.g., cultural references, prior knowledge)	15	2.84	1.02
<b>Mean</b>	<b>18.92</b>	<b>2.82</b>	<b>0.77</b>

**Know Your Learners**

13. Survey learners to identify learner characteristics (e.g., preferred name, preferred pronoun) and needs (e.g., technology devices; reliable internet)	23	2.87	1.06
14. Mindful about learner's privacy (e.g., not requiring to share video or disclose identity)	13	2.95	1.01
15. Support learners who need specialized instruction and related services (e.g., English language learners)	22	2.92	1.07
16. Cultivate learners' sense of connectedness (e.g., learner lounge to interact with peers; timely communication)	25	2.91	1.05
17. Support the learners that may have greater needs and fewer resources (e.g., differentiating assignments)	20	2.84	1.04

18. Support the social and emotional well-being of learners (e.g., promote learner self-care through reflection)	14	2.91	1.00
<b>Mean</b>	<b>19.5</b>	<b>2.90</b>	<b>0.80</b>
<b>Course Design</b>			
19. Create a welcoming environment that fosters inclusion (e.g., use a caring tone).	20	3.04	1.04
20. Collectively establish communication norms for participation (e.g., netiquette guidelines)	15	2.96	0.98
21. Include instructional materials (e.g., readings, visuals, videos, podcasts) that are accessible to all learners (e.g., closed captioned, transcripts, image descriptions, alt-text)	21	2.96	1.05
22. Ensure that the instructional materials are designed for use across devices (e.g., desktops, tablets, smartphones)	14	2.91	0.97
23. Ensure that the instructional materials include a diverse representation and perspectives (e.g., varied race, gender, religion, ability, multicultural)	26	2.92	1.10
24. Include free and accessible open educational resources (e.g., open access textbooks, open source software)	9	2.90	0.98
25. Ensure all cultural references (e.g. humor, metaphors, colloquialisms) utilized can be meaningfully interpreted by all students (e.g. international, non-traditional, minority)	16	2.85	1.02
26. Elicit a variety of learner perspectives in both asynchronous and synchronous discussions (e.g. cultural experiences)	22	2.83	1.03
27. Provide the purpose, task, and grading criteria for all assignments	17	2.92	1.01
28. Provide learners with the opportunity for autonomy (e.g., self-selected topics, differentiated assignments, choice of project)	24	2.87	1.06

29. Include multiple low-stakes (e.g., self-check quizzes) and high stakes assessments throughout the course (e.g., projects)	20	2.84	1.04
30. Include self-assessment opportunities (e.g., non-graded reflections, self-assessment with rubric, goal-setting activities)	15	2.87	0.99
31. Provide resources to learners that are necessary to support their learning (e.g., writing center, disability services, well-being resources)	19	2.85	1.04
<b>Mean</b>	<b>18.31</b>	<b>2.90</b>	<b>0.76</b>
<b>Course Facilitation and Evaluation</b>			
32. Encourage learners to introduce themselves to peers with preferred names and pronouns (e.g., she/her, they/them)	22	2.91	1.08
33. Communicate with prompts that encourage empathy and community-building	18	2.97	1.00
34. Ensure equitable participation in asynchronous and synchronous discussions (e.g., assigning roles to each learner)	24	2.85	1.08
35. Continually monitor learners and intervene when necessary (e.g., periodic check-in emails; check last logged in date)	19	2.92	1.00
36. Record lectures and virtual meetings to be viewed later	19	2.82	1.02
37. Verbally describe visual material during a synchronous session or when recording a lecture	19	2.83	1.03
38. Provide feedback using various modalities (e.g., text, audio, video)	18	2.87	1.02
39. Provide multiple opportunities for learners to improve their work based on instructor feedback	13	2.92	0.96
40. Provide flexibility on deadlines for learners in need (e.g., technology challenges)	14	2.90	1.00
41. Available to support learners using various communication channels (e.g., virtual office hours; being responsive to learner emails, chats, or messages; and periodically checking in with learners)	15	2.95	1.01

42. Provide opportunities for learners to engage in smaller group settings (e.g., using breakout rooms, collaborative assignments, and peer review)	13	2.96	0.98
43. Provide regular opportunities for learners to share their personal experiences (e.g. discussion)	17	2.85	1.02
44. Grade anonymously to reduce bias	31	2.77	1.14
45. Collect feedback anonymously or privately from learners for student concerns and course improvement	19	2.90	1.04
<b>Mean</b>	<b>19.73</b>	<b>2.89</b>	<b>0.74</b>

All four subscales had similar means, and online instructors rated these items between somewhat helpful and helpful. There was only one item that was rated above 3.0, which was “Create a welcoming environment that fosters inclusion (e.g., use a caring tone)” (M=3.04). The lowest rated item was “Set an example by prominently displaying preferred pronouns in the course (e.g., she/her, they/them)” (M=2.67).

### Learner Differences

Learner differences between undergraduate and graduate students that online instructors taught were examined. A T-test was conducted based on the student level taught (graduate vs undergraduate). A significant difference was found between the two groups of respondents for the Know Your Learner subscale,  $t(159) = -1.614$ ,  $p = .045$ , Cohen’s  $d = 0.69$ . Those who taught graduate students rated the Know Your Learner subscale strategies higher than those who taught undergraduate students (Table 3).

**Table 3**

*Learner Level Differences of Inclusive and Equitable Online Teaching Strategies*

<b>IEOTS Subscale</b>	<b>Teaching Level</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>
Instructor Self-Awareness and Commitment	Undergraduate	113	2.82	0.64
	Graduate	48	3.04	0.66
Know Your Learners	Undergraduate	113	2.93	0.64
	Graduate	48	3.12	0.78
Course Design	Undergraduate	113	2.93	0.62
	Graduate	48	3.23	0.55
Course Facilitation	Undergraduate	113	2.90	0.58
	Graduate	48	3.11	0.61

### Instructor Differences

Four instructor variables were examined, gender, ethnicity, teaching experience and teaching expertise.

**Gender.** A T-test was run to examine respondent differences based on gender. Though there were a few respondents who responded as “other” or “do not wish to respond” these were very few in numbers, hence the comparison was run only between respondents who identified as male and female. There was no significant difference between male and female respondents though the female respondents rated the items higher on all the subscales.

**Ethnicity.** Another T-test was run on ethnicity. Due to the lack of variability among the different ethnicities, respondents were grouped into Caucasian and other. There were no significant differences between these two groups.

**Teaching Experience.** A one-way teaching experience. ANOVA was conducted to examine the respondents' differences based on their teaching experience (1-5 years, 5-10 years, 11-15 years, and more than 15 years). There was no significant difference between the groups.

**Teaching Expertise.** A one-way ANOVA was conducted to examine the respondents' differences based on their teaching expertise (Novice, Advanced Beginner, Competent, Proficient, Expert). There was no significant difference between the groups.

### Course Differences

A one-way analysis of variance was conducted based on the course delivery modality (online asynchronous, online synchronous, online bichronous and blended). Among the four subscales, there was a significant difference for the course design subscales,  $F(3,160) = 2.954$ ,  $p = 0.034$ , eta squared ( $\eta^2$ ) = 0.052 based on delivery modality. A Tukey post-hoc analysis was conducted to identify differences between the modalities. IEOT course design strategies were rated differently by instructors who taught online asynchronous and online synchronous. Those who taught synchronously ( $M = 2.87$ ) rated these strategies lower than those who taught asynchronous ( $M = 3.27$ ). Table 4 summarizes the IEOTS by course modality.

**Table 4**

*Course Level Differences of Inclusive and Equitable Online Teaching Strategies*

IEOTS Subscale	Modality	N	Mean	SD
Instructor Commitment	Online Asynchronous	31	3.05	0.64
	Online Synchronous	55	2.83	0.58
	Online Bichronous	29	2.88	0.59
	Blended	49	2.88	0.75
<b>Mean</b>		<b>164</b>	<b>2.90</b>	<b>0.64</b>

Know Your Learner	Online Asynchronous	31	2.99	0.86
	Online Synchronous	55	2.99	0.59
	Online Bichronous	29	2.84	0.66
	Blended	49	3.13	0.69
	<b>Mean</b>	<b>164</b>	<b>3.01</b>	<b>0.69</b>
Course Design	Online Asynchronous	31	3.27	0.53
	Online Synchronous	55	2.87	0.62
	Online Bichronous	29	2.97	0.60
	Blended	49	3.06	0.64
	<b>Mean</b>	<b>164</b>	<b>3.02</b>	<b>0.62</b>
Course Facilitation	Online Asynchronous	31	3.03	0.69
	Online Synchronous	55	2.91	0.57
	Online Bichronous	29	2.86	0.51
	Blended	49	3.05	0.61
	<b>Mean</b>	<b>164</b>	<b>2.97</b>	<b>0.60</b>

### Organizational Level Differences for Training and Support

Organizational level differences were examined through three variables, required training for online teaching, required training on inclusion and equity, and collaboration with an instructional designer.

**Required Training for Online Teaching.** A T-test was conducted to examine differences between those respondents where training for online teaching was required and those for whom it was not. A significant difference was found between these two groups of respondents for the Know Your Learner subscale,  $t(166)=0.229$ ,  $p=0.05$ , Cohen's  $d = 0.69$ . Those who attended training for online teaching rated these items much higher than those who did not attend training.(Table 5).



**Table 5**  
*Organizational Level Differences for Training Required for Online Teaching*

<b>IEOTS Subscale</b>	<b>Training to Teach Online Required</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>
Instructor Self-Awareness and Commitment	Yes	106	2.84	0.60
	No	62	2.99	0.73
Know Your Learners	Yes	106	3.02	0.60
	No	62	2.99	0.83
Course Design	Yes	106	2.94	0.59
	No	62	3.17	0.63
Course Facilitation	Yes	106	2.96	0.57
	No	62	2.98	0.63

**Required Training for Inclusion and Equity.** A T-test was also conducted to examine differences between those respondents where training for inclusion and equity was required and those that were not. Significant differences were found between these two groups of respondents.

**Collaboration with Instruction Designer.** A T-test was also conducted to examine differences between those respondents who collaborated with an instructional designer and those that were not. Significant differences were found between these two groups of respondents.

### **Additional Inclusive and Equitable Online Teaching Strategies**

An open-ended question “Are there any inclusive and equitable strategies that has been helpful to you that were not included in this survey?” was included in the survey. About 40% of the respondents (192 respondents) responded “no” to this survey. One of the respondents who responded “No” stated “No but these are all so great that I wish I had a copy of all 45!” This highlights the value of these strategies for instructors.

There were some responses with recommendations as helpful in addition to the other items on this survey. These were grouped into categories and then themes were identified. The highest mentioned strategy regarded student choice. This was mentioned five times and the instructors mentioned that to be inclusive and equitable, learners should be allowed to choose team members for group work. The next most mentioned strategy was course design strategy mentioned four times; it regarded the use of anonymous learning tools and included diverse representation in examples used. Course facilitation was also mentioned four times and included using terms that are respectful, communicating individually with students either in individual meetings or tutoring sessions, scheduled meetings with individual students apart from scheduled class sessions, and using a variety of communication channels. Course assessment strategies were mentioned three times and included items on clear expectations in rubrics, including DEI

parameters in rubrics, and using mastery learning approaches on assessments. This was followed by the course evaluation strategy mentioned three times on accepting anonymous feedback and providing opportunities for reflection and evaluation of peers in group work. Additional strategies mentioned once included acknowledging and discussing systemic inequities in the course content. Finally, one respondent mentioned the importance of embracing learners' cultural and linguistic backgrounds, and another respondent mentioned the importance of instructor presence for students to reach out for support with diversity needs.

Sample quotes are included in the table below for each of these themes.

**Table 6**  
*Respondents Quotes from Open-ended Question*

Themes	N	Sample Quote
Student Choice	5	Freely choose team members to work with.
Course Design	4	Learning tools can be applied anonymously; Ensure diverse representation in scenarios or examples used within assignments (distinct from visual media depictions).
Course Facilitation	4	Using terms that are respectful; Can use a variety of communication channels; Scheduled meetings with individual students apart from scheduled class sessions; Providing individual tutoring session
Course Assessment	3	Create a rubric for discussion board posts that outlines the instructors' expectation for student; include diversity, equity, and inclusion as rubric parameters; Using mastery learning approaches to assignments
Course and Peer Evaluation	3	Any comments can be submitted anonymously; Provide opportunities for evaluation of peer participation and contribution for group projects
Course Content	1	Acknowledge and discuss systemic inequities that have existed and continue to exist within the discipline; Emphasize role students play in disrupting inequitable systems in their own context
Know Your Learner	1	Embrace learner's cultural and linguistic backgrounds
Instructor presence	1	I think something that wasn't mentioned was the ability to provide a strong social and teacher presence for the instructor. My learners get to know me through synchronous and asynchronous communications that are flavored with personality and personal details. This helps them know they can come to me for support to address any of their diversity needs

The participant responses to the open-ended question assisted in identifying additional IEOTS that are helpful for online instructors.

## Discussion

A successful learning environment should create an inclusive and welcoming atmosphere in which learners feel valued, capable, and motivated to succeed (Lin & Kennette, 2021). With the increasing diversity of online students in higher education, it is critical for online instructors to use inclusive and equitable strategies to help online students feel a sense of belonging, ensure they can access course materials, and support them in achieving their learning goals. The results of our study showed that online instructors perceive inclusive and equitable online teaching strategies such as instructor's commitment, knowing their learners, course design, and course facilitation as equally important. However, the items were not very highly rated, showing that there are still areas for growth among online instructors with regard to using inclusive and equitable teaching strategies. In this section, we discuss the findings by organizing them based on the four IEOTS subscales and also by the learner, instructor, course, and organizational differences.

### Instructor Self-Awareness and Commitment

Among 12 items of instructor commitment, "*Examine own assumptions and expectations about learner behavior and performance*" was highly rated by the online instructors. This suggests the helpfulness of reflecting on who the learners are in order to handle online class dynamics that may perpetuate systemic inequities. By considering learner variability in behavior and performance from the beginning of the course, online instructors can integrate flexible and supportive options to help reduce barriers and support a wide range of learners in achieving their learning goals (Rao, 2021). In this regard, the Universal Design for Learning (UDL) provides a framework to build in supports that address the learner variability and usability for all learners (Burgstahler, 2015; CAST, 2018). One of the respondents mentioned the importance of instructor presence in the open-ended response. Instructor presence can help the instructor connect with the students (Martin et al., 2018) so that they can reach for support to meet diversity needs.

### Know Your Learner

Among six items of know your learners, being "*Mindful about learner's privacy*" received the highest percent of online instructors' rating in creating an online inclusive environment. Online instructors can give learners a choice to participate through verbal chat, audio, or video contributions. Lin and Kennette (2021) noted that although online instructors can encourage learners to turn on their web cameras during online sessions, they shouldn't make it mandatory in order to respect their privacy. Being mindful of the learner's privacy can help increase online engagement while being respectful of each individual learner's comfort level. In the open-ended response, one of the participants mentioned the importance of embracing learners' cultural and linguistic backgrounds. This helps the diverse learners with cultural and linguistic diversity feel included in the online course (Kerr et al., 2018).

### Course Design

Among 13 items of course design, online instructors perceived "*creating a welcoming environment that fosters inclusion*" to be the most important strategy that can help establish inclusive and equitable online learning environments. When online instructors design an online course, they should strive to design an environment where all online learners are welcomed and feel respected, have a sense of belonging, and are able to participate in the course. To create an

inclusive online environment, Quinlan et al. (2012) suggested using teaching strategies focused on students' interests, accommodating different learners, and engaging with students to meet their needs to benefit all students. In addition, instructors can design and develop inclusive syllabuses based on the principles of inclusive education and UDL as a way to adjust teaching-learning practices to meet all students' needs (Carballo et al., 2021). From the open-ended response, applying learning tools anonymously and ensuring diverse representation in scenarios or examples was provided as a helpful strategy. The anonymity in peer assessments and peer discussions (Kumar et al., 2019) and diverse representation in instructional examples is helpful to increase equity and inclusiveness in the online courses.

### **Course Facilitation and Evaluation**

Among 14 items regarding course facilitation, “*communicate with prompts that encourage empathy and community-building*” was perceived as the most helpful strategy to facilitate inclusive and equitable online learning. This is supported by the 2021 Faulkner et al., study that concluded that a personable and communicative instructor is important in “building a relationship where the student feels they can ask for help, go to office hours, share what is going on in their life, and, therefore, potentially get more from the class” (p. 107). Instructors' use of immediate and supportive communication was vital in creating an inclusive learning environment where students can feel safe to be themselves, express their views, and learn (Faulkner et al., 2021). From the open-end response, giving students the opportunity to freely choose team members to work with was the most mentioned strategy. This must be included in the design but also enforced during facilitation. During facilitation, using terms that are respectful; using a variety of communication channels (Martin et al., 2018); scheduling additional meetings with individual students and individual tutoring session were considered helpful facilitation strategies. Focusing on evaluation, creating a rubric for discussion board posts that outline the instructors' expectation for students (Wyss et al., 2014)—including diversity, equity, and inclusion as rubric parameters, using mastery learning approaches to assignments (Archambault et al., 2022), providing students opportunities for submitting comments anonymously, and evaluation of peer participation and contribution for group projects (Kumar et al., 2019) are all helpful strategies to support inclusion and equity.

### **Learner Differences**

Previous research has recommended that the learning outcomes varied by learner disciplines when including the UDL strategies (Ismailof & Chiu, 2022). Among the four IEOTS subscales, instructors who taught graduate students rated the *Know Your Learner* subscale strategies higher than those who taught undergraduate students. This suggests that instructors teaching graduate students believe it is more helpful to use IEOTS to Know Your Learner at graduate level courses as compared to the instructors teaching undergraduate level courses. This may be due to the fact that graduate-level courses are smaller in size and it is easier to know the learners to be able to create an equitable and inclusive environment accordingly. Another interpretation can be that instructors teaching at the undergraduate level may need different kinds of strategies to know their learners other than the ones listed in this survey. In this regard, Comer et al. (2015) recommended using inclusive strategies to get to know the learner's identity, such as their preferred pronoun, and understand the learner's needs if they have the essential technology devices and reliable internet so that the instructor can support them accordingly. Other researchers recommend taking learner characteristics and needs into consideration when

designing online courses to optimize the impact of UDL strategies (Cai & Robinson, 2021; Jiang & Zhang, 2021).

### **Instructor Individual Differences**

No significant differences were found between gender, ethnicity, teaching experience, and teaching expertise of instructors. This shows that regardless of their demographics, instructors perceive all four IEOTS subscales to be helpful for creating an inclusive and equitable online learning environment. Instructors understand that providing opportunities for all learners in the online course can help students actively participate, feel welcomed, and belong. This finding supports the literature that suggest the importance for instructors to commit to the values of equity and inclusion and to use design strategies that suit learner needs so that all learners have fair treatment of the opportunities and resources needed to succeed (Bolliger & Martin, 2021; Comer et al., 2015; Passey, 2017).

### **Course Modality Differences**

Instructors who taught asynchronous courses rated IEOT course design strategies higher than those who taught synchronously. Differentiated strategies for course design might be essential in achieving inclusion and equity in different modalities. For instance, instructors teaching in an asynchronous modality find creating a welcoming environment that fosters inclusion more important than instructors teaching in synchronous modality. In this regard, researchers suggest that synchronous modalities are more effective for interpersonal connections when engaging around complex topics (Grant & Lee, 2014; Licona & Gurung, 2011). On the other hand, asynchronous modalities are effective in providing students with opportunities to work at their own pace and providing more time to reflect on what they are learning. Specifically, asynchronous online discussions provide both students and instructors an opportunity to be included and share their personal viewpoints (Licona & Gurung, 2011; Ortega et al., 2018).

### **Organizational Training and Support Differences**

Instructors who attended training to teach online rated the IEOTS items much higher than those who did not. This suggests the importance of training to teach online that also provides strategies to be more inclusive and equitable. This finding is aligned with studies that show faculty training in inclusive practices such as those suggested in the UDL framework to have a very positive impact on the learning experience of all students (Davies et al., 2013; Lombardi & Murray, 2011). Besides learning about inclusive teaching practices, training allows faculty to gain practical knowledge about adjustments in online teaching strategies and in the design of accessible learning resources (Carballo et al., 2021). Conoway and Bethune (2015) found that implicit bias existed toward stereotypical student names and recommended instructors to use training and resources to help overcome existing implicit biases.

### **Limitations**

A few methodological limitations exist. The instrument may not be an exhaustive list of all IEOTS though it was holistic, focusing on four factors: instructor commitment, know your learners, course design, and course facilitation. Also, though we received 478 responses, only 168 respondents provided demographic details. This resulted in not much variability for some of the variables that could have been analyzed for specific differences. Since this is survey-based

research on instructor perception of helpfulness, the responses could be biased. In addition, the respondents may be biased in their understanding of the IEOT strategies for teaching diverse learners online. Though learner, instructor, course, and organization differences were examined, there might be other differences that were not examined in this study. Since we used several email lists from two universities and a professional organization, we were unable to calculate the response rate.

### **Implications**

The results of our study showed that online instructors perceive inclusive and equitable online teaching strategies such as instructor's commitment, knowing their learners, course design, and course facilitation as helpful. The overall findings based on descriptive statistics on the 45 items were rated between somewhat helpful and helpful. Thus, there is room for growth for the instructors to use these strategies to examine their helpfulness. There were differences in the perception of instructors who taught graduate students than those who taught undergraduate students for the Know your Learner subscale. Differentiated strategies and support might be needed for these two groups of learners. Instructors' perceptions of IEOT course design strategies differed from instructors who taught online asynchronously and synchronously. This shows that differentiated strategies might be essential in achieving inclusion and equity in these modalities. Also, those who attended training for online teaching rated the IEOTS items much higher than those who did not, which shows the importance of training for online teaching. Overall, the study has implications not only for online instructors but also for instructional designers who work with online instructors and for administrators to support the effective integration of IEOTS.

### **Future Directions**

Future research could collect data from observations of online courses and interviews with online instructors on how these inclusive and equitable strategies are implemented. Additional studies are also needed to examine the various perspectives of equity and diversity with various populations. Future researchers should examine additional strategies as the IEOT strategies included are not exhaustive. This study focused on the helpfulness of IEOT strategies based on instructor perspective and other studies can examine them through different lenses such as the perspectives of instructional designer or student. Also, examining strategies by asynchronous, synchronous, and bichronous modalities will assist in identifying specific strategies for the type of online modalities that instructors might be teaching. In addition, research studying student perception of these strategies and what supports them will be helpful to design courses that meet the needs of diverse learners.

### **Declarations**

Institutional Review Board Approval was received at the researcher institution before recruitment and data collection.

The authors declare that there is no conflict of interest in publishing this manuscript with this journal.

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# Culturally and Linguistically Responsive Online Teacher Learning and Professional Development

Faridah Pawan  
*Indiana University, USA*

Belle Li  
*Purdue University, USA*

Meika Billings Dopwell  
Suliya Nijiati  
Alyse Harris  
Tiana Iruoje  
*Indiana University, USA*

## Abstract

This literature review explores the landscape of online teacher learning and professional development (PD) that is responsive to cultural and linguistic differences. The researchers, a diverse group of doctoral students, instructors, and teacher educators, are motivated by the need to address racial inequities and disparities exacerbated by the recent pandemic. The review aims to understand the theories and conceptual models used in responsive online teacher preparation and PD, the utilization of technology and its affordances, and the intentional targeting of specific groups for responsive teacher preparation and PD. The study followed a systematic approach, resulting in the selection of 27 articles that met the inclusion criteria. The findings highlighted the significance of socioculturally inspired theories, frameworks, and practical models in addressing inclusivity. They, in turn, influenced various tools used to reduce barriers, create online communities, enhance accessibility, and promote engagement. Accordingly, the review also revealed that to foster inclusivity, intentional efforts were required to involve teachers from minority, majority, and international communities. The implications emphasized the importance of teacher preparation and PD in establishing responsiveness, refuting deficit thinking, and capitalizing on cultural and linguistic assets. They also underscored the need for equity in the design of online teacher training and professional development. Finally, the review concluded with the various ways AI could be looped into the process.

*Keywords:* Culturally inclusive, linguistically inclusive, responsive pedagogy, online teacher education, online professional development, systematic literature review

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This literature review explores the landscape of online teacher learning and professional development that is responsive to cultural and linguistic differences. Our interest in understanding research and practice in this area emerged during a period of heightened racial tensions and increased awareness of racial inequities as well as pandemic-induced disparities. We are a group of doctoral students, instructors, and teacher educators with diverse backgrounds and ethnicities in the field of learning, design and instructional systems.

As teachers, our diverse identities are expressed pedagogically. The differences and uniqueness that we bring to the table individually as diverse online educators are critical components in our professional and intellectual dispositions. Through those lenses, the promise of the accessibility and flexibility affordances of the online medium has drawn us into the medium's universe. However, we also recognize that the online medium introduces new challenges as well as new inequities. It can even amplify and exacerbate those that already exist. Tate and Warschauer (2022) asserted that teachers "play a key role in mitigating the inequity in online education" (p. 202). This is the position that we, as online educators, assumed and strove to illuminate through this review.

Accordingly, we undertook the literature review research between 2018 and August 2022, during the height of racial tensions in the U.S. They served to remind us of our "socio-professional" (Freeman, 2009) role as educators to bring to light workable pathways helpful to others. We were constantly reminded of the Ubuntu philosophical concept of "Sawubona" (Power-Carter et al., 2019) in which our obligation to educate and inform others should take precedence, even during a time when we ourselves felt personally challenged for being who we were as individuals with diverse ethnic backgrounds.

We began our literature review in 2018 which coincided with the publication of Gunawardena et al.'s *Culturally Inclusive Instructional Design*, recipient of the AECT's distinguished book award in 2021. Gunawardena et al.'s (2018) publication was influential in our thinking, as it directed attention to building inclusive communities in the online medium. This is important not only because the medium was made pervasive by the pandemic but also because of the medium's potential to reach diverse communities. The components in Gunawardena et al. (2018) led us to explore the research in and the implementation of online programs to support culturally and linguistically responsive practices of diverse pedagogists (whether teachers in K-12 public schools or instructors in higher education).

The main argument of this literature review is that it is important to study cultural and linguistic (CL)responsiveness in online teacher preparation and PD, as teachers are the epicenters in the responsive teaching process. More specifically, we argue that teacher knowledge derived from theoretical and conceptual lenses strongly influence the way the teachers design and select the tools they use. The lenses also orient teachers to specific populations for whom their instruction could be most salient and meaningful.

Thus, in this literature review, we examined "Praxis," namely, how research and practice have been undertaken in CL responsive online programs for teacher/instructor learning and professional development. Accordingly, this literature review focuses on the theoretical lenses

used to guide research and practice. It also focuses on pathways of practice that show how technologies are used, how learning is addressed and the people to whom the programs are striving to be responsive.

### **Theoretical Framing**

We were informed theoretically by Ladson-Billings' (1994) "Culturally Responsive Pedagogy" (CRP) and Geneva Gay's (2010) "Culturally Responsive Teaching" (CRT). Before we discuss CRP and CRT influences, we focus first on the concept of "responsiveness." Hollie (2017) identifies "validation" and "affirmation" as central to the responsiveness concept. Validation is the intentional legitimization of the home culture and language of the student. Affirmation is the intentional and purposeful effort to reverse the negative stereotypes, images and representations of marginalized cultures and languages (Hollie, 2017, p. 28). In this regard, by teaching responsively, educators refute deficit thinking as they become aware, acknowledge, and productively capitalize on cultural and linguistic assets of individuals in their classrooms, in their workplaces, and in their professional and social milieu (Hollie, 2017, p. 35).

Ladson-Billings's (1994) CRP and Gay's (2010) CRT converge on "social justice and the classroom as a site for social change" (Aronson & Laughter, 2016, p. 163). The two conceptual frameworks aim to create inclusive and equitable learning environments for students to succeed. CRP is the pedagogical reframing of an educational system that involves the problematization of existing teaching practices, curricula, assessment, and the micro- and macro-school and schooling cultures. Problematization is critical in that it addresses areas where underserved students, teachers, and other educators are not empowered but are neglected and oppressed by the intersection of many factors, including race as well as cultural and language backgrounds. To redress the situation, CRP focuses on culturally responsive efforts on the part of educators to support student success and to develop cultural competence by using and honoring their cultural beliefs and practices. One example of such an effort is scaffolding students' learning through the use of their existing funds of knowledge that they bring to classroom. The efforts also involve creating pathways for students to demonstrate socio-political consciousness to take a stand and to act against social inequalities. Photovoice projects (Wang & Burris, 1997), for example, are well-proven pathways for the purpose. In these projects, students are empowered to visually document and comment on inequities in their community.

Gay's (2010) CRT pushes the pedagogical agenda forward in the classroom by articulating instructional steps for educators to cultivate responsiveness. The central core of these steps are efforts to:

...bridge meaningfulness between home and school experiences; the use of a wide variety of instructional strategies that are connected to different learning styles; and the incorporation of multicultural information, resources, and materials in all the subjects and skills routinely taught in schools. (Gay, 2018, p. 36)

In doing so, educators create pathways of success, not only for underrepresented students but for all students peripheralized by status quo teaching approaches that do not validate, differentiate, and accommodate differences.

### **Teacher Learning and Professional Development as Concepts**

Teacher learning and professional development (PD) are complementary phenomena. As a dialectical, teacher learning is an evolutionary process whereby teachers develop what they know about several aspects of learning: subject matter, students, classroom learning, micro- and macro-cultures, schooling experiences, and self-awareness (Johnson & Golombek, 2016). The situatedness of teacher learning lies in the synthesis between knowledge gained from education and lived experiences (Grangeat, 2008). Praxis thus defines teacher learning, in that subject matter knowledge, practice, and context dialectically inform the minds and actions of teachers at every stage of their preparation and professional undertakings.

Teacher PD is both a mechanism and a process of “deepening teachers’ content knowledge and developing their teaching practices” (Sancar et al., 2021, p. 8). It is an ongoing process that begins during college and continues throughout teachers’ professional lives. The literature on PD approaches is vast and diverse, with numerous studies providing various classification systems for PD approaches (Parkhouse et al., 2019; Schachter, 2015). Schachter (2015) identified 35 different approaches in 73 studies, with coaching, workshops, and curriculum implementation being the most frequently used methods. Parkhouse et al. (2019) identified nine types of PD experiences (i.e., workshop, action research, immersion experience, community of practice, coaching, self-rating, video-feedback, critical friendships, and online component) and found that over half of the programs included multiple components. Research suggests that effective PD requires the use of multiple training methods and intensive ongoing support that is embedded within practice and adapted to local needs and goals (Buysse et al., 2009; Parkhouse et al., 2019; Siraj et al., 2019).

Although teacher learning is often associated with pre-service teachers in the early stages of their professional preparation, it also underlies teacher PD in terms of the types of knowledge that emerge from both experiences. Cochran-Smith (2005) identifies three types of teacher knowledge, namely, “knowledge-for-practice,” “knowledge-in-practice,” and “knowledge-of-practice.” In knowledge-for-practice, teacher learning is the acquisition of formal knowledge and theory generated by researchers. In knowledge-in-practice, teachers learn to probe into, and reflect upon, the knowledge that emerges from their own and their mentors’ methods of designing curricula and classroom interactions in practice and/or authentic teaching situations. In knowledge-of-practice, teachers are the driving forces of their expertise in that they begin to generate new knowledge about teaching and connect it to the social, cultural, political, and intellectual context in which they work.

Teacher learning is also a process of personal identity learning (Beijaard, 2019). Pre- and in-service teachers’ embodiment of their “self-perceptions, and self-definitions” shape the purposes and possibilities for them to take action. Teacher learning also goes beyond the personal in that teacher identity is deeply situated in the complex interplay of factors in the dynamics of their lived experiences of the teachers. What teachers consider as salient and worthwhile in their learning is informed by who they are and their agency in bringing about changes, not only in the classroom but in all communities in which they feel personally and professionally invested.

### **Technology in the Online Medium**

The online medium is defined by waves of change in emerging technologies. Over the decades “[s]ome of these waves are extended, some waves are connected, and other waves are repeated” (Bonk & Wiley, 2020, p. 1595). The manifestation of the waves, as described by Bonk and Wiley, can be seen in the incorporation and use of a myriad set of technological tools for multiple purposes in online teaching and learning. In the early 2000s as Constructivism took hold theoretically, key technologies enabled users not only to consume but also to partake in knowledge construction. This wave was extended to include collaborative tools which then enabled teachers and students alike to globally expand learning and access expertise beyond the classroom and their immediate communities. These waves are currently repeated in which the nodes of open expertise, resources, and content are further distributed through blended and hybrid learning platforms. We see the conceptual framing and infusion of Connectivism (see Siemens, 2005) particularly within the latter of the four waves.

In the “Findings” section of this literature review, we identify the various technological tools in the online medium used in articles we report upon. In particular, we illustrate how they were used toward responsiveness to address the third research question.

### **Problem Statement and Research Questions**

Cultural and linguistic responsiveness remains challenging in teacher preparation and professional development (PD). For example, Doran’s (2016) survey of pre-service teachers indicated that half of the respondents had never heard of cultural and linguistic responsiveness, nor did they have a clear definition of these terms. Moreover, researchers have reported that in-service teachers were often missing specific competencies particularly in responding to learners of diverse backgrounds (Bunch, 2013; Turkan et al. 2014). Most disturbing of all, Wallace Brand (2012) argued that cultural and linguistic inclusivity is often approached by educational stakeholders, not as a responsible solution but as a problem. This disposition stigmatizes and devalues the effort to prepare and guide teachers to teach responsively. This review aims to inform, direct attention to, and consolidate support for responsive teaching. It does so by first showcasing how responsive research and teaching practices are guided by strong conceptual frameworks. Second, the review focuses on the affordances that technology has made possible, and third, the intentional research and teaching efforts to reach and to have targeted impact on specific populations. The questions are as follows:

- (1) What are the theories and conceptual models used to guide research and practice?
- (2) What and how are technology and/or technologically assisted environments used?
- (3) Who and how are teachers and instructors being guided to teach responsively?

We see these questions as interconnected as we focus on teachers’ preparation and PD programs in online cultural and linguistic responsiveness. We reiterate the argument already stated: the knowledge and practice of the programs’ designers, developers, researchers, and participant teachers are mediated by a tripartite of components, namely by the disciplinary theories they draw upon. Those theories, in turn, guide the selection of tools they choose to use

and whom they choose to instruct (Freeman & Johnson, 1998). “Responsiveness” as defined by Hollie (2017) above can only be accomplished if online research and practice are situated in this sociocultural Vygotskyian-inspired process that validates and affirms the individual, their macro context, and the practices that are “internalized” and “transformed” by them.

## Research Methodology

### Data Collection

The literature review followed the systematic approach of clarifying review questions, performing broad and detailed literature searches, screening the abstracts of the studies identified in the searches, developing and refining inclusion and exclusion criteria, and subsequently reading the selected complete texts.

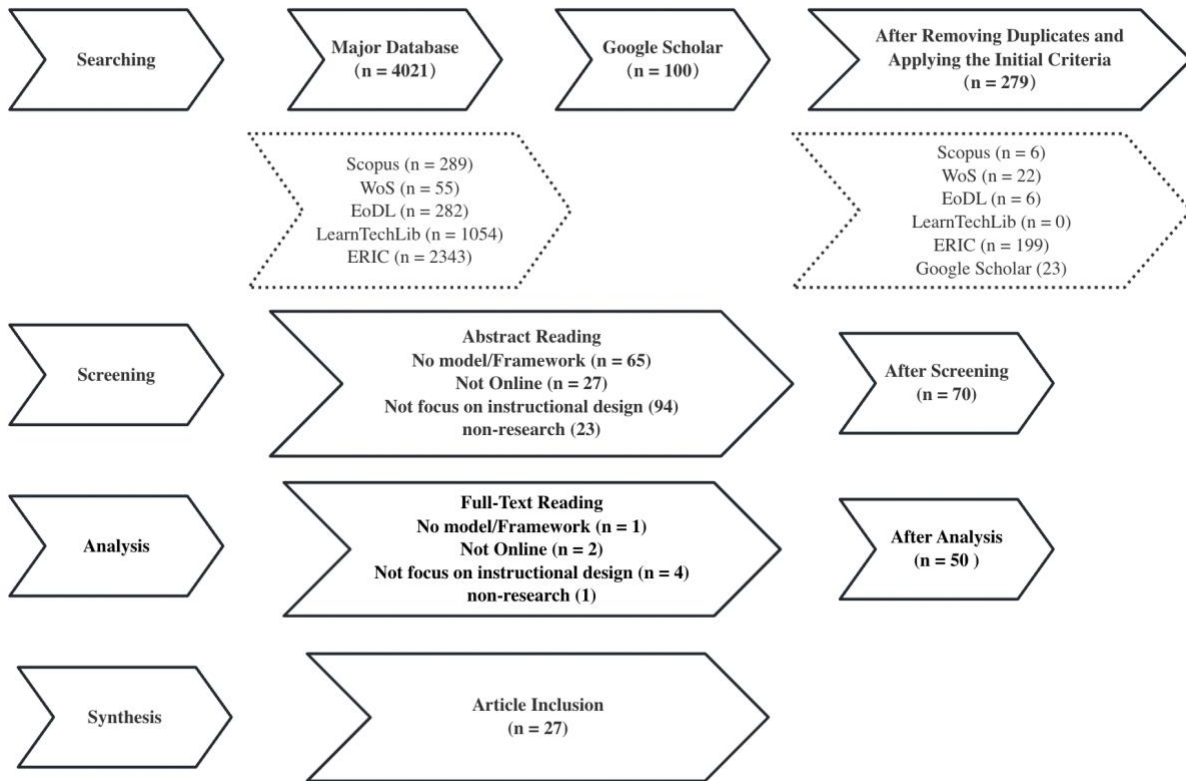
The process of identification of eligible studies began with an initial search in the six significant databases separately: LearnTechLib, Educational Research Information Center (ERIC), Web of Science (WoS), Encyclopedia of Distance Learning (EoDL), and Scopus. The Boolean operators used were the following:

- (1) “Culturally responsive” and (teaching OR pedagogy OR training OR continuing education OR professional development) and (online OR e-learning OR distance learning OR virtual learning) and “instructional design”
- (2) (“Cultural Awareness” OR “Culturally Relevant Education”) and (“Minority Group Students” OR “Professional Development”) and (“Online courses” OR “e-learning” OR “distance learning” OR “virtual learning”)

The initial search yielded 4021 results across the databases. A second round of searches was conducted on Google Scholar to remove duplicates. In this round, to narrow the search further, we focused on articles published between January 1, 2018 and August 27, 2022. As noted, this was the period we considered to be the height of racial tensions. Researchers and educators were most engaged in identifying ways to address the tensions as well as to find responsive educational pathways. AECT’s 2022 recognition of the timeliness of Gunawardena et al.’s (2018) book is one example. These articles were (1) available via full text, (2) published in journals, (3) written in English and, (4) peer reviewed. The first 10 pages of Google Scholar results were scanned to ensure no additional studies were left out in this initial phase across the 6 databases. Thus, 279 peer-reviewed journal articles were identified (See Figure 1).



**Figure 1**  
*Process of Article Identification*



To ensure that the articles were relevant to the target of our search, we screened the articles a third time, resulting in a final collection of 27 articles, using the criteria below that specified that they must:

- (1) Be conducted in internet-based learning environments (i.e., synchronously, asynchronously, hybrid, etc.). These included studies with online activities using learning management systems.
- (2) Include a model, framework, or theory focused on instructional design that helped trainers and designers to develop, design, or lead teacher training and development.
- (3) Address teacher learning and professional development of teachers of culturally and linguistically diverse learners.

### **Coding and Analysis**

We then coded the 27 articles in accordance with the research questions that flowed from our central argument.

Based on Onwuegbuzie et al. (2016), we undertook two cycles of coding. In the first cycle, we undertook a descriptive coding in which the codes were based on word, short phrases based on our research questions i.e. (1) Theories, conceptual models, frameworks; (2) technology, applications; (3) people and groups included. In the second cycle, we themed information we abstracted information from the articles. We strove to maintain trustworthiness in

the coding by referring to Elo et al.’s (2014) recommendations to have multiple coders that check each other’s coding. As per their suggestions, the following steps were undertaken to enhance trustworthiness, namely

1. Six researchers on the team first coded two articles together to calibrate coding;
2. The researchers were paired and separated into three groups;
3. In each pair, one researcher coded first and the second, undertook a follow up in the role of an audit trailer;
4. When there were divergent opinions, all researchers discussed in scheduled weekly meetings as to how to proceed next.

An example of the code book is below for technology and applications in the online medium:

**Table 1**

<b>Author</b>	Phan, T	Technology, Applications, Platforms	Sample Quotes
<b>Year of Publication</b>	2018		
<b>Title</b>	Instructional strategies that respond to global learners’ needs in massive open online courses		
<b>Journal</b>	<i>Online Learning</i>		
<b>Country</b>	USA		
<b>Method</b>	Qualitative		
<b>Audience</b>	Instructors & Instructional Designers		
<b>Code (Cycle 1)</b>	Technology, Applications & Platforms	<ul style="list-style-type: none"> <li>• Coursera, Facebook,</li> <li>• Google Hangout,</li> <li>• PowerPoint</li> </ul>	
<b>Usage</b>	<ul style="list-style-type: none"> <li>• Discussion,</li> <li>• Virtual office hours</li> </ul>		
<b>Themes (Cycle 2)</b>	<ul style="list-style-type: none"> <li>• Reduce barriers</li> <li>• Increase accessibility</li> </ul>		...provide support and engage learners who have English language barriers, or those who did not have the necessary subject background to keep up with the course, or those who were not familiar with American educational culture (p. 95)

### Context of the Studies

#### Geographical, Temporal and Publication Distribution

The majority (79.35%) of the responsive studies (N=27) were conducted in the USA, and one author was affiliated with a US-based institution although the study was not conducted in the US (See Figure 2). The remaining studies were conducted by authors from Korea, the United Arab Emirates, Australia, France, Pakistan, and New Zealand, with each country contributing one author.

**Figure 2**

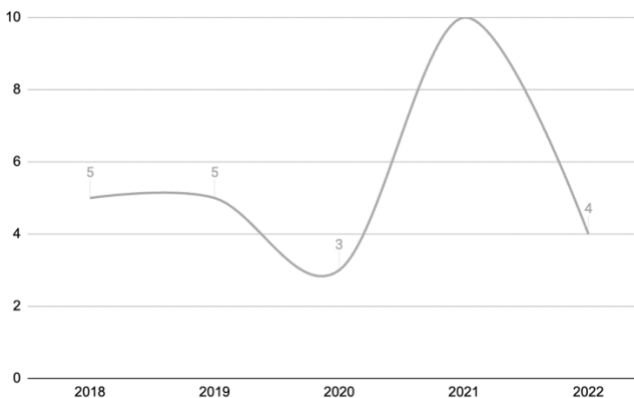
#### *Geographical Distribution of Studies*



Analyzing the year of each publication indicates there is an overall upward trend in the number of publications even though the number of publications fluctuates. Notably, this trend appeared to have accelerated in 2021, with a significant increase in the number of publications, from 3 in 2020 to 9 in 2021 (See Figure 3). It is worth noting that the highest number of articles were published in TechTrends (N =4) and Multicultural Learning and Teaching (N =2).

**Figure 3**

#### *Temporal Distribution of Articles*



## Research Methodologies

The choice of research methods primarily depended on the research question and the nature of the phenomenon being studied. In general, the majority of the selected studies used qualitative (N=13) and mixed methods (N=5) methods. Four studies used quantitative approaches (N=4). The studies that adopted qualitative and mixed methods provided nuanced and context-specific insights into learners' experiences (e.g., Tsuda et al., 2022), perspectives (e.g., Howrey, 2018), and needs (e.g., Phan, 2018; Vail, 2018) and explored complex or dynamic phenomena, i.e., global collaboration (e.g., Gleason, 2021). Quantitative studies examined the effectiveness of online teacher education and PD programs in increasing faculty and staff members' cultural competence (e.g., Hode et al., 2018) or the effectiveness of an online intervention in changing preservice teacher beliefs about the education of culturally and linguistically diverse students (e.g., Polat et al., 2019; Suh and Michener, 2019).

Interviews and case studies were among the most used qualitative research methods in the included studies. It is also noteworthy that some studies used a self-study research approach, such as Donovan et al. (2021), while others used a combination of multiple methods. These included, for example, Hill et al. (2020) who used online curriculum review, test data, observation, and interviews, and Suh and Michener (2019) who used content and discourse analysis to analyze online discussions. Researchers also used quantitative approaches including Yoon (2021) who applied social network analysis while Polat et al. (2019), on their part, solely used surveys.

### Methodological Limitations

The studies reviewed were not comprehensive and representative of responsive studies globally. However, they provided insights into the current state of research in the area. These studies highlighted, from a global perspective, how cultural and linguistic responsiveness can be effectively integrated into teacher education and PD programs worldwide.

The literature review was conducted up to August of 2022. We could not report on the trend following that period. Thus, our review could have excluded the delayed impact of the COVID pandemic such as a lengthier publication cycle and/or a shift in the responsive focus of articles.

## Findings

### Question 1: What Are Theories and Conceptual Models Used to Guide Responsive Research and Practice?

Cultural and linguistic responsiveness is a subject of scholarly inquiry and practical application approached through a plethora of theories and conceptual models. However, it was evident that the articles we analyzed approached cultural and linguistic responsiveness primarily from a sociocultural perspective and its associated dimensions. In this regard, teacher learning and PD were grounded in a social process of back-and-forth engagement situated in, and shaped by, context. It was significant, too, that the review revealed “prolepsis” (Vossoughi & Gutiérrez, 2016) or the “critical” in sociocultural thinking. In doing so, responsiveness was implemented when the sociocultural lens allowed for the problematization of past and lived experiences in

research and in the proactive design of practice. As in the percepts of responsiveness, prolepsis is multivocal and multi-contextual. Accordingly, the inclusion of indigenous and intercultural theoretical frameworks also underlay research and practices reviewed and reported in this section. In doing so, they also served to expand existing responsive frameworks.

The use of these theories revealed responsiveness as a socially negotiated process. Suh and Michener's (2019) research utilized Lucas and Villegas's (2013) framework for linguistically responsive (LR) teacher education and Bakhtin's (1981) dialogism framework. Dialogism is a lens through which teacher candidates' dialogues are a means to show tension for change toward responsiveness to diversity. These dialogues were based on the teachers' engagement with content that focused on sociolinguistic consciousness, the value of diversity, and advocacy for learners whose first language was not English. Similarly, Boada (2022) framed his research within the socio-cultural theoretical framework of the Community of Practice (CoP) (Lave & Wenger, 1991). Within CoP, teachers were engaged in Instructional Conversations the patterns of which were brought to the surface through Social Network Analysis (SNA). In essence, the lens enabled the observation of how teachers were inducted into a community to address responsiveness through online collaboration, conversation, and communal reflection.

The sociocultural framework was also used to reveal changes in specific areas. In Polat et al.'s (2019) study, the focus was on changes in teacher beliefs through their interactions with their diverse learners as E-Penpals. Interactions are necessary, as teachers' beliefs are symbiotically formed and informed by them (Borg, 2003). E-Penpals were undertaken to offset the limited experience that pre-service teachers had in multilingual and multicultural classrooms. In that regard, Polat et al. looked at changes through these interactions, in the teachers' beliefs about cultural and linguistic diversity and anti-deficit perspectives. Warren (2018) utilized "discursive psychology" (Potter, 2012) to expose teacher beliefs about teaching culturally and linguistically diverse students. These beliefs were uncovered through interpersonal discourse in an online PD course.

Frameworks that included criticality were also observed primarily through "critical reflection" as a concept in responsive online teacher education programs. Through the reflections, we see criticality in these frameworks as responsiveness that not only empowers and validates but also problematizes and interrogates positionality. In this regard, the basis for examining equity and inclusion are teachers "own experiences, life worlds, privileges, struggles, and positions in relation to others (their students as racialized and cultural beings, their students' parents, their students' communities, and their students' ways of knowing)" (Milner, 2006). Walker et al. (2021) situated their study in a constructivist-interpretivist framework that enabled the examination of those reflections in their study comparing teacher online and onsite preparation. In Braunstein's et al. (2021) research, the lens of "critical constructivism" enabled the researchers to observe teacher candidates' reflective use of the online medium as "counterspaces" to explore the dangers of essentializing race, culture, and identity in their teacher preparation program. Hill et al. (2018) reported on the Indigenous Cultural Competency Program (ICCP). The framework constituted mandatory training for all staff to undergo a reflective "journey within" to explore self-awareness about transformation and change in their perceptions of Australian indigenous student populations. In Goin Kono Taylor's (2021)

research, the “Ethos of Care” framework centered the analysis of faculty reflective narratives about their experiences as they learned to bridge the digital divide underlying diverse students’ access to online education during the pandemic. McCollough (2020) relied upon Kolb’s (1984) classic model of learning through disruption and cognitive dissonance. McCollough designed online reading exercises of seminal science education texts that required pre-service teachers to reflect on diversity and inclusion personally and critically when she juxtaposed those readings with culturally relevant readings (e.g., Ladson-Billings’s *The Dreamkeepers* (1994)). Finally, Howrey’s (2018) research of pre-service teachers’ discussion of literature with Mexican immigration themes in a hybrid class underscored the need for a reflective reading stance in developing responsive teachers. Drawing from the Rosenblatt’s (1978) Reader Response Theory, Howrey observed that the enactment of criticality and empathy occurred when teachers in the online class immersed themselves emotionally based on reflections of their own experiences (aesthetic reading) in contrast to approaching the reading as sources of information (efferent reading) in discussions.

The review also yielded frameworks used by researchers to train instructors, teachers, and all related staff members to address inclusiveness responsively and proactively on a larger scale in teaching and design. Brown et al. (2021) provided a “Virtual Professional Development” framework for social justice and equity training that included virtual “professional learning communities, personal coaching, classroom observations, and self-reflection” (p. 5). Westine et al. (2019) focused on instructors’ use of and familiarity with the principles of Universal Design for Learning (UDL) from CAST (2018). They included delivering materials and instruction through multiple means of representation, action and expression, and engagement. In essence, UDL was used as a responsive framework that guided the teachers in proactively and comprehensively planning, enacting instruction, and assessing learning.

Similarly, Donovan et al. (2021) approached responsiveness in the inclusion of culturally and linguistically diverse learners in online teacher education program from the lens of “Learning Ecology.” The lens enabled them to analyze the program’s design features from a holistic perspective by studying the relationship and intersectionality between curricula, policies, processes, individuals, and the relationships between all of them. Phan (2018) included Henderson’s Multiple Cultural Pedagogical Model of interactive multi-media design that considers the intersection of multiple identities based on ethnic, workplace, academic, and entrepreneurial cultures. Hode et al. (2018) created a model for use in an online diversity course that helped faculty and staff recognize and respond to diversity as a value from the individual/interpersonal (e.g., productivity) to the organizational and societal levels (e.g., dynamic economy, pluralistic democracy). Engerman and Otto (2021) promoted the recursive design model they saw in Bennet et al.’s (2017) study that included the iterative design processes of designing before, during, and after implementation. Such a model created pathways to reveal and include diverse social, cultural, and linguistic orientations into instruction and design.

Other research drew from intercultural and internationalization frameworks as foundations to understand and support instructors in being responsive. In terms of the former, Bunkowski and Shelton (2019) used the “indigenous epistemology” as a lens for contextualizing and identifying tribal leaders’ leadership strategies of online education in the Northwest Indian

College (NWIC) system. The epistemology consists of American Indian ways of knowing, values and beliefs derived from “relationships, connections between people, location/earth, time and spirituality” (p. 3). Kumi-Yeboah et al. (2020) drew on Bennett’s (2001) framing of multicultural research in Curriculum Reform, Equity Pedagogy, Multicultural Competence and Societal Equity. The framework was used to uncover the perceptions and challenges faced by university instructors to address and respond to diversity in their classroom. Responsiveness can be seen also through how frameworks guide teacher training by bridging understanding across borders or by creating spaces for new understandings. Yoon et al. (2021) used Cultural Intelligence (CQ) (Earley & Ang, 2003) as a measurement of cultural awareness outcomes (cognitive, motivational, and behavioral) by Korean science teachers’ online encounters with US minority students. Gleason and Jaramillo Chavez’s (2020) research used Hansen’s (2017) lens of Cosmopolitanism in studying teacher candidates’ collaboration and intercultural communication. The lens immersed teacher candidates in multiple perspectives as they did so. Tsuda et al. (2021) utilized Dardoff’s (2006) Intercultural Competence model that moved teachers from the personal plane of attitudinal development to observable interpersonal communication outcomes that reflected intercultural competence such as “flexibility, adaptability, ethno-relative perspective and empathy” (p. 3). Vail (2018) used Cohen et al.’s (2011) interpretive ontological stance in which “truth” was defined from different vantage points. In her research to help educators strive toward culturally responsive digital learning for international students, the stance allowed her to showcase both students’ and educators’ perspectives on responsiveness. Deng et al. (2021) developed and showcased the implementation of their collaborative “Pedagogical Design” developed to guide online intercultural collaboration between Hong Kong and Minnesotan pre-service teachers. The design included the use of existing cross-cultural awareness models, namely, Hofstede’s (1980) cultural dimensions, Hall’s (1989) low and high contexts cultures, and Lewis’ (2010) cultural types. The cross-cultural model formed one leg of the tripartite design that also included guidelines for technological tool selection and online strategies for sociability and communication.

The frameworks we saw in the review also acknowledged, augmented, and expanded the culturally responsive paradigms, where responsiveness is perceived through the lens of the efficacious utilization of online and technological affordances. Ardley and Repaskey’s (2019) research for example, juxtaposed Ladson-Billing’s CRP with models that enabled the inclusion of, and partnerships with, multiple stakeholders, namely, Ausburn et al.’s (2011) Tetrafocal Professional Development and Bailey et al.’s (2016) Intellectual Partnerships Models. The models provided a foundation for teacher educators to use video annotated technology to enhance their responsiveness in collaboration with teacher candidates in a Historically Black college. Ren’s (2022) study relied on Lee’s 2003 Culturally Responsive Design framework that placed culture at the core of design, technologically assisted, and online teaching. In the framework, students’ prior knowledge, ways of knowing, engagement and motivation needs, and social and civic empowerment interests were used as guides. Eppard et al. (2022) leveraged Dang’s (2010) Edtech Culturation concept which concluded that, in order to be effective, technologically assisted and online teaching had to be situated in local learning culture, including collaboration with individuals in the local context. In addition to referring to Ladson-Billings’s (1994) and Gay’s (2010) responsive pedagogical frameworks, Shelton et al. (2022) also paired them with the “Racial Platform Capitalism.” The pairing conceptually framed their research on

social justice in teacher professional learning (PL) on Instagram. It demonstrated capitalist principles underlying online platforms that can algorithmically yield content capable of reinforcing biases and extremist views. Thus, in undertaking responsive and inclusive PL, Shelton et al.'s research called for teachers and their influencers to be trained in “exercising critical agency in their social media behavior” (p. 852).

In this section, we identified theories and conceptual models used to guide responsive research and practice in teacher learning and professional development that took place in technologically assisted and online environments. The theories and models provided ways to understand and to guide research and design as well as to create pathways for practice.

### **Question 2: What and How is Technology Used Responsively in Online and/or Technologically Assisted Environments?**

The review demonstrated that a contextualized and myriad set of tools were used to achieve online responsiveness. They were used to reduce barriers and foster inclusivity, create online communities and affinity spaces, enhance accessibility, broaden learning opportunities, foster engagement, and advance learning. In the concept of prolepsis mentioned earlier that juxtaposed sociocultural thinking and criticality, Vossoughi and Gutiérrez (2017) pointed out Freire's conception of the human capacity to change the environment through tools is not a neutral act. It is a “continuous movement toward humanizing social relations” (p. 147), to make it better, real, and responsive. The choices of tools made in online teacher training and PD to be discussed in this section demonstrate this mindset and the deliberate undertakings that flowed from it to provide guidance to teachers to teach responsively.

#### ***Contextualized and Individualized Myriad Use of Online Technologies as Central to Responsiveness***

Multiple studies (e.g., Phan, 2018; Deng et al., 2021) made use of a combination of learning management systems (LMSs) alongside discussion forums, local messaging, communication tools (e.g., WeChat for China; KakaoTalk for Korean), and virtual meeting tools to complement and enhance the LMS features (See Figure 4). Ren (2022) highlighted the importance of integrating local messaging and communication tools, given the social and cultural preferences of students. Such tools were often deemed necessary to supplement the LMS and facilitate effective communication and collaboration among learners.



**Figure 4**  
*Integration of Online Systems and Tools*

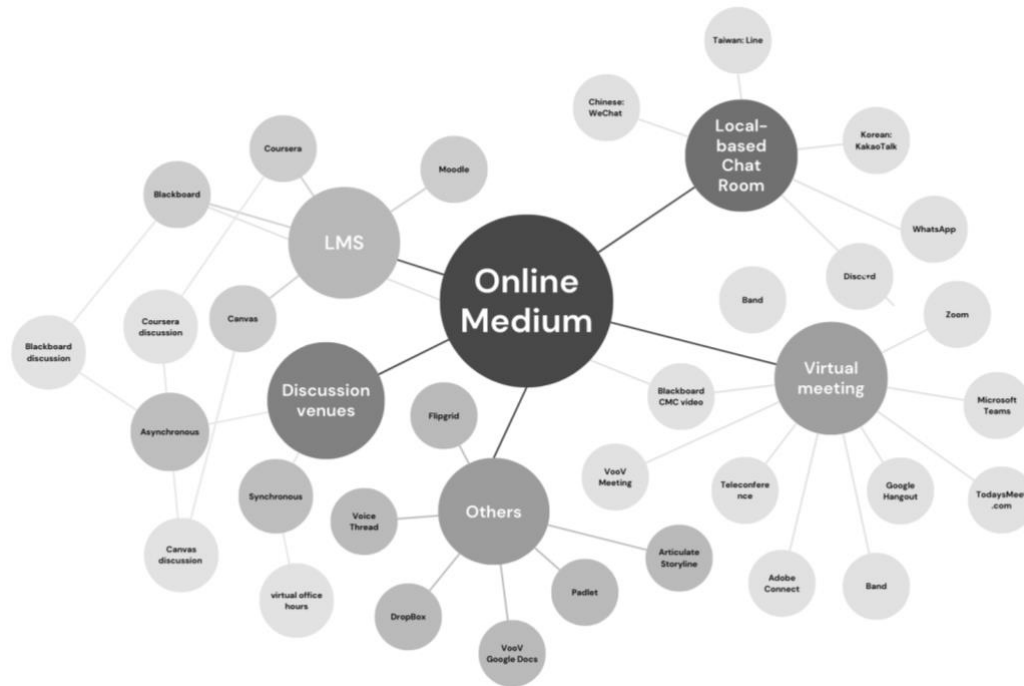


Figure 4 demonstrates the incorporation of multiple and myriad online systems and tools. Blackboard (N=5, e.g., Hode et al., 2018; Taylor & Yan, 2018; Walker et al., 2021) and Canvas (N=2, e.g., Braunstein et al., 2021; Walker et al., 2021) were two widely used LMSs to post course content, assignments, and assessments, and to provide a platform to engage in discussion and collaborate with their peers (e.g., Taylor & Yan, 2018). In addition, technical structures such as file sharing and video conferencing were also available. Sociability structures were added to online platforms, including blogging, group and private messaging, chatting in real-time, and personalized notifications. WhatsApp (N=2, e.g., Gleason, 2021), Instagram (N=3, e.g., Gleason, 2021; Shelton et al., 2022), Skype (N=3, e.g., Brown et al., 2021; Deng et al., 2021; Gleason, 2021), and other social media platforms were also used to facilitate asynchronous communication to increase sociability. Discussion venues, whether in an LMS or as an individual tool (e.g., Facebook page), were used to create online affinity spaces where learners could make, comment on, and share cultural artifacts (e.g., images, videos, and texts) and by doing so, adapted and added to these artifacts' multimodal designs. Collaborative tools (e.g., Google Docs and Padlet) facilitated small group collaboration and provided opportunities for students to engage in collaborative activities (e.g., Deng et al., 2021; Gleason, 2021).

### ***Technology Used to Reduce Barriers and Bridge Differences***

Online mediums have the potential to mitigate geographical, linguistic, and cultural barriers, thereby facilitating communication and collaboration among individuals from diverse backgrounds. Deng et al. (2021) explored the use of online tools to support cross-cultural pedagogy in the context of a project involving pre-service teachers in Hong Kong and the United States. The study reported the use of several online tools to facilitate communication, collaboration, and resource sharing among students, including Slack, Google Docs, and Zoom.

These tools were used for instant messaging, threaded discussion forums, video conferencing, and monitoring group progress. Braunstein et al. (2021) examined how online discussion boards can be used as a pedagogical strategy to build on the cultural and linguistic resources for pre-service teachers of color. The study analyzed thirty discussion board posts by pre-service teachers of color and highlighted how online tools can allow minority students to connect with online communities, share their identities, and augment their voices. The study found that the discussion board allowed participants to contribute to discussions of various topics in ways that traditional face-to-face lectures did not allow, and that technology allowed participants to freely reflect, critique, and extend knowledge. Phan (2018) illustrated how a massive open online course (MOOC) leverages discussion forums and virtual meetings to offer language assistance, content support, and various forms of online interactions to learners, using various online tools such as Coursera, Facebook page, Google Hangout, and PowerPoint for course delivery. The author suggested the use of translation and subtitle tools to increase accessibility for learners with different language backgrounds. The study highlighted the importance of building in-course components that provided flexibility for diverse learners, such as choices of language for assignment submissions and content materials categorized by levels. Similarly, Ren's (2022) study explored instructional design practices for distance teaching and learning in a cross-cultural context. She suggested the use of various technologies to facilitate cross-cultural learning, including video conferencing platforms like Adobe Connect and Zoom, e-learning authoring video tools like Articulate Storyline, and social media platforms like WeChat and KakaoTalk to facilitate communication among learners from diverse cultural backgrounds. In her practice, she established locally based chat rooms within a transnational education program to address challenges related to cultural differences and facilitate a smooth transition. The use of social media chat rooms like WeChat and KakaoTalk allowed learners to communicate in their native languages and use familiar communication tools. They provided learners with a sense of cultural and linguistic familiarity and consequently, enhanced their learning experience.

### ***Technology Used to Increase Sociability, and Build Community***

The community and networking features of educational technology tools can be leveraged to construct diverse online communities, providing multiple opportunities for dialogue and flattening communication hierarchies. In Gleason's (2021) study, a range of educational technology tools were used to facilitate virtual exchanges and global collaboration in a teacher education course. These tools included email, WhatsApp, Instagram, Skype, Snapchat, Discord, FaceTime, Flipgrid, Google Docs, Google Hangouts, Line, and Zoom. Video and audio tools such as Skype, Zoom, and FaceTime enabled “in the moment” communication which fostered a sense of presence and immediacy in engagement with others. Vail's (2018) article highlighted the importance of creating a globally accessible classroom platform and incorporating online case studies into the curriculum to create a third space online where students of varying nationalities can participate in inclusive and expansive dialogue. Student participation and engagement were encouraged by familiar shared spaces, and peer-to-peer responsiveness was evident through online postings and subsequent in-class discussions. Boada (2022) highlighted the fact that online platforms with sociability features, such as blogging, group and private messaging, real-time chatting, videoconferencing, and personalized notifications for new posts and activities were essential for fostering a sense of community and improving knowledge. By

cultivating an online community of practice, teachers were able to overcome barriers related to isolation and connect with others who shared similar pedagogical goals and challenges.

### ***Technology Used to Increase Accessibility and Expand Opportunity***

The online medium was employed to facilitate equitable access to educational resources across geographical regions and time constraints. Walker et al. (2021) conducted a qualitative cross-case study to examine the effectiveness of Blackboard and Canvas delivering courses to prepare teachers for culturally and linguistically diverse (CLD) urban schools. The study also found that online teacher education courses can effectively prepare teachers to work with CLD students in urban schools, which has implications for addressing educational inequities and improving outcomes for CLD students. In Gleason (2021), the focus was on designing and implementing an educational innovation, the Virtual Exchange (VE), which facilitated the development of global collaboration and empowered intercultural learning skills among pre-service teachers (PSTs). Incorporating the VE into the PSTs' teacher education program enabled them to engage in an intercultural exchange with Turkish counterparts. The VE platform allowed for synchronous and asynchronous communication, which accommodated different time zones and allowed for flexibility in scheduling participation. The VE also provided both groups with access to cultural and linguistic educational resources and materials which were previously not available to them.

### ***Technology Used to Promote Engagement and Advance Learning***

Online technologies and mediums were utilized to support just-in-time teacher learning, regular and continuous learning for in-service teachers to be responsive to cultural and linguistic differences. Brown et al. (2021) proposed a framework for continuous professional development for in-service teachers to promote culturally relevant and responsive teaching during the COVID-19 pandemic. Their virtual professional development framework included personal coaching, self-reflection, classroom observations, and professional learning communities facilitated through virtual platforms such as Zoom, Skype, Microsoft Teams, and Google Hangouts. In McCollough's (2020) study, online mediums such as discussion forums and digital presentation boards were used to support the implementation of Transformational Reading Exercises (TREs) in a science teacher preparation class at Texas A&M University. The use of technology facilitated the implementation of the TRE approach and provided opportunities for open discussions and authentic implementation of culturally relevant teaching.

The utilization of educational technology tools in the online medium enhanced cultural and linguistic responsiveness in teachers' learning. Consequently, technology also impacted their efforts to include diverse students in the online classroom.

### **Question 3: Who and How Are Teachers and Instructors Being Guided to Teach Responsively?**

In responding to the first and second research questions, the review demonstrated the sociocultural theoretical underpinnings of responsive online teacher learning and PD research and practice, including technology choices and usage. In responding to the third question, the populations targeted for the support in the articles reviewed once again reflected sociocultural influences. The specific groups targeted and the types and goals of support they received were

mediated by the view that individuals are “sociohistorical beings” (Vossoughi & Gutierrez, 2016, p. 155). The review thus demonstrated that individuals’ identities, the contexts in which they lived and worked, and past and present experiences mattered in responsive online teacher education and PD programs.

Thus, in the articles reviewed, pre-service and in-service teachers from minority, majority, and international communities were the populations addressed in the online teacher learning and professional development (PD) that focused on CLI responsiveness. Minority communities were often referred to as “culturally and linguistically diverse groups” in the literature. We define the majority community as groups of people with social, economic, political, and educational access and advantages (Seyranian et al., 2008) and the international community as people living outside the United States. The literature review suggested ways the specific groups of teachers could improve their cultural and linguistic responsiveness.

### ***Support for Instructors from Minority Communities***

Online teacher learning and PD provided support for teachers from minority communities. The responsive approaches we identified centered on the empowerment of voice and values. For example, Braunstein et al. (2021) suggested strategies, such as using an online discussion board, that centralized the importance of voice for pre-service teachers of color. Teachers felt connected through online tools that allowed them to share their thoughts and ideas with people from other cultures. Shelton et al. (2022) collaborated with individuals from historically marginalized groups (e.g., teachers of color and non-cisgender individuals) to develop strategies to amplify their voices and social justice agenda with specific tools. For example, teachers were guided to use Instagram posts from “justice-oriented education influencers” to boost cultural competence in their students (Shelton et al., 2022, p. 840). This is because the authors found that the influencers’ content provided professional learning of social justice and inclusive pedagogy. They also shared resources that honored culture in students’ homes to support their diverse needs and inspire “critical consciousness” (Shelton et al., 2022, p. 849). Bunkowski and Shelton (2019) focused on the inclusion of valued voices from within Native American communities in their work on designing online teacher professional development in a U.S. tribal college. Cultural and linguistic responsiveness in the program was achieved through collaborating specifically with community leaders and incorporating their opinions in developing the online PD program for teachers. Leaders at the college shared their views on the most successful strategies they found that allowed the school “to achieve its mission, vision, and core values through online education” (p. 2).

### ***Support for Instructors from Majority Communities***

The development of a culturally responsive online classroom characterized by cultural awareness and responsiveness was equally valuable to teachers from majority communities. Researchers primarily targeted cultural awareness and cultural competence.

To best support students from culturally and linguistically diverse backgrounds (CLD), teachers from the community were engaged in self-reflection to increase cultural competence. Practices included the use of online journal entries that allowed pre-service teachers to review their interactions with students (Gleason, 2021). Donovan et al. (2021) used a self-study

approach to promote equity and inclusion among faculty via online synchronous meetings and asynchronous online conversations. For example, they were asked to reflect on pedagogical practices and other aspects of the course content for unintended biases as well as for practices that required improvements to scaffold students' learning. Other studies, such as those by Goldstein Hode et al. (2018) and Walker et al. (2021), reviewed practices in established training programs for faculty and teacher education graduate students, including self-reflections, in efforts to improve their diversity awareness and ways to enact the awareness in culturally and linguistically responsive ways.

### ***Support for Instructors Working with Students from International Communities***

The studies reviewed focused on teacher learning and PD by emphasizing that responsiveness can be achieved by focusing on cross-cultural competence and communication skills. Responsiveness was also about situating online instruction in local contexts and by using the medium as a "third space" (Bhabha, 2004).

Gleason (2021) created a virtual exchange program between pre-service teachers (PSTs) from a predominantly white institution and PSTs at an international university. Through this program, PSTs increased their cultural awareness and cultural competence while learning alongside overseas peers. Similarly, Tsuda et al.'s (2022) study showcased an example to be used by teachers pertaining to an online cross-cultural learning classroom community that increased intercultural communication. In the teaching example, elementary students from the U.S. and Japan introduced their own cultural activities to others by filming, uploading, and watching each other's videos with the support of online technologies (e.g., Google Drive). Results showed that students who participated in this project improved their communication skills both in and outside the classroom.

Studies reviewed also examined successful programs to illustrate to teachers and instructional designers the importance of incorporating culturally responsive pedagogy to facilitate intercultural communication skills. For example, in evaluating an online exchange program between African and U.S. students and faculty (Collaborative Online International Learning (COIL), Vahed and Rodriguez (2021) saw the impact of the pedagogical principles. The COIL program was successful because the use of the pedagogy fostered meaningful cultural exchanges and developed intercultural awareness across shared multicultural online learning environments. Similarly, Liu and Shirley (2021) observed that the incorporation of direct instruction on cultural diversity, cultural acceptance, and intercultural awareness led to a successful online exchange program between U.S. and German students learning to teach during the COVID-19 pandemic. This exchange program effectively increased intercultural competence in international communication, which in turn, supported learning.

Ren (2022) explored ways for online instructional designers (including teachers who design classroom interactions) to overcome the challenges in transnational and international communication in classrooms with international participants. The author pointed out that designers should be responsive to local specificities such as government regulations and availability of digital resources that may challenge reciprocity in student participation in online classrooms. Yoon's (2021) study demonstrated that contextualizing cultural differences may

need to precede online instruction. For example, Korean teachers were better able to teach in an online science classroom, in the Virtual and Open Integration of Culture for Education (VOICE) program, once they understood how American elementary students interpreted science concepts in ways that were culturally different from how the concepts were understood in Korea.

The studies also demonstrated that the online medium and technologies within them enabled the creation of third spaces to build bridges and promote communication across borders. Teaching responsiveness can happen in these spaces. Deng et al. (2021) conducted an online communication project of pre-service teachers from the U.S. and Hongkong through Slack and Zoom. The study showed that the application of web-based tools boosted and created “safe” and inviting spaces for the discussion of students’ understanding of cultural differences.

The literature review demonstrated that responsive online teacher education and PD supported, in specific ways, teachers from minority, majority, and international communities. The online medium and technology, as seen in the literature review, were being utilized to optimize their undertakings to do so.

## **Discussion and Implications**

The literature review demonstrated to us, as researchers and practitioner scholars, that “Praxis” (Freire, 1989) guided online teacher training and PD programs in the articles we included. In this review, on the whole, we saw socioculturally informed theories and practices working in tandem with each other.

However, a discussion of the equity for the teachers themselves in gaining the training and professional development in teaching responsively would be beneficial. Teachers’ individual circumstances and needs require differentiated approaches and pathways for them to gain, take ownership of, and enact the expertise they gained in ways that are aligned with who they are as teachers and the specific demands of their teaching contexts. Like the resources identified in Tate and Warschauer (2022) as requirements for students, equity for teachers requires equitable access not only to physical (e.g., space, hardware, internet) and training resources (e.g., training in literacy, education, and self-regulated learning), but also, most of all, to social resources (e.g., support from community, teachers, peers).

To that end, online teaching education and PD programs should always incorporate learning as a socioculturally mediated process. Thus, it was reinforcing to see that, in studies reviewed, online Communities of Practice (CoPs) were essential sociocultural components of teacher learning and PD. CoP members can consist of practitioners at every level of expertise. Membership enables teachers to develop a shared repertoire of resources including experiences, stories, tools, ways of addressing recurring problems which are, in short, a shared practice based on experiences and disciplinary knowledge. They engage in sustained interaction over time. Learning in a community of like-minded people builds relationships that impact learning and provides a space to come together. Time spent in the community provides opportunities for the teachers to nurture and take ownership of a culture of responsive teaching practices of their own.

Most importantly in CoPs, teachers are able interact with “more knowledgeable others” (MKOs) or as “temporary others” (Johnson & Golombek, 2016). An MKO includes anyone who possesses a higher or better understanding and/or ability, or a peer or even a novice teacher with similar interests and vision, or who shares the same circumstances. The MKO mediation enables teachers to reach Vygotsky’s Zone of Proximal Development (ZPD) (Vygotsky, 1978) through which they can achieve more than they can achieve alone. Thus, embedding MKOs or temporary others in online teacher education and PD are responsive acts in that it empowers teachers by affirming their expertise and validating their contributions to move knowledge and best practices forward.

At the beginning of the literature review, we referred to Bonk and Wiley’s (2020) waves of technological changes impacting online teaching and learning. We are riding now on the new wave of Artificial Intelligence (AI) which provides a ready opportunity for novel ways to use MKOs and temporary others in responsive online teacher education and PD programs. Instead of the human-to-computer interactions, AIs’ “human-to-human-like” interactional capacities can be useful. These interactions are defined by personalized, customized back-and-forth engagement, and reciprocity that could simulate for teachers’ interactions with live MKO human peers or with temporary others. The 2023 report from the US Department of Education on AI and the future of teaching and learning provides several ideas as to how AI can be of assistance. They include the following:

- a) Assist teachers to identify and analyze models of responsive practices; patterns of their own responsive practices and that of others; and possible biases in their own and the practices of others; recommendations/resources to rectify the biases.
- b) Assist teachers to access online information through learner analytics that can help them to be responsive and specific in addressing the different needs of diverse students.
- c) Support teachers to select and adapt technological tools to be used in the online medium in ways appropriate to students’ interest, purposes, and circumstances.
- d) Inform teachers through alert tools that bring their attention to events in the macro context that could affect the daily lives of diverse students. The information can help teachers with attending responsively to the ways they impact students’ classroom performance.

The suggestions above demonstrate that for online teachers, AI can provide a readily available support network in their efforts to teach responsively. To do so will take everyone and everything that the teachers can muster.

### **Declarations**

The authors (Pawan, Li, Billings Dopwell, Nijiati, Harris & Iruoje) declare no conflicts of interest. The authors (Pawan, Li, Billings Dopwell, Nijiati, Harris & Iruoje) declare no funding for this research. This research did not require ethics board permission because it did not enroll human subjects.

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## Appendix A

**Table A1**  
*References Included in the Systematic Review*

	<b>Author</b>	<b>Title</b>	<b>Journal</b>
1	Phan (2018)	Instructional strategies that respond to global learners' needs in massive open online courses	<i>Online learning</i>
2	Hode et al. (2018)	Testing the effectiveness of an online diversity course for faculty and staff.	<i>Journal of Diversity in Higher Education</i>
3	Vail (2018)	Examining the need for culturally responsive digital learning.	<i>Waikato Journal of Education</i>
4	Warren (2018)	Exploring Experienced Teachers' Constructions of Culturally and Linguistically Diverse Students in an Online Class.	<i>International Journal of Multicultural Education</i>
5	Howrey, Shannon Tovey (2018)	Pre-Service Teachers' Changing Perspectives of Mexican Immigration Following an Online Multicultural Literature Experience	<i>Multicultural Learning and Teaching</i>
6	Suh (2019)	The preparation of linguistically responsive teachers through dialogic online discussion prompts	<i>Teaching and Teacher Education</i>
7	Polat et al. (2019)	Change in preservice teacher beliefs about inclusion, responsibility, and culturally responsive pedagogy for English learners.	<i>International Multilingual Research Journal</i>
8	Ardley, Jillian; Repaskey, Lisa (2019)	Video Annotated Technology: Exploring Teacher Candidates' Adaptation to a New Tool in Student Teaching	<i>i-Manager's Journal of Educational Technology</i>
9	Bunkowski, Lisa; Shelton, Kaye (2019)	Mission, Vision, and Core Values through Online Education.	<i>Quarterly Review of Distance Education</i>

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| 11 | Hill, Barbara; Tulloch, Marian; Mlcek, Susan; Lewis, Melinda (2020) | The 'Within' Journey: Assessment of the Online Indigenous Australian Cultural Competence Training Programme at Charles Sturt University | <i>The Australian Journal of Indigenous Education</i>                             |
| 12 | McCollough, Cherie (2020)   | Using Culturally Relevant Transformational Reading in a COVID-Era Online Science Teacher Preparation Class                              | <i>The Electronic Journal for Research in Science &amp; Mathematics Education</i> |
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| 15 | Gleason (2021)  | Design Thinking Approach to Global Collaboration and Empowered Learning: Virtual Exchange as Innovation in a Teacher Education Course   | <i>TechTrends</i>   |
| 16 | Brown et al (2021)  | The “New” Normal: Re-imagining Professional Development amidst the COVID-19 Pandemic  | <i>Middle School Journal</i>  |
| 17 | Eppard et al. (2021)  | EdTech Culturation: Integrating A Culturally Relevant Pedagogy into Educational Technology.   | <i>Electronic Journal of e-Learning</i>   |
| 18 | Engerman and Otto (2021)  | The Shift to Digital: Designing for Learning from a Culturally Relevant Interactive Media Perspective.                                  | <i>Educational Technology Research and Development</i>                            |
| 19 | Braunstein, Lauren B.; Ozdemir, Ozgur; Garcia, Chad (2021)          | “Danger of a Single Story”: Pre-Service Teachers' of Color Use of an Online Discussion Board to Discuss the Essentialization of Culture | <i>Multicultural Learning and Teaching</i>  |

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| 21 | Donovan, Loretta; Green, Tim. D.; Besser, Erin; Gonzalez, Edward (2021) | The Whole Is Greater than the Sum of the Parts: A Self-Study of Equity and Inclusion in Online Teacher Education                     | <i>Studying Teacher Education</i>                          |
| 22 | Goin Kono, Kari; Taylor, Sonja (2021)                                   | Using an Ethos of Care to Bridge the Digital Divide: Exploring Faculty Narratives During a Global Pandemic                           | <i>Online Learning</i>                                     |
| 23 | Walker, Dana; Mahon, Elizabeth; Dray, Barbara (2021)                    | Can We Prepare Culturally and Linguistically Responsive Teachers Online? A Cross-Case Analysis of Online and On-Campus Courses       | <i>Urban Education</i>                                     |
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| 27 | Ren (2022)  | Autoethnographic Research to Explore Instructional Design Practices for Distance Teaching and Learning in a Cross-Cultural Context   | <i>TechTrends</i>  |
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# Conceptions of Time in Educational Technology: Considerations for Equity-focused Design

Jacob Fortman  
*Grand Valley State University, USA*

Rebecca M. Quintana  
Jacob M. Aguinaga  
*University of Michigan, USA*

## Abstract

The adoption of technology-enhanced online learning platforms is transforming teaching and learning practices within and outside the university. As online learning and educational technology become increasingly ubiquitous, there is a need for equity-minded scholarship attending to the social, cultural, and political implications of the technology sustaining online learning. While prior literature has made important strides framing education technology within conversations of equity and justice, there is a lack of empirical research analyzing marketing material of education technology. This presents a significant gap in understanding for education researchers, as marketing material plays a significant role in shaping public perceptions of technology, and can be widely read among students, instructors, and university stakeholders before directly engaging with the tool. Given recent scholarly interest in the ways subjective understandings of temporality are implicated in learning design, the present study connects burgeoning interest in temporality towards corporate marketing material of learning design. Drawing on artifact analysis methods, we analyzed blog posts from Coursera and customer success stories from Microsoft that describe how their products are designed to support online learning. Our research questions include: (1) How does marketing material from two education technology companies shape subjective understandings of temporality in online learning? (2) How can these temporal representations be leveraged to promote equity-oriented pedagogical design? Results from our analysis show how time is constituted as an efficient and agentic resource, and as an orientation towards future careers. We discuss how these findings have implications for equity-oriented pedagogical design by linking conceptions of time to neoliberalism and humanization.

*Keywords:* temporality, online learning, learning design

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The adoption of technology-enhanced online learning is transforming teaching and learning practices within and outside the university. This is particularly evident after the rapid transition to online learning precipitated by the COVID-19 pandemic, where students across the world made the transition to online courses (Cameron et al., 2021; Quintana et al., 2021). As online learning becomes increasingly ubiquitous, there is an increased need for equity-minded scholarship attending to the social, cultural, and political implications of the technology sustaining online learning.

Rising to meet this need, scholars from across the learning sciences, higher education, and online learning have worked from diverse perspectives and foundational literature to situate educational technologies within analyses of power and social equity. For instance, recent scholarship has linked neoliberal ideology in higher education to the proliferation of online proctoring technology (Fortman, 2023; Hébert 2021; McKenna, 2022), examined the relationship between the digital divide and online learning during COVID-19 (Kono & Taylor, 2021), and explored the experiences of refugee students learning online (Witthaus, 2023). By considering how the implementation and design of online learning technology is implicated in diverse social, political, and cultural frames, this growing body of research has showcased how an instrumentalist view of educational technology as “just tools” is insufficient, as it “ignores how our technological tools are manifest within social contexts, and that social agendas, assumptions and typical ways of knowing and acting are reflected in not just their use, but their very design” (Papendieck, 2018, p. 4). This critical trend in online learning can also be seen against a larger backdrop of critical digital scholarship, which has analyzed how systems of oppression manifest through biased algorithms and technology design (Benjamin, 2019; Noble, 2018).

While prior literature has made important strides in framing online learning within conversations of equity and justice, there is a lack of empirical research analyzing marketing material of online learning technology. This presents a significant gap in understanding for education researchers, as marketing material plays a significant role in shaping public perceptions of technology and can be widely read among students, instructors, and university stakeholders before directly engaging with a tool or platform. In this sense, we see corporate marketing material as an important pedagogical force structuring learners’ understandings even before they use the tool for learning academic content.

Given recent scholarly interest in the ways subjective understandings of temporality are implicated in learning design (Nguyen et al., 2022), the present study connects burgeoning interest in temporality towards corporate marketing material of online learning design. In particular, we draw on conceptual understandings of public pedagogy and platformization to analyze marketing material from two major educational technology corporations, specifically attending to the ways subjective understandings of time are marketed in the design of their online learning technologies. Drawing on artifact analysis methods (Trausan-Matu & Slotta, 2021), we analyzed blog posts from Coursera and customer success stories from Microsoft that describe product features. Our inclusion criteria identified six ( $n = 6$ ) Coursera blog posts and twenty-two ( $n = 22$ ) Microsoft customer success stories for analysis. Results from our analysis show how time is construed as a resource for increased efficiency and agency, and as a future orientation for learning. Our results further showed that corporate marketing material positioned universities as desiring efficient, job-oriented pedagogical designs. We discuss how these findings have

implications for equity-oriented pedagogical design by linking conceptions of time to neoliberalism and humanization. Our study is guided by two research questions:

- (1) How does marketing material from two education technology companies shape subjective understandings of temporality in online learning?
- (2) How can these temporal representations be leveraged to promote equity-oriented pedagogical design?

Interrogating the positionality of each researcher at the outset of the study was vital in conducting our investigation. To elucidate how characteristics of neoliberalism and proximity to the world of higher education might play a role in the way we conducted our study, each researcher reflected on their positionality relative to our guiding research questions. Holmes (2020) defines positionality as “an individual’s worldview and the position they adopt about a research task and its social and political context” (p. 1), noting that researchers can identify their positionality by explicating their relationship to their research topic, their participants, and their research design. Drawing on Jacobson and Mustafa’s (2019) social-identity-mapping framework, each author reflected upon the ways in which their positionality may inform their perspectives and interpretations.

Jacob Fortman is a white, cisgender male. He works as an Emerging Technology Research Analyst at a large public university where his responsibilities range from demonstrating new educational technologies to researching their design and implementation. Jacob regularly interfaces with a diverse range of educational technology vendors, which influences how he conceptualizes the relationship between for-profit educational corporations and public universities.

Rebecca Quintana is a white, cisgender middle-aged female. In her role at a leading university, she serves as a director of a 20-person online learning design team, co-director of a learning experience design program, and adjunct faculty member at the university’s school of education. She regularly presents research and keynote addresses on the topics of online learning design, equitable and inclusive design, and technology-enhanced learning environments. As director of online learning at the university’s provost-funded academic innovation center, she is deeply familiar with Coursera—its feature set and associated marketing materials. This background gives her an “inside perspective” on the topics of this paper.

Jacob Aguinaga is a white, cisgender male, first-generation Hispanic college student. He is pursuing a doctoral degree in education, specializing in the use of Massive Open Online Course (MOOC) platforms as an educational technology that enable social learning at scale. He attends a large, public research-one university in the United States where he also works as a learning experience designer, and where he collaborates with campus faculty to develop equitable and inclusive online learning experiences. As a student in higher education at a leading university, the values of neoliberalism are ever-present. However, so too are the values of diversity, equity, inclusion, and justice, which are initiatives embraced on campus and in the classroom. As a learning experience designer, Jacob frequently interacts with Coursera and is familiar with the blog posts as well as their current feature set. This experience with Coursera provides additional context other researchers might not be privy to.

## Literature Review

### *Platformization as Public Pedagogy*

To elucidate the ways in which corporate marketing material shapes subjective understandings of temporality in online learning design, we draw on two conceptual frameworks to frame our thinking: Public pedagogy and platformization. By synthesizing across these two concepts, we intend to show how narratives invented through the “ed-tech imaginary” (Watters, 2020) and instantiated through technology platforms constitute a form of public pedagogy structuring collective understandings of temporality and learning design.

Drawing on Giroux (2004), we conceptualize public pedagogy as the diverse ways in which cultural practices function pedagogically to produce, distribute, and regulate power. In this way, pedagogy is not limited to classroom interactions, as learning occurs across a broad range of social contexts, including new media, communities, and familial relations. Furthermore, pedagogy cannot be understood as politically neutral, as processes for learning are implicated within individuals’ political identity formation, moral valuing, and historical consciousness. Taken together, we liken public pedagogy to a form of “constant education” whereby individuals are always embedded within social structures and institutions that act pedagogically to shape subjectivities.

The platformization of education is one example of a public pedagogy structuring collective understandings of “ideal” teaching and learning practices. Following Decuyper et al. (2021), we view platforms “not as neutral ‘digital tools,’ but on the contrary as connective artefacts constitutive of, as well as constituted by, active socio-technical assemblages that are in the process of significantly transforming the educational sector” (p. 2). Accordingly, as institutions of higher education adopt new digital learning platforms, they must negotiate the assumptions, biases, and ideological forces that are carried through that platform. By affording some pedagogical interactions and foreclosing others, educational platforms silently condition instructors and students towards norms of teaching and learning. When instructors and students work outside the limitations of a given platform, they must invent workaround procedures, or acquiesce to the conditions set by their platform (Quintana & Tan, 2019). In this way, platforms function pedagogically by guiding instructors and students towards particular ways of knowing, doing, and being. Considerations of politics, power, and ideology come into play more explicitly when we consider who is construing the idealized model of teaching and learning, and how this model privileges or constrains certain identities, ideas, and interactions within the learning environment.

We see the notion of platformization as public pedagogy resonating throughout previous educational scholarship. Fortman (2023) critiques the proliferation of online proctoring platforms by framing it within the larger neoliberalization of the university. By relying on invasive video recording and facial detection technologies, online proctoring technologies normalize harmful teaching practices that are founded on neoliberal values of atomization, precarity, and competition. Massive Open Online Course (MOOCs) platforms have also been the subject of critique, as various scholars have connected the platforms to projects of neocolonialism (Adam, 2019; Altbach, 2014). In one illustrative example, Reilly et al. (2016) showcase how automated essay scoring in MOOCs can disadvantage non-native English speakers. While previous

scholarship has provided helpful critiques and theoretical language to frame future thinking, there is a lack of empirical scholarship taking up such critical perspectives.

### ***Perspectives on Time***

While scholars have increasingly turned a critical eye towards online learning platforms and the technologies sustaining them, another emerging research strand has settled around subjective understandings of temporality and the way conceptions of time are implicated within learning design and education more broadly. By troubling the notion that time can only be known as a static, objective measure, this temporal turn in educational thought has argued that subjective understandings of time can structure learning in significant ways. Shahjahan (2014) captures this sentiment: “Even as it silently structures our everyday lives, time is not given or natural; rather, its meanings and forms shift historically and are culturally specific” (p. 490).

Within the learning sciences, we see the interest in time manifest in Nguyen et al. (2022), which covers diverse research focused on subjective and culturally situated understandings of space, time, and equitable learning design. Topics from this learning sciences symposium include analyzing chronotypes (Bakhtin, 1981) in crisis and innovation narratives from ed-tech innovators, designing to equitably support learners’ identity trajectories, and the role of space-time dimensions in the design of extended reality learning experiences, among other topics. Further evidence of the learning sciences recent focus on temporality can be found in Uttamchandani (2021), who draws on conceptions of prolepsis (Cole, 1996) and prefiguration (Curnow, 2016) to describe how anticipated future activity shapes present activity in socially and politically meaningful ways.

Outside the learning sciences, scholars of higher education have also fruitfully theorized the subjective nature of time by highlighting how the concept can undergird neoliberal logics of academic capitalism (Walker, 2009) and colonialism (Shahjahan, 2014). For instance, Shahjahan (2014) has argued that the historical evolution of time measured biotically or naturally (e.g., passing days, weather cycles) to a linear conception of clock time has contributed to notions of linear student development, punctuality, and a disconnect between our bodies and nature.

## **Methods**

Our study draws on artifact analysis methods (Trausan-Matu & Slotta, 2021) to examine Coursera blog posts and Microsoft customer success stories describing education technology product designs. Following Saldaña (2009), a single coder used provisional codes centered on time to elicit preliminary insights from the data, and subsequently developed additional codes to elaborate on these constructs. In the first round of coding, one coder open-coded the data set for language that invoked conceptions of time. While we were particularly attuned to explicit mentions of “time,” we were also attuned to the ways time was invoked more implicitly. For instance, notions of “rate,” “rapidity,” and “efficiency” expressed how much time it took to accomplish a task. In this way, we started to conceive of time as a benchmark for establishing the pace of work, and less time on task equated to greater efficiency. Informed by previous research on prefiguration and prolepsis, in which future goals shape present actions (Uttamchandani, 2021), we also considered how conceptions of the future implicated designs in the present.

After the initial round of coding, we worked within smaller sets of coded data to locate examples where time was linked to the design of online learning (e.g., the product allowed students to instantaneously receive feedback from anywhere). These examples were collected on a shared Miro Board, a collaborative digital tool featuring sticky notes and grouping abilities. Within the shared Miro Board, we iteratively generated themes relating discourse examples. Smaller themes were merged into larger themes until we arrived at a broad set of themes to characterize the range of ways time was implicated within the design of online learning technologies.

## Data

Data for this study consisted of publicly available marketing material from Coursera and Microsoft websites published between 2020 and 2023. We chose to analyze Coursera and Microsoft because they represent two of the largest education technology companies in the world, and their respective products are distinct. While Microsoft offers a wide range of hardware and software to support online learning, Coursera centers more specifically on MOOC and online learning platforms, which enrolls millions of learners on its platforms (Shah, 2019). Furthermore, to diversify our data set, we intended to locate marketing material written for different purposes. While Microsoft's customer success stories featured descriptions of how their products are being used within higher education institutions, Coursera's blog posts were written as updates and announcements for new online learning platforms and features. By representing different marketing material, technology products, and corporations in our data set, we sought to provide a rich set of perspectives on the ways technology design for online learning implicates time in meaningful ways.

Coursera is the largest MOOC platform in the world, boasting 118 million learners enrolled across over ten thousand courses offered by over 300 higher learning institutions (Shah et al., 2023). It is one of the many global MOOC platforms, with there also being MOOC platforms specific to individual countries. Contemporary MOOC designs center pedagogies that enable individualistic learning experiences. These designs generally feature "a set of short, modularized video-lectures, followed by automated, multiple-choice testing of learners' understanding of the content" (Margaryan et al., 2015, p. 77). As an attempt to adapt to the changing demands of an audience of global learners, MOOC platforms like Coursera must continually develop new features and capabilities which then must be advertised to institutions for adoption, marking a vitally important step in the marketing and sustainability of the platforms.

Microsoft's technology offerings span a broad range of educational, professional, and general consumer offerings. To support online learning, Microsoft offers their popular communication platform: Microsoft Teams, their cloud computing platform: Azure, their combination laptop and tablets: the Microsoft Surface, their suite of productivity software: Office 365, their pre-made online curriculum: Microsoft Learn for Educators, their virtual whiteboard application: Whiteboard, and Career Coach, an application that integrates with Teams to provide students with professional advice. Collectively, these offerings represent a diverse range of online learning engagement, from written (a)synchronous communication to real-time digital inking.

To ensure we analyzed marketing material that was directly related to conceptions of time and learning design, we excluded articles that did not describe technology used in online teaching and learning contexts, and we further excluded articles that did not provide descriptive details of technology design. This brought the included Coursera articles from twelve (n = 12) to six (n = 6) and the included Microsoft articles from fifty-five (n=55) to twenty two (n = 22). While the Coursera articles focus on their MOOC platform (n = 2), CourseMatch (n = 2), Career Academy (n = 1), Career Learning Paths (n = 1), Live2Coursera (n = 1), the Microsoft articles feature a diverse range of online learning platforms and educational technology products, including Microsoft Teams (n = 13), Azure (n = 12), Surface (n = 9), Office 365 (n = 4), Microsoft Whiteboard (n = 2), Microsoft Learn for Educators (n = 1), and Career Coach (n = 1). The complete catalog of articles included in this study can be found in Appendix A.

## Findings

Findings from our qualitative analysis of Microsoft customer success stories and Coursera blog posts show how various understandings of time played a role in structuring how, why, and when learning happens. We grouped these understandings into two large themes: Time as a resource and time as a future orientation. We further characterize two subthemes within the time as a resource theme. A description of each theme and subtheme is represented in Table 1.

**Table 1**

*Themes Present in Microsoft Customer Success Stories and Coursera Blog Post*

Theme	Description	Quote
Theme 1: Time as a Resource	Time is a resource that can be used to benchmark the rate at which learning occurs and the relationship learners have with educational material.	<i>“By providing remote learning opportunities, Staffordshire University could also help its instructors, who are practicing clinicians, spend less time commuting and setting up simulations and more time with their patients” (Microsoft, 2022f).</i>
Subtheme 1.1: Time as a Resource for Efficiency	Time is a resource that should be used optimally so that learners can progress through an educational experience in an efficient manner. Accordingly, technology designs facilitated pedagogical interactions in ways that were automatic, instantaneous, and real-time. Marketing material also conveyed that efficiency was a desire of university consumers.	<i>“Learners can input their schedules into a course to automatically receive personalized course deadlines and goals to stay on track” (Goli, 2022).</i>

<p>Subtheme 1.2: Time as an Agentic Resource</p>	<p>Time is a resource that grants students and instructors increased autonomy to work how, when, and where they would like. Accordingly, technology designs facilitate pedagogical interactions where the use of time is unstructured.</p>	<p><i>“Every student automatically getting a Windows license and access to Office 365 across all their devices creates a level playing field so that students can use it where, when, and how they want.” (Microsoft, 2022e).</i></p>
<p>Theme 2: Time as a Future Orientation</p>	<p>The goals for education and learning are primarily determined to be graduation and employment. Accordingly, the design of technology centered on skills that would easily translate to the job market. Marketing material also conveyed that these educational goals were expressed by university consumers.</p>	<p><i>“The Microsoft Learn for Educators program enables faculty members to infuse Microsoft curriculum, hands-on labs, and tools into the courses they already teach, better preparing their students for Microsoft certification and successful job hunts” (Microsoft, 2022a).</i></p>

***Time as a resource for efficiency***

Throughout the Microsoft and Coursera marketing materials, time was positioned as a resource that should be used efficiently. To facilitate the optimal use of time, marketing materials prioritized speed and efficiency through delivering information automatically, instantaneously, and in real-time. This automatic, instantaneous, and real-time information could serve a variety of pedagogical purposes. For instance, one Microsoft customer success story describes the benefits of using automated notifications in Microsoft Teams to help students stay up to date with their work: “Students change their learning behaviors with Teams together mode, learn from each other directly in breakout rooms, and use organized structures with automated notifications to stay on top of their assignments” (Microsoft, 2022c). A similar feature was also detailed in the Coursera platform, where “Learners can input their schedules into a course to automatically receive personalized course deadlines and goals to stay on track” (Goli, 2022).

While automatic notifications for keeping students organized and on track were common throughout Coursera and Microsoft’s marketing materials, they also drew on themes of speed and efficiency for other pedagogical purposes. In another description of Microsoft Teams, marketing materials describe how the Career Coach app provides students with just-in-time advice from peers and mentors: “Because Career Coach is built into Microsoft Teams, students get just-in-time advice from peers and mentors as they reach key milestones in their career journey” (Microsoft, 2022b). In a post from Coursera, they describe using machine learning (ML) to create lecture reviews that are quicker for learners to go through: “ML-generated summaries of key lecture videos provide learners with an easy way to review prior course material, gain a quick understanding of a topic, and progress faster through a course” (Goli, 2022). In this instance, the time it takes to watch a video has been compressed into on-demand, automatically generated summaries.



While Microsoft and Coursera products were routinely positioned as making learning an efficient process, Microsoft's marketing material also explained that their products could allow other company's products to be increasingly quick and responsive. In one customer success story, Microsoft describes how their cloud computing platform, Azure, allowed a university to launch a new digital simulation platform that reacts in real-time: "CAE Maestro Evolve simulates a diverse range of clinical experiences with a digital patient, and learners practice performing essential medical procedures such as taking a pulse and performing defibrillation while the digital patient reacts in real time with relevant symptoms" (Microsoft, 2022f). As this anecdote highlights, when Microsoft's products aren't directly providing learners with instant information, they are the engine driving other products to do so.

Unlike Microsoft, Coursera did not explicitly market their products as increasing the efficiency of other products. However, they did describe a variety of integration features with other companies, which allowed for increased educational efficiency. For example, they explain how Turnitin, a plagiarism detection software, allows instructors to grade at scale: "Educators can leverage industry-standard tools to grade at scale, including Gradescope and Turnitin, with WISEflow coming later this year" (Goli, 2021). In this instance, increasing the efficiency of grading and plagiarism detection practices becomes a key component for increasing the amount of learners Coursera can educate.

Finally, to show that customers *want* learning experiences where time is used efficiently, Microsoft's customer success stories describe how instructors and students desired these goals. In this way, Microsoft is meeting rather than inventing a need. In an example from Staffordshire University, Microsoft describes how the move to remote learning allowed instructors who are practicing clinicians to spend less time on classroom logistics and more time with their patients: "By providing remote learning opportunities, Staffordshire University could also help its instructors, who are practicing clinicians, spend less time commuting and setting up simulations and more time with their patients" (Microsoft, 2022f). In another example from DeGroote School of Business at McMaster University, a customer success story describes how a team of faculty and Microsoft staff sought to design a highly efficient sequence of courses: "The joint team aimed to design a highly efficient, effective sequence of classes to deliver the most targeted, leading-edge content" (Microsoft, 2022d). Coursera took a similar tact marketing its platform, in one example they write: "Knowing that educators are often strapped for time, we focused on streamlining the authoring experience with features that aim to make content creation and management more efficient" (Goli, 2022). By positioning efficiency and productivity as authentic desires of their customer, the technology appears as a manifestation of authentic needs rather than an invention of corporate marketing.

### ***Time as an agentic resource***

While time was often figured as a productive resource driving educational efficiency, it was also positioned as a resource to foster agency among instructors and students. In this characterization of time, having the ability to choose how you spent it empowered instructors and students to work when and where they would like. For instance, while quoting a Director of Learning Technologies, one customer success story notes that Office 365 creates a "level playing field" for students:

“I saw one student writing a research paper using just a keyboard and his phone. Every student automatically getting a Windows license and access to Office 365 across all their devices creates a level playing field so that students can use it where, when, and how they want.” Additionally, students can access Office apps entirely in-browser, ensuring that no matter a student’s access environment, they can still complete assignments and collaborate with others. (Microsoft, 2022e)

For Microsoft, increased agency was also granted through asynchronous learning opportunities, allowing learners to study in ways that work for them. In one description of using live classroom recordings, Microsoft notes that this asynchronous activity can better accommodate students in multiple time zones:

During the live class, the teacher leads remote and in-person students together to discuss key concepts, use Microsoft Whiteboard to brainstorm, and join polls and breakout rooms to work on group exercises. Afterward, students can review class recordings and continuously exchange thoughts at any time, no matter which time zones they’re in. (Microsoft, 2022c)

Coursera similarly emphasized the value of granting learners independent, asynchronous work time. In describing a file download procedure that lets learners work from anywhere they prefer, they write that “With just a few clicks, learners can easily download files from Labs to work locally in their preferred development environment or to preserve their work” (Goli, 2022).

### ***Time as a future orientation***

While Microsoft and Coursera emphasized using time efficiently, this sense of efficient learning tended to orient students towards two future goals: graduation and employment. In this way, time is not only a resource to use efficiently, but it also sets the terms for measuring success. This sense that learning should be an efficient means of career preparation is captured in Coursera’s announcement for “Career Academy,” an online platform for upskilling and reskilling learners for new jobs: “Today we announced Career Academy to help enterprises give individuals—even those with no college degree or prior work experience—the opportunity to learn the skills to enter a high-demand, entry-level digital job.” As part of the features within the Career Academy, Coursera made available a library of short videos and lessons to address “in-the-moment learning needs,” and described their “42 SkillSets” to “drive productivity, adapt, and innovate in a rapidly changing world” (Goli, 2022).

As Coursera and Microsoft marketing material oriented learners towards their future employment, the stories concurrently emphasized the value of practical “hands-on” skills that prepared students for authentic work. In describing the Microsoft Learn for Educators program, the company writes: “The Microsoft Learn for Educators program enables faculty members to infuse Microsoft curriculum, hands-on labs, and tools into the courses they already teach, better preparing their students for Microsoft certification and successful job hunts” (Microsoft, 2022a). This sentiment for practical, job-oriented training is also seen in the decision to adopt Office 365 at the University of Texas at San Antonio:

Giving students professional workplace skills was another leading factor in UTSA's decision to move to Office 365. "Students can either learn the tools now or on the first day on the job, and the latter puts them at a disadvantage," said Dr. Abel Wilkinson. "Bringing students into this platform boosts their professional development. The work they're doing in academia does double duty because it's also teaching them how to collaborate in a professional context." (Microsoft, 2022e)

Microsoft customer success stories were also clear that the desire for practical job training skills was not a corporate invention—these were authentic needs from their university customers. For instance, in describing the need for a digital manikin simulation platform powered by Azure, one Microsoft post takes the perspective of university administration: "University administrators wanted to give students access to highly valuable, hands-on training opportunities from any internet-enabled location and allow them to practice independently without needing access to a physical manikin" (Microsoft, 2022f). Coursera similarly notes that what educators need is efficient, hands-on learning: "As more educators move online, they need to be able to author content efficiently and effectively, offer hands-on learning experiences, manage grades and program operations at scale, and monitor student or content performance at any time" (Goli, 2021).

## Discussion

Findings from our qualitative analysis of marketing material from Microsoft and Coursera showcase how two major education technologies shape subjective understandings of temporality through their marketing material. These subjective understandings of temporality have important implications for equity-oriented learning design. By positioning time as a resource to be used efficiently, both Coursera and Microsoft designed features that allowed learners to progress through their courses quickly. This was evident in the instantaneous, automatic, and real-time information delivery features intended to keep students on track, and it was further emphasized in Coursera's description of using machine learning to create lecture reviews. While time structured the rapidity of student learning, it also oriented their learning by setting graduation and employment as the end goals for education. This future orientation impacted present learning by tailoring the curriculum towards practical skills that transferred into the job market. Finally, time also became a source for student agency, as some designs purposefully granted students leeway on when they could do their work. Such was the case with adopting Office 365, which allowed students to learn "where, when, and how they want."

These conceptions of time are not without certain tensions, particularly as it entails equity-oriented learning design. One tension arises when we consider how an overemphasis on efficiency can limit pedagogical scaffolding. For instance, a medical simulation that only provides instantaneous reactions eliminates the opportunity to reflect, hypothesize, and discuss what reactions *might* occur before those reactions are shown on a simulation. Or, when advice from peers and mentors are synched to automatically be delivered based on certain milestones, students lose the opportunity to seek out that information themselves. In this way, efficiency in technology design can foreclose opportunities for reflection, collaboration, and agentic exploration.

The future orientation marketed by these corporate technology companies also suggests a tension regarding the role of higher education. While Coursera and Microsoft position graduation and employment as the future orientation for learning, overemphasizing such careerist narratives erases notions of education serving a larger public good where marginalized learners are humanized, systems of oppression are critiqued, and the breadth of human understanding is expanded for the collective benefit. In this way, marketing material of educational technology aligns with the broader neoliberalization of higher education, where the mission of learning is largely defined through free-market interests (Busch, 2017). Bylsma (2015) captures this sentiment:

The telos of higher education has been colonized by a neoliberal ideology and the teleological implications that follow, shifting the ultimate direction of higher education from its social, communal, and democratic ideals toward a vision of success rooted in individual achievement and determined by material gains. (p. 6)

While narratives of efficiency and job preparation in education technology marketing broadly align the neoliberalization of higher education, we see an opportunity to promote alternative narratives of learning and higher education by attending more deliberately to notions of agency. While marketing material explained that university instructors and staff desired efficient learning experiences to prepare learners for a changing global job market, it is less clear what ends agentic learning leads to, and where these desires for agency are born from. In other words, while efficiency appears as a means towards a desired end, agency appears as an undesired end in itself. In a critical interpretation of this finding, one could argue that an emphasis on learner agency reaffirms a neoliberal education model where learners are construed as atomized, self-interested individuals competing against their peers. However, this interpretation could be hasty, as empowering learners through agency can also represent an important move towards a humanizing, praxis-oriented pedagogy. Such perspectives resonate with Freireian critical pedagogy, particularly in its critique of the passive banking model of education and in its advocacy for problem-posing education (Freire, 2020). To promote a vision of education serving a larger social good, we argue that education technology companies should connect agency in learning design to a humanizing pedagogy where learners are dignified and empowered to solve problems of personal and public importance. Such narratives extend beyond myopic notions of agentic learning only promoting convenience, and reaffirms learning as an ethical, communal, and humanistic act.

## **Future Directions**

Our analysis of how educational technology companies shape subjective understandings of temporality foregrounds important future directions for scholarship of online learning. In one direction, we see an opportunity for scholars to continue taking up the task of empirically studying how learning design is marketed by corporate entities. While our present study focuses specifically on the marketing of temporality by two major education technology companies, other pedagogical concepts would likely benefit from further research. For instance, Fortman and Quintana (2023) point towards research that explores how marketing strategies can shape learners' understandings of collaborative and embodied learning in virtual reality.

In another direction, we see an opportunity for scholars to empirically study how instructors and students make sense of online learning marketing material within their specific learning contexts. While we argue that the platformization of education serves as a form of public pedagogy conditioning educators and students towards norms of teaching and learning, we do not think this is the whole story. We see opportunities for nuancing how marketing material of online learning translates into specific implementations and designs in the classroom. For instance, it is not clear how instructors and students might consciously work against the narratives marketed towards them.

Given the popularization of online learning technologies, we see a tremendous potential for future scholarship to empirically analyze online learning marketing material and subjective understandings of time. While this study offers insights on the ways time is constructed both as a resource and as a future orientation, future scholars would be well served by further interrogating time as a social construction, and the pedagogical influence of marketing material for online learning.

### **Declarations**

The authors declare that there is no conflict of interest.

The authors declare that this work was exempt from review from an IRB/Ethics board.

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## Appendix A

### Data Sources

<b>Coursera Product Updates</b>	
Title	Date Published
Unleashing the next chapter of personalized and interactive online learning with generative AI, machine learning, and virtual reality	April 13, 2023
New products, tools, and features to enhance teaching and learning on Coursera	May 4, 2022
Announcing new products, tools, and features to support learners, educators, and institutions with their rapidly evolving teaching and learning needs	April 19, 2021
Introducing Career Learning Paths: Learn the skills to advance your career with confidence	August 28, 2020
Introducing New Tools and Features as Demand for Online Learning Grows	April 21, 2020
Coursera launches CourseMatch: A machine learning solution that automatically matches a University's on-campus courses to courses on Coursera	April 15, 2020
<b>Microsoft Customer Success Stories</b>	
Title	Date Published
University of North Carolina Greensboro migrates to Microsoft Azure to elevate student and community experiences	August 8, 2022
CAE, Staffordshire University extend virtual patient simulations, drive better healthcare education with Azure	July 13, 2022
Tulsa Tech enables a truly hybrid learning environment with Microsoft Teams Rooms	June 30, 2022
Pearson VUE aces data safety with Microsoft Sentinel across a multicloud and hybrid environment	June 6, 2022
The University of Texas at San Antonio Increases Collaboration and Strengthens Cybersecurity with Microsoft 365	May 17, 2022
McMaster University's DeGroote School of Business collaborates with Microsoft to design advanced digital literacy curriculum	May 2, 2022
Florida university gives students hands-on skills, job-hunting success with Microsoft courseware	April 28, 2022

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USC’s Viterbi iPodia Program invests in collaborative hybrid learning to break down barriers in traditional education with Microsoft Teams	March 23, 2022
Career planning for the modern workforce—How University College Cork used Career Coach to transform the student experience	March 16, 2022
Kent State University offers hybrid learning for remote and in-room students with Microsoft Teams	February 1, 2022
NSU engages students with AI-enabled chatbot using Microsoft Azure	September 21, 2021
Clemson University and Microsoft partner to pilot Surface and Teams to enhance student success and promote community-based engagement	September 10, 2021
Jacksonville University creates a data-driven culture with Power BI	August 5, 2021
How Microsoft and Anthology empowered Coppin State University’s student engagement through digital transformation	July 7, 2021
Michigan student gains life-changing opportunities after earning multiple Microsoft certifications while still in high school	June 25, 2021
University athletes score academic wins with Microsoft Surface and cloud technology	June 25, 2021
From No. 2 pencils to the cloud, Territorium transforms testing, helping universities open doors for students	June 14, 2021
University of North Carolina at Charlotte uses Azure PaaS to bootstrap an EV charging solution	May 21, 2021
The Crimson Tide roll on Office 365: How the University of Alabama brought “The Capstone” together using Microsoft solutions	May 11, 2021
Indiana University aces remote learning with virtual exam solution in Microsoft Teams	February 25, 2021
Taking medical instruction remote and to mixed reality at Case Western	December 2, 2020
Working as a team amidst disruption at the University of South Florida	April 20, 2020

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# Emergent Themes from a Study of a Highly Flexible Hybrid Learning Program

Mariana Castañón

Mary Rice

*University of New Mexico, USA*

Traci Filiss

*Grand Canyon University, USA*

## Abstract

As educators increase their use of digital technologies across learning modalities, some schools are experimenting with highly flexible models of learning that maximize opportunities to support learner preferences. The perceptions of these programs by teachers, parents, and students are crucial for building and maintaining community support and securing funding for school practices that are innovative and educative. The purpose of this study was to understand the perceptions of teachers, parents, and students working in a school using hybrid learning with individualized schedules. Perceptions of the school emerged as a sense of shared responsibility and united advocacy for students. Advocacy centered on (1) making instruction accessible and (2) providing appropriate instructional support. While there was agreement across participant groups on these themes, teachers described additional workloads. Implications include the need to build a united purpose around students while also supporting teachers.

*Keywords:* K-12 hybrid learning, flexible school scheduling, self-regulation of learning, hybrid instructional supports, accessible digital learning

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*Hybrid learning*, which some scholars and practitioners have also called *blended learning*, attempts to combine online and in-person instruction, usually at different points in time (Barbour et al., 2011; Johnson et. al, 2022). Hybrid learning occurs in higher education and K-12 schooling and there are varying models and routines for how to deliver the online, in-person, and the synchronous and asynchronous elements, often with the use of a learning management system (LMS) (The Digital Learning Collaborative, 2019). According to the Christensen Foundation for Disruptive Learning (Arnett, 2021), K-12 teachers increased their use of hybrid learning techniques leading up to the pandemic. In a series of surveys beginning in October 2020, 596 classroom teachers representing 430 school districts from 45 states and the District of Columbia reported increased use of hybrid learning (Arnett, 2021). The foundation also conducted administrator surveys where responses were collected from 694 K–12 administrators representing 596 school districts from 48 states and the District of Columbia. Findings were similar. Administrators reported large increases in uses of both online and in-person instruction. As additional evidence, although not a scientific sample, Williams (2023) documented visits to 100 K-12 classrooms in three states over six months and found teachers and students using digital tools to do work across time and in different places (home and school). Williams wrote:

[Teachers] have continued to use Google Classroom and other platforms as part of their courses. These streamline student assignments—teacher grading and subsequent data analysis—and offer the potential for more effective and timely communication with students’ families. Indeed, teachers reported that, at this stage of the pandemic, many more of their families have and can use online communication tools like email, school communication apps, ... and video conferencing to stay linked up to what’s happening on campus. (Williams, 2023, n.p)

Previously, scholars like Barbour and Harrison (2016), Kuo et al. (2014), and Gough et al. (2017) have found some evidence of positive perceptions for hybrid initiatives among teachers. Although these findings have been promising, additional inquiries are needed to determine how various groups besides teachers perceive the hybrid learning experience. Moreover, it would be useful to understand perceptions of roles and responsibilities within hybrid learning (Harrell & Wendt, 2019). When learning takes place both online and in-person and both synchronously and asynchronously, there should be a greater need for shared monitoring of learning, support from adults, and dialogue to determine how to help the children and adolescents have good experiences. In the present study, researchers gathered perspectives from parents, youth in grades 5-12, and parents in the same hybrid school. The research question was:

What do individuals from various groups in this school perceive as the shared commitments about hybrid learning?

### **“Self”-Regulation for Engagement in Hybrid Learning**

Online learning research has drawn on theories of *self-determination* (e.g., Deci & Ryan, 2012) and *self-regulation of learning* (e.g., Zimmerman, 2013) to describe how learner engagement is initiated and maintained. In self-determination theory, learning design structures should be present but there should not be so much structure that learners become so frustrated that they disengage (Pintrich, 1999).

Engagement is the effort that students invest in learning (Fredericks et al, 2004; Hughes et al, 2008). Scholars often discuss three specific types: behavioral, cognitive, and emotional (Halvorson & Graham, 2019). *Behavioral engagement* involves measurable, observable actions students complete to learn content (Zimmerman & Schunk, 2001). *Cognitive engagement* is the expenditure of thoughtful energy to learn (Finn & Zimmer, 2012). *Emotional engagement* is the presence of facilitating emotions such as interest and the absence of task-withdrawing emotions, such as distress (Reeve, 2012).

To regulate learning through engagement, students use *regulatory apparatus*, including resources (e.g., databases, spell checkers, pacing guides) and strategies (e.g., using tabs to navigate between multiple sites simultaneously, help seeking online and in-person) (Roscoe et al., 2013). Recent attention has focused on learners' perceived sense of belonging, the relationships they have with physically proximate peers, their teachers, and the subject matter (Borup et al., 2020; Stevens & Rice, 2016). In this way, the "self" in *self-regulation* is not entirely accurate. Educators from the school context, parents, and peers are part of the *regulatory apparatus* available in a learning setting during social engagement.

Research about how parents engage and monitor students in hybrid learning is emerging. In traditional settings, parents have a basic duty to bring children to the school and respond to school communication (Epstein, 2001; Hoover-Dempsey et al., 2005). However, in online learning, parents accept additional responsibilities (Borup et al., 2013; Borup et al., 2015; Crouse et al., 2018; Ortiz et al., 2021). In fact, Borup, et al., 2015 found that parental support centered heavily on ensuring learner self-regulation using resources and the employment of strategies. For children who have been identified with disabilities, parents advocate for children to be allowed into the online setting *and* to benefit from it, including efforts parents make to facilitate interaction with peers online (Rice & Ortiz, 2022). However, online teachers report that they are the ones doing yeoman's work monitoring and supervising to keep children "self"-regulated so they can engage (Stevens & Rice, 2016; Crouse et al., 2018). Being in the physical presence of the learner while learning may be integral to who (parent or teacher) supports the "self"-regulation. It is not feasible to place all responsibility on either a parent or a teacher to support the student in a hybrid school because the student changes venues for learning. The current research located a school using hybrid learning and varying shifting schedules and then determined how shared responsibilities were perceived.

## Methodology

We employed a convergent parallel mixed methods design for this research (Teddlie & Tashakkori, 2009). Quantitative and qualitative data were collected and analyzed independently and over a continuous timeframe. Findings from both methods were analyzed concurrently to allow each set of data (qualitative and quantitative) to inform the results and interpretations of each method (McCrudden et al., 2019; Schoonenboom, & Johnson, 2017). The authors received human subjects' approval for the study.

### School Context

The site for this study, Tierra Academy Charter School (TACS), serves grades 5-12 as a hybrid school program. At TACS, all students have an individualized learning plan or ILP. Using

digital curriculum available to the learner 24/7 and instructional specialists in the school building five days a week, educators at TACS aim to individualize instruction while also supporting a needs-based, differentiated educational structure. TACS uses a flexible weekly scheduling model offering all students a choice in attendance from fully online to five days per week on campus. When students were not attending fully online, they attended on campus during the week for on-campus academic and enrichment instruction with teachers or attended one-on-one tutoring offered both online and in person. Students were allowed to be on campus even when they were not scheduled as part of the flexible model, but if they were scheduled to be on campus, they were required to be on campus.

### Survey Instrument

Teachers, parents, and students responded to an online survey about support for learning and achieving at school. The first step in creating the survey instrument was for the research team to create the survey items for each of the study participants (parents, teachers, and students). Survey items were designed using research support alongside the interests of the administrative team. Table 1 links key studies to the final constructs and survey items. In identifying support, we reviewed studies focused on the K-12 context and that drew characteristics of hybrid framing where there were online and in-person elements occurring at different times.

**Table 1**

*Pairing of Survey Constructs and Literature*

<b>Constructs for Survey Items</b>	<b>Literature Support from K-12 Hybrid Studies</b>
<i>Behavioral Engagement</i>	
Number of access points	Alvarado-Alcantar et al. (2018) highlighted the importance of reducing access in the LMS to a few steps.
Praise/rewards	Stevens and Rice (2016) found that adding emoji to their work along with verbal praise were important simple rewards for students. Rice and Carter (2016) also documented an LMS dashboard's ability to show progress as a reward and regulator for teachers and students.
Feedback	Kazakoff et al. (2018) and Villanueva (2021) documented the use of feedback about academic work in hybrid learning. The feedback provided specific information about performance and set new goals for the future.
<i>Cognitive Engagement</i>	
Challenging curriculum	Leacox and Jaxson (2014) and Prescott et al. (2018) conducted studies highlighting the need for a challenging curriculum in K-12 hybrid learning. In both cases, students gained language skills rapidly with consistent access to lessons that increased in difficulty.
Suited to interests	Chiu (2021) found that hybrid environments that supported learning autonomy were more likely to engage students. Similarly, Rice and Stevens (2021) found that students customized assignments in the hybrid environment to tailor them to their interests and often increased the cognitive challenge.
Leads to achievement	Bottge et al. (2014), Hawkins-Lear & Grisham-Brown (2018), Kazakoff et al. (2018), Leacox and Jaxson (2014) and Prescott et al. (2018) have all found demonstrable improvements in learning over control groups, while Harrell and Wendt (2019) found positive perceptions of achievement.

Enables choice	Kundu et al. (2021) modified the environment using learning choice to optimize learner engagement. They were able to eliminate disengagement after four weeks and maintain it for the remaining nine weeks of the study.
<i>Emotional Engagement</i>	
Overall Manageable frustration level	Billingsley et al. (2009) and Bingham (2016) reported on the potential for frustration in hybrid learning when tasks are not appropriate for teachers who are unable to manage the environment.
Online frustration	Accessibility issues where students cannot find, read, or use materials is a primary cause of frustration when working online (Alvarado-Alcantar et al., 2020; Crouse et al., 2018; Rice & Ortiz, 2022). Schmidt (2013) noted the frustration of trying to get help online when it is unavailable.
In-person frustration	Mormando (2022) found student frustration in the in-person classroom setting. Teachers of students with disabilities lacked the autonomy they needed to make accommodations for students in a hybrid classroom.
Perception of positive emotions for learning	Villanueva (2020; 2021; 2022) documented possibilities for students' positive emotions during hybrid learning.
<i>Social Engagement</i>	
Peer-to-peer interaction opportunities	Garrett Dikkers et al. (2014) and Whiteside, et al. (2016) documented the role of peer-to-peer interaction opportunities in hybrid learning environments from helping students feel prepared for future educational opportunities.
Teacher-learner interaction	Garrett Dikkers et al. (2015), Stevens and Rice (2016), and Villanueva (2021; 2022) all framed teacher-learner interaction as a trusting relationship in hybrid learning.
Supportive of Friendships	Rombot et al. (2020) highlighted the potential to use hybrid learning to build and maintain not just collegial relationships between learners, but true friendships.

The second step was to create a separate Google Survey Form for each participating group and to make sure they have access to the Google Survey Form. One of the research team members reached out to the TACS director and asked for assistance in sharing the Google Survey Form with the teachers, parents, and students at the school. The director asked teachers via email to consider participating in the Google Survey and to allow time for their students to complete the student survey during their class time. The director emailed the Google Survey Form to guardians and asked for their participation in the survey. All interested students, guardians, and teachers completed the Google Survey form. To explore the research question, a member of the research team conducted follow-up, semi-structured interviews with a self-nominated subgroup. The reliability analysis of the survey used the items on a scale comprising four Likert items (1= strongly disagree, 4 = strongly agree). Cronbach's alpha showed the questionnaire to reach acceptable reliability,  $\alpha = 0.88$ . All items appeared to be worthy of retention as the range of means was 3.4-4.2 (SD=1.9-2.1). Table 2 contains final survey items and their responses.

## Interview

In-person interviews were conducted with interested teachers and students. The interview questions are outlined in Table 2. An invitation email was sent to all teachers in the school asking them to consider participating in the in person interviews; five teachers volunteered to be interviewed (four female and one male). In addition, six volunteer students were interviewed,



three boys (5th, 12th and 9th grade), as well as three girls (8th, 9th, and 11th grade). Table 2 provides additional information about these participants. A researcher visited the school site and met individually with the interviewed teachers and students. Interview length varied from 20 minutes to 1.5 hours long. Each interview session was video recorded for transcribing and data analysis purposes. The transcribed texts were analyzed. Parents who participated in online surveys were emailed and invited to participate in a personal interview or answer additional questions in electronic form. Six parents responded to the electronic form. Responses from parents were incorporated into the survey findings and data. 1 out of the 6 parents is also a teacher at the school. Interview topics appear in Table 2.

**Table 2**  
*Interview Protocol*

<b>Participants</b>	<b>Interview Questions</b>
<i>Educators</i>	<ol style="list-style-type: none"> <li>1. How did you come to be an educator at this school?</li> <li>2. What elements of the school do you think are especially supportive of a hybrid learning mission? (if any)</li> <li>3. What is a typical workday like in terms of time spent planning, instructing (online and in-person), and evaluating? What about the rhythm of a week for these activities?</li> <li>4. What are some of your “tried and true” instructional practices for supporting students in hybrid environments?</li> <li>5. What are some of your “tried and true” engagement practices for supporting students in hybrid environments?</li> <li>6. How do faculty collaborate to design hybrid learning activities and materials?</li> <li>7. How do you choose instructional materials for students for both online/in-person instruction?</li> <li>8. How do you build community with parents and other facilitators (if at all)?</li> <li>9. How has working here increased your subject matter/pedagogical/technological expertise (if at all)?</li> <li>10. What is your long-term vision for making a curriculum that builds learning communities?</li> </ol>
<i>Guardians</i>	<ol style="list-style-type: none"> <li>1. What were the circumstances surrounding your child’s enrollment at the school?</li> <li>2. What aspects of hybrid learning help your child persist in their coursework? What specifically engages them (if anything)?</li> <li>3. What is a typical “school day” like in terms of working on an offline? What is the rhythm of a week?</li> <li>4. How does communication with teachers about student learning and hybrid curriculum build community (if at all)?</li> <li>5. How has hybrid learning opportunities assisted with engagement in school for your child?</li> <li>6. How has working with your child hybrid coursework increased your parenting/technological expertise (if at all)?</li> <li>7. What communities has your child built with peers, teachers, or others from doing hybrid learning at the school (if any)?</li> <li>8. What is your overall vision for your child’s hybrid learning experience?</li> <li>9. What advice would you give about supporting children/adolescents in hybrid learning?</li> </ol>

*Students*

1. What led you to take classes at this school?
2. What did you expect hybrid learning to be like? Did it meet your expectations?
3. Describe a specific lesson that you liked that had both in person and online elements. What did you like about that lesson? Was anything difficult? How did you solve problems?
4. How do the teachers at your school support you during both the online and the in-person learning?
5. How has learning at this hybrid school helped you build technological skills (if at all)?
6. How has learning at this school helped you build a social community (if at all)?
7. How has learning in a hybrid setting helped you take charge of your learning (if at all)?
8. What is your typical school like in terms of time spent on and offline doing lessons?
9. When you need help with your work, what is your process for obtaining it?
10. What are your long-term goals for your learning as a hybrid learner?
11. What advice would you give to a student who was new to hybrid learning?

**Data Analysis**

Data from all research instruments was analyzed by aligning participants' responses to create categories/themes pertaining to the responses. A separate document was created for each emerging response/ category/theme. Researchers organized the data and independently coded responses question-by-question for each group (students, parents, teachers) in relationship to the research questions and compared codes. Where disagreement existed, researchers discussed decisions and documented a future course of action (Merriam, 1998). Teacher data was examined first; parents second; student responses were accounted for last. Students' survey responses were considered last because we anticipated a greater range of responses due to potential developmental differences and the potential that they would have less familiarity with research processes. After the first round of coding for each group, researchers compared findings to ensure agreement. This procedure was followed for each group. When 95% agreement was reached for the questions in a group, researchers moved to the next group. Researchers met to collapse codes into themes tied to the research questions and survey data (Saldaña, 2012). Final themes are presented in the findings section.

**Findings**

Data gathered from participants (See Appendix A for survey data) reflected the theme of shared advocacy for meeting student needs. Each of the shared sub-themes are discussed below. Teachers also shared one unique sub-theme around the labor it requires to collaborate.

**Advocacy Through Access to Instruction**

Participants in this study agreed that access to instruction was a primary concern at the school. This access to instruction occurred primarily through collaborative scheduling and goal setting.

### ***Collaborative Scheduling***

Teachers, families, and students agreed that the flexibility of having the kids do both online and in-person learning is crucial. This flexibility was described as opportunities but not requirements to attend in-person school two times a day. One parent elaborated on the need to have in-person learning as an option, stating, “without the live taught aspect of the curriculum, there would be little engagement.”

Support for students in-person alongside hands-on, project-based learning built into the schedule contributes to that flexibility, according to the participants. One teacher said, “you cannot just put the kids on the computer and that’s it.” Participants agreed the opportunity to schedule in-person enrichment time for core subjects also supported students, “...they kind of married together to provide a really supportive environment.”

Interviewed students discussed the amount of time they spent both online and in in-person learning each day. For example, one student spent close to 17 hours per week online and 11 hours in-person; another student stated that he does most of the online work for his schooling over the weekend; he also attended in-person school two days a week; a third student reported spending equal amounts of time online and in-person learning, 5 or 6 hours a day. A fourth student reported attending school during in-person days and spent 4 hours a day during schoolwork online on days where they did not attend in-person.

Parents stressed that while routines were important to establish with their children, they also appreciated the flexibility of the school’s schedule. Parents reported collaboration with their children to create a schedule; “I created a schedule for them to follow on the days they are not on campus. I believe it is creating good habits to continue to do their best daily,” one parent said.

### ***Collaborative Goal Setting***

In addition to flexible scheduling to provide access to instruction, participants also cited the opportunity to collaborate on learning goals as an important to the positive perception of the school. In the survey, 52 % of educators, 31% of students, and 47% of parents agreed that students make choices about topics of study. In addition to topics, students can make choices about whether to use digital resources. For example, regarding when to use digital technologies to teach or learn, 71% of teachers, 64% of students, and 55% of parents believed they have choices. One teacher explained, “we really wrap our minds around students because we are so small that we can do that.” In support of the positive community reputation of TACS, 90 % of teachers, 75% of students, and 95% of parents indicated that they believed that the school has created a positive community climate.

Teachers, parents, and students talked about the importance of communication amongst each other to meet students’ learning goals. Parents also noted that TACS has a variety of opportunities for them to participate in their children’s learning. One parent stated that to collaborate successfully with the school and their children's learning goals, “Parents need to be involved and understand the software that is being used and the tools they have to follow up.” It has been easier to stay involved and know what students are working on with the online curriculum.

### **Advocacy Through Learner Support**

The second way that participants perceived as important was the advocacy achieved through deliberate attempts at learner support. The specific sources of support included high expectations for learning reflected in the school's mission, peer support, and teacher support.

### ***High Expectations for Learning***

An overall theme emerged from the collected data connected to high expectations from the school and their families. During interviews, participants discussed the importance of monitoring students and encouraging participation. One educator said, “[learners] are not going to engage if they are uncomfortable, and if they don’t have any motivations or rewards.” She continued by stating it is the role of the teachers to be deliberate about making instruction interesting for learners.

Students and parents discussed the importance of doing well academically at TACS. Survey responses indicated that 65% of educators, 57% of students, and 78% of parents believed that students at the school achieved high grades. During interviews, two students shared how important it was for them to maintain pace with their work. All interviewed students indicated a sense that they needed to learn to use their learning time appropriately. One student stated that she is learning more about how responsible she can be on her own, “And now I’m learning that I have a voice in my head saying you have to do work.”

Parents who participated in interviews expressed an expectation that TACS will teach their children to balance work, school, and down time; also, they hope the teachers will teach their children self-discipline. One parent stated, “The environment of self-advocacy at [TACS] was very different from the municipal schools. This has bled into many aspects of her life.” One parent explained that hybrid learning allowed students to take dual credit classes at the local branch campus of the state research university in addition to their regular schoolwork.

[TACS] offers so many resources that apply to life after school like college prep, discussions around tech/trade schools.

Another parent stated that the hybrid learning has helped her child challenge himself with more difficult coursework. She said:

My son signed himself up for all AP classes, he became an advocate for himself when it came to asking for help, more work and opportunities focused on school. My son is better at communicating with us as parents because he can physically show us grades, courses, and test scores which I think is a HUGE benefit to schoolwork.

Overall, parents expressed a perception that their children were able to understand the work that they had to do, and they were generally willing and able to do that work.

### ***Peer Support***

Four of six interviewed students commented positively about peer interactions. Survey responses revealed that 29% of educators, 10% of students, and 56% of parents stated that the instructional practices inspired positive emotions in students. In addition, survey findings

indicated that 71 % of educators, 50 % of students, and 58% of parents believed that students interact regularly with each other to learn. Three students stated that when they needed help with their work, they asked their friends first and then the teachers. Another student stated he enjoyed the learning labs where he and his friends collaborated to build a laser cutter:

So let's say one thing that I liked about the lesson was I was able to learn how to work with others better and one difficult part was when we couldn't find the activation key...so we basically took the whole room apart and looked for it.

Another student described how he enjoyed practicing the piano at home and then playing with other people at school.

Students also talked about the benefits of interacting with the front office staff and teachers when they are present in the building. Students shared that teachers know the students very well due to the small class sizes with 10 students in a class. A parent said, "My son enjoys gardening in a local garden by the school. He likes the steam programs they offer, especially cooking, which he is a participant in each year."

Some parents expressed that they worried about socialization. However, according to the survey, 76% of educators, 82 percent of students, and 75% of parents believed that students at TACS interacted regularly with each other as friends.

Even parents that expressed hesitancy about socialization opportunities during interviews described multiple types of peer interactions and other activities at TACS, such as team building, camping, hiking, ropes courses, playing in rock bands, culinary arts, doing local and global project-based learning and small group tutoring opportunities.

### ***Teacher Support***

In the interviews and the survey, educators, students, and parents agreed that TACS staff supported both online and in-person learning. One teacher described how, in addition to students choosing days to come to campus, the school also offered additional, optional days for students to come to the building to receive help with schoolwork. Survey results indicated that 90% of educators, 59% of students, and 59 % of parents believed that students received instructions for improving their grades. In addition, the survey showed that 90% of teachers, 59% of students, and 80% of parents believed that teachers TACS interacted regularly with students to support learning. A teacher stated, "...the option is always, they can come here. We're always available if they need that face-to-face." She highlighted the importance of going over the online curriculum with students face-to-face to help them understand it. She said, "...repetition, repetition, repetition, and clarifying it, and applying something in a life skills way" is the key to helping kids. Working on the lessons without teacher support could become frustrating for students.

Survey results also indicated that 48% of educators, 34 % of students, and 24% of parents believe students experienced at least some frustration while working through their lessons. During online learning, the survey showed that 33 % of educators, 36 % of students, and 53% of parents believed that students could work with the online curriculum without frustration. For

offline work, the survey showed that 67 % of educators, 45 % of students, and 68% of parents believed that students experienced the offline curriculum without frustration. One student shared the benefits of enrichment classes that are in-person when students are having a hard time with their academic skills. He stated, “There is a lot of support here for you if you get stuck.”

During interviews, all students expressed a perception that they were receiving a better education at TACS than their previous school. One parent stated, “Our younger [child] never used to like school, now she feels okay about going to school and is looking into colleges. The teachers somehow find a way to motivate the students to do well.” Another parent elaborated on trusting relationships. “Teachers are very open and never treat me like I am asking dumb questions. They do get back to me in a timely manner and always have a solution.”

### **Tensions and Gaps in Advocacy**

Although there was overall agreement between the three groups, teachers voiced specific concerns that did not emerge from data collected from students and parents. Among these concerns were the effort it takes to locate and use appropriate instructional materials, and additional time needed to communicate and collaborate with colleagues and parents.

### ***Effort to Find Materials for Students***

Teachers commented on the energy and work it takes to find instructional materials for students. TACS purchases most of their instructional materials from a single vendor, but teachers must request permission to add on additional or alternative activities for students to meet their individual academic needs. During interviews, teachers shared how important the in-person enrichment classes were for students, especially students who were struggling. Many teachers shared that they take the online instruction and break it into smaller pieces to support students. Teachers were also giving support through graphic organizers and other writing strategies. The school also had purchased and was using a developmental reading program. All these efforts required additional labor from teachers.

### ***Collaborative Efforts and Relational Work with Colleagues and Parents***

Educators shared their collaboration efforts and relational work with colleagues and families to meet the needs of their students. Collaboration meetings occur at the end of the day at TACS. Collaboration teams meet and discuss topics relevant to the school. During these meetings, teachers take on roles in facilitating and choosing the topics of discussion. However, during interviews, most teachers expressed a desire for more time to sit together and talk about student work.

Teachers also have regular after-school teacher meetings. The teachers found these meetings beneficial for talking with other teachers about the online curriculum and planning face-to-face instruction activities. Teachers desired more time to prepare for the online and in-person lessons. A teacher who was new to the profession described using that time to seek support from more experienced teachers. In general, there was a sense that teachers supported one another and shared resources. Even with this general sense of community, one teacher stated that his planning usually takes place on the weekends, at home. During interviews, all teachers expressed appreciation for students and parents. All expressed an overall contentment with hybrid learning, yet they wished that their workload was more manageable.

## Discussion

In this study, researchers gathered information from teachers, parents, and students at TACS. Each group expressed positive perceptions of the school. Parents and students appreciated the opportunities to have individualized scheduling and choices about when to come to school in person and when to do work online. The students and parents also reported high levels of learner support. Much of the credit for this high level of support was given to teachers. While the teachers were pleased the students were doing well, they felt their workload was high.

### Practical Implications

In this school that uses hybrid learning with flexible schedules, there is an appreciation for the flexibility and an understanding that such an opportunity provides the space for students to practice self-regulation of learning. Even so, they need help from both parents and teachers (Borup et al., 2020). The way that these groups seem to be sharing the responsibility—for now—is for parents to do as much as they can and then lean on the school. This works for families where there might already be a lot of resources. It seems that where students are falling behind and needing to be at the school more, it is because families are less able to take care of this independently. This will likely remain a barrier to bringing in more families to a similar setting.

Teachers might also need more preparation and support to take full advantage of the ways technologies can help them (Roscoe et al. 2013). For example, Alvarado-Alcantar et al. (2018) have warned about how frustrated students might become with complicated online instructional materials. Teacher education programs must take these likely shortcomings in instructional materials seriously and prepare teachers to expect this and help teachers find ways to compensate for it in ways that do not require so much teacher labor. Also, researchers like Rice and Carter (2016) highlighted how teachers used the dashboard to regulate their work and students' work; Kazakoff et al., (2018) and Villanueva (2021, 2022) have shown patterns for feedback, and Stevens and Rice (2018) showed how an emoji from a teacher on online work operated to keep students on task. Teachers in this study seem to have needed more help in learning how to use strategies other than “come in and I will teach you in person.” Moreover, such thinking undermines the strong theme of peer support where students benefited from working with others in the hybrid environment (Garrett Dikkers et al. 2014, Garrett Dikkers et al., 2015; Rombot et al. 2020; Whiteside et al., 2016).

### Research Implications

Previous research has documented achievement in hybrid learning environments (Bottge et al., 2014; Hawkins-Lear & Grisham-Brown, 2018; Kazakoff et al., 2018; Leacox & Jaxson, 2014; Prescott, et al., 2018). Not only must learning occur comparably with and even over control groups, the perception of achievement is also important (Barbour & Harrison, 2016; Kuo et al., 2014; Gough et al., 2017; Harrell & Wendt, 2019). Perceptions are crucial because strong feelings of frustration can be reported in hybrid environments (Bingham, 2016; Mormando, 2022). There was a sense among study participants that frustration is universally harmful and should be eliminated. From a theoretical standpoint, some struggle while learning is part of what creates cognitive challenge (Pintrich, 1999; Reeve, 2012). Future research should take the issue of frustration from both teachers and students in hybrid learning environments more seriously. What frustrations are acceptable? What support can be offered? What dialogue needs to occur to prepare teachers and students to expect and manage frustration?

Another important finding focused on students' need for strong relationships inside and outside of school with both teachers and peers. Some research has suggested that peer relationships in blended environments can promote outcomes that go beyond the immediate school (e.g., planning for college) (e.g., Whiteside et al., 2016). Other research has looked at the possibilities for students to become friends in hybrid spaces (Rombot et al., 2020). Parents and students seemed to blend peers and teachers into a community; this is an interesting phenomenon that deserves additional attention as it does not fit tidily into cognitive models of self-regulation of learning and emotion typically used to understand engagement.

### **Policy Implications**

Policy support is essential for designing and evaluating hybrid programs beyond pandemic circumstances. While flexible scheduling seems to be valuable to families, policy makers—state and local—may be averse to moving away from traditional thinking about regular daily attendance and seat time (Arnett, 2021). Also, policies need to consider what funding and other resources are needed to run high quality flexible programs. Resources might include funding for lower student-to-teacher ratios, more access to digital tools and resources, earlier and more rigorous evaluation of digital instructional materials for accessibility and suitability, and more frequent feedback opportunities for teachers, parents, and students. The relationships that students had did seem to make students and parents feel comfortable and happy. Should student happiness be a policy goal for strong hybrid learning programs? If so, how would policy makers measure and ascertain it? Finally, we wonder, what role *can* policy play in making joyful spaces for students to have agency over their relationships with each other, with teachers, with technologies, and with their learning?

## **Conclusion**

The purpose of this study was to learn about the perceptions of teachers, parents, and students in a school using hybrid learning with flexible schedules. Overall, the school's particular hybrid design was perceived as supportive of student learning. Since this study took place at one site and since hybrid programs, by definition, can vary so much in structure, it is important to realize this study cannot generalize to other hybrid programs. Instead, it offers a description of a program that might resonate with other programs with similar characteristics. What may be clear is that K-12 schools can be spaces for exploring hybrid scheduling regimes in ways that account for community goals and preferences.

### **Declarations**

The authors declare no conflicts of interest.

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**Appendix A**  
**Survey Findings**

<b>Category #1: Behavior Engagement Statements</b>					
Statement #1 Number of access points: Students can access materials without logging into multiple accounts.					
	<b>1 (not at all)</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5 (extremely likely)</b>
Teacher			9.5% (2 out of 21)	28.6% (6 out of 21)	61.9% (13 out of 21)
Student	1.5% (2 out of 134)	6.8% (9 out of 134)	24.8% (33 out of 134)	33.8% (45 out of 134)	33.1% (44 out of 134)
Guardians			15.6% (7 out of 45)	44.4% (20 out of 45)	40% (18 out of 45)
Statement #2 Praise/Rewards: Students receive praise for their work.					
	<b>1 (not at all)</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5 (extremely likely)</b>
Teacher			19% (4 out of 21)	42.9% (9 out of 21)	38.1% (8 out of 21)
Student	8.3% (11 out of 134)	17.4% (23 out of 134)	28% (37 out of 134)	31.8% (42 out of 134)	14.4% (19 out of 134)
Guardians		2.2% (1 out of 45)	17.8% (8 out of 45)	37.8% (17 out of 45)	42.2% (19 out of 45)
Statement #3 Feedback: Students receive instructions for improving their performance.					
	<b>1 (not at all)</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5 (extremely likely)</b>
Teacher			9.5% (2 out of 21)	38.1% (8 out of 21)	52.4% (11 out of 21)
Student	2.3% (3 out of 134)	13% (17 out of 134)	26% (34 out of 134)	42% (55 out of 134)	16.8% (22 out of 134)
Guardians	2.2% (1 out of 45)	2.2% (1 out of 45)	13.3% (6 out of 45)	42.2% (19 out of 45)	40% (18 out of 45)

<b>Category #2: Cognitive Engagement Statements</b>					
Statement #1 Challenging curriculum: The lesson materials at this school challenge students to think.					
<b>Participant Type</b>	<b>1 (not at all)</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5 (extremely likely)</b>
Teacher			14.3% (3 out of 21)	52.4% (11 out of 21)	33.3% (7 out of 21)
Student	2.3% (3 out of 134)	5.3% (7 out of 134)	28.6% (38 out of 134)	51.9% (69 out of 134)	12% (16 out of 134)
Guardians		2.2% (1 out of 45)	15.6% (7 out of 45)	33.3% (15 out of 45)	48.9% (22 out of 45)
Statement #2 Suited to interests: The lesson materials at this school are interesting to students.					
	<b>1 (not at all)</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5 (extremely likely)</b>
Teacher	14.3% (3 out of 21)	42.9% (9 out of 21)	38.1% (8 out of 21)	4.8% (1 out of 21)	14.3% (3 out of 21)
Student	9% (12 out of 134)	20.9% (28 out of 134)	35.1% (47 out of 134)	29.9% (40 out of 134)	5.2% (7 out of 134)
Guardians	2.3% (1 out of 45)	6.8% (3 out of 45)	36.4% (16 out of 45)	38.6% (17 out of 45)	15.9% (7 out of 45)
Statement #3 Leads to achievement: Students at this school achieve high grades.					
	<b>1 (not at all)</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5 (extremely likely)</b>
Teacher		5% (1 out of 21)	30% (6 out of 21)	55% (11 out of 21)	10% (2 out of 21)
Student		9.7% (13 out of 134)	33.6% (45 out of 134)	35.1% (47 out of 134)	21.6% (29 out of 134)
Guardians		4.4% (2 out of 45)	17.8% (8 out of 45)	37.8% (17 out of 45)	40% (18 out of 45)

Emergent Themes from Study of a Highly Flexible Hybrid Learning Program

Statement #4 Enables choice: Students have choices about topics of study.					
	<b>1 (not at all)</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5 (extremely likely)</b>
Teacher	14.3% (3 out of 21)	4.8% (1 out of 21)	28.6% (6 out of 21)	38.1% (8 out of 21)	14.3% (3 out of 21)
Student	19.7% (26 out of 134)	18.2% (24 out of 134)	31.1% (41 out of 134)	26.5% (35 out of 134)	4.5% (6 out of 134)
Guardian	6.7% (3 out of 45)	13.3% (6 out of 45)	33.3% (15 out of 45)	28.9% (13 out of 45)	17.8% (8 out of 45)



<b>Category #3: Emotional Engagement Statements</b>					
Statement #1 Frustration level: Students become frustrated while working through their lessons.					
	<b>1 (not at all)</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5 (extremely likely)</b>
Teacher		4.8% (1 out of 21)	47.6% (10 out of 21)	42.9% (9 out of 21)	4.8% (1 out of 21)
Student	10.4% (14 out of 134)	26.9% (36 out of 134)	28.4% (38 out of 134)	20.1% (27 out of 134)	14.2% (19 out of 134)
Guardians	17.8% (8 out of 45)	33.3% (15 out of 45)	24.4% (11 out of 45)	13.3% (6 out of 45)	11.1% (5 out of 45)
Statement #2 Online: Students are able to work with the online curriculum without frustration.					
	<b>1 (not at all)</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5 (extremely likely)</b>
Teacher	4.8% (1 out of 21)	42.9% (9 out of 21)	19% (4 out of 21)	28.6% (6 out of 21)	4.8% (1 out of 21)
Student	9.8% (13 out of 134)	21.2% (28 out of 134)	32.6% (43 out of 134)	23.5% (31 out of 134)	12.9% (17 out of 134)
Guardians	11.1% (5 out of 45)	11.1% (5 out of 45)	24.4% (11 out of 45)	33.3% (15 out of 45)	20% (9 out of 45)
Statement #3 In person: Students are able to work with the offline curriculum without frustration.					
	<b>1 (not at all)</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5 (extremely likely)</b>
Teacher	4.8% (1 out of 21)	19% (4 out of 21)	9.5% (2 out of 21)	52.4% (11 out of 21)	14.3% (3 out of 21)
Student	7.8% (10 out of 134)	13.3% (17 out of 134)	34.1% (44 out of 134)	25.6% (33 out of 134)	19.4% (25 out of 134)
Guardians	4.5% (2 out of 45)	4.5% (2 out of 45)	22.7% (10 out of 45)	38.6% (17 out of 45)	29.5% (13 out of 45)

Emergent Themes from Study of a Highly Flexible Hybrid Learning Program

Statement #4 Range of emotions: The curriculum inspires positive emotions in students.					
	<b>1 (not at all)</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5 (extremely likely)</b>
Teacher		4.8% (1 out of 21)	66.7% (14 out of 21)	28.6% (6 out of 21)	
Student	25.4% (34 out of 134)	26.9% (36 out of 134)	38.1% (51 out of 134)	9% (12 out of 134)	0.7% (1 out of 134)
Guardian	4.4% (2 out of 45)	6.7% (3 out of 45)	33.3% (15 out of 45)	40% (18 out of 45)	15.6% (7 out of 45)

<b>Category #4: Social Engagement Statements</b>					
Statement #1 Peer-peer interaction: Students interact regularly with each other to learn.					
	<b>1 (not at all)</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5 (extremely likely)</b>
Teacher			28.6% (6 out of 21)	57.1% (12 out of 21)	14.3% (3 out of 21)
Student	6.1% (8 out of 134)	15.2% (20 out of 134)	28.8% (38 out of 134)	29.5% (39 out of 134)	20.5% (27 out of 134)
Guardians	4.4% (2 out of 45)	22.2% (10 out of 45)	15.6% (7 out of 45)	31.1% (14 out of 45)	26.7% (12 out of 45)
Statement #2 Peer-teacher interaction: Teachers interact regularly with students to support learning.					
	<b>1 (not at all)</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5 (extremely likely)</b>
Teacher			9.5% (2 out of 21)	47.6% (10 out of 21)	42.9% (9 out of 21)
Student	3% (4 out of 134)	10.6% (14 out of 134)	27.3% (36 out of 134)	38.6% (51 out of 134)	20.5% (27 out of 134)
Guardians	2.2% (1 out of 45)	6.7% (3 out of 45)	11.1% (5 out of 45)	51.1% (23 out of 45)	28.9% (13 out of 45)
Statement #3 Supportive of friendships: Students interact regularly with each other as friends.					
	<b>1 (not at all)</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5 (extremely likely)</b>
Teacher			23.8% (5 out of 21)	47.6% (10 out of 21)	28.6% (6 out of 21)
Student	3% (4 out of 134)	4.5% (6 out of 134)	10.4% (14 out of 134)	26.9% (36 out of 134)	55.2% (74 out of 134)
Guardians	4.4% (2 out of 45)	6.7% (3 out of 45)	13.3% (6 out of 45)	33.3% (15 out of 45)	42.2% (19 out of 45)

# “I Sing the Body Electric”: Embodiment in the Community of Inquiry Framework

Crystal D. Howell  
*Randolph College, USA*

## **Abstract**

Even prior to the COVID-19 pandemic, more K-12 teachers in the United States were teaching online than ever before, particularly in rural and economically distressed communities (US Department of Education, 2011), and since March 2020, nearly every teacher has become, at least for a little while, a virtual teacher. The purpose of this study was to better understand the embodied experiences of women “sojourner” teachers—that is, teachers who move among online, face-to-face, and hybrid teaching spaces (Howell, 2020). Working from a feminist poststructuralist perspective, I gathered qualitative data from four sojourner teachers in the Midwestern and Mid-Atlantic United States. These data revealed participants’ complex relationships with their bodies while teaching online and how their bodies fit into their perceptions of what it means to be a good virtual teacher. I argue that the current domains of the Community of Inquiry (CoI) framework (Garrison et al., 2000) are limited and would benefit from the explicit inclusion of embodiment to facilitate discussion about the interplay of physical and intellectual labor and, potentially, the real effects embodied identities have on teachers’ experiences in virtual classrooms.

*Keywords:* Community of Inquiry, embodiment, online education, social presence, teaching presence, cognitive presence

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More teachers at all levels are teaching online than ever before. According to the National Center for Education Statistics (U. S. Department of Education, 2021), nearly 60% of U.S. college students were enrolled in at least some distance courses in 2021, and at the PK-12 level, enrollment at virtual schools—particularly virtual charter schools—has been growing more than any other type of public school even though virtual charter students’ proficiency rates are “significantly lower” than other school types (U. S. Government Accountability Office, 2022, “What GAO Found”). The continued growth in distance education underscores the importance of understanding distance teachers’ and students’ experiences and developing from them a cogent framework for online teaching and learning.

The purposes of this article are, first, to share the embodied experiences of women (who make up an overwhelming majority of the U.S. PK-12 teaching workforce yet still experience significant gender bias) who move among online, face-to-face, and hybrid teaching spaces. In other words, I was interested in *sojourner teachers* (Howell, 2020), a term intended to reflect the uniquely flexible and fluid work of many contemporary teachers, and how they live in and experience their unique classroom contexts through their bodies. Unlike many PK-16 instructors forced into online and hybrid classroom by COVID-19 in 2020-2021, the participants in this study were deliberately working as sojourner teachers, making their experiences distinct from those of teachers who abruptly shifted to emergency remote instruction with little preparation or choice. Second, through my analysis of these teachers’ experiences, I recognized a gap in the much-embraced Community of Inquiry (CoI) framework (Rourke et al., 1999; Garrison et al., 2000; Garrison et al., 2001; Anderson et al., 2001; Rourke et al., 2001) and now seek to address that gap.

I begin by synthesizing the existing literature related to teachers’ embodied experiences, narrowing toward scholars’ understanding of teacher embodiment in virtual PK-12 classrooms. Then, I describe the two theoretical lenses through which I viewed this project, *embodiment* and *poststructural feminism*, as well as the Community of Inquiry framework. Next, I describe the present study and report tellings relevant to the CoI framework. Finally, I argue that the current domains of the Community of Inquiry (CoI) framework are limited and exclude embodiment as an integral part of meaningful educational experiences, sublimating serious discussion about the interplay of physical and intellectual labor and, potentially, the real effects embodied identities (including gender and race) have on teachers’ experiences in virtual classrooms. I conclude by proposing an expanded view of the framework and continued study of teachers’ embodied experiences in online settings.

## Literature Review

“Our bodies,” Grumet (2003) writes, “give us away” (p. 257). Teachers’ bodies, like written or spoken language, act as texts to be read in classroom contexts, “moving, speaking, and interacting in particular ways [to] produce social spaces” (Jones & Hughes-Decatur, 2012, p. 52). Atkinson (2008) describes the idealized contemporary teacher as motherly but not sexual, smart but nonthreatening. She—because, like 80% of U.S. PK-12 teachers (U.S. Bureau of Labor Statistics, 2023), the ideal teacher is a woman—is ready to “reproduce citizens for a democratic society, men and women for a patriarchal heterosexual culture, and differently skilled laborers for a capitalist economy” (Atkinson, 2008, p. 109). Students, colleagues, and administrators often stereotype and marginalize teachers with bodies that communicate something other than

this idealized teacher subjectivity. Small teachers lack authority (Ingalls, 2006), fat teachers are lazy (Garrett & Wrench, 2012), pregnant teachers are inappropriately sexual (Spangler Gerald, 2003), Black teachers are angry (Lewis, 2016), and sick (DiPalma, 2003; Price Herndl, 2003) and disabled (Radtke & Skouge, 2003) teachers rely too much on others.

Students are highly attentive to teachers’ appearance and actions. Uitto and Syrjälä (2008) describe how students infer teachers’ approval and disapproval from their bodily cues alone; one participant in their study of 49 college students reported that she knew her high school math teacher did not believe math was for girls just based on his facial expressions. Mallozzi (2014) and Atkinson (2008) both focus on teacher dress. In Mallozzi’s (2014) study, working practitioners (including Mallozzi herself) described how their clothes, hairstyle, and accessories communicated attributes like marital status and sexual orientation and how they manipulated their appearance to hide those attributes. Atkinson’s (2008) participants were all preservice teachers; they identified several teacher types based on appearance (apple jumper teachers, teacher babes, and bland uniformer teachers) and debated the affordances and constraints each type provides while speculating about which type they might become.

Body-centered issues do not simply evaporate in virtual settings. Brophy (2010) rejects the idea that online settings are disembodied “cyberutopia[s]” (p. 930). Although they might allow greater fluidity in how users present their gender, sexuality, race, and socioeconomic status, they may also result in the reification of stereotypes and increased marginalization when users occupying privileged identities assume other users are just like them—that is, when marginalized identities are successfully masked. But often marginalized identities are not masked; in these instances, bias is often obvious. In their study of 14 online sections of an introductory political science course at a large state institution, Chávez and Mitchell (2020) illustrate Brophy’s (2010) assertions. Even though the only difference among the course sections was the instructor’s name and appearance in a welcoming video, the researchers found that women and people of color all received lower scores than White men on ordinal course evaluations; for female instructors, this difference was statistically significant.

Yet scholars are divided in their acknowledgement of whether embodiment even exists in online contexts. Dreyfus (2009), for example, is implacably pessimistic about online education because he views virtual experiences as totally disembodied. Dreyfus rejects online education because the intercorporeal actions he sees as foundational to learning cannot be experienced online, even with advanced video, audio, and haptic technologies. Ess (2003) and Cunningham (2014) are more optimistic, both conceding that blended or hybrid teaching and learning can work, although supports might be needed to stimulate the creation of social presence in classes with a mix of virtual and face-to-face students.

Very little empirical research exists on teachers’ embodied experiences in online classrooms. Some exists incidentally: in their study of an online Master’s of Nursing Science program, Lindsay et al. (2009) did not aim to address embodiment and were surprised when embodiment emerged as a theme in their data. Faculty in particular reported the physical demands of teaching online (e.g., tendonitis, eye strain, fatigue) as well as the challenge of “being present to an absence” when teaching remote students (p. 184). “Technology at a distance might seem disembodied, but it is not,” Lindsay et al. opined (p. 184).

Bolldén (2016), in contrast, remains one of the only studies in which the researcher explicitly aims to investigate teachers’ embodiment in virtual settings. Most interesting in Bolldén’s findings is her characterization of teacher embodiment as “multiple” and “manifold” (p. 13). In addition to using Second Life avatars (which they sometimes struggled to control), the college-level instructors in Bolldén’s study reported that they demonstrated their embodied-ness via their profile pictures on their course platform and by participating in live discussions, not to add substantive content but simply to show that they were there.

Notably, the existing literature on teachers’ embodied experiences in virtual settings focuses exclusively on higher education contexts. This study helps address that gap by focusing on the experiences of PK-12 teachers.

## Essential Frameworks

### Embodiment

Embodiment means “having, being in, or being associated with a body” (Smith, 2017, p. 1). While this understanding of what it means to be human may seem too obvious to be debatable, this embodied perspective contrasts sharply with more prevalent dualist understandings of soul/body or mind/body binaries. The distinction between the mind and body in Western philosophical traditions began more than two millennia ago in Plato’s writing and has been taken up by numerous scholars since then, including, notably, philosopher and mathematician Rene Descartes, who shifted thinking from the soul/body to the mind/body. The Cartesian understanding of the body as a simple “machine” (Broadie, 2001, p. 297) acting as “the mind’s unproblematic instrument” (Michel, 2015, p. S41) persists in much popular thinking today.

In the mid-20th century, however, French phenomenologist Maurice Merleau-Ponty challenged this dualism. Merleau-Ponty (2005) writes that the body is “not an object for an ‘I think’” but “a grouping of lived-through meanings” (p. 177). Merleau-Ponty’s notion of consciousness is not separate from nor does it exist despite humans’ embodied experiences; consciousness is instead the experience itself of knowing the world from the body. Although some philosophers have criticized Merleau-Ponty’s understanding of Descartes as too simplistic (see, for instance, Hudac, 1991), Merleau-Ponty’s work is useful for precisely this reason: His simple understanding of the mind/body hierarchy reflects the resulting popular discourse about the body after centuries of dualist thinking.

Embodiment is particularly relevant to women and people of color. Women’s bodies have long been “a metaphor for the corporeal...representing nature, emotionality, irrationality and sensuality” in contrast with “the masterful, masculine will, the locus of social power, rationality and self-control” (Davis, 1997, p. 5). The disassociation of women’s bodies with rationality is especially frustrating in U.S. PK-12 classrooms, domains managed overwhelmingly by women. Bodies of color are similarly situated in contemporary discourse (Trinh, 1989; Almeida, 2015); for instance, White academics in the U.S. regularly dismiss female Black, Indigenous, and scholars of color as “experiential/emotional” rather than theoretical writers (Almeida, 2015, p. 80).

### Feminist Poststructuralism

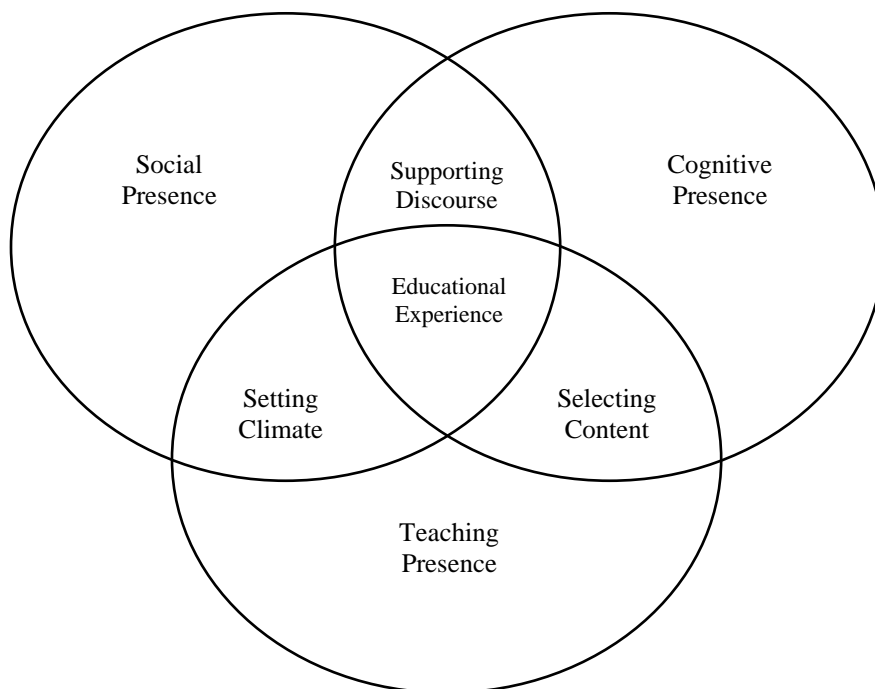
Feminist poststructuralism is also foundational to this study. Although poststructuralism can take many forms and many poststructuralist scholars resist efforts to define their work, most share the understanding that meaning exists in constantly shifting sign systems and, in particular, language. When humans use language, they create *discourses* (Baxter, 2003). Fairclough (2013) describes discourses as “social interactions” (p. 20); these interactions always occur within a specific context in which interlocutors occupy multiple *subjectivities*. According to Weedon (1987), subjectivities are “the conscious and unconscious thoughts and emotions of the individual, her sense of herself and her ways of understanding her relations to the world” (p. 32). Subjectivities are multiple, “precarious, contradictory” (p. 33), and shaped by one’s relation to systems of power, unlike the more fixed and freely constructed notion of *identity*. Feminist poststructuralist analysis, then, relies on careful attention to linguistic structures and the contexts in which language is used and requires the researcher to recognize that meanings are multiple and fluid.

### Community of Inquiry

The CoI framework was created by Garrison et al. (2000). In their original work, Garrison and his colleagues sought to “investigate the features of the written language used...that seem to promote the achievement of critical thinking” (p. 91) in text-based, computer-mediated communication in asynchronous online courses. Calling back to Dewey's (1897) observation that education is part psychological and part sociological, Garrison et al. speculate that a community of inquiry, while perhaps not absolutely necessary, is a valuable context in which to create an educational experience. Their CoI model (Figure 1) has three distinct domains or presences: cognitive presence, social presence, and teaching presence.

**Figure 1**

*The Community of Inquiry Framework*





*Cognitive presence* refers to “the extent to which the participants in any particular configuration of a community of inquiry are able to construct meaning through sustained communication” (Garrison et al., 2000, p. 89). A class that creates cognitive presence gives students opportunities to encounter new, unexpected ideas; to ask questions; to make connections; and to make inferences based on evidence. And without careful planning, this sort of critical-thinking-supporting, interactive classroom can be challenging to facilitate online. Indicators of cognitive presence include some sort of “triggering event”—that is, when a student feels puzzled or recognizes a problem—followed by exploration, integration, and resolution (when students apply new ideas to solve problems).

Such a community, Garrison et al. (2000) asserted, is “nurtured within the broader social-emotional environment of the communicative transaction” (p. 94). They hypothesize that people must feel comfortable relating to one another before the level of genuine interactivity, receptiveness to new ideas, and willingness to engage in productive dialogue necessary for critical thinking can occur. Thus, their second domain or presence of interest is *social presence*, which they define as “the ability of participants in a community of inquiry to project themselves socially and emotionally as ‘real people’ through the medium of communication being used” (p. 95). In other words, to take the sorts of intellectual risks required for critical thinking, students have to see their instructor and their peers as real people with whom they are sharing an experience.

The final presence binds together cognitive and social presences. Garrison et al. (2000) call this domain *teaching presence*. This work is wide-ranging and includes selecting appropriate texts and other curricular materials, structuring that content, designing appropriate assessments, and selecting or designing appropriate instructional methods, all while communicating, modeling, and negotiating course norms and expectations.

In their initial article, Garrison et al. (2000) proposed using this framework as a coding scheme to analyze computer-mediated communication such as discussion threads, and while many scholars have used it in this way, scholars have used the framework in broader ways as well. Arbaugh and several others (including Garrison) (2008) created a survey to operationalize the three presences, and other scholars have used that survey to study the effects of the presence (or absence) of the three presences. Garrison et al. (2007) have explicitly invited questioning and further study of the framework and quite openly acknowledge that it is a work in progress. Scholars such as Xin (2012) and Annand (2019) have taken up this invitation, questioning CoI’s generality, simplicity, and purported foundational paradigms.

Scholars also note a lack evidence showing a statistically significant link between CoI’s three presences and student achievement (see, for example, Rourke and Kanuka’s [2009] review of the CoI literature or Maddrell et al.’s [2017] investigation of the relationship between social presence and student learning). However, some studies suggest that in courses with strong evidence of the three presences, students reported feeling like they learned more and had more positive attitudes toward the course; Cheung et al. (2018) found this to be the case in racially and ethnically diverse science classrooms. Why do these perceptions matter if course grades stayed the same? Students who feel more favorably about content and feel as if they are learning are

more apt to persist, an especially important outcome in subjects students perceive as challenging, like math and science.

In addition to filling contextual and methodological gaps in the existing CoI literature (Olpak, 2022), the present study responds to Garrison et al.’s (2007) invitation to question the CoI framework, through the lenses of embodiment and feminist poststructuralism.

### **Research Questions**

In this study, I initially asked:

- How do female sojourner teachers experience embodiment?

In this article, I explore a sub-question generated as a result of my initial analysis and finding that embodiment remains largely unexplored within the existing CoI literature:

- Do female sojourner teachers’ embodied experiences align with the Community of Inquiry framework, and if so, how?

### **Method**

As the previous sections show, the topic of this project was (and remains) understudied. When I undertook this investigation during the 2016-2017 academic year, my first goal was simply to make this part of the world visible by documenting and interpreting (together with participants) the unique experiences of female PK-12 sojourner teachers. The fundamental nature of my primary research question along with the lack of previous literature made a qualitative approach most appropriate for my study.

### **Participants**

After securing approval from my Institutional Review Board, I solicited participants from two U. S. states, one in the Mid-Atlantic region and one in the Midwest. In the Mid-Atlantic state, all virtual PK-12 programs were managed by the state’s Department of Education, including an in-house Spanish program, offering middle and high school language courses from certified Spanish teachers to school districts around the state who were consistently unable to hire and retain certified world language teachers. These teachers were employed by the state’s Department of Education and engaged in a mix of synchronous and asynchronous instruction for 6-8 classes capped at 15 students. Most of the state’s virtual programs were administered at students’ local schools under the supervision of non-teaching staff member (such as a librarian). I used publicly available information as well as personal introductions to connect with and invite the eight virtual teachers working for the program. Four initially agreed to participate in this study; two dropped out due to a lack of time to complete the study.

In contrast, the Midwestern state’s virtual programs were highly decentralized and mostly managed by the educational management organization K12, Inc. When I began this study, the state had five virtual charter schools, one overseen by a local school district and the other four managed by K12, Inc. Another (also managed by K12, Inc.) opened during recruitment. The schools did not have enrollment caps; as a result, some enrolled as many as 5,000 students. Most were rated F (failing) by the state’s accrediting agency. For each school, I first attempted to

contact administrators via email, chat, phone, and, for at least one school, by visiting their physical headquarters. If that was not successful, I contacted any teachers with an email or “contact me” button publicly displayed on the school’s website. Ultimately, I was able to make contact with the principal at the single school overseen by a local school district; he referred me to one eligible participant (Emma). Of the remaining five schools, four did not respond to emails, chats, calls, or visits and did not provide faculty rosters online. At the last school, administrators did not respond, but a spreadsheet with faculty names and emails was available online, which I used for recruitment. Three teachers responded to my recruitment email. Two were unable to finish the study due to personal and professional time constraints.

Ultimately, four teachers completed the study:

- **Claire**, a White, cisgender English-as-a-new-language and Spanish teacher in her early 40s with more than a decade of experience in a large Mid-Atlantic metro area and remote, rural Mid-Atlantic area. At the time of this study, Claire taught middle school students from her home through a virtual Spanish program managed by the Department of Education of a Mid-Atlantic state. Claire’s students participated at their home schools in supervised computer lab settings where they worked asynchronously approximately three days per week and met with Claire synchronously two days per week.
- **Regina**, a White, cisgender Spanish teacher in her early 50s with two decades of experience, including several years outside of the profession working as an anthropologist, and experiences in rural schools in New England and the Mid-Atlantic. Regina worked from her home, teaching high school Spanish through the same virtual program as Claire with the same ratio of asynchronous and synchronous work.
- **Emma**, a White, cisgender math teacher in her 20s in her fourth year of teaching at a virtual charter school managed by and physically headquartered in a large urban high school in the Midwestern state. Working on-site from midday until early evening, Emma taught virtual classes as well as in-person classes through the school’s extended day program. She also offered drop-in virtual and in-person tutoring for students.
- **Tilly**, a White, cisgender special education teacher with two decades of experience in suburban regions in the Mid-Atlantic and Midwest. Tilly taught from home through a virtual charter school run by K12, Inc. in partnership with a local school district (a requirement of the state’s charter school regulations at the time of this study). At the start of this project, her caseload included more 100 high school students from throughout the state. Midway through data collection, another special education teacher at her school resigned, and Tilly also had to absorb her caseload of 109 students until the position was filled. The majority of her interactions with students were asynchronous.

### **Data Collection**

With each participant, I conducted a one- to two-hour semi-structured initial interview in person or via Skype (for interview protocol, see Appendix A). The initial interview was followed by a sequence of journaling activities, conducted exclusively via email, in which participants created and probed metaphors capturing aspects of their face-to-face, online, and hybrid teaching experiences (for a complete description of email prompts, see Appendix B). I adapted Gordon’s (1972) synectics protocol for the email sequence. Synectics, a strategy originally designed by Gordon to cultivate creativity among advertising executives, is also often used as an instructional strategy to help students make connections among seemingly disparate concepts. The protocol relies on a structured sequences of invitations to create metaphors and through these metaphors “mak[e] the familiar strange” and “mak[e] the strange familiar” (Gordon, 1972, p. 296). Each participant and I spent about five months on this stage, exchanging at least a dozen emails. Data generation concluded with a final one- to two-hour semi-structured interview (see Appendix C for the final interview protocol).

### **Data Analysis**

I began analyzing data after the first interview and continued iteratively throughout data generation. I used elements of Carspecken’s (1996) steps for critical qualitative inquiry and relied on Jackson and Mazzei’s (2012) thinking with theory approach. Specifically, I engaged in low- and higher-level coding (Carspecken, 1996), first looking for codes related to embodiment, then developing codes based on the data themselves, and then, after writing up my initial findings, returning to the data to code with the CoI in mind. Throughout data analysis, I looked for examples of what Jackson and Mazzei (2012) call “irruptions” (p. 8) and used Carspecken’s (1996) meaning field analysis and reconstructive horizon analysis at these points to help me understand the possible meanings in what participants said and wrote. I also used Fairclough’s (2013) ten main questions for discourse analysis during this stage.

### **Researcher Positionality**

My professional background and experiences undoubtedly influenced this research (St. Louis & Calabrese Barton, 2002). I am a straight, White, cisgender woman. I look like a typical U.S. teacher and like my participants, a position that likely resulted in unearned trust from them. I also came to this project with a largely positive view of online teaching and learning. I had had rich, rewarding experiences teaching online and many opportunities to support other teachers’ online teaching practices. Unlike many PK-12 teachers, I held a full-time online teaching position nearly a decade prior to the COVID-19 pandemic. I shared my prior experiences with my participants in order to gain their trust and to demonstrate that I was interested in their stories. But this strategy carried risk; participants might have assumed I knew things about their experiences that were, in fact, unique to them as individuals and not common to all sojourner teachers.

### **Trustworthiness**

Like most qualitative researchers, I aimed to engage in trustworthy research that might yield understandings transferable to other, similar contexts. Before and during the research, I engaged in reflexive writing about my positionality. I kept a detailed audit trail (Creswell & Miller, 2000). Peer debriefers (Creswell, 2014) provided essential feedback when I created by interview protocols. I translated my recordings, transcripts, and notes into a thick record

(Carspecken, 1996), and I engaged in member checking and searched for disconfirming evidence to reduce the risk of confirmation bias (Creswell & Miller, 2000).

### **Limitations**

The primary limitation in this study is its homogeneous sample. This study reflects the experiences only of the typical U.S. teacher: White, cisgender, middle-class women, omitting the experiences of the many teachers who do not embody this norm. Although I briefly describe the frustrating process of recruitment for this study in this article that undoubtedly contributed to this homogeneity, in Howell (2019), I offer a fuller critique of the challenges such educational settings present to researchers.

## **Tellings**

In this section, I showcase excerpts from participants’ interviews and email exchanges, organized by the three presences in the CoI framework: social presence, teaching presence, and cognitive presence.

### **Social Presence**

Unsurprisingly, all participants described how their bodies contributed to significant moments of social presence in their virtual classrooms—that is, when they and students began to recognize one another as human beings. Claire described the abrupt and unplanned way her body humanized her to her students and a colleague when synchronously teaching while pregnant with her first child. In the following exchange, she described her earliest scheduled class meeting during the year of her first pregnancy:

CLAIRE: So honestly I don’t even remember teaching during that period but I know I did.

CRYSTAL: Yeah.

CLAIRE: But I don’t remember doing it so I was absolutely on autopilot. I couldn’t take time off because I had to save all that for maternity leave.

CRYSTAL: Oh for maternity leave sure.

CLAIRE: Right so I wasn’t able to take days and time off. I really don’t I mean clearly I taught whatever I was supposed to be teaching cause I was still working. (laughs) But I you know definitely not the most engaged and best teacher cause I was not feeling well and wasn’t you know wasn’t my chipper self. In fact I hadn’t told my bosses I was pregnant yet but this one class I had to call really early in the morning at like 7:15. Their class was actually before their school started...I had to call in there really early every day and I wasn’t even on the clock yet. So I would call them and then eat breakfast and do whatever and then get on the clock.

CRYSTAL: Uh huh.

CLAIRE: So I kept calling them and I would be like “Oh let me call you guys back. I don’t feel good.” And I would hang up the phone and have to go be sick come back and call them back. And then finally after probably a month of this—the facilitator who was my only male facilitator at the time maybe it was two but anyway he was like “Are you pregnant or something?”

CRYSTAL: (laughs)

CLAIRE: Yup!

When recalling how she intentionally created connections, Claire described her embodied experiences in virtual teaching as highly gendered; even online, she said, “teaching high school boys [didn’t] let [her] forget” she was a woman. She explained how gendered expectations affected her appearance in our first interview:

CLAIRE: ...yes I do put on lipstick every day cause otherwise I look like a ghost on the video cause I’m just like totally washed out.

CRYSTAL: Mmhm.

CLAIRE: That would be one of the few things where like my embodiment is certainly feminine because I have to wear lipstick every day. But otherwise no I mean I don’t think of you know—and that’s more I don’t know that I’m trying to look like pretty or beautiful? I don’t think that’s it cause like I don’t—every day I don’t really care about but I think it’s more like just because I’m speaking so much?

CRYSTAL: Mmhm.

CLAIRE: Like I want to bring attention to my—I don’t want to bring attention—to like visually kind of separate my mouth from all of this very light colored background.

CRYSTAL: (laughs)

CLAIRE: And light colored you know skin and that like I’m just sort of like part of the wall. But when I’m wearing it it stands out more and so students kind of can see. Or maybe I am vain and I just want to look better.

Claire’s reasons for caring about her appearance are complex, having to do with the performance of femininity/beauty (“I do put on lipstick every day cause otherwise I look like a ghost,” pointing toward the domain of social presence) as well as practical concerns (“to like visually kind of separate my mouth from all of this very light colored background,” pointing toward teaching presence).

Tilly similarly relied on “look[ing] ok” to connote professionalism and establish social presence when teaching online. In our first interview, Tilly described how important her appearance was when she had been working in a brick-and-mortar setting. When teaching online, she wrote in a subsequent email,

I still get up, shower, do my hair but only eye makeup. I like to use my video camera so I need to look ok. I do not worry about how I dress though, usually sweats and a sweat shirt. ( I do dress normally if I have to go out after school). We do have to dress for face-to-face things with the kids and families. That gets tricky because you have to wear real clothes and look professional. The face-to-face meetings (field trips, testing) are fun because you get to meet kids and families. At these you need to present yourself well.

Maintaining a “normal” teacher look when she was on camera and when she met students and their families face-to-face was an important part of Tilly’s efforts to connect with students. This effort was just one step she took to prevent “fall[ing] apart”:

TILLY: I think even though the roles are different you know. Like teacher—virtually your role is different and like this year my role is even more different than it was in the

past three years? But I feel—yeah you’re still all connected you’re still all—it’s still all like this one body one mind one thing you know what I mean?

CRYSTAL: Yeah.

TILLY: But I think in the virtual setting you have to make yourself that way. You have to train yourself to be that way because I mean I see virtual teachers that can so disconnect you know what I mean?

CRYSTAL: Mmhm.

TILLY: Like they’re teaching virtually but they’re not as connected as what they need to be? Because you know it’s not—they don’t have that I guess that virtual mentality? Or they don’t know how to connect it all together to do it virtually.

When I asked Tilly what happened when teachers did not cultivate a “virtual mentality,” she replied:

TILLY: ...I think what falls apart is that face-to-face connection.

CRYSTAL: Mmhm.

TILLY: Like I think you know even though there’s kids in your classroom you’re not really seeing them as kids because you can’t put a face with that? And so and I think that’s hard. I mean I know we had a virtual teacher leave this year because she’s like “I can’t stand that I don’t know what my kids look like.” You know? And like yesterday the little girl one of the little girls that I tested yesterday her teacher’s like “Oh my gosh you’re testing her? Can you send me a picture?” So you know—and a lot of times when you test you’ll take pictures with your kids and send them to other teachers that kind of thing.

CRYSTAL: Mmhm.

TILLY: So I sent her a picture and she texts back she goes “she’s as beautiful as her voice online.”

CRYSTAL: Aww.

TILLY: You know? So I’m showing the little girl the messages back from her teacher and stuff. You know? So I think that’s where a lot of virtual teachers that disconnect come from. Like they’re you know they don’t—that whole face-to-face and oh my gosh there is really a kid on the other side of that computer.

In Tilly’s telling, establishing social presence explicitly requires an embodied orientation: The teacher must be aware of her own embodied presentation to students and must actively seek out opportunities to envision her students as embodied in order to cultivate a sense of one another as real people.

### **Teaching Presence**

All participants also described embodied aspects of their virtual teaching practice that were integral to developing teaching presence. Claire, for instance, wrote in an early email exchange about the importance of her body and voice in direct instruction online:

In my virtual teaching, I find myself using my voice and hands more than my body for some aspects, so my voice and hands kind of are my body (so to speak). I still gesture of course to support meaning in Spanish, but the ability to clearly explain something in

English when we have a technology issue or new tech tool is paramount. I will model with a visual screen share and pointer/mouse cursor, but mainly I use my voice to guide students through steps where they are looking at the screen (not at a video of me). Unlike the classroom, I cannot bend over and see their issue, nor can I take their mouse and solve it, so I instead have to explain myself or steps in a process with extreme detail so that students can follow along independently. I also then need them to clearly explain issues that arise on their screens, since again I cannot bend over their shoulders and see it myself.

...I continue to use voice, with more facial expressions, and more use of hands (with some use of my lower body, but minimally) because it is effective for conveying meaning when the students are faced with immersive language. Just as I would in the face-to-face classroom, I tend to exaggerate hand movements or facial expressions some to support understanding, but keep it naturally tied to the level of learner, other visual support, and meaning. I also repeat movements/words to highlight their use, like any language teacher would. I am also in the unique position as a virtual teacher that I can still write something down or drawing it on the “board” by hand since I have a writing tablet. So the mouse and stylus really are extensions of my hands since I can instantly and seamlessly pick them up and point out, draw, or write anything that needs clarification during a lesson.

Claire’s conception of her body was expansive when she described teaching online, extending past her fingertips to encompass tools such as her mouse and stylus. Her exaggerated body language and use of these tools was clearly the result of both premeditation and instructional decisions made in the moment.

Regina, too, expressed the importance (and hard work) of using her body during online instruction:

REGINA: I feel as if it has to be really scripted and it’s much more work.

CRYSTAL: Mmhm.

REGINA: But and a lot of the reason that it’s work is because students and learners I mean excuse me learners and teachers alike are new to this process. It’s kind of like you know the way that people talk face-to-face versus talk on the telephone is—we had to learn how to do that you know?

CRYSTAL: Yeah.

REGINA: And yeah but I do feel—and I would say that there is that feeling of isolation that you get when you’re teaching online? Is because you’re separating your mind from your body. There is a disembodiment that you have to figure out how to you know you have to figure out how to bring those two back into line together if that makes sense?

CRYSTAL: Mmhm.

REGINA: I mean it’s very noticeable because of the fact that if you’re a teacher and particularly if you like middle school and high school you get a lot of energy from your students and it’s just something that happens. You can’t predict you can’t script it or anything. My husband and I would often talk about this feeling that we had that we couldn’t really plan what we were gonna do in a training or a lesson until we saw the students—you know? I would say “Well I’ll just have to look at them.” (both laugh)



Like Claire, Regina described the successful use of her body during online instruction as relying on careful preparation as well as cues emerging from her interactions with students.

Emma differently highlighted the importance of embodiment in creating teaching presence when she wrote in an email how difficult it was to find ways to use her body online due to few live video chats:

In an online setting, I have not found a way to use my physical body. As a result, words become exponentially more important because they are really the only way I can communicate with students. Tone also becomes more important. I have to read emails and messages carefully to make sure that I am not coming across as too harsh or too lenient. I can't rely on subtle nonverbal communication like facial expressions to convey what I need to say. It's hard to establish the same relationship with a student over the phone or through email that I could establish with a traditional student.

She made up for this lack of opportunities by more explicitly cultivating emotional connections. She described the significance of these feelings in our later interview when describing how she helped students having difficulty managing her course:

EMMA: ...it makes it much more challenging sometimes to say you know “Ok you're telling me you watched this video. Well what did you know what did they saw about this example problem?” [as if student replying] “Well I don't remember.” “Well did you—” and then it's “Well did you take notes?” “No.” “Ok well there we go.” And so it takes a lot more to get to the heart of the problem.

CRYSTAL: Yeah.

EMMA: And it requires some trust and openness I think between the teacher and the student...one of the things I love the most about this job and that I tell people—both actually both parts even though I sometimes I don't even meet my Succeed Virtual kids in person until I go to graduation and they're there and I'm like “Oh hey! That's the face I've been talking to.”

CRYSTAL: (laughs) Yeah.

EMMA: ...I'm getting to build relationships with them. Sometimes even deeper than they would have then I would be able to in a traditional setting.

While she insisted she struggled to use her body in her online courses, Emma clearly relied on affect not only to create connections with her students but also to facilitate the complex organization and instructional work of establishing teaching presence.

### **Cognitive Presence**

Although dualist notions of the mind/body split might suggest that embodiment is least connected to cognitive presence, participants' descriptions of their embodied experiences also encompassed this domain. In an email exchange, for example, Regina compared her teaching practice to a performance including scripted and improvisational elements. Here, she expanded on how this related to her online teaching specifically:

The struggle with online teaching is to get students to respond spontaneously (as in an improvisational interaction) to your prompts. To elicit this, I have to have multiple scripts already thought through—almost like an algorithm “If student doesn’t respond, then bring out example A. If response to A, move to question 1. If no response to A, move to yes/no question B.” etc. The algorithm is probably something I used subconsciously in ftf teaching but now there is a metacognitive element to it. I have to be thinking about thinking (my own and my students’) all the time.

Creating opportunities for metacognition was clearly at the fore of Regina’s practice. In our later interview, she revisited how she helped students think about their own learning:

REGINA: I do use my brain to sort of try to get into the perspective of the student and what the student response or lack of response might mean and you know I use my voice to set a tone the same exact way. Body is obviously a little different because I don’t—I mean with the exception of video which helps I really don’t have a lot of access to gestures touch even you know just the presence the physical presence—

CRYSTAL: Mmhm.

REGINA: In the classroom can sometimes convey a lot of meaning or at least help students chill out. (laughs) So I think that’s why you know I was talking about improvisation in the classroom because I have—you have many more [inaudible, 20:22.] tools to work with. Rather than you know tools that are just extensions of your brain you know? Which is what you have in an online environment. You still have tools but they’re really extensions of your thinking as opposed to you know your body language or what you’re able to do with your body if that makes sense.

CRYSTAL: Oh that—[as if thinking out loud] yeah it does and I hadn’t thought of it that way yeah. So many of the virtual tools or the online tools are extensions of your thinking yeah.

REGINA: Yeah they really are another piece of your mind or your brain and in a way that’s why it’s harder for students because you’re asking them to both learn to use those tools—

CRYSTAL: Mmhm.

REGINA: And use their minds which you know they’re in various and sundry states of brain development. (laughs)

CRYSTAL: Yeah. (laughs)

REGINA: And you know a lot of times they use their bodies to convey meaning like a shrug or a confused look or a raised eyebrow or a smile or even just like a slouching in the chair or a glazed over look or you know there’s just so much meaning that they use their bodies for and you’re asking them to do something that you do in your working environment all the time and they really don’t do that in their learning environment all the time so they have a lot less practice. They do it in a social environment you know you often hear kids being talked about as natives to technology land?

CRYSTAL: Mmhm.

REGINA: But I don’t really believe that. I think they’re natives to social technology land which is a completely different land than learning technology. (laughs)

Using her own body and considering the embodied needs of her students is integral to her efforts to help them engage in individual and shared metacognition, which Garrison (2022) has noted is essential within the CoI framework.

## Discussion

In the present understanding of CoI (Figure 1), issues of embodiment are largely ignored, yet this study (albeit narrow in scope) demonstrates how embodiment is interwoven in social, teaching, and cognitive presences. Embodiment is integral to being human, and therefore researchers ought to consider it when investigating human activities, including teaching.

Like Atkinson (2008), I found that my participants had very specific ideas about the appearance, actions, and affect of an ideal teacher, all of which relied on their bodies and their ability to emotionally connect with their students—and thus clearly related to their social presence. As Brophy (2010) speculated, the fact that participants’ interactions with students happened online did not eliminate gendered expectations or yield some sort of hyper-egalitarian classroom: Claire, Regina, Tilly, and Emma all described, at times, how they engaged in the same traditional performance of femininity expected of face-to-face teachers. This finding alone makes clear the importance of explicitly and consistently thinking about embodiment as an aspect of social presence.

But embodiment is not limited to social presence: Such a conceptualization would conform to outdated, dualist ideas about the relationship between body, mind, emotions, and self(ves). Claire, Regina, Tilly, and Emma described embodied experiences clearly related to teaching and cognitive presences as well, and these experiences were often quite complex. Claire’s expansive sense of her body and how it extended to encompass tools like her mouse and stylus, for instance, echo Bolldén’s (2016) descriptions of her participants as having multiple or multilayered bodies and point toward entanglements between the body and the more technical aspects of planning for and delivering instruction. Likewise, Regina’s description of the ways she and her students must parse the available uses of their bodies and how these uses are different from those available to them in physical classrooms point toward significant cognitive and metacognitive demands.

Scholars’ failure to consider how embodiment fits into the CoI framework sublimates serious discussions about the interplay of physical and intellectual labor and, potentially, the real effects embodied identities such as gender and race have on students’ and teachers’ experiences in virtual classrooms. Moreover, such a conceptualization reifies patriarchal discourses about women, who, as I note earlier in this article, make up the overwhelming majority of the American teaching force (U.S. Bureau of Labor Statistics, 2023), casting their bodies as separate from the intellectual and executive work of teaching reflected in the domains of cognitive and teaching presence, respectively. Bell hooks (1994) describes the dangers of imagining teachers as disembodied and the need for re-embodiment:

The arrangement of the body we are talking about deemphasizes the reality that professors are in the classroom to offer something of our selves to the students. The erasure of the body encourages us to think that we are listening to neutral, objective facts, facts that are not particular to who is sharing the information. We are invited to teach

information as though it does not emerge from bodies. Significantly, those of us who are trying to critique biases in the classroom have been compelled to return to the body to speak about ourselves as subjects in history. We are all subjects in history. We must return ourselves to a state of embodiment in order to deconstruct the way power has been traditionally orchestrated in the classroom, denying subjectivity to some groups and according it to others. By recognizing subjectivity and the limits of identity, we disrupt that objectification that is so necessary in a culture of domination. (p. 139)

Without considering embodiment as a foundational aspect of teaching and learning online, my participants’ gendered experiences would have been too easily missed, an elision that benefits only the maintenance of a patriarchal status quo. Although not reflected in this study, I suspect teachers in different kinds of othered bodies (e.g., Black, Indigenous, or bodies of color; queer bodies; disabled bodies) are likewise made ignorable by a presumption of disembodiment in virtual classrooms (a presumption made evident explicitly in the work of scholars such as Dreyfus [2009] and implicitly through researchers’ failure to even speculate about students’ and teachers’ embodied experiences in these settings), an ignorance that serves racist, heteronormative, and ableist systems of power, not the students and teachers living and learning within those systems.

## **Directions for Future Research**

As I note when describing my research method, the most significant limitation in this study is the homogeneity of the participants and my inability to solicit more (and more diverse) participants. In future studies, it is critical that researchers recruit and center the embodied experiences of teachers from historically marginalized communities, including teachers of color, teachers with disabilities, gender-nonconforming or nonbinary teachers, and others. Future studies should also examine the experiences of male teachers, who represent a minority of the U.S. PK-12 teacher workforce. Such studies along with the present study might inform the development of a survey or other instrument suitable for gathering data from the broader population of sojourner teachers. Finally, while this study focused exclusively on teachers’ embodied experiences, future studies focused on students’ embodied experiences would also be valuable.

## **Implications for Practice**

The most immediate practical implications of this study relate to teacher education. All participants expressed excitement that their experiences were being studied and reflected on their role as explorers in a new teaching frontier. They had not been prepared to be sojourner teachers nor guided to consider how their bodies fit into their unique teaching positions. Recent research suggests teacher preparation remains limited in this regard. National surveys of teacher education programs have revealed that only a small fraction of teacher education programs provide virtual field experiences: 1.3% according to Kennedy and Archambault (2015), 4.15% according to Archambault et al. (2016), and 2.8% according to Graziano and Bryans-Bongey (2018). If teacher educators expect PK-12 virtual instruction to be successful, teachers must have intentional, high-quality virtual field experiences, shaped by frameworks like CoI.

## **Conclusion**

Understanding teachers’ experiences more fully requires acknowledging how their embodied understandings of themselves, others, and the world around them are threaded throughout the domains of social, teaching, and cognitive presence. I conclude this article with the hope that by re-embodiment sojourner teachers, researchers can elucidate and then work to deconstruct harmful discourses that marginalize those teachers outside the discursive ideal.

**Declarations**

The author has no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

The author asserts that an ethics review board (IRB) at Indiana University reviewed and approved this study.

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## **Appendix A**

### **Initial Interview Protocol**

#### **Lead-off Question:**

When someone asks what you do, what do you say?

#### **Possible Follow-up Questions:**

1. What does a teacher look like? Sound like? Move like? Do? How do you know?
2. Tell me about how you first became a teacher. What did you do to prepare? You can talk about formal things like earning a degree or certificate or applying for jobs, but you can also talk about less formal steps like buying or collecting supplies for your classroom, building a professional wardrobe, or even learning who was in charge of the coffee maker at your school.
3. Are there specific moments when you began to think of yourself as a teacher? Can you describe some of them? Make sure to include sensory feelings in your description.
4. How would you describe yourself as a teacher—for example, as fun, demanding, caring, etc.? As a guide? Facilitator? As someone who listens? Who performs? Why?
5. Tell me about a time when you felt like the best teacher you’ve ever been. What happened? What were you doing, thinking, and feeling (emotionally and physically)?
6. Tell me about a time when you felt like the worst teacher you’ve ever been. What happened? What were you doing, thinking, and feeling (emotionally and physically)?
7. How were you like that teacher you described at the beginning of our conversation? How were you different from him/her?
8. What does an online teacher look like? Sound like? Move like? Do? How do you know?
9. Tell me about how you became an online teacher. What did you do to prepare? How was this preparation similar to or different from your earlier teacher preparation?
10. How would you describe yourself as an online teacher—fun, demanding, caring, etc.?
  - a. (if the same as face to face description[s]) Are there any words that you might use to describe yourself in online settings that you wouldn’t use to describe yourself in your face to face classroom or vice versa? If so, what are they? Why do you think that you don’t have these specific qualities in both settings?
  - b. (if different from face to face description[s]) These aren’t the same words that you use to describe yourself in your face to face classroom. Why do you think that you use these different descriptions for these different kinds of teaching?
11. Tell me about a time when you felt like the best teacher you’ve ever been in an online setting. What happened? What were you doing, thinking, and feeling (emotionally and physically)?
12. Tell me about a time when you felt like the worst teacher you’ve ever been in an online setting. What happened? What were you doing, thinking, and feeling (emotionally and physically)?
13. Are there any other things that you would like to tell me about today that we haven’t talked about yet?

## Appendix B Synectics Email Exchange Protocol

**Email One Purpose:** To establish a working definition of embodiment in approachable language and invite the participant to consider how she is embodied.

**Common Prompt:**

Our job during the next part of the project is to explore how you understand what you do, particularly as it relates to embodiment. Embodiment is the idea that our minds, our intellectual activities, and our emotions aren't separate from our physical bodies. Teaching in particular is an activity that is both intellectual and physical. As teachers, we engage in hard intellectual work every day: we're working with our students on content, and we're doing the reflection and professional development that we know we have to do to be better at our job. But our work is physical, too: we manage our classrooms, we offer comfort, and we demonstrate to students and colleagues how we're feeling with our bodies. And lots of research tells us that parents, our colleagues and administrators, community members, and our students in particular read our bodies. They pay attention to what we wear, how we move, our posture, our gender, our race—they notice a lot.

When I was getting ready to start this project, I was reading the book *The Teacher's Body: Embodiment, Authority, and Identity in the Academy* (edited by Diane P. Freedman and Martha Stoddard Holmes), and this quote stuck out to me: “Every teacher, even the distance-learning teacher, has a body (virtual or imagined though it may be) and needs to negotiate its place in the classroom, possibly transforming what cannot be made invisible into a sign of authority or, if she is particularly courageous, an acknowledged element of the learning process” (pp. 13-14). I thought a lot about my body in my brick-and-mortar classroom. I dressed my body in a way that I thought was modest and professional, I consciously used “appropriate” touch like high fives and side-to-side hugs, I redirected students who were off-task by simply standing next to their desk—but I didn't think too much about my body when I started teaching virtually. So the quote above really stood out to me. I didn't think of myself as embodied at all when I taught online, but I was. I still had a body, obviously. I just didn't use it in the same ways that I had when I taught face to face, and I didn't think of it as integral to my teaching practice.

So that's what I'd like for us to think about together: how are you embodied in your classroom? We're going to use metaphors to help us think as we go along, but please don't get antsy about them! :-). We'll use a specific sequence of brainstorming and questions to help us get to some good metaphors—you won't just have to come up with them off the top of your head. I would like to start, though, by asking if you've ever thought about the place of your body in your classroom. You can talk about your brick-and-mortar classroom and/or your virtual classroom (just please indicate which one you're talking about when). Aim to write a couple of paragraphs, but if you write more, hooray!

**Email Two Purpose:** To record a working definition of metaphor and to invite the participant to create a metaphor to describe her face-to-face or online teaching experiences.

**Common Prompt:**

Besides thinking more about [reference to previous email], I would also love for us to start thinking about metaphors that we might use to talk about teaching. A metaphor is another way of talking about an object by comparing it to something else, so I might say something like, “A brick-and-mortar school is like a beehive because everyone there is very busy all the time, and it is the center of the bees' community.” I could then go on to talk about other ways that a brick-and-mortar school is like a beehive and maybe how they're different, too. What would you compare teaching in a brick-and-mortar school to? If you want to suggest a couple of things, that's okay, too. I know that it might be hard to come up with just one metaphor that works exactly right.

**Email Three Purpose:** To unpack and expand the metaphor created by the participant.

**Example Questioning Language:**

“After reading and rereading your description several times, I kept coming back to the idea of teachers’ full selves (mind, experiences, body) as a component (the cathode ray tube, the plasma, the liquid crystals) in a larger machine. If we were to expand the metaphor, what would machine (the tv) be in relation to teaching and education? Who would have control of the machine--who could turn it on and off? Are the students passive or active consumers of what is being displayed--that is, are they watching by choice or because they are compelled to? Is there any sort of commercial element, as there typically is with actual television programming?” (To Regina)

**Email Four Purpose:** To invite the participant to create a metaphor to describe her teaching experiences in the remaining context (face-to-face or online).

**Example Prompts:**

“On that note, I read your tv metaphor as applicable to both online and ftf teaching. Is that right? If so, are there other metaphors that might work for online teaching but not ftf and vice versa? Or do you think that any metaphor you might use for teaching would be equally applicable in both settings? In your next response, could you spend some time thinking about a metaphor that only applies to your ftf teaching. Then let’s see if it also fits your online teaching.” (To Regina)

**Email Five Purpose:** To unpack and expand the metaphor created by the participant. At this point, each series of emails had progressed differently, meaning the questioning language used in this step is less uniform than that used in earlier emails.

**Example Questioning Language:**

“Thinking about how best to move forward: our conversation has moved differently than some of the others. With some participants, I’ve had clearly delineated exchanges about metaphors that apply to their ftf experiences and online experiences. We’ve talked about those two settings together for the most part. I feel like we are at a good place to talk on the phone or online again, but I also want to make sure you’re ready to move on to that step. What do you think?” (To Regina)

**Email Six Purposes:** To share my metaphor of the sojourner teacher and invite the participant to create a metaphor to describe her experience as both a face-to-face and online teacher and to invite the participant to begin thinking about how her metaphors have affected her perception of her professional practice.

**Common Prompt:**

I’ve also been working on creating metaphors during this project. One of the ways that I’ve conceptualized teaching online and face-to-face is using the idea of a professional knowledge landscape (I’ve adopted this metaphor from researchers named Connelly and Clandinin—I can send you more info on them if you’d like to read more). I’ve imagined teaching as a literal landscape, captured in a map. Teachers like you (and me) who move back and forth between face-to-face teaching contexts and virtual contexts don’t just stay in one place on the map. They move all over, often via previously uncharted paths. They may stay in one place for a while, but not forever. As a result of this map/landscape metaphor, I’ve been using the term “sojourner teacher” to describe a teacher who moves or has moved between face-to-face and online teaching. This is the overarching metaphor I’ve created to encompass my experiences teaching both in face-to-face and online classrooms. Is there a metaphor that you might use that connects both kinds of teaching experiences? I would like for you to think about what that metaphor might be, and during our last interview, we can talk about it.

## **Appendix C**

### **Final Interview Protocol**

#### **Lead-off Question:**

We've been talking together about several metaphors you've created to describe your experiences teaching face-to-face and online. When we last emailed, I asked you to think about a metaphor that might capture both of those experiences. Tell me about what you've been thinking about.

#### **Possible Follow-up Questions:**

1. Did making metaphors help you think about your face-to-face and online teaching experiences new ways? Could you describe your process for creating metaphors and how they helped you see things differently, if that's the case?
2. Now that we're at the end of our exchanges, I would like to revisit explicitly the idea of embodiment. Do you consider your teaching knowledge “embodied”? Do you feel embodied in the same ways when you're teaching face-to-face and when you're teaching online?
3. Do you think your gender affects how experience embodiment? If so, how? Could you describe a time when you've been aware that you were teaching with or through a woman's body?
4. Did any of your metaphors help you think about how your teaching practice is embodied?
5. Why did you decide to participate in this project? What were you hoping that you would learn about yourself or about teaching? What did you learn?
6. Would you be interested in reading the metaphors created by other participants or potentially talking with other participants about their metaphors?
7. Are there any other things that you would like to tell me about today that we haven't talked about yet?

# Instructional Strategies for Engaging Online Learners: Do Learner-centeredness and Modality Matter?

Hui Shi  
Jaesung Hur  
Yuen Man Tang  
Vanessa P. Dennen  
*Florida State University, USA*

## Abstract

This study explores how online instructors use different instructional strategies to engage learners, and the active learning indicators that they look for among their students. Additionally, it examines how modality—synchronous versus asynchronous—and instructor learner-centeredness relate to instructional strategy choices. Using a mixed methods approach with a concurrent triangulation design, 101 higher education online instructors were surveyed and 11 were interviewed. Findings show that the use of learner-centered strategies, particularly discussion, occurs at a high rate regardless of an instructor's learner-centeredness or modality. Interestingly, instructors with high learner-centeredness reported greater use of lectures as a percentage of both synchronous and asynchronous courses than instructors with low learner-centeredness. This finding was counterbalanced by the high learner-centeredness group reporting significantly higher importance for having learners speak and post messages during class.

*Keywords:* learner-centeredness, online instruction, synchronous learning, asynchronous learning, active engagement

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Student engagement has long been hailed as an important component of online learning, although definitions of and strategies for engagement vary widely. Engagement implies some form of interaction, which in online classes may entail learner interaction with their instructor, other learners, or learning content (Moore, 1993). This interaction framework has served as the foundation of much student engagement research and practice. For example, Martin and Bolliger (2018) used it to frame their study on student engagement in online learning, finding that common engagement strategies such as course discussion are considered valuable to some students, but not valuable to others. Systematic reviews of the online teaching and learning literature confirm both the importance of student engagement and the challenge that online instructors face when trying to determine how to best engage students (Berge & Mrozowski, 2001; Martin et al., 2020; Zawacki-Richter et al., 2009). Professional development may help instructors develop better engagement strategies (Bigatel & Williams, 2015), although instructor and learner perceptions of what is effective may differ (Bolliger & Martin, 2018). Whereas learners may passively consume course content and perceive that they are learning, instructors rely on visible indicators of student engagement to gauge student learning in a formative sense.

Learner-centeredness similarly has been proposed as critical to online learner success. Learner-centeredness refers to an educational approach that places the learner at the center of the instructional process, considering their individual needs, interests, and abilities (McCombs, 2008). By placing learner needs at the center of the class experience instead of pre-designed content delivery, learner-centered approaches empower students to actively participate and take ownership of their learning process (Blum-Smith et al., 2021; Considine et al., 2014). Given the level of autonomy typically associated with online learning, learners take responsibility for their learning journey (Moore et al., 2011) and, especially in asynchronous courses, apply self-regulation and independent problem-solving skills (Ribbe & Bezanilla, 2013). Learner-centered online instruction can foster the development and use of these skills.

Both student engagement and learner-centeredness promote active learning. Active learners do not simply consume course content but must participate in learning activities and are likely to receive formative feedback based on that participation (Nguyen et al., 2021). To engage active learners, instructors must apply learner-centered principles to promote learning strategies such as inquiry, collaboration, and reflection (Archambault et al., 2022). In other words, a class taught by lecture alone would not engage students in active learning or be considered learner-centered. In contrast, by requiring students to participate in ways that help them make meaningful connections with the course content and perhaps also with each other, instructors draw upon learner-centered principles and support active learning. These concepts are interrelated but are not always designed for online classes and may not be valued equally by all online instructors.

This study explores the relationship between online instructors' learner-centeredness and their instructional choices and perceptions related to student engagement. Specifically, it considers the pedagogical strategies that higher education instructors use, the indicators of active learning they seek, and the importance they place on peer and instructor interaction. These elements of online learning are examined in both synchronous and asynchronous learning modalities, with the recognition that different temporal experiences of learning and engagement may lead to different instructor strategies and perceptions.



## Literature Review

### Online Learning Engagement

Students have varied engagement levels and patterns in online courses. For example, in asynchronous courses, some students contribute posts and comments on discussion boards, while others do not contribute. Some researchers propose viewing engagement patterns dichotomously, with students categorized as either active or passive (Blau & Shamir-Inbal, 2021; Mikum et al., 2018; Rubio et al., 2018, Ruthotto et al., 2020, Srba et al., 2019). In this classification, students have been deemed active when they leave visible traces and thus, students' non-posting or read-only behaviors are considered passive (Choi & Hur, 2023). Passive students may be following along with the learning activities and learning both from course content and vicariously through others' interactions—essentially, less visible activities, such as reading, may also be part of the engaged student's repertoire (Dixson, 2015)—or they may be absent from the course and not learning.

To examine students' engagement patterns, a variety of quantitative measures and visible indicators have been used, such as posting frequency, posting volume, and time spent online (Malinen, 2015; Ruthotto et al., 2020; Shi et al., 2023; Wilton, 2018). Each indicator is an observable metric that can gauge students' engagement levels. Posting volume is a common indicator and online instructors frequently specify a minimum contribution level for credits (Dennen, 2008). Similarly, posting frequency allows instructors to determine if students are participating concurrently with their peers (and hopefully engaging with those peers) or in a delayed fashion. Students commonly follow the engagement guidelines that are connected to their course grades, and the prevailing belief is that engagement and learning outcomes are heavily intertwined (Hrastinski, 2009). Still, student engagement patterns also may vary based on learning activity design and instructor facilitation styles (Binali et al., 2021; Choi & Hur, 2023). Essentially, instructor decisions and actions can influence visible learner activity.

### Course Modalities and Engagement Patterns

Online courses are typically designated as synchronous or asynchronous, indicating the most prominent modality in which learners engage with their instructor and peers. Synchronous teaching refers to the pedagogical approach where educators and learners engage in real-time, interactive instruction, while asynchronous teaching involves pre-prepared materials and assignments accessed by learners at their convenience (Kear et al., 2012). Communication and interaction occur differently based on modality (Hrastinski, 2008), and as a result, the indicators of engagement vary. For instance, instructors in synchronous courses may use turning on webcams as an indicator of active learning due to the fear of students' absence behind the screen (Gilmour, 2021), although students may be present yet keeping their webcams off for other reasons (Dennen et al., 2022). In asynchronous courses, instructors may value both posting frequency and time spent in the course (Wilton, 2018; Wise et al., 2013). Different modalities support different purposes and aspects of online courses (Hrastinski, 2008), and instructors adopt distinct tools and pedagogical activities for each modality, affecting measurement and indicators of engagement patterns. Similarly, students experience social presence and perceptions of learning differently across modalities (Ratan et al., 2022). Thus, online learning should not be treated as a monolith, and modality differences may be relevant to both instructors and learners as they choose the experience that best fits their needs and preferences.

## **Learner-centered in Online Instruction**

Learner-centered education has long been advocated by educators and researchers as an approach to enhance learning effectiveness (Zhou et al., 2019). This approach involves the implementation of strategies that actively engage learners and give them ownership over their learning experience, including problem-based learning, inquiry-based learning, and project-based learning in the classroom (Chimbi & Jita, 2021; Herranen, 2016; Karimi, 2011). In the context of online courses, to support learner-centeredness instructors are also encouraged to create a constructivist learning environment where learners are active contributors (McCombs, 2015).

Previous research has identified various learner-centered instructional strategies that have proven effective in promoting student engagement and learning performance (e.g., Cheng et al., 2021; Mahmood, 2021; Orr et al., 2021; Wang et al., 2021). For instance, Orr et al. (2021) highlighted innovative practices such as case-based instruction, gamification, interactive simulations, and multimedia presentations, all of which have been found to increase student engagement in online courses. Effective use of digital technologies and careful management of technology in online learning settings are also important factors in ensuring student engagement (Orr et al., 2021). Wang et al. (2021) discovered that online instructional strategies optimized with smart interactive tools, including cloud-based video conferencing, online teaching platforms, and messaging tools, are more effective than traditional teaching methods in terms of fostering student engagement and motivation. These tools provide opportunities for active learning, personalized feedback, and collaboration, thus enhancing learner-centeredness (Wang et al., 2021). Besides, Mahmood (2021) emphasized the importance of effective instructional design (e.g., providing clear and well-organized materials) for engaging online students. Additionally, instructors may consider incorporating both synchronous and asynchronous approaches in a course to offer flexibility and cater to diverse learning needs (Mahmood, 2021). In sum, the opportunities and approaches that facilitate learner-centered instruction are many and varied.

Given the many pedagogical opportunities available to online instructors and the connection between learner-centeredness and active learning, it is helpful to understand how online instructors use different pedagogical activities and assess student engagement, as well as whether their approaches and beliefs vary by teaching modality and the degree to which they value learner-centeredness. To investigate these issues, the following research questions frame our study:

1. What pedagogical activities have online instructors used most frequently? Do learner-centeredness and modality matter?
2. What indicators do online instructors use to identify active learning? Do learner-centeredness and modality matter?
3. How do online instructors perceive students' interaction with instructors and peers? Do learner-centeredness and modality matter?

## **Method**

This study adopted a sequential explanatory mixed-method approach to understanding instructors' perceptions of active learning and learner-centered instruction in online courses. This approach is appropriate when researchers use quantitative data as their primary data source and supplement it with qualitative data to help explain their findings (Creswell, 2009). In this study,

quantitative data were collected via an online survey and qualitative data were collected through interviews.

### Participants

Participants in this study are higher education instructors with experience teaching online, whether asynchronous, synchronous, or in both modalities. A total of 101 higher education faculty completed the online survey, 11 of whom participated in a follow-up interview. Convenience sampling was used, and participants were recruited through social media posts. Participation was voluntary, and the study was approved by the researchers' Institutional Review Board.

Table 1 provides an overview of the sample's demographic characteristics. The average length of teaching experience was 12.56 years ( $SD = 9.32$ ) and the average length of online teaching experience was 6.46 years ( $SD = 6.35$ ). Approximately half of the instructors taught in either education (32.7%) or humanities (26.7%). Most of the participants have taught both synchronous and asynchronous courses (43.6%) and were from North America (75.2%).

**Table 1**

*Overview Information of Participants (N = 101)*

<b>Demographic Variables</b>	<b>Min.</b>	<b>Max.</b>	<b>M (SD)</b>
Years of teaching	1	40	12.56 (9.32)
Years of online teaching	0.5	25	6.46 (6.35)
<b>Demographic Variables</b>	<b>N</b>	<b>Percentage</b>	
Discipline			
Teacher Education	33	32.7%	
Humanities	27	26.7%	
Social Sciences & Business	18	17.8%	
Natural Sciences	17	16.8%	
Others (e.g., Interdisciplinary)	6	5.94%	
Country/Region			
North America	76	75.2%	
Asia	19	18.8%	
Europe	6	5.9%	
Course Modalities			
Synchronous	29	28.7%	
Asynchronous	28	27.7%	
Both	44	43.56%	

### Instruments

The primary instrument used in this study was an online survey. This survey consisted of demographic questions (see Table 1 for an overview of those items), a learner-centeredness scale, and sections about strategies for student engagement, indicators of student engagement, and perceptions of interaction.

*Learner-centeredness.* To measure learner-centeredness, a modified version of the Assessment for Learner-Centered Practices (ALCP) developed by McCombs (2015) was employed. In this study, we adopted the short version of ALCP, which consists of three scales (i.e., learner-centered beliefs, non-learner-centered beliefs—learners, and non-learner-centered beliefs—teach & learn) and 15 statements in total. Participants were asked to choose the option that best matches their online teaching experiences (1 = strongly disagree to 5 = strongly agree) (Ware, 2006). The Cronbach's alpha for the three scales in McComb's (2015) study was 0.86, 0.76, and 0.71. In our research context, the alphas were 0.788, 0.740, and 0.714, respectively, indicating a high level of internal consistency for our specific sample (Cronbach's Alpha > 0.7).

*Strategies for student engagement.* Participants were asked to rate the frequency with which they use specific pedagogical activities (e.g., lecture, discussion, presentation) in synchronous or asynchronous lessons (1 = never to 5 = very frequent). Items appear in Table 3.

*Indicators of student engagement.* For each modality they have previously taught, instructors were asked to choose from a list of indicators they have used to determine whether students were actively engaged. The indicators were adapted from Cerezo et al. (2016), Kim et al. (2016), and Shi et al. (2023), and appear in Tables 6 and 7.

*Perceptions of interaction.* Participants were asked to indicate their agreement with the importance of different types of interactions and interaction-related actions in their classes using a 5-point scale (1 = strongly disagree to 5 = strongly agree). The items were based on Moore's (1993) interaction framework. Specific items appear in Table 8.

*Interview.* Interview participants were recruited via a separate form at the end of the survey. Interviews followed a semi-structured protocol and were conducted over Zoom. The interview questions focused on eliciting information about the participants' perceptions of and strategies for student engagement in online learning. Sample interview questions include:

- a) How do you define active and passive participation in online learning?
- b) How do you define learner-centeredness?
- c) How do you determine whether students are actively participating?
- d) How do you engage passive students?

## **Data Analysis**

Based on the nature of our research questions, we used descriptive analyses and analyses of group differences for all three research questions. To describe the sample's responses, frequencies and measures of central tendency were used. To address possible group differences, we conducted a Kruskal-Wallis test, because the normality assumption is not satisfied. Data was analyzed using SPSS (Version 26), and two-tailed  $p$ -values < 0.05 were significant.

To score the learner-centeredness scales, we used the guidance from McCombs (2015) to first determine if participants exhibited learner-centered beliefs on each of the three scales. Then, continuing with this guidance, we classified participants into four types based on the aggregate number of learner-centered scale scores they received (range = 0 - 3; see Table 2). The non-learner-centered group had very few participants compared with the other three groups. Consequently, this group was combined with the low learner-centered group. The three resulting

groups presented in Table 2 were used to determine group differences based on learner-centeredness.

**Table 2**

*Instructor Groups based on ALCP Scales*

Type	Number of Participants	Description
Low learner-centered	44	learner-centered on 0–1 scales
Medium learner-centered	36	learner-centered on 2 scales
High learner-centered	21	learner-centered on all 3 scales

All eleven interviews were transcribed by the research team. To protect the identity of the interviewees, pseudonyms were used during the transcription process. We employed a triphasic coding process to analyze the interview. Commencing with an immersive reading and re-reading of the transcripts, our objective was to familiarize ourselves thoroughly with the raw data. Subsequently, in alignment with our research questions, we adopted an open coding approach to analyze the transcripts line by line from the interviews (Maguire & Delahunt, 2017). This approach was selected due to the absence of pre-existing codes, allowing us to cultivate and adapt the codes progressively as we navigated through the coding process (Maguire & Delahunt, 2017). Three researchers individually coded the transcripts, assigning codes to every text segment pertinent to our research question. To increase the validity, the researchers checked the accuracy of each other's transcriptions and had regular meetings to discuss the disagreements. In the final stage, the codes were examined for thematic relationships, and several were subsequently amalgamated into distinct themes. Interview data was coded and analyzed using Microsoft Excel.

## Results

### Frequently Used Pedagogical Activities

Participants were asked to indicate the frequency with which they allocated class time to specific activities (e.g., lecturing, class discussion, student presentation) in both synchronous and asynchronous courses, using a scale ranging from 1 (never) to 5 (very frequent). Mean scores were calculated to determine the frequencies of these activities (see Table 3). In the synchronous online course, class discussion emerged as the most frequently used strategy ( $M = 3.99$ ,  $SD = 0.905$ ), followed by live lectures ( $M = 3.77$ ,  $SD = 0.979$ ), group discussion ( $M = 3.67$ ,  $SD = 1.042$ ), and student presentation ( $M = 3.11$ ,  $SD = 0.859$ ). Similarly, in the asynchronous course, discussion ( $M = 4.19$ ,  $SD = 1.016$ ) was reported to be more frequent than pre-recorded lectures ( $M = 3.67$ ,  $SD = 1.187$ ). Aligning with the indicator of active engagement in the asynchronous course, reading assignments were the most commonly employed strategy ( $M = 4.26$ ,  $SD = 1.088$ ). In contrast, student presentations were less commonly used in asynchronous courses ( $M = 2.82$ ,  $SD = 1.211$ ).

**Table 3**

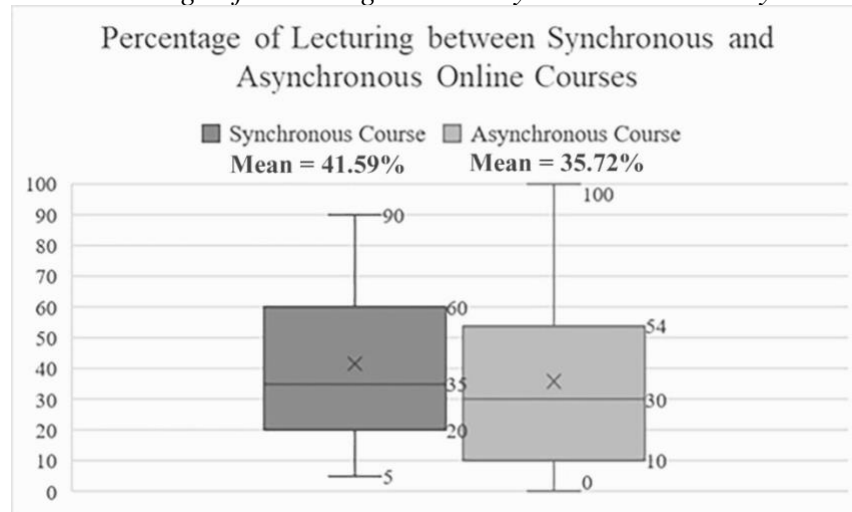
*Frequencies of Pedagogical Activities Allocated in Synchronous and Asynchronous Online Courses*

Context	Instructional Strategies	Frequency	
		<i>M</i>	<i>SD</i>
Synchronous online course	Class discussion	3.99	0.905
	Live lectures	3.77	0.979
	Group discussion	3.67	1.042
	Student presentation	3.11	0.859
Asynchronous online course	Reading assignments	4.26	1.088
	Discussion	4.19	1.016
	Pre-record lectures	3.67	1.187
	Collaborative activities	3.32	1.362
	Quiz	3.03	1.321
	Student presentation	2.82	1.211

Instructors were asked to indicate the percentage of class time that was allocated to lecturing, whether live or pre-recorded, using a sliding scale from 0 to 100%. Instructors reported a longer duration of live lectures in synchronous courses ( $M = 41.59\%$ ) than of pre-recorded lectures in asynchronous courses ( $M = 35.72\%$ ) (see Figure 1), indicating that faculty are more likely to adopt lecturing and to lecture for more of the instructional time when teaching synchronously.

Figure 1

*The Percentage of Lecturing between Synchronous and Asynchronous Online Courses*



This study further compared different types of pedagogical activities across high learner-centeredness, medium learner-centeredness, and low learner-centeredness instructors. The outcomes are displayed in Table 4, Table 5, Figure 2, and Figure 3. These show the comparative statistical analysis of test results among different learner-centeredness levels of instructors. The Kruskal–Wallis Test showed no significant differences (see Table 4 and Table 5) among the pedagogical activities adopted in synchronous and asynchronous courses. Unexpectedly, as shown in Figures 2 and 3, high learner-centered instructors allocated a slightly greater percentage

of time for lecturing in their online classes than medium and low learner-centered instructors regardless of modality.

**Table 4**  
*Hypothesis Test Summary*

Items	p-value	Decision
<i>Synchronous</i>		
Live lectures	0.271	Accept the null hypothesis
Class discussion	0.775	Accept the null hypothesis
Breakout rooms	0.312	Accept the null hypothesis
Student presentations	0.546	Accept the null hypothesis
<i>Asynchronous</i>		
Pre-recorded lectures	0.980	Accept the null hypothesis
Discussion	0.645	Accept the null hypothesis
Student presentations	0.556	Accept the null hypothesis
Reading assignments	0.435	Accept the null hypothesis
Collaborative activities	0.128	Accept the null hypothesis
Quiz	0.946	Accept the null hypothesis

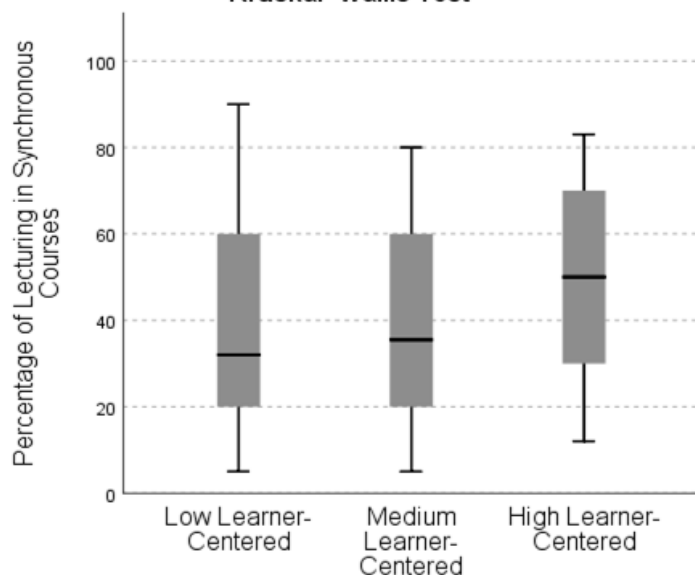
*Note.* The null hypothesis is there is no significant difference among the three learner-centeredness groups of instructors in terms of pedagogical activities used in synchronous and asynchronous online courses

**Table 5**  
*Hypothesis Test Summary*

Items	p-value	Decision
Synchronous live lectures	0.360	Accept the null hypothesis
Asynchronous pre-record lectures	0.281	Accept the null hypothesis

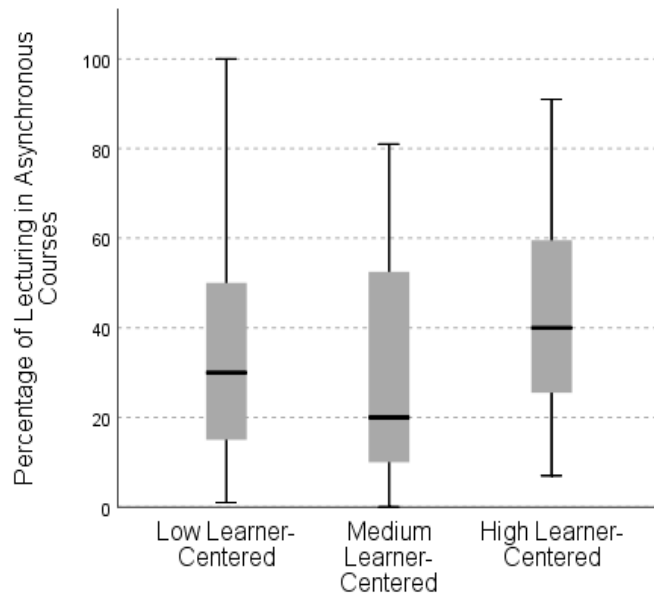
*Note.* The null hypothesis is there is no significant difference among the three learner-centeredness groups of instructors in terms of the percentage of lecturing used in synchronous and asynchronous online courses

**Figure 2**  
*Percentage of Live Lecturing in Synchronous Courses among Three Groups*  
**Kruskal-Wallis Test**



**Figure 3**

*Percentage of Pre-record Lecture Videos in Asynchronous Courses among Three Groups*  
Kruskal-Wallis Test



The greater use of lecturing among high learner-centered instructors is surprising. However, during interviews, most of whom declared themselves to be learner-centered, indicated that when they use lectures it is interactive, drawing upon tools like Kahoot to provide opportunities for learners to interact during lectures. Additionally, they reported coupling lectures with discussion activities. In other words, an activity labeled “lectures” might not just be a one-way transmission of information from the instructor to the learners but is likely to engage learners in the practice of using that information while they are learning it.

Interview participants further shared that learner-centeredness revolves around granting student ownership in their learning process, offering choices in learning activities, and fostering students' self-efficacy as well as motivation. Specifically, one of the interviewees stated that learner-centeredness refers to decentering herself as an instructor and creating an environment that encourages students to actively contribute and share their stories.

I think it's [learner-centeredness] more a matter of de-centering myself, and it is a matter of centering them right, so de-centering myself so we're all learners in an environment where we're all going to be able to contribute unique things. Right, everybody has something that they bring to the table, they have work experience, a life experience, a kind of literacy I don't have. (P1, 2-year online teaching experience)

### Indicators of Active Learning

In synchronous courses, instructors most often reported using responses from activities, posts in chat, student attendance, and quality of student posts as indicators of active learning (see Table 6). Replies to peers, use of webcams, and length of posts were least commonly used as indicators. Frequencies varied by learner-centeredness, but a Chi-square test showed that only one indicator, responses from class activities, had significant differences by learner-centeredness



( $\chi^2 = 5.719$ ,  $p = 0.045$ ). The post hoc test showed that high learner-centered instructors significantly differed from low learner-centered instructors in their choice of this active indicator ( $\chi^2 = 5.907$ ,  $p = 0.017$ ).

**Table 6***Indicators of Active Synchronous Engagement among Three Learner-centeredness Groups*

<b>Indicators</b>	<b>Overall (N = 73<sup>a</sup>)</b>	<b>Low LC (N = 28)</b>	<b>Medium LC (N = 28)</b>	<b>High LC (N = 17)</b>	<b><math>\chi^2</math> (df)</b>
Responses from class activities (e.g., polling, quiz)	59 (80.8% <sup>b</sup> )	20 (71.4% <sup>c</sup> )	22 (78.6%)	17 (100.0%)	5.719 (2)*
Frequency of students communicating in the chat	51 (69.9%)	21 (75.0%)	17 (60.7%)	13 (76.5%)	1.187 (2)
Percentage of student attendance	50 (68.5%)	19 (67.9%)	18 (64.3%)	13 (76.5%)	0.736 (2)
Quality of posts in discussion forums or collaborative tools	48 (65.8%)	19 (67.9%)	16 (57.1%)	13 (76.5%)	1.870 (2)
Number of posts in discussion forums or collaborative tools	44 (60.3%)	17 (60.7%)	16 (57.1%)	11 (64.7%)	0.014 (2)
Frequency of students speaking on the main audio channel	42 (57.5%)	16 (57.1%)	15 (53.6%)	11 (64.7%)	0.540 (2)
Number of replies to peers	36 (49.3%)	14 (50.0%)	12 (42.9%)	10 (58.8%)	1.087 (2)
Percentage of students turning on the webcam	24 (32.9%)	8 (28.6%)	11 (39.3%)	5 (29.4%)	0.849 (2)
Length of posts in discussion forums or collaborative tools	14 (19.2%)	7 (25.0%)	4 (14.3%)	3 (17.6%)	1.070 (2)

*Note.*

<sup>a</sup> the number of instructors responding to synchronous online questions.

<sup>b</sup> the percentage of instructors who selected the specific indicator as the active engagement indicator.

<sup>c</sup> the percentage of instructors in different Learner-Centeredness groups who selected the specific indicator as the active engagement indicator.

\*  $p < 0.05$

In asynchronous courses, instructors most often reported using indicators such as assignment completion rates, frequency of logins, and activities related to discussion board use (e.g., number and quality of posts, number of replies; see Table 7). The least frequently used indicators were post length, duration of logins, and emails to the instructor. Chi-square tests indicated that differences among learner-centeredness groups were not significant.

**Table 7***Indicators of Active Asynchronous Engagement among Three Learner-centeredness Groups*

<b>Indicators</b>	<b>Overall (N = 72<sup>a</sup>)</b>	<b>Low LC (N = 33)</b>	<b>Medium LC (N = 24)</b>	<b>High LC (N = 15)</b>	<b><math>\chi^2</math> (df)</b>
Completion rate of assignments or quizzes	64 (88.9% <sup>b</sup> )	30 (90.9% <sup>c</sup> )	22 (91.7%)	12 (80.0%)	1.524 (2)
Quality of posts in discussion forums or collaborative tools	61 (84.7%)	28 (84.8%)	18 (75.0%)	15 (100.0%)	4.458 (2)
Frequency that students log in to course activities	48 (66.7%)	20 (60.6%)	17 (70.8%)	11 (73.3%)	1.033 (2)
Number of replies to peers in discussion forums or collaborative tools	48 (66.7%)	19 (57.6%)	18 (75.0%)	11 (73.3%)	2.277 (2)
Number of posts in discussion forums or collaborative tools	47 (65.3%)	20 (60.6%)	14 (58.3%)	13 (86.7%)	3.856 (2)
Grades of assignments or quizzes	34 (47.2%)	17 (51.5%)	12 (50.0%)	5 (33.3%)	1.479 (2)
Length of posts in discussion forums or collaborative tools	27 (37.5%)	14 (42.4%)	7 (29.2%)	6 (40.0%)	1.093 (2)
Duration that students are logged in to course activities	26 (36.1%)	10 (30.3%)	9 (37.5%)	7 (46.7%)	1.277 (2)
Frequency of exchanging emails with the instructor	25 (34.7%)	10 (30.3%)	10 (41.7%)	5 (33.3%)	0.808 (2)

*Note.*

<sup>a</sup> the number of instructors responding to synchronous online questions.

<sup>b</sup> the percentage of instructors who selected the specific indicator as the active engagement indicator.

<sup>c</sup> the percentage of instructors in different learner-Centeredness groups who selected the specific indicator as the active engagement indicator.

Interviews reinforced the survey responses, suggesting that instructors seek ways to engage learners and indicators of that engagement. For example, one instructor discussed using multiple tools to engage learners and to see which learners were active:

Being the person who's going to talk on Zoom and seeing them involved in different activities, I think that's one of the nice things about using a Padlet or a Jamboard or even an LMS. You can see who's in there and who's working and what's going on. (P2, 2 years online teaching experience)

Another instructor (P6, 2 years online teaching experience) indicated they might integrate multiple choice questions in their pre-record lecture videos to increase active engagement.

Course discussions, regardless of modality, are a space where instructors confirm they can assess student engagement because students are expected to post messages in their own words. However, instructors shared that they are concerned with more than just having students fill space with words in class discussions:

Active engagement would seem to me as if they are producing something. And they're producing something that you can see or that you can hear . . . I think just producing text or producing words that they're saying is not a sufficient condition to determine active engagement, because they're perfectly capable of talking and writing without thinking at all. (P1, 25 years online teaching experience)

Much like how P1 emphasized that some visible indicators of student presence could have little meaning, P6 looks for quality of engagement:

I do look at how detailed their responses are to discuss board posts. I have several engagement activities in my classes, and they can be answered in a variety of different ways. But if a student writes one sentence, versus a student writes a thoughtful paragraph, I'm going to assess those differently in terms of engagement. So, typically when I'm looking at engagement, I'm more fully focused on the quality of the work that students are submitting rather than some of those other indicators that you mentioned (the quantity). (P6, 2 years online teaching experience)

Finally, P4 (30 years online teaching experience), suggested that to be active requires “Engaging not only in the content, but the other participants in the environment.” Per the instructors, students who are focused on course outcomes, such as earning credit hours, over learning are less visible throughout a course than their learning-focused peers. These students are the passive learners in the course.

Some people don't go along with the modules. They push it back and procrastinate. They're not really interested in the course, so they don't really see the value in it. So they're not going to really do anything but they need the credit. So once the end is coming near, they turn in all and rush through things. For me, the people who are rushing at the end, or providing very little information on their assessments, tend to be engaging more passively in the course. (P7, 1 year online teaching experience)

These students are either passive or outright absent until the moment when their grade is in jeopardy.

### **Perceptions of Interactions Among Instructors and Peers**

The results indicated the importance of different forms of student interaction using a Likert scale ranging from 1 (Strongly disagree) to 5 (Strongly agree). As shown in Table 8, in both modalities instructors felt most strongly that students need to know how to use the course communication tools ( $M = 4.45$  for synchronous,  $M = 4.64$  for asynchronous), followed by interacting with peers ( $M = 4.36$  for synchronous,  $M = 4.51$  for asynchronous) and instructors ( $M = 4.33$  for synchronous,  $M = 4.35$  for asynchronous).

According to one interviewee, P4 (30 years of online teaching experience), learning from peers can be more beneficial because students can gain diverse perspectives and insights from their fellow learners. This perspective highlights the value of collaborative learning and the idea that knowledge and understanding can be enriched through interactions with peers. Conversely, another participant, P1 (25 years of online teaching experience) highlighted the limitations of relying solely on the instructor for knowledge and expertise. They emphasized the significance of engaging with peers who bring their own unique life experiences and perspectives to the learning environment. The interviewee acknowledged that while course materials can be revisited for deeper engagement, the opportunity to interact with peers is distinct and offers a valuable learning experience.

**Table 8**  
*Instructor's Perceptions Toward Student Interaction in Online Courses*

Items	M	
	Synchronous	Asynchronous
It is important to me that...		
students speak in my online class	3.86	-
students post messages in my online class.	3.84	4.44
students interact with each other in my online class.	4.36	4.51
students interact with me in my online class.	4.33	4.35
students have their webcams on in my online class.	3.16	-
students know how to use online tools to actively communicate in my online class.	4.45	4.64

Kruskal-Wallis tests were used to determine if there were significant differences in perceptions between learner-centered groups (see Table 9). For most items, there were no statistically significant differences. However, there were statistically significant differences in responses on two items: “It is important to me that students speak in my synchronous online class” ( $p < 0.05$ ) and “It is important to me that students post messages in my synchronous online class” ( $p < 0.05$ ). A post-hoc test used Dunn’s Kruskal-Wallis multiple comparison  $p$ -values adjusted with the Bonferroni method. The multiple pairwise comparisons indicated that high learner-centered and medium learner-centered instructors perceived student engagement through speaking and posting messages as more important than low learner-centered instructors.

**Table 9**  
*Summary of Kruskal-Wallis Test Findings for Comparing Perceptions by Instructor Learner-centeredness*

Items	Test Statistic	p-value	Decision
<i>Synchronous</i>			
It is important to me that students speak in my synchronous online class.	6.963*	.031	Reject the null hypothesis
It is important to me that students post messages in my synchronous online class.	17.858***	.000	Reject the null hypothesis
It is important to me that students interact with each other in my synchronous online class.	1.350	.509	Accept the null hypothesis
It is important to me that students interact with me in my synchronous online class.	0.865	.649	Accept the null hypothesis

It is important to me that students have their webcams on in my synchronous online class.	3.411	.182	Accept the null hypothesis
It is important to me that students know how to use online tools to actively communicate in my synchronous online class.	0.980	.613	Accept the null hypothesis
<i>Asynchronous</i>			
It is important to me that students post messages in my asynchronous online class.	3.955	.138	Accept the null hypothesis
It is important to me that students interact with each other in my asynchronous online class.	0.581	.748	Accept the null hypothesis
It is important to me that students interact with me in my asynchronous online class.	1.938	.380	Accept the null hypothesis
It is important to me that students know how to use online tools to actively communicate in my asynchronous online class.	2.658	.265	Accept the null hypothesis

*Note.* The null hypothesis is there is no significant difference among the three learner-centeredness groups of instructors in terms of the perceptions of peer and instructor interaction in synchronous and asynchronous online courses.

## Discussion and Implications

### Pedagogical Strategies

The first research question investigated the pedagogical strategies employed by instructors and explored their variations based on course modalities and learner-centeredness. The findings showed that the most prominent are activities that present information to students (e.g., lecturing, readings) and have students explore course content discursively with others. Although individual practices and proportions of use varied, this finding holds true across modalities and different learner-centered beliefs. Lecturing has historically been considered non-learner-centered (Boyd, 2012), but these findings suggest that even in a learner-centered class students need to engage with learning content, presumably so they are then able to engage with each other in ways that support learning that content. Again, Hrastinski's (2009) assertion that in online courses learner engagement is tied to learning outcomes comes to mind. One does not get the full picture of how online learning occurs by considering individual activities in isolation. Instead, it is the combination of activities that allows learners to encounter and explore content that supports learning. This finding is aligned with current trends in education such as the flipped classroom approach (e.g., Palmero et al., 2023), and new approaches such as LecturePlus (Hashim et al., 2023), in which lecture or another form of information dissemination precedes opportunities to engage in practice and feedback. Of course, there are also inquiry-oriented learning strategies in which learners must seek the content they need to learn, but this marriage of instructor provided content and subsequent discursive interaction is more prevalent and, in many instances, more efficient. From the student perspective, other studies have found that students rate lectures more highly than discussions in part because they trust the quality more (Berlin & Weaver, 2021), and learner-content interactions as defined by Moore (1993) remain salient in the online learning context.

Interestingly, in this study instructors with high learner-centeredness reported a slightly higher rate of lecturing use compared to those in the medium and lower learner-centered groups, which is counter to expectations. However, they still used and valued discussion and, as indicated in interviews, ensured that their lectures included points of interaction. This data set does not indicate whether instructors who value learner-centeredness truly are more learner-centered in practice, but the overall similarities across learner-centered groups may be endemic to the larger issues facing the implementation of active learning in higher education. Børte et al. (2020) found that among the major barriers to implementing active learning in higher education is the focus on technology use over pedagogy in professional development. As instructors grapple with the intersection of technology and pedagogy, for some instructors their online design and facilitation may reflect what they can do or what they have been trained to do more than what they value.

### **Indicators of Engagement**

The second research question examined how instructors rely on various course indicators to know that students are engaged. Not surprisingly, popular synchronous learning indicators were predicated on active learning at the moment and appear to acknowledge limitations of real-time interaction, such as shared airspace. In contrast, popular asynchronous indicators convened around notions of quantity and quality of interactions, long heralded as ideals for asynchronous learners (Dennen, 2005). In online learning, synchronous and asynchronous instructional settings possess distinct characteristics (Fabríz et al., 2021). Instructors should acknowledge these differences and tailor their approaches to effectively evaluate students' active or passive engagement. For synchronous online courses, instructors should leverage real-time interaction capabilities and prioritize creating a supportive and interactive learning environment, encouraging students to actively engage in class activities and maintain frequent communication (Murphy et al., 2011).

Various tools and platforms can be employed to facilitate real-time interactions and track attendance, ensuring consistent student involvement. By emphasizing these indicators, instructors can ensure active engagement and maximize the benefits of synchronous online sessions for students. Regarding asynchronous online courses, real-time interaction is limited, and learners have greater autonomy over their learning with reduced dependence on instructors (Murphy et al., 2011). Consequently, in comparison to synchronous courses, learner-content interactions via learning materials hold greater prominence in asynchronous settings than learner-instructor interactions (Alqurashi, 2019). Therefore, instructors place greater emphasis on evaluating the completion of assignments. By assigning meaningful and relevant tasks, instructors can encourage students to demonstrate their understanding of the course material and engage in critical thinking.

Although instructors used the same indicators in roughly the same proportions regardless of learner-centeredness, this does not mean that they used the indicators in the same way. Instead, it means that in general instructors are similarly attuned to the indicators that are available to them. Instructors who are looking not only at activity levels but also at the content of learner responses and who simultaneously value learner interaction with peers are likely to naturally foster conditions for meeting several of the APA's (1997) Learner-Centered Principles in their online courses. Alternatively, instructors who are low learner-centered might use these

indicators mechanically, to simply note presence or absence, and perhaps even punitively, deduct grade points from students who appear to be inactive.

Finally, in the survey, instructors were only asked about indicators related to individual student actions rather than collaborative or interdependent ones. Active engagement through the posting is a baseline action needed to support discursive learning processes such as intersubjectivity, which remains somewhat elusive as a construct but is established when learners engage to develop mutual understanding (Dennen et al., 2023). Through interviews, instructors acknowledged the importance of peer engagement from a structural perspective but did not go so far as to delve into ideas like collaborative knowledge instruction. This area is ripe for future research, to explore the degree to which instructors value and know how to design and facilitate activities that foster this deep level of collaborative learner engagement.

### **Instructor and Peer Interaction**

The third research question focused on perceptions of instructor and peer interactions. The findings reaffirm that from the instructor's perspective, both learner-learner interaction and learner-instructor interaction play a vital role in online instruction. Cycling back to findings from the first research question, which showed the continued relevance of lectures in online learning (i.e., learner-content interaction), Moore's (1993) work on distance learning interaction remains important.

Some of the survey items explored perceptions of conditions for interaction. The ability to use interaction tools was rated more important than actually using those tools. This finding suggests that even more than actually having learners interact instructors wanted to make sure that learners could interact. In other words, instructors want to ensure that learners who want to communicate may do so and are not passive because they lack technology-based communication skills. Technology self-efficacy is connected to learning outcomes (Wang et al., 2013), and is among the skills that online instructors are expected to support (Dennen & Jones, 2022).

In synchronous learning contexts, where webcam use has been highly debated, instructors seem to not connect cameras to interaction. This is similar to Belt and Lowenthal's (2023) findings, which indicated camera use was unnecessary for instructor interaction and could introduce its own problems. Trust and Goodman (2023) found that although cameras are beneficial from a social perspective, students have personal reasons for turning them off. Learner-centered instructors would ideally be flexible in this regard and allow learners to self-regulate.

### **Limitations and Future Research**

This study is limited by its sample, due to sample size and sampling procedures. The sample is not representative of the overall population of online instructors. Future research should explore these factors in large samples and diverse contexts to provide a more comprehensive understanding of online instruction practices. Additionally, the question about the proportion of class time devoted to the lecturing did not specify whether the lecturing solely referred to one-way communication or could also include moments when an instructor was simultaneously disseminating information in a planned manner and engaging students in discussion. More research could be done in this area to determine if there are differences in the

interactive nature of lectures delivered by learner-centered and non-learner-centered instructors as well as differences by modality.

## **Conclusion**

In conclusion, this study explored the practices and perspectives of online instructors regarding instructional strategies, indicators of active engagement, and instructor and peer interaction. Additionally, it considered whether differences exist based on teaching modality or instructor learner-centeredness. The findings show that as much as the modalities differ, underlying components of teaching and learning remain similar. In other words, although synchronous and asynchronous learning experiences are qualitatively different, instructors still seek to foster interactions among themselves, learners, and course content. This finding holds true regardless of an instructor's degree of learner-centeredness, although learner-centeredness and reliance on multiple indicators of learner engagement go hand in hand.

Learner-centeredness does not negate the need for or use of lectures, nor does it lead to learning environments where all students are highly visible and provide continuous evidence of their presence. Learner-centered instructors can deftly combine lecture and interaction into an engaging format and do so in ways that not only require learner action but also actively involve learners in shaping their learning processes and developing an understanding of course material. Essentially, learner-centered instructors know that active learning requires more than just making one's presence known in a course and seek ways to discursively engage their students with class content and each other.

## **Declarations**

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# Comparing Blended and Online Learners' Self-Efficacy, Self-Regulation, and Actual Learning in the Context of Educational Technology

Zhuo Zhang

Qian Xu

Adrie A. Koehler

Timothy Newby

*Purdue University, USA*

## Abstract

In this quantitative comparative study, we explored the differences in technology integration self-efficacy, use of self-regulated learning strategies, and actual learning between preservice teachers enrolled in blended sections ( $n = 275$ ) and online sections ( $n = 50$ ) of the same introductory educational technology course. The results revealed that preservice teachers enrolled in the online format of the course reported a significantly higher level of using time management strategies, but a significantly lower level of employing help-seeking strategies compared to preservice teachers enrolled in the blended format of the course. However, no significant differences in technology integration self-efficacy and actual learning existed. Results offer insight for designing educational technology courses that align with the needs of both online and blended learners and preparing preservice teachers that likely will be responsible for facilitating blended and online learning with their own students.

*Keywords:* online and blended learning, educational technology, teacher education, self-regulation, self-efficacy

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In contemporary educational environments, learning experiences are increasingly delivered in blended or online formats due to advancements in technology, availability of the internet, and flexibility for navigating disruptions to learning (Lowenthal et al., 2017; Rasheed et al., 2020). Online learning is defined as learning experienced through the internet without the need for the co-presence of instructors and students (Singh & Thurman, 2019), while blended learning is “the thoughtful integration of classroom face-to-face learning experiences with online learning experiences” (Garrison and Kanuka, 2004, p. 96). According to the National Center for Education Statistics, approximately 33% of undergraduate students took at least one distance course in 2017 (McFarland et al., 2019), with this percentage reaching nearly 100% due to higher education institutions being forced to transition to online formats in response to the COVID-19 pandemic (UNESCO, 2021). Blended learning can overcome barriers of purely online learning (e.g., socialization and collaboration) and face-to-face learning (e.g., time and location) to create meaningful learning experiences that combine modalities (Garrison & Kanuka, 2004; Graham, 2006; Hrastinski, 2019). Furthermore, Means et al. (2013) conducted a meta-analysis including 50 empirical studies, with results suggesting that both online and blended learning were more effective than face-to-face learning in improving learners' academic achievements, while the difference between blended learning and face-to-face learning ( $g = .35$ ) was much larger than the difference between online learning and face-to-face learning ( $g = .05$ ).

The adoption of blended and online learning in higher education has also created trends in instructional technology preparation in teacher education programs. According to a review from Zhu and Kumar (2023), 13 highly ranked educational technology departments or programs in the U.S. offer blended and online learning for their prospective graduate students. To enhance undergraduate preservice teachers' (PSTs) educational technology competencies, one of the most common approaches is offering stand-alone introductory educational technology courses (Morel & Spector, 2022). These educational technology courses are often provided in a blended format (e.g., Cai et al., 2017; Cheng et al., 2023), however, after the COVID-19 pandemic, educational technology practitioners have increasingly explored designing and implementing educational technology courses in a fully online format and have confirmed the effectiveness of delivering educational technology courses through online modalities (Lyublinskaya & Du, 2022; Zhang et al., 2023). At the same time, the schools where PSTs will work are increasingly offering blended and online options (Hathaway & Mehdi, 2020; Hodges et al., 2022).

As a result of these trends and realities, PSTs entering the education profession must be prepared to design and teach across diversified learning environments (i.e., face-to-face, blended, and online) (e.g., Ersin et al., 2020), and leverage educational technologies to support and enhance their teaching in these environments during their preparation programs (Foulger et al., 2019). To achieve these goals, it is imperative for teacher educators to understand how PSTs perceive their capabilities in technology integration, approach, and regulate learning in blended and online learning environments. Although research has explored differences between blended and online learning in other disciplines such as psychology and management (e.g., Broadbent, 2017; Larson and Sung, 2009), the differences between online and blended learners' learning in educational technology use are largely unknown. The primary objective of this study is to delve into the disparities in learning among PSTs in the realm of educational technology, specifically in relation to different learning modes (blended vs. fully online). In order to gain a comprehensive insight into the learning process, educational theorists (Bandura, 1986;



Zimmerman, 2000) and researchers (e.g., Broadbent & Poon, 2015) have underscored the significance of venturing beyond mere tangible learning outcomes such as course grades. More fully understand learners' learning beliefs and the strategies they employ to facilitate their learning journey is crucial in improving PST preparation. Therefore, the present study focuses on the differences in learner-centered factors including learners' self-efficacy (confidence to learn), self-regulated learning (SRL) (strategies used to learn), and actual learning (knowledge gain) between blended and online learners.

## Literature Review

### Self-Regulated Learning (SRL) and Learning Mode (Blended vs. Online)

Building upon Bandura's social cognitive theory, which assumes self-regulation occurs during the interaction of personal, behavioral, and environmental determinants (Bandura, 1986), Zimmerman defined self-regulation as "self-generated thoughts, feelings, and actions that are planned and cyclically adapted to the attainment of personal goals" (Zimmerman, 2000, p. 14). To explicate the structure of self-regulatory systems, Zimmerman (2000) proposed a cyclical three-phase SRL model including forethought (the influential process that precedes efforts to act, setting the stage for subsequent actions), performance or volitional control (process that occurs during motoric efforts and impacts attention and action), and self-reflection (process that occurs after performance efforts and influence an individual's response to their experiences). SRL strategies have been used differently among the three phases. For example, learners frequently employ goal-setting and planning strategies during the forethought phase, task and resources management strategies in the performance phase, and self-evaluative strategies in the self-reflection phase, respectively (Zimmerman, 2000).

Compared to traditional face-to-face learning, the effective utilization of SRL strategies becomes even more crucial in blended and online learning environments. These environments, with their flexibility and fewer spatial and time restrictions, require a higher level of SRL strategies, such as help-seeking (Broadbent & Howe, 2023), goal-setting skills (Koehler et al., 2020), metacognitive skills, and resource management (Puzziferro, 2008). In both blended and online learning environments, learners are expected to take more ownership in navigating their learning experiences. For instance, in navigating asynchronous discussions, a common instructional strategy used in blended and online learning environments, learners are responsible for "identifying a goal for participation, selecting an appropriate time to enter a discussion and follow-up with peers, determining which peers to interact with, finding opportunities to join the conversation in meaningful ways, deciding how many discussion posts to read, adjusting personal strategies based upon the feedback from peers and the instructor, and managing challenges inherent of asynchronous online discussions" (Koehler et al., 2020, p. 67). In short, learners who can effectively regulate their learning in blended and online environments are more likely to reach successful outcomes. Two existing systematic reviews have synthesized the existing research on SRL strategies in higher education blended learning environments (Eggers et al., 2021) and fully online learning environments (Broadbent & Poon, 2015). However, to our knowledge, only two empirical studies comparing the differences in using SRL strategies between blended and online learners exist. Broadbent (2017) compared the usage of nine types of SRL strategies between 140 online undergraduate learners and 466 blended undergraduate learners and found that online learners demonstrated higher use of most types of SRL strategies such as elaboration, time management, effort regulation, and metacognition, with the exception

of peer learning and help-seeking strategies. Broadbent et al. (2021) found that, compared to blended learners, online learners reported higher use in all types of SRL strategies including critical thinking, metacognition, time management, and effort regulation, although only effort regulation and time management approached significance. In teacher education specifically, multi-media-based learning approaches (e.g., online courses, workshops, video tutorials, and assistance menus within software packages) have been widely used to foster PSTs' technology integration skills (Kay, 2006). approaches require learners to possess proficient SRL skills, therefore enabling effective learning outcomes (Koehler et al., 2020; Zhang et al., 2023). While research suggests the significance of SRL skills in influencing PSTs' technology integration (Huang et al., 2021; Valtonen et al., 2017), differences in PSTs' SRL skills between blended and online learning modalities remain uninvestigated.

### **Self-Efficacy and Learning Mode (Blended vs Online)**

Self-efficacy refers to “beliefs in one’s capabilities to organize and execute the course of action required to produce given attainments” (Bandura, 1997, p. 3). Self-efficacy affects learning or performance by regulating learners’ cognition, affection, motivation, and selection (referred to as the four mediating processes by Bandura [1997]). The indirect effect of self-efficacy on performance in online learning among PSTs has been revisited and validated through structural equation models by Zhang et al. (2023). Bandura (1977) also emphasized that self-efficacy is not a personal trait but a context-dependent system of beliefs when one deals with a given situation. Considering that the present study is contextualized in teacher educational technology preparation, we specifically explored PSTs’ technology integration self-efficacy. Substantial research has explored PSTs’ technology self-efficacy in either blended or online learning environments (e.g., Banas & York, 2014; Cheng et al., 2023; Zhang et al., 2023). However, our literature search yielded only two studies focusing on the comparison of blended and online learners’ self-efficacy. Alkış and Temizel (2018) investigated the effect of motivational factors on academic performance in blended and online learning environments. Among 316 undergraduate students (189 online and 127 blended) enrolled in an information technology (IT) course, they found that online learners’ self-efficacy for learning positively predicted their academic performance, while such a predictive effect was not found for blended learners. Broadbent et al. (2021) found that online learners perceived self-efficacy for learning in a psychology course was significantly higher than blended learners.

### **Actual Learning and Learning Mode (Blended vs. Online)**

Actual learning, along with perceived learning and satisfaction, are commonly used to determine the value of a specific learning experience (Martin et al., 2022). Unlike perceived learning and satisfaction which are typically identified by asking learners to reflect on personal expectations and perceived knowledge gains, actual learning “reflects a change in knowledge identified by a rigorous measurement of learning” (Bacon, 2016, p. 4). Actual learning can be measured by scores generated from tasks and tests, course grades, and grade point average (GPA). Researchers have explored the impact of learning modes (blended and online) on higher education students’ actual learning. Interestingly, existing empirical studies consistently have found no differences in actual learning between blended and online learners across various courses: program evaluation (Lim et al., 2007), management information systems (Larson and Sung, 2009), child development (Yen et al., 2018), and cognitive psychology (Broadbent et al.,

2021). However, Bicen et al. (2014) found that blended PSTs scored significantly higher than online PSTs on a multimedia-based project in an instructional development course.

The results of this literature review identified three research gaps. First, previous studies have primarily focused on comparing either online learning or blended learning with face-to-face learning, rather than comparing blended and online learning. Second, previous studies comparing blended learning with online learning have primarily focused on comparing learners' actual learning outcomes instead of their learning confidence or strategies. Third, the only comparison study conducted in the context of educational technology is one by Bicen et al. (2014), which investigated the difference in task performance between blended and online PSTs. Therefore, the present study aims to deepen understanding of the impact of learning mode (blended vs. online) on PSTs' educational technology learning by exploring the disparities in not only actual learning but self-efficacy and self-regulation. Specifically, the three research questions below guided our investigation.

1. Do PSTs enrolled in blended and online course formats demonstrate different levels of technology integration self-efficacy?
2. Do PSTs enrolled in blended and online course formats demonstrate different levels of usage of SRL strategies?
3. Do PSTs enrolled in blended and online course formats demonstrate different levels of actual learning?

## Method

### Research Design and Context

This study employed an ex post facto research design (Ary et al., 2019), a non-experimental research approach, to examine the effect of a preexisting independent variable (blended vs. online course formats) on PSTs' technology integration self-efficacy, use of SRL strategies, and actual learning in an educational technology course. This research design was appropriate for this investigation as the researchers lacked control over the independent variables. In this study, we determined that identifying PSTs who were already enrolled in either the blended or online format of the educational technology course was most appropriate, rather than assigning them to specific formats, to capture their natural engagement and attitudes towards the selected format.

This study was conducted in a 16-week undergraduate foundational educational technology course at a public research-intensive university in the U.S. The course aimed to prepare digital-competent PSTs by helping them plan, integrate, and evaluate educational technologies for teaching and learning. The course comprised three main instructional components: video lectures, online discussions, and weekly face-to-face two-hour labs (applicable only to the blended format). In addition to attending labs and participating in online discussions, students were required to work on three types of assignments to complete the course: (1) obtain six digital badges designed to enhance their technology skills (e.g., video editing and website development); (2) analyze eight authentic cases and address real-world educational issues by using technology in a pedagogically appropriate fashion; and (3) create an interactive online learning module as their final project (see Table 3 for details). The course was offered three times a year (spring, summer, and fall), with different formats available, including blended and fully online. In the blended format, students were expected to attend a two-hour lab each week to work on the digital badges with guidance from an assigned teaching assistant. In

the fully online format, students were given access to pre-recorded lab videos and could schedule online meetings with their assigned teaching assistant as necessary. Except for the teaching assistant lab facilitation, the instructor, instructional content, learning materials, and assignments were consistent between the blended and online formats.

### **Participants and Data Collection**

Upon receiving approval from the Institutional Review Board (IRB), we developed an online survey and distributed it using Qualtrics (Provo, UT) during the last week of each term in 2021 and 2022. The survey consisted of a demographic questionnaire (e.g., gender, academic year), a technology integration self-efficacy questionnaire, and an SRL questionnaire. While the survey did not ensure anonymity to link respondents with the allocation of extra credit, after extra credit points were granted, all personally identifiable information, including students' names, was removed, and encoded before data analysis. A total of 382 PSTs who were enrolled in the educational technology course in 2021 and 2022 were invited to participate in the survey, with the incentive of receiving five extra credit points (1.5% of the total score of 328 for the course). While the use of incentives may affect sample composition, given that motivated individuals tend to participate more readily than those who are not, the majority of the existing empirical studies have reported no significant effect of incentives on sample composition or response distributions (Singer & Ye, 2013). Conversely, research underscores that using incentives in web-based surveys is an effective approach to boosting response rates (Singer & Ye, 2013). Among the 382 PSTs, 325 completed the survey, resulting in a response rate of 85.1%.

The participants were PSTs from a variety of teacher education programs (e.g., special education, elementary education, social studies education, mathematics education, and science education). The average age of the participants was 19.94, with a standard deviation of 2.77. Table 1 includes additional participant demographic information, including course format, gender, academic level, and previous online, blended, educational technology learning experiences. The gender distributions in both online and blended formats exhibited a similar pattern, with female PSTs substantially outnumbering male PSTs (ratio > 3:1). Independent samples t-tests were executed to explore potential significant differences in other demographic variables based on the course formats. The results indicated that none of these variables displayed significant distinctions between PSTs enrolled in online and blended formats.

**Table 1**  
*Demographic Information (N = 325)*

<b>Variables</b>	<b>Frequency</b>	<b>Percentage (%)</b>
<b>Course format</b>		
Blended	275	84.6
Online	50	15.4
<b>Gender</b>		
Female	248	76.3
Male	77	23.7
<b>Academic level</b>		
Freshmen	98	30.2
Sophomore	118	36.3
Junior	79	24.3
Senior	30	9.2
<b>Blended courses previously taken</b>		
0–1	82	25.2
2–3	130	40.0
4–5	58	17.9
6 or more	55	16.9
<b>Online courses previously taken</b>		
0–1	75	23.1
2–3	118	36.3
4–5	68	20.9
6 or more	64	19.7
<b>Educational technology courses previously taken</b>		
0–1	282	86.8
2–3	34	10.5
4–5	4	1.2
6 or more	5	1.5

## **Variables and Instruments**

### ***Technology Integration Self-Efficacy***

To our knowledge, the Technology Integration Self-efficacy Questionnaire (TISQ) developed by Wang et al. (2004) is the only survey instrument available for measuring pre-service teachers' (PST) technology integration self-efficacy. The TISQ is a 16-item instrument that employs a five-point Likert scale. Wang et al. (2004) conducted an exploratory factor analysis on the items of the TISQ, which indicated the single-factor structure of TISQ. Zhang et al. (2023) further confirmed its single-factor structure through confirmatory factor analysis and computed the reliability coefficient (Cronbach's Alpha = .95), demonstrating high internal consistency. A sample item of TISQ is "I feel confident about selecting the appropriate technology for instruction based on curriculum standards."

### ***Self-Regulated Learning (SRL)***

Many instruments exist for measuring SRL; however, one instrument that has been thoroughly validated and can be employed in both online and blended learning environments is the Online Self-Regulated Learning Questionnaire (OSLQ, Barnard et al., 2009). The OSLQ is a 24-item five-point Likert-scale instrument. Barnard et al. (2009) conducted both exploratory factor analysis and confirmatory factor analysis on the OSLQ items, which suggested a six-factor structure. These factors include goal-setting (five items), task strategies (four items), time

management (three items), environmental structuring (four items), help-seeking (four items), and self-evaluation (four items). Barnard et al. (2009) also computed the reliability coefficients (Cronbach's Alpha) for each factor in both blended and online learning environments, which indicated acceptable internal consistencies. Table 2 presents the definition, sample items, and reliability coefficients of the six factors.

**Table 2***Definition, Sample Items, and Reliability Coefficients of OSLQ*

	<b>Definition</b>	<b>Sample items</b>	<b>Cronbach's Alpha (blended/online)</b>
Goal-setting	"setting of educational goals or subgoals and planning for sequencing, timing, and completing activities related to those goals" (Zimmerman, 1989, p. 337).	"I set short-term goals as well as long-term goals."	.86/.95
Task strategies	Decomposing a complex task and reorganizing it meaningfully (Pintrich et al., 1991).	"I work extra problems in online courses in addition to the assigned ones to master the course content."	.67/.93
Time management	Planning and scheduling study time (Pintrich et al., 1991).	"I choose a time with few distractions for online courses."	.78/.87
Environmental structuring	"efforts to select or arrange the physical setting to make learning easier" (Zimmerman, 1989, p.337).	"I choose the location where I study to avoid too much distraction."	.90/.92
Help-seeking	"efforts to solicit help from peers, teachers, and adults" (Zimmerman, 1989, p.337).	"I find someone knowledgeable in course content so that I can consult with him or her when I need help."	.69/.96
Self-evaluation	"student-initiated evaluations of the quality or progress of their work" (Zimmerman, 1989, p.337).	"I summarize my learning in online courses to examine my understanding of what I have learned."	.78/.94

***Actual Learning***

In the present study, we chose to use learners' course final letter grades to reflect their actual learning in technology integration. Table 3 presents the course assignments and their corresponding percentages of the final grades.

**Table 3**  
*Course Assignments and Corresponding Percentages*

<b>Assignments</b>	<b>Percentage (%)</b>
Six digital badges (e.g., online assessment, information literacy, website development)	22.6
Eight case studies	30.9
Three online discussions (e.g., current issues in educational technology)	6.2
Ten short quizzes	21.7
Interactive learning module (i.e., course final project)	18.6

### **Data Analysis**

The two learning modes (blended and fully online) served as the independent variable, and participants' technology integration self-efficacy, six types of SRL strategies, and course performance served as dependent variables. Both descriptive and inferential statistics were applied to understand the impact of course format (blended versus online) on each of the eight dependent variables. Descriptive statistics such as mean and standard deviation were computed to describe the central tendency and dispersion of the distribution of data. The one-way Analysis of Covariance (ANCOVA) was applied to examine whether blended and online learners had significantly different levels of technology integration self-efficacy, SRL, and course performance and account for the confounding effects of demographic variables such as gender, age, and academic level.

As suggested by previous research (e.g., Wang et al., 2013), demographic variables could affect learners' self-efficacy, SRL, and actual learning. Major assumptions for conducting ANCOVA were tested and met. For example, two diagnostic statistics and their acceptable ranges, skewness  $\pm 3$  and kurtosis  $\pm 10$ , were used to test for normality (Kline, 2005), Levene's test was applied to test for the homogeneity of variance, and interaction effects of covariates and the independent variables were used to test the homogeneity of regression coefficients. As highlighted by Blanca et al. (2017), the F-test used in ANCOVA is robust when dealing with unequal sample sizes across groups, therefore the imbalance of sample size would not invalidate the results of this study. All the data analytic procedures were completed in SPSS Version 28.0.

## **Results**

### **Descriptive Results**

Table 4 presents the means and standard deviations of the blended and online learners' technology integration self-efficacy, six types of SRL strategies, and course final grades. The descriptive results revealed that on average (1) online learners' technology integration self-efficacy and course final grades were comparable with blended learners, with online learners earning slightly higher grades and reporting slightly higher self-efficacy scores; (2) online learners reported higher use of most types of SRL strategies than blended learners such as goal-setting, task strategies, time management, and environmental structuring, with the exception of help-seeking and self-evaluation, which were lower than blended learners; (3) among the six types of SRL strategies, both blended and online learners reported lowest use of task strategies and highest use of environmental structuring strategies.

Table 4  
*Means and Standard Deviations of Dependent Variables*

	Blended learners (N = 275)		Online Learners (N = 50)	
	Mean	SD	Mean	SD
Goal-setting	4.01	.66	4.10	.64
Time management	3.23	1.03	3.53	.88
Task strategies	2.86	.99	3.07	.74
Environmental structuring	4.13	.74	4.19	.66
Help-seeking	3.45	.73	3.10	.86
Self-evaluation	3.28	.89	3.10	.80
Technology Self-efficacy	4.35	.62	4.37	.61
Course Final Grade	9.96	3.12	10.22	2.80

Note. SD = standard deviation

<sup>a</sup> In SPSS, item choices of TISQ and OSLQ were coded as: “strongly disagree” – 1, “somewhat disagree” – 2, “not disagree or agree” – 3, “somewhat agree” – 4, “Strongly agree” – 5.

<sup>b</sup> In SPSS, course final letter grade was coded as: “F” – 1, “D-” – 2, “D” – 3, “D+” – 4, ..., “A-” – 11, “A” – 12.

## Inferential Results

### *Technology Integration Self-Efficacy*

The ANCOVA results indicated that the differences in technology integration self-efficacy between blended and online learners were not significant ( $F = .152, p = .70$ ) after controlling for the effects of participants' demographic variables including gender, age, and academic level.

### *Self-Regulated Learning (SRL) Strategies*

The ANCOVA results indicated that, after controlling for effects of participants' demographics variables including gender, age, and academic level, online learners reported significantly higher use of time management ( $F = 6.69, p = .01$ ) but significantly lower use of help-seeking strategies ( $F = 3.99, p = .04$ ) than blended learners while the differences of using other four types of SRL strategies were not significant.

### *Actual Learning*

The ANCOVA results indicated that the differences in PSTs' actual learning outcomes between blended and online learners were not significant ( $F = .50, p = .48$ ) after controlling for the effects of gender, age, and academic level.

## Discussion

We investigated the differences in self-efficacy, usage of six types of SRL strategies, and actual learning achievements between PSTs enrolled in blended and online learning formats of the same educational technology course. Our study yielded three major findings that provide insight into how teacher educators can differentiate instruction and model effective technology integration and learning experiences for PSTs in both blended and online settings.

### **Self-Regulated Learning (SRL) and Learning Mode (Blended vs Online)**

First, the results of our study indicated that compared to blended learners, online learners reported higher use of most types of SRL strategies including goal-setting, task strategies, time management, and environmental structuring but shared lower use of help-seeking and self-



evaluation strategies. However, only the differences in time management and help-seeking reached statistical significance. These findings align with previous research that also found that online learners self-identified more proficiency in using most types of SRL strategies than blended learners, while less proficiency in using SRL strategies that demand socialization and interaction such as peer learning and help-seeking (Broadbent, 2017; Broadbent & Fuller-Tyszkiewicz, 2018; Broadbent et al., 2021). The higher reported use of SRL strategies by online learners is not surprising given that online learners must be autonomous, self-managing, and self-directing (e.g., Broadbent, & Poon, 2015). However, online learning is not without issues or challenges, among which, the most critical one is promoting online learners' collaboration and interaction (Oncu & Cakir, 2011).

As argued by Garrison and Akyol (2015), despite the difficulty in building a collaborative online community, doing so is vital given learners' cognition is always socially situated and shared. These challenges offer insight as to why online learners rarely seek help from their peers and instructors compared to blended learners who were provided opportunities to interact with others in a face-to-face manner. The effectiveness of learners' self-evaluation is also largely dependent on the social dimensions of a learning community (Zimmerman, 2000). From a social cognitive perspective, Zimmerman (2000) emphasized social comparison and collaboration as two major criteria that learners often employ to assess their own learning. This may explain one of our SRL findings—online learners used less self-evaluative strategies than blended learners although the difference was not significant. Our findings implied that “granularity” matters when conducting SRL research as different SRL strategies have different relationships with contextual variables such as learning mode and learning variables such as actual learning (Means et al., 2013) and self-efficacy (Broadbent & Howe, 2023). Specifically, along with other SRL researchers (e.g., Lee et al., 2019), we suggest examining SRL at a finer level by considering various SRL strategies individually rather than using SRL as a global concept.

### **Self-Efficacy and Learning Mode (Blended vs Online)**

Our study's second major finding indicated that learning mode (blended vs online) had no impact on PSTs' self-efficacy in using and integrating educational technologies into learning and teaching. This finding contradicted findings from previous research (Broadbent et al., 2021) suggesting that in an undergraduate psychology course online learners had a significantly higher level of self-efficacy than blended learners. One possible reason for this inconsistency could be the disciplinary differences between these two studies (educational technology vs. psychology). According to Bandura's self-efficacy theory (1986, 1997), learners' self-efficacy is not a personal trait but a set of contextualized beliefs that tends to vary across subject areas. Also, research investigating disciplinary differences in online learning across students' perceptions of community and affective learning outcomes suggests that students from different disciplines perceive and value components of online environments differently (e.g., Lim & Richardson, 2022). Our findings generalized this characteristic (i.e., contextualization) of self-efficacy to the field of teachers' educational technology, suggesting that learners' academic majors may potentially moderate the relationship between learning mode and perceived self-efficacy.

### **Actual Learning and Learning Mode (Blended vs. Online)**

Third, we found that PSTs' actual learning outcomes, as indicated by their final grades in the educational technology course, were not influenced by the mode of learning (blended vs. online). This finding aligns with the majority of previous comparative studies conducted in various disciplines including psychology, child development, human resources, and business and management (Broadbent et al., 2021, Larson and Sung, 2009, Lim et al., 2007, Yen et al., 2018). However, it was inconsistent with a study conducted in an educational technology context by Bicen et al. (2014), which found that PSTs completing a multimedia-based project in a blended format outperformed PSTs participating in an online format. Differences between our study and the findings of Bicen et al.'s (2014) study can be attributed to how actual learning outcomes were measured. While our study, along with the other four comparative studies, relied on course grades, test scores, or aggregated scores from a combination of formative and summative tasks, Bicen et al. (2014) assessed their participants' actual learning using a single multimedia-development project. The disparity suggests that the level of detail in the measurement of actual learning plays a crucial role when comparing blended and online learning. Specifically, learners' actual learning outcomes in a certain task are likely to differ depending on the learning mode, but this discrepancy diminishes as additional components are incorporated into the measurement of actual learning. Overall, this finding underscores that PSTs can be effectively prepared to use educational technologies regardless of course format.

### **Implications for Designing and Facilitating Educational Technology Courses**

Our findings have important implications for teacher educators, instructional designers, and program coordinators involved in the educator preparation programs and specifically the design and facilitation of educational technology courses. First, incorporating face-to-face components such as weekly labs and lectures in an educational technology course, alongside online instruction, may not necessarily enhance PSTs' self-efficacy in technology integration or their actual technology competencies acquired from the course. These two factors (technology self-efficacy and competency) are two essential predictors of PSTs' intention to use technologies in their future classrooms (e.g., Baturay et al., 2017).

Currently, blended educational technology courses are more frequently used than fully online options, suggesting that teacher educators and instructional designers should reconsider the effectiveness of offering educational technology courses in blended learning formats in achieving desired outcomes (e.g., heightened educational technology competencies and long-term impact on PSTs' technology integration after entering profession). When preparing preservice teachers to effectively use instructional technologies, best practices include modeling effective instructional technology use, prompting reflection on educational technology use, and providing collaborative opportunities for PSTs to learn by design (Foulger et al., 2019). Therefore, when using a blended or online format for an educational technology course, teacher educators should be intentional with how they are using environmental affordances to model appropriate design and support techniques and keep in mind that PSTs' self-efficacy is a set of contextualized beliefs.

For instance, at the beginning of a course, teacher educators can draw attention to the affordances of the modality or modalities being used, facilitate a discussion regarding how PSTs can use this to support their own learning, and point out specific challenges inherent to the environment. At the same time, giving PSTs opportunities to design and implement both blended and online learning experiences is important not only to prepare them for their future realities, but as a chance to reflect on their own experiences with participating in blended and online formats. By making sense of their own experiences, beliefs, and strategies, PSTs can navigate blended and online modalities more intentionally both as a student and a future teacher.

Second, combining face-to-face instruction with online instruction could largely influence the development of PSTs' SRL skills. Specifically, compared to the blended learning mode, PSTs who take a purely online educational technology course may experience significant improvement in their time management skills, while their help-seeking skills may be weakened. Therefore, when designing and teaching a blended educational technology course, teacher educators should intentionally employ effective instructional strategies or interventions to improve PSTs' time management skills. As suggested by previous research, such instructional strategies or interventions include time management workshops (Wilson et al., 2021), reflecting and tracking weekly workload and time allocations via mobile devices (Tabuenca et al., 2022), and enhancing instructors' presence by setting clear expectations and sending weekly check-in emails (Ensmann et al., 2021).

On the other hand, teacher educators should promote collaboration and interaction in their online educational technology courses, providing PSTs with more opportunities to learn from or seek assistance from their peers and instructors. Research suggests that integrating an intelligent tutor agent providing immediate metacognition feedback (Roll et al., 2011) could improve online help-seeking skills. Additionally, Ertmer and Koehler (2018) emphasized the importance of establishing a positive social climate in online discussion forums and its impact on online learners' engagement and willingness to interact with others. They also suggested that strategies such as directing student attention, using humor, and addressing students by their names in online discussion forums can be employed. Broadbent and Howe (2023) furthered the understanding of online learners' help-seeking behaviors by exploring the interactive effect between online learners' help-seeking strategies and their learning self-efficacy. They found that confident online learners engaged more often in help-seeking than those lacking confidence. Accordingly, we suggest instructors of online educational technology courses pay particular attention to supporting less confident PSTs when facilitating their development of help-seeking skills. Instead of assuming that students possess innate learning navigation skills, it is also crucial for online teacher educators to initiate an upfront open dialogue, offer follow-up built-in support, and collaboratively explore specific strategies enabling PSTs to seek assistance when confronted with challenges.

## **Limitations and Future Research**

Given that previous research has predominantly focused on comparing blended and online learners' actual learning outcomes, our study additionally explored the motivational dimensions of PSTs' learning including their usage of specific SRL strategies and learning self-efficacy. In addition to focusing on learner-centered variables, investigating additional elements beyond learner-centered variables would be beneficial. For instance, considering how learning

mode relates to teaching-centered variables (e.g., instructional strategies, online teaching readiness, and teaching presence), social dimensions (e.g., social presence, socially shared regulation), and institutional support is worthy of future investigation. By examining these factors, a more comprehensive understanding of the relationship between learning mode and various aspects of the learning experience can be achieved.

We adopted self-reported measures to gauge PSTs' use of online SRL strategies. Despite the validity, reliability, and robustness of the selected measures, responses obtained through self-report measures might be influenced by the participants' individual perspectives, memory recall capabilities, and tendencies to present themselves favorably in responses (Bråten & Samuelstuen, 2007). Future investigations could consider combining the use of objective measures (e.g., clickstreams sourced from learning management systems) and self-reported measures to achieve triangulation, thereby providing a more comprehensive understanding of how PSTs engage with online SRL strategies.

Regarding data analysis, although we adopted ANCOVA to control for the effects of participants' demographic variables including gender, academic year, and age, future studies could consider measuring participants' academic achievement (e.g., GPA), self-efficacy, and SRL capacity before enrolling in an educational technology course. Including these entry-level variables in the inferential analysis may enhance the validity of the statistical conclusions of a comparative study. Lastly, our study found that online learners exhibited greater capability in regulating most of their learning behaviors compared to blended learners, aligning with existing SRL theories and research that emphasize SRL as an essential competency for online learning (e.g., Broadbent & Poon, 2015). Future research examining whether learners' SRL skills develop along a continuum that includes face-to-face, blended, synchronous online, and asynchronous online learning, with increasing proportions of online instructions would be intriguing. Exploring this progression can provide further insights into the development of SRL skills across different learning modalities.

## Conclusion

The present study was conducted in the field of educational technology to examine the influence of learning mode (blended vs. online) on PSTs' technology integration self-efficacy, use of SRL strategies, and their actual learning outcomes. The findings revealed that both blended and online PSTs showed similar levels of technology self-efficacy and actual learning outcomes after completing the educational technology course. However, there were notable differences in their development of SRL skills. Online PSTs demonstrated a higher overall level of SRL capacity, while their utilization of socially regulated strategies, such as help-seeking, was limited. These results underscore the importance of tailoring instructional strategies to the specific needs of blended and online educational technology courses and the affordances of each modality. Considering the unique requirements and characteristics of each learning mode when designing and facilitating these courses is essential in modeling appropriate educational technology design and increasing awareness of effectively navigating each environment.

### Declarations

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# Exploring Personalized Learning and Open Education Pedagogy in Multilingual Learner Teacher Preparation

Rhonda Bondie

*Hunter College, CUNY, USA*

## Abstract

Preparation to serve multilingual learners is often required for P-12 teacher certification. Teachers come to this preparation with varied experiences and urgent needs to better serve their students. When teacher preparation courses use a one-size-fits-all approach to satisfy certification requirements, teachers may not find learning meaningful to their current context. Further, without common mechanisms for sharing resources produced through teacher preparation, each novice teacher starts assignments from the beginning rather than learning from, and building upon, previous assignments of peers. Reusable teacher preparation assignments through open education pedagogy (OEP) may address the challenges of providing collaborative, relevant, and optimally challenging state-mandated teacher preparation. However, personalized learning may not be aligned with university course evaluations. Thus, faculty members may be concerned about the impact of personalization on student course evaluations. This exploratory study examined personalization and OEP in a required, graduate-level teacher preparation course by analyzing assignment completion data to explore teacher personalized learning paths and comparing standard university course evaluation items from four course runs pre- and post-personalization (N=230). Descriptive analyses illustrate negative changes in teacher evaluation of course organization, feedback timeliness, and time spent outside of class. Teacher satisfaction increased in the areas of diversity, use of technology, access, and online discussions. Results from examining personalized paths and course satisfaction provide recommendations for designing personalized teacher preparation.

*Keywords:* Individualized learning, open educational resources, teacher preparation, English language learners, faculty course evaluations

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Increasingly, teachers serve multilingual learners in public schools across the United States (National Center for Education Statistics, 2023). In response to the growing multilingual student population, departments of education in all states have resources for teaching English learners on their websites and some states, for example, New York and Massachusetts, require preparation in teaching multilingual learners for teacher certification (Andrei & Northrop, 2022). External credentialing structures and state-approved course syllabi can lead to standardized teacher preparation that may lack a means to respond to teacher needs (Lavery et al., 2019). For example, Lavery et al (2019) examined various mechanisms for providing training to teachers to teach English learners, including embedding required or recommended information and strategies into current courses, creating specific courses, and ongoing professional development. Some courses were standardized to ensure that teachers received the required information to develop specific competencies identified by state education departments. In contrast to standardized mechanisms that provide the same information in the same manner to all educators, Gabriel (2010) found that teachers in their first three years benefitted from collaborative professional learning geared toward their individual interests. Similarly, Lavery et al.'s (2019) findings showed that multi-level or differentiated professional development led to teaching practices that in turn showed promising impacts on English learners' learning. Further, efforts to individualize or personalize learning often leverage digital tools. When Kimmons and Hall (2016) studied teacher technology integration, they found that teachers sought technologies with concrete connections to student learning and ease of use. Synthesizing research findings, Kennedy's literature review summarized key components of effective educator professional learning, specifically, teacher motivation, intellectual challenge, and feelings of meaning (2016). Personalized learning paths provide a pedagogical vehicle to enact Kennedy's key components of effective educator development. Previous research provides examples of personalized learning in teacher education, where teachers select meaningful assignments within a faculty-designed structure to learn expected outcomes (Arnesen et al., 2019; Chaipidech et al., 2021; Jones & McLean, 2018).

In addition to responsive professional learning that attends to individual teacher needs, online databases of materials may also increase teacher collaboration. Weiss et al. (2017) identified meaningful collaboration opportunities in teacher preparation as an important need. Rather than the course instructor being the only audience for teacher assignments, studies (e.g., Sun & Van Es, 2015) show that teachers benefit from analyzing each other's work. Teacher preparation courses often require teachers to demonstrate learning through writing lesson plans in isolation with high stakes (e.g., Stanford Center for Assessment, Learning, and Equity, SCALE, 2016) and without building on the previous work of colleagues. However, freely available collaborative technologies (e.g., websites and databases) that facilitate searches and contributions make it possible to provide vehicles for teachers to build upon previous curriculum developments and to contribute new ideas to a teacher community (Jhangiani & DeRosa, 2018).

Taken together, learning designs for teacher preparation need to address the challenges of collaboration and personalization. Yet, given the important role of standard university course evaluations on tenure and promotion, faculty members may be reluctant to experiment with new pedagogical methods such as personalization and OEP (Dziuban, 2023). This study explored how an open education pedagogy (OEP) with personalized assignments in teacher preparation to

serve multilingual learners may impact individual teacher learning paths and course satisfaction as measured by standard university course evaluations.

## **Literature Review**

This literature review defines personalized learning, OEP, and teacher competencies to serve multilingual learners. First, key elements used in personalization, specifically in P-12 teacher education, were defined. Second, a summary of open education resources (OER) principles described the underlying foundation for the process teachers used to search for, remix, and share personalized tasks. Finally, an overview of teacher preparation to serve multilingual learners provided the rationale for topic selection and learning methods of this study's personalized task matrix.

### **Personalized Learning**

Although personalized learning is not new, interest has grown in education in the last decade and there are examples of successful implementation in P-12 schools (Shemshack & Spector, 2020; Patrick et al., 2016). Considering contemporary learning theories, personalized learning may be found in the writings of John Dewey, who described learning as a socially constructed process where individuals are active and reflect on their experiences (Groff, 2008). The concept of personalized learning is rooted in the model of apprenticeship and mentoring (Shemshack & Spector, 2020).

### ***Key Components of Personalized Learning***

Key components of personalized learning focus on: (a) learner as an active agent, (b) instructor or technology tool for facilitation and feedback, and (c) environment with multiple or adaptive pathways (Jones & McLean, 2018). More specifically, Van Schoors et al. (2023) summarized characteristics of personalized learning to include attention to learner characteristics and goals, adaptive learning environment and tasks, driven by the learner, teacher, or technology tool, and visualized feedback through continuous formative assessment. Learner feelings of optimal challenge and relevance are also crucial (Groff, 2008). Chaipidech et al. (2019) summarized important andragogical components of personalization in teacher education, specifically a self-directed, problem-based, context-specific approach. Addressing these elements of personalization, Short and Shemshack (2023) suggested renaming personalized learning to personalized instruction because personalized learning requires faculty members to customize curriculum to address the interests and abilities of each learner in the greatest number of ways.

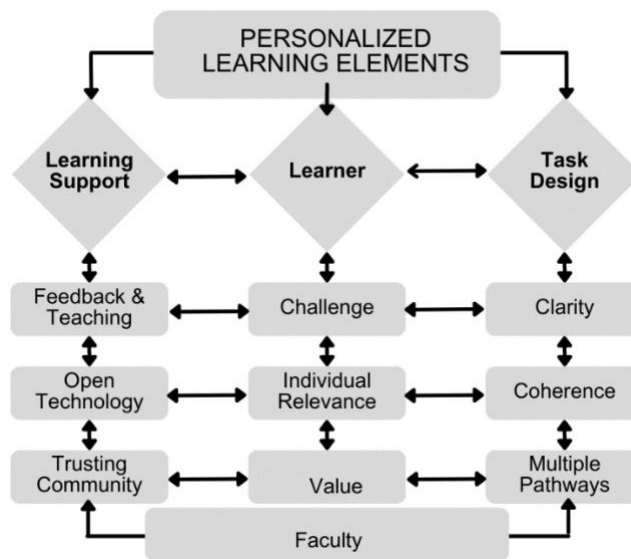
Personalized learning can be challenging to implement. For example, Van Schoors et al. (2023) examined personalized learning from the teacher's perspective and identified issues beyond practical challenges such as time, organization, and curriculum coherence to articulate discrepancies among teacher expectations of student learning and use of technology tools needed to support personalization. Specific pedagogical design features, such as constructing coherent learning pathways that provide support and assessment, while also offering vehicles to pursue different avenues toward learning, challenge teachers when implementing personalized pedagogy (Salinas & De-Benito, 2020). In Shaikh and Khoja (2012), the literature review of personalized learning synthesized the required teacher competencies to implement personalized learning into five areas: learning designer, curator of large bodies of content, communicator, manager, and technologist. Taken together, research studies identified common elements of personalized task

design, such as clarity, coherence, multiple pathways, and continuous assessment that require faculty skill and planning.

Synthesizing previous studies, Figure 1 illustrates elements of personalization used to guide this study's design and implementation of personalized tasks in teacher preparation for multilingual learners. These personalized learning elements were also used to organize the items of the university's course evaluation. This model or personalized learning elements is limited to the 26-Likert scale university course evaluation items. For example, agency is a key personalization element, yet there were no evaluation items that specifically aligned to student agency. While not inclusive of every aspect of personalization, this model provides an example of connections between personalized learning and existing course evaluation items. In addition, the alignment exercise may shed light on missing evaluation areas such as perceptions of learner agency.

**Figure 1**

*Personalized Learning Elements Relevant to this Study*



### ***Preparing P-12 Teachers through Personalized Learning***

The International Association for K–12 Online Learning (iNACOL, Friend, 2017) published a report with rich descriptions of successful personalized learning implementation in P-12 schools. The iNACOL report also highlighted elements of personalization including student agency and collaboration for both teachers and students. Modeling personalized learning in teacher preparation can support teachers in implementing personalization with P-12 students. For example, Arnesen et al. (2019) found that teachers who experienced personalization in preparation for teaching through blended learning felt more prepared to personalize learning for P-12 students. Indeed, proponents of personalized learning identify benefits such as greater autonomy leading to increased intrinsic motivation and deeper understanding (Shemshack & Spector, 2020; Salinas & De-Benito, 2020). However, critics have raised concerns that greater learner autonomy also facilitates more surface-level learning and avoidance of tasks that might challenge skills and beliefs (Van Schoors, et. al., 2023). Building on this previous research, this study explored teacher use of pathways constructed in a matrix (see Figure 3) designed to

provide clarity of purpose and to scaffold teacher learning tasks from knowledge acquisition to clinical application.

### **Open Educational Resources (OER)**

OER share educational materials freely through the internet by providing copyright for others to use, revise, and build upon the resources (Johnston, 2005). To describe this system, beyond resources being free and accessible, Wiley (2016) introduced the 5R framework (reuse, revise, remix, redistribute, and retain) to guide OER permissions. This study examined the freely available OER database of teacher preparation assignments, sample student work analyses, and curriculum materials to build knowledge in teacher education and propel personalized individual learning pursuits (see <https://bondie.commons.gc.cuny.edu/multilingual/>). The OER database of curriculum materials were intended for teachers and teacher educators, both to use and to contribute to, to continually grow resources and knowledge of the materials teachers are using to support English learners. Guided by OER principles, teachers were encouraged to contribute new materials to the database, build on previous teachers' submissions, and provide feedback to peer submissions (Geith & Vignare, 2019). For example, teachers could expand previously submitted language objectives by adding a lesson plan to the objectives or adapting curriculum materials from the database to their own setting. This approach to openly share assignments aimed at preparing teachers to serve multilingual learners has an open architecture that grew by learner generation and was intended to facilitate collaboration and personalization.

### **Open Pedagogy (OEP)**

Beyond OER materials, the pedagogy of preparing teachers to serve English learners and the subsequent teaching of English learners was also continuously and openly shared and further generated by participants. Jhangiani et al. (2018) defines the effort to share pedagogy as OEP. Hegarty (2015) identifies eight attributes of open education practices or pedagogy (OEP): participatory technologies, trusting, innovation, sharing, networks, learner-generated and co-constructed, reflective practice, and peer-review. Figure 2 displays the personalized learning process used in this study that reflects Hegarty's attributes (also see self-reflection tools, Appendices B- F). This process was designed to support self-regulated learning by promoting a continuous cycle of goal setting, monitoring, control of actions, and reflecting on learning (Zimmerman, 2008). To support sharing, an online discussion board was established for peer and instructor feedback. In addition to the OER, completed tasks were collected into individual digital portfolios that prompted teachers to reflect on their learning and examine trends in task selection. This approach to personalized teacher learning used both OER and OEP.

**Figure 2**  
*Personalized Task Process*



### Teacher Preparation for Multilingual Learners

This study explored personalized learning within a required course aimed at preparing teachers to serve multilingual learners across all grades and subject areas. Similar to Karlsson's (2015) research that examined teacher learning and implementation of strategies for serving English learners, this study was guided by the WIDA standards that provide a framework for curriculum, teaching, and assessment for multilingual learners in grades K-12, specifically developing student language skills and content knowledge simultaneously (see <https://wida.wisc.edu/teach/standards/eld>). The topics that teachers selected in the personalized assignment were based on WIDA standards. Teachers chose a learning method that provided a continuum from research to application. Within each task, options focused on different subject areas (e.g., math or social studies) or aspects of the topic (e.g., different types of writing). Figure 3 displays the matrix that organized the personalized task assignments by seven topic rows (language objectives, discussion, vocabulary, reading, writing, language/culture/identity, and design your own) and five learning method columns (read research, analyze student work, apply technology, create materials, and plan a lesson). See Appendices A-G for the assignment, self-assessment and task selection survey, assignment tracker, and rubric.

Each week, teachers used the reflection tool to identify relevant and/or useful tasks. Teachers could search previously completed tasks by grade level and subject at <https://bondie.commons.gc.cuny.edu/multilingual/> to gain ideas for new submissions or remix submitted tasks. The professor provided the sequence of two topics for the weekly course meetings (see Figure 4, top row) and recommended tasks from the matrix that could be completed prior to (e.g., readings) and following classes (e.g., creating materials). Teachers were encouraged to complete one reading task before other assignments in each row. The minimum completion expectation was one hundred points for any assignment combination. A limit of no more than two 15-point assignments was given, but not rigidly enforced. The purpose was to guide teachers toward completing lower value assignments designed to build skills needed to



complete the 15-point tasks. Assignments could be completed more than once (e.g., creating objectives for different lesson plans).

**Figure 3**

*Personalized Task Matrix*

Activity Type		Read Research (5 points)	Analyze Student Work (10 points)	Apply Technology (10 points)	Create Materials (15 points)	Plan a Lesson (15 points)	Offer Peer Feedback (5 points)	Design Your Own (propose points)
Topic	Language Objectives	Objectives-Read	Objectives-Analyze	Objectives-Apply	Objectives-Create	Objectives-Plan	Objectives-Offer	Objectives-Design
	Discussion	Discussion-Read	Discussion-Analyze	Discussion-Apply	Discussion-Create	Discussion-Plan	Discussion-Offer	Discussion-Design
	Vocabulary	Vocabulary-Read	Vocabulary-Analyze	Vocabulary-Apply	Vocabulary-Create	Vocabulary-Plan	Vocabulary-Offer	Vocabulary-Design
	Reading	Reading-Read	Reading-Analyze	Reading-Apply	Reading-Create	Reading-Plan	Reading-Offer	Reading-Design
	Writing	Writing-Read	Writing-Analyze	Writing-Apply	Writing-Create	Writing-Plan	Writing-Offer	Writing-Design
	Culture & Identity	Culture & Identity-Read	Culture & Identity-Analyze	Culture & Identity-Apply	Culture & Identity-Create	Culture & Identity-Plan	Culture & Identity-Offer	Culture & Identity-Design
	Design Your Own (DYO)	Design Your Own (DYO)-Read	Design Your Own (DYO)-Analyze	Design Your Own (DYO)-Apply	Design Your Own (DYO)-Create	Design Your Own (DYO)-Plan	Design Your Own (DYO)-Offer	Design Your Own (DYO)-Design

### ***Challenges Beyond Personalized Task Design***

Preparing teachers is more complex than acquiring new skills, and researchers warn that teachers may enter teacher education programs with fixed dispositions and beliefs about languages and language learning that prevent them from providing access and effectively serving multilingual learners (Edwards, 2010). Scholars have concluded that novice teachers need program-wide experiences to learn key instructional practices and develop advocacy skills needed to ensure that culturally and linguistically diverse students, their families, and communities thrive at school (Gitomer & Bell, 2016). However, additional research is needed for faculty members to better understand how to use limited teacher preparation time to ensure that all novice teachers develop capacities to serve culturally, linguistically, and ability-diverse students.

For example, Howlett and Penner-Williams (2020) identified a gap in the literature examining teacher satisfaction regarding professional development to prepare teachers to serve multilingual students. Previous studies have focused on measuring teacher learning outcomes but have not as often explored teacher feelings regarding their learning. Through teacher survey analysis, Howlett and Penner-Williams (2020) found that beyond acquiring knowledge and strategies, teacher feelings about their professional learning mattered, e.g., being concerned about time or feeling an increased awareness of their practices. Although this research did not examine teacher feelings about their teaching practices, this study did explore teacher

satisfaction with course design, instructor pedagogy, and engagement with course materials—important components of teacher learning that are not frequently explored in previous literature.

### Course Evaluations

Although the literature debates the usefulness of university course evaluations in evaluating teaching, course evaluations do provide mechanisms for faculty promotion and tenure (Costin et al., 1971). Dziuban et al. (2023) highlighted the complex dynamics of course evaluations, discussing factors that might influence learner evaluations. For this study, factors such as class size or simultaneous enrollment in other courses may have shaped evaluations as much as the addition of personalized learning and OEP. Despite many limitations, course evaluations were systematically administered and required no additional time from faculty members to create or collect. Evaluation items provided one form of data to explore changes in student satisfaction of the course and instructor pre- and post-implementation of personalized learning and the OEP. Table 1 displays 26 Likert-scale evaluation items grouped by personalization element from Figure 1. The alignment illustrated connections between standard course evaluations and implementation of personalized learning.

**Table 1**

*Course Evaluation Items Aligned to Elements of Personalization*

# Items	Course Evaluation Items	Personalization Element
<b>Learner (7 items)</b>		
3	Intellectual challenge Stimulated thinking in new ways Assignments promoted learning and growth	Challenge & Purpose
2	Workload amount Benefit to you	Value
2	Readings were valuable Application to real problems/context	Relevance
<b>Task Design (8 items)</b>		
3	Clear and well-organized syllabus Course objectives were clearly stated Evaluation criteria/process was clear	Clarity
3	Course activities aligned with the syllabus Clearly aligned course content Assignments reinforced course goals	Coherence
2	Diversity issues well addressed Encouraged diverse opinions and perspectives	Multiple Pathways
<b>Learner Support (7 items)</b>		

2	Timely feedback on assignments Useful feedback	Feedback
3	Technology use deepened understanding Technology use enabled discussions Technology facilitated peer learning	Open Technology
2	Environment conducive to learning Discussions enhanced understanding	Trusting Community
<b>Faculty (4 items)</b>		
4	Was accessible Responded respectfully Provided well-structured lectures Led effective discussions	Faculty

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### Research Questions

The purpose of this study was to explore how personalized learning and OER may impact teacher learning paths and course satisfaction when participating in a state-required course aimed at preparing P-12 teachers to serve multilingual learners in the general education classroom. Two research questions guided this study. The first research question explored the extent to which teachers followed individualized learning paths by exploring the sequence of completed assignments, the total completed assignments for each topic across four cohorts, and the amount of time teachers reported spending on course activities outside of class. The second research question explored four semesters of standard university-issued student course evaluation pre- and post-personalization. The course evaluation data provided descriptive information from the P-12 teacher perspective that may inform faculty designs for future personalized assignments.

### Methods

This exploratory research examined the impact of personalization and OER on teacher learning paths by analyzing task completion from one course cohort as a case study and comparing standard university graduate course evaluation items across eight courses, four pre-personalization and four post-personalization taught by the same instructor.

### Participants

All teacher participants, pre- and post-personalization, were enrolled in a two-credit graduate course that had seven in-person class meetings at a private university in the Northeast United States. Demographic data from individual teachers were not collected. Table 1 describes the enrollment data pre- and post-personalization. All summer term participants were novice teachers seeking initial secondary general education certification for a specific subject area. Fall and spring course participants included novice secondary education teachers, experienced teachers seeking elementary reading specialist certification, and administrators seeking school-level building administration certification. Prior to personalization, 81 teachers participated in four different courses. There were 149 participants in the four courses post-personalization. There was a 46% increase in enrollment in the course following personalization. Prior to personalization teachers enrolled in the course as a requirement for teacher certification. Post-personalization, more students enrolled in the course as an elective. The motivation to enroll in

the course, whether the course was a choice or a requirement, may have influenced teacher interest in the course, personalized task selections, and course satisfaction. Pre-testing equivalence was not measured beyond the qualifications for master's degree admissions. Table 2 illustrates the number of evaluations and response rates pre and post personalization.

**Table 2**

*Participants Enrolled in Teaching Multilingual Learner Course Pre- and Post-Personalization*

Year	Term	Enrollment	# Evaluation Responses	Response rate %
<i>Pre-Personalization</i>				
2017	Summer	23	15	65
2017	Fall	22	19	78
2018	Spring	7	7	86
2018	Summer	27	21	86
<i>Post-personalization</i>				
2018	Fall	43	43	100
2019	Spring	36	25	69
2019	Summer	23	19	83
2019	Fall	47	46	98
<i>Total Enrollment and Course Evaluation Responses Pre and Post Personalization</i>				
2017-2018	Total Pre	81	62	77
2018-2019	Total Post	149	133	86
Difference		68 (+46%)	+71	+9.25

### Variables

This study used data that are routinely collected through implementation of the graduate course, including assignment completion (i.e., personalized tasks) and standard university course evaluation items aligned to the research questions.

### *Assignment Completion*

Assignment completion was calculated from the individual teacher portfolios where personalized task assignments were tracked each week. Assignment completion calculated the sequence and frequency of each task completed.

### *Reported Hours Outside Class*

Reported hours spent on personalized task assignments were calculated based on one item in course evaluations that asked teachers to estimate on average how many hours per week were dedicated to this course outside of class from the following seven options: less than 2 hours, 2 to <4 hours, 4 to <7 hours, 7 to <10 hours, 10 to <15 hours, more than 15 hours, or no response.

### ***Pre-Post University Course Evaluation Items***

The university asked all enrolled teachers to complete an online survey course evaluation with 26 Likert-scale items evaluating the course and instructor by measuring agreement to statements listed in Table 2 from strongly disagree, disagree, neutral, agree, and strongly agree and included five open-ended questions asking students for comments on the most and least valuable aspects of the course, effectiveness of the instructor, advice to future students, and needed preparation. For this study, only Likert- scale responses from four pre-personalization and four post-personalization course implementations were analyzed. The final column in Table 2 organized the course evaluation items to elements of personalization.

### **Procedure**

Prior to the start of the course, assignments were transformed from standard required assignments with common due dates (e.g., readings and lesson plans) into a matrix of personalized tasks (see Figure 3). The instructor created assignment guidelines and assessment tools, an OER website, and an online discussion board (see Appendix A through E). IRB approval was not required for data generated through normal course activities and anonymous course evaluations. Task completion was tallied from individual portfolios after course completion. Post-course evaluation data was requested from the university system. Exploratory analysis and visual displays were created to explore individual personalized paths and shifts in teacher responses pre- and post-personalized learning (Tufte, 2017).

## **Results**

The first research question explored the personalized learning paths in four ways: sequence of tasks completed by one cohort, timing of task completion, average completion of each task across four cohorts, and dedicated time outside of class. Figure 4 illustrates the personalized learning paths from the first cohort of 43 participants from Fall 2018. This cohort was selected because 100% of participants completed the course evaluations and 74% of participants reported being required for program completion.

Figure 4 illustrates the personalized paths pursued by individual teachers by charting tasks completed by topic and task type compared to the two topics taught by the course instructor during each of the seven weeks (i.e., see top row). On average, each teacher contributed 13 tasks, submitting 575 tasks into the OER database. The shades of gray indicate the order of topics each participant selected. For example, we see that 38 participants completed a reading task following the first class. The capital letters and different shades of gray indicate that participants chose to learn through different methods and topics. When scanning each column, we see greater variation in task completion by both topic (i.e., gray shading) and type of task (i.e., capital letter) as the seven-week semester progressed. Individual learning trajectories or the sequence of topics completed increased in variance over time from the instructor's topic sequence. Similarly, task types increased in variation from week one, where four different task types were selected, to week six, where all seven task types were completed. White-colored cells show when a teacher had zero task completion. Because task types ranged in points from five points for *Reading Research* to 15 points for *Planning Lessons*, participants could complete fewer tasks if 15-point tasks were selected. The final column of total points earned shows that all but two teachers

earned more than the required 100 points, with the highest score of 131 points. For this display, teachers were grouped by subject area taught and no patterns by subject area were visible.

**Figure 4**  
*Comparison of Course Instructor Topics and Individual Teacher Personalized Task Completion*

KEY			
Color	Topic	Letter	Task Type
	Objectives	R	Read Article
	Discussion	A	Analyze Student Work
	Vocabulary	T	Apply Technology
	Reading	C	Create Materials
	Writing	P	Plan a Lesson
	Culture & Identity	F	Give Peer Feedback
	Design Your Own	DYO	Design Your Own

Week	1	2	3	4	5	6	7
Instructor							
Students							
1	A	R	P	A	A	R	P
2	A	R	R	T	T	R	C
3	P	R	F	R	R	C	A
4	P	T	C	P	T	A	A
5	R	A	P	R	R	A	T
6	R	A	R	A	P	R	A
7	R	A	R	R	T	DYO	R
8	R	A	R	T	P	R	T
9	R	A	R	A	R	R	R
10	R	C	P	R	C	P	C
11	R	F	R	A	A	P	R
12	R	P	R	P	R	R	T
13	R	P	R	T	T	T	P
14	R	P	DYO	R	R	P	DYO
15	R	T	A	R	P	P	DYO
16	R	T	R	A	R	A	R
17	R	R	A	T	T	T	C
18	R	R	A	R	R	P	T
19	R	R	P	R	A	A	P
20	R	R	P	R	A	A	R
21	R	R	R	T	R	T	A
22	R	R	R	R	T	A	C
23	R	R	A	R	R	P	A
24	R	R	A	R	A	P	P
25	R	R	A	R	C	R	P

26	R	T	R	A	DYO	DYO	A	R	A	P	P				
27	T	R	R	C	T	T	R	A	C	A	C	R	P		
28	T	R	R	R	R	P	P	T	A						
29	R	R	A	DYO	T	A	A	P	P						
30	R	A	P	P	R	R	C	T	DYO	A	F				
31	P	R	R	R	R	R	A	C	C	T	C	A			
32	R	P	R	A	P	A	C	C	A	A					
33	R	R	R	A	A	C	P	P	C	P	T				
34	T	R	R	DYO	DYO	A	P	C	R	A	P				
35	A	R	P	R	R	C	T	P	C	C	R				
36	P	R	P	T	T	P	P	R	A						
37	R	R	A	R	C	T	R	A	P	A	P	T			
38	A	R	T	R	A	T	C	A	C						
39	R	A	T	T	T	A									
40	A	R	R	R	A	DYO	A	R	R	R	C	T			
41	R	P	R	R	P	DYO	R	P	R	R	P	P	R	A	
42	R	A	C	P	A	P	P	A	P						
43	DYO	R	R	R	R	R	R	A	A	R	P	T	A		
44	DYO	A	P	A	P	A	T	R	P	T	DYO				

**Figure 5**

*Number of Assignments Completed Each Week by Individual Teachers*

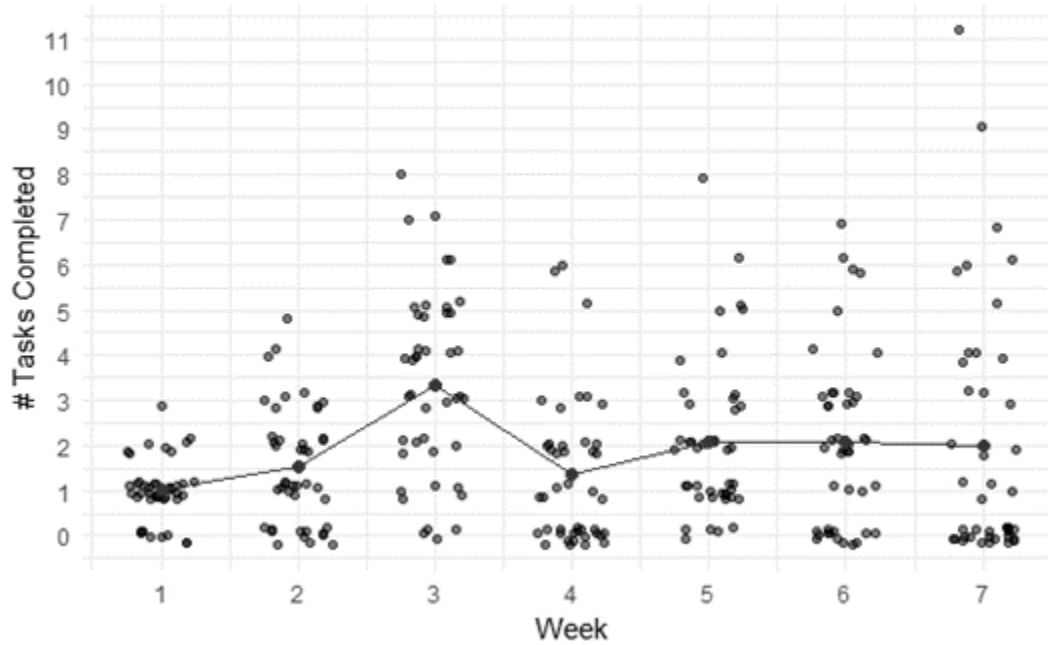


Figure 5 displays the number of personalized tasks completed each week by individual teachers. During week three many teachers completed between two and eight personalized tasks. A few teachers waited until the end of the course to turn in between six and 11 tasks. This view of the data reveals patterns among teachers who completed assignments at a steady pace that increased to a high point middle and then decreased, and those who waited until the end of the course to complete assignments.

Table 3 illustrates the percentage of teachers who completed each task, ordered by greatest to least frequency, by course topic, and by cohort. On average, over four cohorts, the most frequently submitted tasks used the *Reading Research* task type and the topics of language objectives, discussion, vocabulary. The least-submitted learning method was *Using Technology* in the topic areas of reading, writing, and culture.

**Table 3**

*Percent of Teachers Who Completed Each Personalized Task by Topic, Task Type, and Cohort Year*

	Fall 2018 (43)	Spring 2019 (36)	Summer 2019 (23)	Fall 2019 (47)
<b>Language Objectives</b>				
Read Research	0.93	0.92	0.78	0.79
Plan Lesson	0.84	0.72	0.70	0.77
Analyze Student Work	0.23	0.31	0.26	0.32
Apply Technology	0.21	0.22	0.43	0.36
Create Materials	0.02	0.14	0.26	0.04
<b>Discussion</b>				
Analyze Student Work	1.00	0.83	1.00	0.74
Read Research	1.00	1.08	0.87	1.02
Plan Lesson	0.70	0.25	0.39	0.15
Create Material	0.56	0.17	0.87	0.13
Apply Technology	0.23	0.28	0.04	0.15
<b>Vocabulary</b>				
Read Research	0.53	0.75	0.57	0.66
Plan Lesson	0.44	0.22	0.17	0.40
Analyze Student Work	0.30	0.31	0.30	0.62
Apply Technology	0.05	0.44	0.22	0.47
Create Material	0.00	0.06	0.09	0.19
<b>Reading</b>				



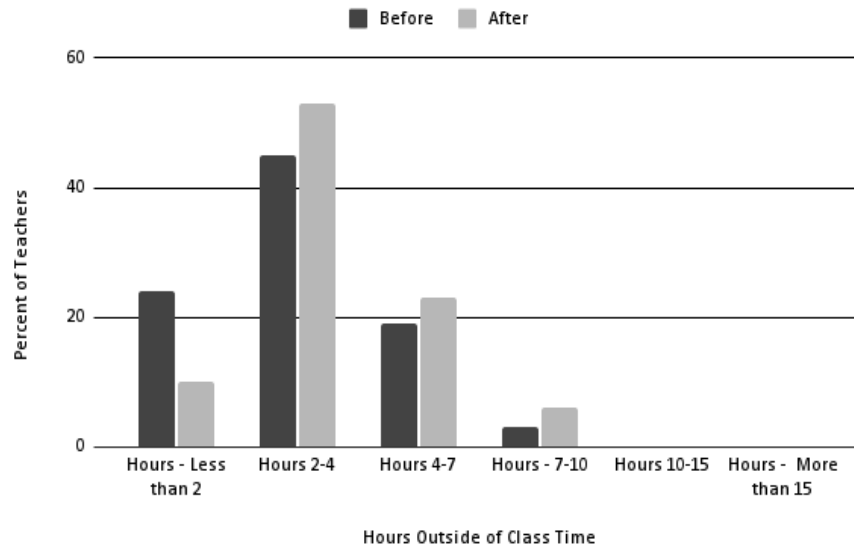
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Read Research	0.35	0.75	0.30	0.38
Plan Lesson	0.30	0.28	0.22	0.21
Analyze Student Work	0.05	0.17	0.13	0.15
Create Material	0.02	0.17	0.04	0.11
Apply Technology	0.07	0.08	0.00	0.04
<b>Writing</b>				
Read Research	0.26	0.42	0.22	0.28
Plan Lesson	0.21	0.19	0.13	0.09
Analyze Student Work	0.07	0.08	0.09	0.28
Create Material	0.02	0.11	0.30	0.04
Apply Technology	0.00	0.14	0.04	0.09
<b>Culture &amp; Identity</b>				
Analyze Student Work	0.84	0.33	0.04	0.40
Read Research	0.72	0.64	0.39	0.34
Plan Lesson	0.21	0.08	0.04	0.06
Create Material	0.07	0.08	0.17	0.23
Apply Technology	0.00	0.06	0.00	0.02
<b>Design Your Own</b>				
Design Your Own	0.00	0.28	0.87	0.60

*Note: Topics are displayed in color aligned with Figure 4.*

Figure 6 displays the estimated amount of time participants reported spending on course activities outside of the synchronous classes comparing pre- and post-personalization. The expected amount of time by the university is six hours per week. Fewer participants reported spending fewer than two hours; more spent between two and ten hours.

**Figure 6**  
*Work Hours Outside of Class Time*



**Research Question 2**

Research question two examined eight courses, four pre- and four post-personalization through data visualizations and descriptive statistics (Tufté, 2017). Figure 7 displays the percentage of teachers who responded with each Likert-scale rating from not at all to five, or not applicable for each evaluation item, organized by personalized learning element. Percentages were used instead of frequencies of the ratings because of the difference in the number of teachers who completed the evaluations (i.e., pre-62 and post-133, see Table 1). This figure provides a visualization of teacher satisfaction in the four pre- and post-personalization courses.

**Figure 7**  
*Percent of Likert Scale Ratings by Personalization Element Pre-Post Personalization*



Note: The item regarding Workload used different response options (see Figure 5). For this display the final two options, 10-15 hours and more than 15 hours were combined because there were zero responses for each category. Workload is included here to visualize perceptions of workload in relation to benefit or value.

Table 4 presents the mean rating of each Likert-scale item organized by personalization element. Items related to technology positively changed *deepening understanding* (+.28) and *enabling discussion* (+.61). Teachers reported greater perceptions of workload (+.27) and smaller changes in course benefit (.06). Relevance included items related to the value of course readings (+.29) and applications to real world problems and contexts (+.19). Challenge included items related to *intellectual challenge* (+.15), *stimulating thinking in new ways* (+.04), and assignments *promoting learning and growth* (+.28). Clarity included negative change in *syllabus organization* (-.23), *course objectives were clearly stated* (+.1) and positive change in *clear evaluation criteria and processes* (+.94). Coherence had a negative change in lectures (-.21) with many teachers

selecting *not applicable* and a few *not at all*. Very little change was observed in other coherence items, e.g., *course activities aligned with syllabus* (+.3), *clearly aligned course content* (+.08), or *assignments reinforced goals of course* (+.03). Feedback had negative changes in *timely feedback on assignments* (-0.24) and *useful feedback* (-0.01). Multiple pathways were aligned with items reflecting on issues of diversity, e.g., *diversity issues well addressed* (+0.35) and *encouraged diverse opinions/perspectives* (-0.14). Trusting community was aligned with items reflecting the class culture, e.g., *environment conducive to learning* (+0.17), and *discussions enhanced understanding* (+0.13). Changes were observed in items rating the course instructor, including *responded respectfully* (+1.00) and *led effective discussions* (+1.31) while other items related to the instructor had less change, e.g., *was accessible* (+0.8) and *provided well-structured lessons* had a small negative change (-.07). This exploratory study used descriptive analyses versus inferential statistics due to the exploratory study purpose, sample size differences, and varied motivations for pre-post course enrollment.

**Table 4**

*Course Evaluation Items Pre-Post Personalization Mean Comparison by Personalization Elements*

<b>Likert Scale Evaluation Items (Agreement, 1-5, Not Applicable)</b>	<b>Pre-Mean</b>	<b>Post-Mean</b>	<b>Change</b>	<b>Personalization</b>
Promoted learning & growth	4.03	4.31	0.28	
Stimulated thinking in new ways	4.29	4.32	0.04	Challenge
Intellectual challenge	3.68	3.82	0.15	
Readings were valuable	3.84	4.13	0.29	
Application to real problems / contexts	4.36	4.54	0.19	Relevance
Benefit to you	4.09	4.14	0.06	
Workload Amount	2.98	3.25	0.27	Value
Accessible	3.18	4.00	0.82	
Responded respectfully	3.20	4.20	1.00	Teaching & Feedback
Timely feedback on assignments	4.67	4.44	-0.24	
Useful feedback	4.46	4.45	-0.01	
Communication	3.80	4.48	.68	
Peer learning	3.82	4.38	.56	Open Technology
Deepened understanding	4.15	4.43	0.28	
Enabled discussions	3.73	4.33	0.61	Trusting Community
Environment conducive to learning	4.56	4.39	0.17	

Course objectives were clearly stated	4.84	4.94	0.10	
Clear evaluation criteria/process	3.15	4.09	0.94	Clarity
Clearly aligned course content	4.27	4.35	0.08	
Assignments reinforced	4.37	4.40	0.03	
Activities aligned to goals	4.64	4.94	0.30	
Goals	4.18	4.37	0.19	Coherence
Lectures	4.13	3.92	-0.21	
Organized syllabus	3.50	3.27	-0.23	
Diversity issues well addressed	4.19	4.53	0.35	
Encouraged diverse opinions/perspectives	4.40	4.54	0.14	Multiple Pathways
Provided well-structured lessons	4.09	3.98	-0.07	

## Discussion

This study explored how teachers engaged with personalized professional tasks and evaluated the course pre- and post-personalization. The display of the completed tasks (see Figure 4) revealed patterns that may be related to individual teachers and time (see Figure 5). This analysis illustrated how individual learning paths differed. During the first week, many teachers engaged in the course instructor's topic. However, within that topic, teachers selected different learning methods. This might suggest that teachers had different immediate needs or interests that personalization enabled them to pursue. At the same time, teachers unfamiliar with the course content could begin by following the course instructor's lead. As the course continued, the variety of topics and task types that teachers completed increased. These results may illustrate that increased knowledge on a topic facilitated learners' agency, divergent interests, or risk taking. These results might also suggest that some tasks were more accessible or useful depending on previous knowledge and current teaching needs. In addition, familiarity with matrix options may have led to a wider range of selections and ease in selection. Taken together, these results suggest that previous knowledge and awareness of the options may facilitate teacher agency in pursuing individual learning interests. Figure 4 also illustrates how teachers leveraged time flexibility to finish course requirements on an individual schedule versus set due dates. This design element may have worked well with the competing demands of teachers' lives. However, teachers who finished early or skipped completing tasks during some weeks may have missed the opportunity to apply learning from class sessions. For example, the final instructor led topics of reading and writing and had the fewest number of completed tasks across all four cohorts. These results provide insights for future personalized task design and the organization of course content.

Examining patterns through the average assignment completion over four cohorts provides additional information on teacher engagement with the learning tasks. All four cohorts completed the tasks in very similar patterns, with topics taught earlier in the course receiving the most completed assignments. However, task completion was not completely consistent. For example, the task type *Reading Research* on the topic *Culture and Identity* declined after the first two cohorts. In addition, the *Create Material* task in the Discussion topic changed with each cohort, moving from 56% to 17% then increasing to 87% completion during Summer 2019, and finally returning to 13% completion. *Reading Research* in the Reading topic had one spike of 75% in Summer 2019 but was in the 30% range for all other cohorts. These shifts in teacher task selection may be related to course instructor varying class activities or current events that nurtured teacher interest. Another observation was that the first cohort did not complete the *Design Your Own* task (DYO) option. However, individuals completed the DYO tasks in all subsequent cohorts. This trend may suggest that the availability of the OER database of previous assignments facilitated greater freedom in task selection and creation.

The *Apply Technology* topic was rarely completed by teachers. There are several possible explanations: teachers may have estimated that the task completion time was too long because of learning a new application to complete the task, there may have been misalignment between the ways teachers use technology or what technology was available at their schools, the tasks may have not been relevant, or teachers may have felt that all of their tasks used technology since they were accessing tasks through OER and maintaining a digital portfolio. The low engagement with technology raises many questions about how teachers develop teaching with technology skills when assignments are integrated into courses where learning technology is not the primary focus. Teachers also may have felt it was too time consuming to learn the strategies to teach multilingual learners and to engage with new technologies at the same time. However, technology tasks focused on teaching multilingual learners have been successful in teacher preparation, such as Martínez-Álvarez et al.'s (2017) multimodal expressions exploring relationships of identity, culture, and language invited recursive and deep reflections. Given the lack of engagement with technology-focused tasks, faculty could revise tasks based on examples from previous literature.

Teachers reported an increase in the number of hours dedicated to the course outside of class time, with most teachers spending between two and four hours. How teachers spent the additional time raises many questions. For example, more time may have in turn resulted in the development of greater skills to teach multilingual learners. However, the increased time could have been related to selecting assignments. The nine students who continued to submit tasks through the final week of the course may have found an interest that they were pursuing. Given limited time, teachers may have selected tasks that could be finished quickly rather than tasks needed to develop their teaching skills. Future course evaluation could add a question asking teachers to describe the activities that they engaged in during the time outside of class.

Course evaluation items provided a lens to consider the task completion data. Figure 6 reveals that, on average, teacher-reported satisfaction shifted pre- and post-personalization. Interestingly, the response *not at all* was used much more often post-personalization. Specifically, the item measuring the alignment of lectures to course goals shifted to include *not at all*. This result makes sense, given that the topic sequence of classes was often different than

the topics teachers pursued in their tasks (see Figures 4 and 5). Figure 7 illustrates that, overall, teacher-reported ratings were positive, at 3 or higher, prior to personalization and remained positive after personalization. The data visualization draws our attention to where there was more movement in specific items. For example, *diversity*, *well-structured assignments*, and *multiple perspectives* all shifted positively post-personalization and reflect important elements of personalization and OER. However, course satisfaction related to the course organization and clarity decreased after personalization, possibly because the personalized assignment was not explained clearly or that this type of assignment was unfamiliar to many teachers enrolled in a course required for certification. This could also suggest that making decisions each week and searching through completed tasks taxed teacher cognitive load (Mayer, 2004).

### Significance

This research explored the impact of personalization and OER on novice teacher learning paths and course satisfaction as measured by university course evaluations. These changes transformed a required licensure course aimed at preparing teachers to serve multilingual learners into a personalized learning experience. This study provided evidence that a cursory alignment among evaluation items and personalized learning is possible and standard course assignments can be reorganized into learning paths that offer autonomy, choice, and flexibility in due dates. Further, evidence suggests that teachers, within this specific course and setting, seemed to respond positively to these changes. This study offered methodological, practical, and theoretical significance for the field of teacher education.

By using data generated through course activities and existing measurement tools, this study provided a realistic methodology for future studies. This research showed how existing tools can be used by faculty members to deeply reflect on learner engagement and responses to pedagogy in teacher preparation. The results also illuminated ways to improve the personalized tasks and implementation.

Practically, this study demonstrated that when faculty members are confronted with a dictated curriculum, standard assessments, and limited time (i.e., two credit/seven weeks versus four credit/15 weeks), learning can be personalized and enhanced through OER/OEP. The personalized assignment task matrix and analysis methods are replicable both in teacher preparation courses and P-12 education. The personalized learning model and assignments provide a documented beginning for future studies to build upon. As Lavery et al. (2019) identified, teachers who experience personalized learning in teacher preparation may be more likely to utilize personalized learning in their own teaching. However, the completed tasks in teacher portfolios were not analyzed for the extent to which personalized learning elements were applied, nor were personalized learning elements used in the rubric that guided submissions (see Appendix E). Explicit support for teachers to apply pedagogy being modeled through the course into their own P-12 classroom was not provided and should be incorporated in future iterations of this course design.

Through careful analysis, clear missing components in the personalized task design for this study were revealed, including attention to teacher feelings (Howlett & Penner-Williams, 2020) and explicit development and recognition of teacher beliefs and expectations regarding multilingual students and learning languages (Van Schoors et. al., 2023). Further, Heineke et al.

(2022) examined the importance of teacher capacity to nurture the well-being of multilingual learners. Aspects of beliefs, expectations, and well-being for both teachers and students should be included in future implementations of a personalized matrix for teacher preparation to serve multilingual learners.

In addition, Mayer (2004) suggested measuring cognitive and behavioral activity when testing educational techniques such as discovery learning or constructivism, which are key elements of personalized learning. This study focused on examining behavioral responses but did not investigate the thinking or feelings that propelled or resulted from engaging in the personalized assignment. Future studies may examine cognitive load in decision making and feelings of challenge when engaging with personalized tasks. Specifically, future studies should investigate the extent to which personalized learning can prepare teachers for the intellectual challenges of classroom teaching. The extent to which personalization facilitates avoidance of intellectual challenge should also be examined.

Theoretically, this study identified elements of personalized learning aligned with university course evaluations. Course evaluations convey messages to students regarding what is important about learning experiences in courses and may shape faculty instructional decisions through the influence of course evaluations on opportunities for advancement (Costin et al., 1971). While the alignment of course evaluations to personalized learning and OEP is imperfect, making the effort to do so offers theoretical contributions to the field of teacher education because the alignment makes underlying values visible. However, students' feelings about their agency or learning, role, and experiences throughout the course were not sought. The items related to the student learning experience asked only about time spent outside of class on course activities versus exploring ways the course content was relevant to their lives outside of the course.

Theoretical significance includes the illumination of this study's approach to personalization as a beginning or surface-level approach to greater individual relevance in required teacher preparation courses. The designs of learning tasks and existing evaluation items fall short of Kenney's (2016) identification of motivation, intellectual challenge, and feelings of meaning as key components of teacher development. This study showcases the need for a new theoretical framework to guide the design of teacher learning that moves beyond skill acquisition detached from thinking and feeling. Zusho et al. (2023) offers a framework that focuses on the quality of learning experiences as new standards, e.g., measuring learner feelings of love, joy, rigor, and freedom. These feelings are salient to all personalized learning pursuits and could effectively guide teacher preparation. Future designs for personalized learning may explore ways to nurture love, joy, rigor, and freedom in task design and to measure these qualities from the teacher perspective.

### **Limitations**

This exploratory study has important limitations that should be considered when interpreting the results. Pre-testing equivalence was not measured beyond the qualifications for master's degree admissions. Course evaluations items were not distributed equally among personalization elements or personalized element alignment tested. Changes in the evaluation items could be the result of factors other than personalization, such as the course instructor



teaching improvements over eight iterations of the same course content. Sample sizes varied by 46% pre-post personalization. Findings should not be generalized beyond this study. Although OER was used as a critical component of the personalized task assignment, no evaluation items could be used to measure the extent to which teachers examined completed tasks in the database and built on submissions. Although this exploratory study did not aim to produce generalizable findings, the results do offer insights and raise questions that may inform creating personalized tasks.

### **Recommendations**

The close examination of personalized learning paths and results of course evaluations offer direction and questions for implementing personalized learning in teacher education. For example, while the ability to make relevant assignment choices worked well for some teachers' learning, others may have preferred a sequence of required assignments. Read and Hurford (2008) described this tension as a continuum from overwhelming to enabling. Future courses may address this tension by providing a path with fewer choices designed by the professor. Future studies should interview teachers to discover the reasoning that underlies perceptions of personalized learning, use of completed assignments, and implementation of personalized pedagogy in their own teaching. Faculty members might consider eliminating or revising assignments that were not selected by any cohort. A matrix with equal numbers of tasks for each topic may not be necessary, but other organization structures for personalized learning tasks should be explored.

This project was a test and proof of a concept demonstrating one way of implementing personalization within the context of an established curriculum and credentialing structure. Additionally, this project explored how personalization in teacher preparation may further teachers' individual expertise while also demonstrating what personalized learning could look like in teachers' own Pre-K-12 classrooms. Future studies should explore how personalization relates to teacher autonomy and commitment to P-12 personalizing learning and how the free materials website may support learning transfer to daily practice. In addition, future studies might measure the extent to which standardized outcomes in teaching practices can be achieved through personalized learning. While this study relied on participants to self-select personalized tasks, future studies may leverage technology tools from automated survey feedback to employing algorithms to assess teacher skills and then recommend tasks to teachers.

Researchers have suggested that teacher preparation for multilingual learners needs to examine beliefs and dispositions about language learning (Edwards, 2010; Van Schoors et. al., 2023). Faculty members may consider adding a reflection component to each assignment that directly prompts reflections on teacher beliefs. In addition, a row may be added to the matrix to nurture the development of teacher identity and awareness of existing beliefs. Future studies should tackle the challenge of measuring or documenting how personalized learning in teacher education may support teachers and course faculty members in confronting and changing the dispositions and beliefs about multilingual learners that may prevent teachers from providing necessary teaching and access to the curriculum for all students in daily teaching.

### **Declarations**

The authors declare no conflicts of interest.

The authors declare no funding for this research.

Permission to collect data from human subjects was not required from the IRB/Ethics Board at the Harvard Graduate School of Education.

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## **APPENDIX A**

### **Personalized Pathways Procedures**

#### **Where are the Learning Choice Materials?**

All materials can be found at <https://bondie.commons.gc.cuny.edu/multilingual/>

**All posts must include both the preparation and post thinking routines.**

#### **Preparation Thinking Routine**

1. Name of the selected assignment and number of points the assignments is worth (attach completed assignment)
2. I made this choice because ... (describe your goal or what you are hoping to accomplish by completing this assignment)
3. How long do you think you will spend working on this assignment?
4. On a scale of one to five, with one being not at all confident, 3 being neutral, and 5 being very confident, rate how confident you are that you will be able to accomplish your goal? Describe what makes you say that level of confidence?

#### **Post Assignment Reflection**

1. What did you do (give number of assignment and points desired)?
2. What challenges, if any, did you encounter? Describe how you addressed the challenges.
3. Reflect on your learning from this assignment. Complete the sentence: I used to think \_\_\_\_\_ but now I think \_\_\_\_\_ so next I will \_\_\_\_\_

\* In the subject line of your post indicate the assignment number and the feedback you desire: Peer, Teacher, Self, Expert

*Points will be awarded each week (by the following Sunday).  
Check grades in Canvas on the left-hand menu for scores.*

## APPENDIX B Task Choice Selection Tool

### How do I know what topic to choose?

Take a moment to think about the topics that we will be studying. Create a learning value score by thinking about the amount of expertise that you already have using the *Knowledge Rating Tool* and the ways that help you learn best using the *Methods for Learning Tool*. Use this reflection guide to help set learning goals for yourself and to plan a learning path of assignments that will be most effective and efficient for you.

**Knowledge Rating:** Reflect on how familiar you are with the topics of our course.

1 = I know a lot about this      2 = I have heard about this      3 = This sounds new to me

**Interest Rating:** Ask yourself what sounds interesting.

1 = This seems tiresome      2 = I am curious      3 = I am excited to learn more

**Useful Rating:** Thinking about your immediate situation and future, which topics are useful?

1 = I can't imagine needing this knowledge    2 = I think it could help me    3 = I need to know

Topics - What We will Learn (Rows)	Knowledge 1, 2, or 3	Interest 1, 2, or 3	Useful 1, 2, or 3
<b>1.Objectives</b> Practice creating language objective, breaking down objectives into accessible learning progressions, and incorporating anti-bias objectives into lesson plans.			
<b>2. Discussion - Speaking/Listening</b> Learn how to structure equitable discussions and support all learners in using language for communication and learning.			
<b>3. Vocabulary</b> Learn how to select words to teach and help students learn and use vocabulary.			
<b>4. Reading</b> Learn how to select relevant texts, make text accessible and build language skills, and support student comprehension.			
<b>5. Writing</b> Learn how to support and extend student writing skills.			
<b>6. Language, Culture, and Identity</b> Expand your understanding of language, culture, and identity.			



**APPENDIX C**

**Task Choice Selection Tool (continued)**

**How do I choose a method of learning the topic that I have chosen?**

Think about the ways that help you learn most. Evaluate the methods that would be most helpful for each topic (row) that you would like to learn.

<b>Effective Rating: When I do activities like this:</b>		
<b>1</b>	<b>2</b>	<b>3</b>
I forget pretty soon	I can remember for a long time	I can use my learning, e.g., to solve problems and relate my learning to other topics

<b>Efficient Rating: Reflect on the ratio of effort to value:</b>		
<b>1</b>	<b>2</b>	<b>3</b>
Too much work for the benefit	Time spent and effort match	Impact is greater than the amount of time and effort

<b>How to Learn (Columns)</b>	<b>Effective (1, 2, or 3)</b>	<b>Efficient 1, 2, or 3)</b>
<p style="text-align: center;"><b>R - Read, Research, and Reflect</b></p> <p>Use articles, videos, podcasts, infographics, and other sources to explore a research question. Organize your findings and reflect on how this knowledge will impact your instruction.</p>		
<p style="text-align: center;"><b>A - Analyze Teacher and Student Work</b></p> <p>Expand your thinking about language demands in curriculum. Increase your sensitivity to the strengths that students bring to learning.</p>		
<p style="text-align: center;"><b>T - Technology Tools</b></p> <p>Learn how tools support and extend language learning.</p>		
<p style="text-align: center;"><b>C - Create Learning Materials</b></p> <p>Create scaffolds, supports, and extensions to support and extend language development. Revise materials to increase access and rigor for all learners.</p>		
<p style="text-align: center;"><b>P - Lesson Plans</b></p> <p>Demonstrate understanding of WIDA standards and SIOP strategies in instructional plans.</p>		
<p style="text-align: center;"><b>F - Offer Feedback</b></p> <p>Respond to a module colleague using the ladder of feedback.</p>		

**APPENDIX D**  
**Planning and Tracking Sheet for Personalized Pathway**

	Expertise I will develop	Assignments I will complete	Expected Points
<b>Week 1</b>			
<b>Week 2</b>			
<b>Week 3</b>			
<b>Week 4</b>			
<b>Week 5</b>			
<b>Week 6</b>			

**Limits**

Maximum of two 15-point assignments

Must complete one Read and Research before doing other assignments in the row.

**APPENDIX E**  
**Choice Assignment Rubric**

	<b>Does Not Meet Criteria</b>  (No points, you will be asked to resubmit assignment)	<b>Meets Criteria</b>  (Full points)
<b>Responds effectively to the assignment</b>	Does not complete the assignment as written, does not meet the full criteria of the assignment.	Completes the assignment as written. Meets all components of the assignment.
<b>Accurately reflects WIDA Standards and the principles of SIOP</b>	Does not demonstrate understanding of core principles enumerated in the course understandings and literature.	Demonstrates understanding of core principles enumerated in the course understandings and literature.
<b>Work demonstrates precision and accuracy appropriate to the demands of a graduate course (including correct citations, grammar, and mechanics)</b>	Work contains significant grammatical inaccuracies, inaccurate citation, or a general lack of precision with respect to completeness or accuracy.	Work meets all discipline specific standards for accuracy.
<b>Work demonstrates thoughtfulness and insights appropriate to the demands of a graduate course</b>	Work does not demonstrate deep thinking or insightful responses to the task.	Work demonstrates thoughtfulness and insights appropriate to the demands of a graduate course.
<b>Work specifically and explicitly responds to an identified language demand in an inclusive setting.</b>	Work product does not include specific attention to language demands.	Work specifically addresses the language demands.

Use these criteria to offer feedback to peers. Points will be earned based on meeting **all** criteria.

# Exploring Open Pedagogy in Online Community College Settings: Enhancing Equitable Access, Engagement, and Student Persistence

Staci Gilpin

*The College of St. Scholastica, USA  
University of Wisconsin-Superior, USA*

Stephanie Rollag Yoon

*Minnesota State University, Mankato, USA*

Julie Lazzara

*Paradise Valley Community College, USA*

## Abstract

This qualitative study examines open pedagogy as a critical instructional strategy in online community college settings to increase opportunities for authentic interactions that support student persistence. Discourse analysis was used to understand how community college students (n=78) perceive and connect with different aspects of open pedagogy activities. The study's findings underscore the students' awareness of their audience in online settings, their value of collaborative efforts to design digital materials, and the significance of acknowledging the digital learning context. Despite many students choosing to share their work publicly, challenges related to sharing work publicly were illuminated across reflective questionnaire responses. To address these issues, the study recommends enhancing media literacy, providing group collaboration options, and emphasizing institutional support. Further research should explore the influence of social media experiences and AI tools on the public sharing of open pedagogy activities. Ultimately, by embracing open pedagogy in online learning contexts while considering individual student identities and perceptions, community college settings can enhance online interactions, engagement, and student persistence.

*Keywords:* Open pedagogy, online learning, community college, student persistence, collaboration, online interactions

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Community college leaders acknowledge that many of their students prefer online options due to their flexibility and convenience (Murphy & Stewart, 2017; Raza et al., 2020), but they also have concerns about student persistence in these online courses compared to on-site courses (Hobson & Purohito, 2018; Francis et al., 2019). As community colleges face the challenge of graduating fewer than 40 percent of their students within six years (Bailey et al., 2015) and recognize the potential for online learning to provide accessibility for their student population (Harris & Martin, 2012; Murphy & Stewart, 2017; Raza et al., 2020), it is imperative that online pedagogy be developed to meet students' learning needs so that they can persist and complete their educational journeys. Institutions address these challenges primarily through adaptations to learner support systems and instructional designs within their operational capacity (Xu & Jaggars, 2011; Kelly & Zakrajsek, 2020). Instructional designs significantly influence student learning outcomes (Rovai, 2003) and are relatively feasible to implement rather than making fundamental changes to technical or environmental conditions (Fang et al., 2023).

With online learning, students report feeling isolated and disconnected from their peers (Kaufmann & Vallade, 2020). Scholars have identified a link between lower online course persistence rates and course design, leading to an interaction deficit (Watts, 2016), while students who engage in the learning process with their peers may have lower attrition levels (Angelino et al., 2007). Notably, Paulsen and McCormick (2020) underline the constrained student-to-student interaction opportunities in online courses versus on-site settings. Other scholars argue that interactions in online courses lack authenticity for modern diverse learners, potentially isolating students and leading to disengagement and withdrawal (Kadokia & Owens, 2016; Majid et al., 2015; Mehall, 2020; Schultz et al., 2020). This isolation arises due to inadequate communication and genuine interaction, adversely affecting performance and course retention (Bawa, 2016). Instructors often address this gap using instructional designs that include text-based asynchronous discussion boards (Kauffman, 2015) despite students expressing discontent with this approach (Kauffman, 2015; Majid et al., 2015). Ultimately, online instructors are often frustrated due to poor guidance about best practices when designing interactions (Fehrman & Watson 2020).

As online learning instructors and researchers, we found ourselves connecting around these concerns and a shared interest in the possibility of utilizing open pedagogy to positively impact students' experiences in online learning in the community college setting. In our pursuit of equitable online education, open pedagogy emerged as a promising instructional strategy to provide a high-quality learning experience to all higher education students because it allows for collaborative practices that serve authentic purposes. Drawing on its connections to Open Education Resources (OERs), we define open pedagogy as focusing on student-centered creations, collaboration, authentic audiences and purposes, and utilizing Creative Commons (CC) licensing (Rollag Yoon & Gilpin, 2022). In our literature review, we expand on this definition and how its focus provides a pathway for student persistence in online learning at community colleges.

Our article begins with a literature review that situates our study by defining open pedagogy and identifying gaps in the research base around open pedagogy in community colleges. Importantly, we reflect on the ways open pedagogy provides space to critically question information as it is provided and actively and collaboratively make pathways for further

participation of all students. We position this idea within a view of online learning as a space of possibility for students' participation. We then provide details of our research study, including implementing open pedagogy activities, and share our findings. Finally, we discuss the implications of our research for open pedagogy and its potential to enhance equitable access, student engagement, and persistence in online community college settings.

## Literature Review

This literature review focuses on three concepts that shape our understanding of open pedagogy as implemented in this study: (1) defining open pedagogy to include practical examples of these activities, (2) connections between online learning theories and open pedagogy, and (3) the complexities of open pedagogy. We end this section with a call for research around open pedagogy for the community college population, including our research questions.

### OER to Open Pedagogy

The open education movement has its roots in OER as a cost-saving tool that can alleviate student debt and, to some extent, promote educational equity (McCoy-Simmons, 2022). Evidence of the positive impact of OER in education continues to build (Clinton, 2018; Gurung, 2017; Watson et al., 2017; Griffiths et al., 2018; Nelson & Riehm-Murphy, 2022). Hilton (2020) synthesized 36 studies involving OER effectiveness and perceptions, finding that students and faculty perceive OER as equal to or better quality than traditional textbooks. Add to this a large-scale study of over 20,000 undergraduate students (attending both community and four-year institutions) by Colvard and colleagues (2018) which revealed the positive impacts of OERs on grades and student attrition with the greatest positive impacts on historically underserved students and those from lower socioeconomic backgrounds.

In recent years, there has been a significant focus on enhancing diversity, equity, and inclusivity in education through the concept of open pedagogy (Bali et al., 2020; Clinton-Lisell et al., 2021; Hodgkinson-Williams & Arinto, 2017; Lambert, 2018) which is perhaps untapped in its potential to support online learners. This approach seeks to align the increased access and reduced costs provided by OER with social justice principles, as emphasized by Hare (2020), Kruger and Hollister (2021), and Nascimbeni and Burgos (2019). Additionally, open pedagogy operates within an OER ecosystem, where students learn to leverage CC licenses (CC, 2021) to copyright their materials for use and redistribution by others digitally. By providing space for students to create educational materials for others, open pedagogy can contribute to representational justice by facilitating equitable expression of perspectives (Lambert, 2018).

Aligned to the context of this study, the benefits of open pedagogy and OER have appeared in studies that focus on community college students (Clinton-Lisell, 2021; Rollag Yoon & Gilpin, 2022, Clinton-Lisell & Gwozdz, 2023; Griffiths et al., 2018; Lazzara & Clinton-Lisell, 2022). One such study by Clinton-Lisell and Gwozdz (2023) reveals compelling outcomes linked to open pedagogy activities. Students expressed heightened enjoyment, autonomy, pride, and motivation when engaging in renewable assignments compared to conventional tasks while feeling less pressure. These open pedagogy activities allowed students to share personal stories and insights, resonating with their experiences more effectively than traditional assignments. Open pedagogy has also been shown to support community college students through the creation

of ethnographic course materials (Griffiths et al., 2018), and using social annotation (SA) with OER resources has also been beneficial for community college students (Lazzara & Clinton-Lisell, 2022).

### **Our Definition of Open Pedagogy**

The definition of "open pedagogy" is still evolving and is variously interpreted (Clinton-Lisell, 2021). Our definition contributes to the ongoing discourse of open education, OER, and open pedagogy. We use a definition of open pedagogy in this study and previous studies (Rollag, et al., 2022) based on four interconnected principles: (1) Student-centric creation, (2) Collective creation and collaboration, (3) Audience engagement, (4) Integration with OER and CC Licensing. In keeping with the spirit of open pedagogy, if students create their materials, we believe they should control how public or private they wish to be (DeRosa & Jhangiani, 2017). In the following subsections, we explain each principle in more detail.

#### ***Student-Centric Creation***

Open pedagogy focuses on students as active information creators rather than passive consumers (Griffiths et al., 2022; Bentley & Chib, 2016; Hodgkinson-Williams & Trotter, 2018; Lambert, 2018). This approach moves past a one-way flow of information (Freire, 1998; Mirra, et al., 2018; Morrell, 2015) by focusing on the creation of texts as real-world projects *with* and *from* students (Lambert, 2018; DeRosa & Jhangiani, 2017). This principle is the foundation of open pedagogy because, without this focus, the activities revert to disposable activities with a limited audience. Making active space for student-created texts honors students' insights and experiences while leading to critical thinking, creativity, and collaboration (Rollag, Yoon, & Gilpin, 2022).

#### ***Collective Creation & Collaboration***

Within open pedagogy, creation is collaborative, focusing on making connections across materials. Examples of collaborative open pedagogy assignments include opportunities for students to work collectively by building websites or creating podcasts with partners or small groups (Clinton-Lisell et al., 2021) and students posting memes to social media (Riser et al., 2020). The digital nature of many open pedagogy assignments also allows creators to work across time and space, bringing students together from different contexts to work collectively (Hilton et al., 2019; Seiferle-Valencia, 2020). Collective creation also comes with the use of OER intended for remix. Supported by media literacy and knowledge of CC licensing, open pedagogy assignments emphasize the ways people collaborate across material use.

#### ***Audience Engagement***

The student-centered and collective nature of open pedagogy is directly connected to the importance of audience. Engaging students in open pedagogy supports them to share their work publicly, either with peers in their courses or with larger audiences including, for example, social media and professional organization websites (DeRosa & Jhangiani, 2017; Wiley & Hilton, 2018.). With this focus on openness, we still believe students should have choices about whether they engage in their open pedagogy activities individually or collectively. Ultimately, with the focus on authenticity, open pedagogy has the potential to address the authentic interaction deficit in many online learning spaces (Kadokia & Owens, 2016; Majid et al., 2015; Mehall, 2020; Schultz et al., 2020) as it impacts persistence.

### ***Integration with OER and Creative Commons Licensing***

Encouraging students to share their work publicly does not diminish their rights to it; instead, it can establish ownership, prevent unauthorized claims, and facilitate improvement through peer feedback. Students need to understand concepts like copyright, plagiarism, and remixing, and incorporating practices such as adding CC licenses can be beneficial (Jenkins, 2009). Students (the creators) should decide whether and how to license their creations, as the objective of open pedagogy for us is to nurture student engagement and interactions through the authentic creation of materials; to accomplish this, CC licensing should not be a barrier.

### **Open Pedagogy in Online Learning**

The shifts we described thus far often include embracing pedagogies that cater to online learning. Open pedagogy emphasizes learning at the intersection of relationships, interests, and digital tools (DeRosa & Jhangiani, 2017). In this way, it aligns with features from the Community of Inquiry (CoI) (Garrison, et al., 2000), as this well-known online course design framework highlights social presence, which is concerned with developing meaningful relationships and community in online courses through technology-mediated interactions between instructors and students that allow for deep learning (Garrison & Cleveland-Innes, 2005; Rovai, 2001; Rovai, 2002) and support persistence (Rovai, 2002; Gilpin, 2020). Online instructors often turn to text-based asynchronous discussion boards to nurture social presence. However, students dislike these interactions (Kaufman, 2015) and instructors are frustrated by the dearth of guidance on designing online interactions effectively and the limited exploration of practical alternatives (Fehrman & Watson, 2021). However, some innovative alternatives to text-based asynchronous discussion boards have recently been advanced. For example, asynchronous video-based discussions (Lowenthal & Moore, 2020) and synchronous video conferencing technologies (Gilpin, 2022) have been shown to support the development of social presence.

We, too, see the benefits of developing social presence. Still, we recognize that some instructional designs used to nurture social presence may reinforce existing educational power structures (Chick & Hassel, 2009) that disenfranchise some students and potentially cause them not to persist. Yet, social presence can be nurtured in ways that empower all learners and align with open pedagogy. For example, Lowenthal and Thomas (2010) suggest that online instructors should strive to incorporate authentic, real-world experiences in their online courses to include public performance and the accompanying public feedback. They also posit that public sharing of course activities and even feedback in an educational setting, rather than individual submissions to course learning management systems (LMS) only instructors view, can enhance instructors' social presence with students without adding extra workload. When students actively participate in knowledge creation by sharing their course activities publicly, the online learning experience becomes more meaningful, engaging, relational, student-centered, and ultimately, accessible (Chick & Hassel, 2009; Gilpin, 2022; Gilpin et al., 2023).

Nonetheless, in support of equitable online learning, we look to theories beyond social presence that focus on the complexity of sociocultural factors that students bring into the classroom. We draw on ways that open pedagogy moves into reflective and critical action when students recognize how sociocultural factors impact moments of creation. This view aligns with a lens of Connected Learning (Ito et al., 2015), as it acknowledges that learning in the world



happens through a focus on authentic purposes, relationships with peers, and the use of available digital and material tools. From there, we see how this access to creation through online tools can be a way for students to question what knowledge has been created as they bring their perspectives and lens to material and resources that are then part of the wider discussion. Ensuring students recognize they can question and shift knowledge in this process is a key factor for our view of open pedagogy. Aligned with critical digital pedagogy (Mirra et al., 2018), it provides students space to reimagine material into a new form of engaging with real-world questions and problems.

### **Complexities of Open Pedagogy**

It is crucial to acknowledge the complexities that open pedagogy activities present as students navigate sharing their work publicly. The main objection to students sharing their work publicly, whether on a LMS or elsewhere, is concern over privacy guarantees. This issue has been a topic of discussion since online learning's inception, especially with the influence of social media. Boyd (2007) emphasizes that the distinction between "public" and "private" is more intricate than the simplistic binary many perceive it to be. In this critical frame, we see space for students to bring their identities to open pedagogy practices in ways that empower them to share their work publicly. To accomplish this, we must consider students' experiences sharing in digital (e.g., social media, blogs) and non-digital (e.g., sports, music, arts) public spaces.

With a history of extensive usage in the arts and sports, public performance and the incorporation of public feedback as instructional strategies have not only been embraced, but are highly esteemed (Ross, 1994). According to reports from the Pew Research Center (2020 & 2022), today's students are known for using digital spaces to express their views on current events and issues. They create and share multimedia content, amplify hashtags, and cultivate digital identities through various forms of art and performance. However, despite this widespread experience of public sharing (Pew Research Center, 2020 & 2022; Ross 1994) and positive experiences reported with open pedagogy (Clinton-Lisell, 2021; Rollag Yoon & Gilpin, 2022. Clinton-Lisell & Gwozdz, 2023; Griffiths et al., 2018; Lazzara & Clinton-Lisell, 2022), students sometimes hesitate to embrace the digital sharing of their open pedagogy creations fully (Clinton-Lisell, 2021; Rollag Yoon & Gilpin, 2022). This is due to concerns about sharing with a potentially large audience and the potential for negative feedback and judgment by others (Rollag Yoon & Gilpin, 2022). Studies indicate that some students still prefer privately shared traditional assignment activities in which their work is shared only with their instructor and not beyond the course (Rollag Yoon & Gilpin, 2022; Clinton-Lisell, 2021; Wiley et al., 2016). Most instructors who use open pedagogy provide space for student agency around sharing publicly (Clinton-Lisell, 2021).

Some suggest that instructors support students' development of digital identities and teach them digital media literacies (Morrell, 2015) while acknowledging anxieties they may have from past experiences sharing in digital space that impact their willingness to share publicly in academic settings. In looking to support students' public sharing of open pedagogy products, Rollag Yoon and Gilpin (2022) found that teacher candidates were more willing to share publicly when working with a small group rather than independently. Interestingly, these same students shared their teaching portfolios publicly but suggested they were satisfied with this because they

could control the audience, whereas teacher candidates were concerned with times when the audience could be infinite. Other researchers suggest that a way to support student concerns about sharing publicly is for students to choose a pseudonym to share their work (Lowenthal, 2010; Bonica et al., 2018).

Open pedagogy also offers an instructional approach that challenges traditional educational hierarchies by offering alternative learning approaches (Griffiths et al., 2022; Bentley & Chib, 2016; Hodgkinson-Williams & Trotter, 2018; Lambert, 2018). This leads to some instructor concern about losing control over the learning process because open pedagogy blurs the lines between instructor and student roles. Open pedagogy promotes collaboration between instructors and students beyond mere content delivery or acquisition. It encourages active participation, co-creation, and knowledge sharing within and beyond the classroom (Rollag Yoon & Gilpin, 2022; Griffiths et al., 2022; Bentley & Chib, 2016; Hodgkinson-Williams & Trotter, 2018; Lambert, 2018). This shift can be highly challenging for those with a “banking model” philosophy of education which views students as passive recipients of knowledge deposited by instructors, emphasizes a one-way flow of information, with instructors being the authoritative source of knowledge, and students expected to absorb and reproduce that knowledge passively (Freire, 1998; Mirra, et al., 2018; Morrell, 2015).

### **Research Questions**

The current study addresses the concerns about online student persistence (Hobson & Puruhito, 2018), interaction deficits (Paulsen & McCormick, 2020; Kadakia & Owens, 2016; Majid et al., 2015; Mehall, 2020; Schultz et al., 2020), instructional designs to address these deficits (Fehrman & Watson, 2020). In addition, there is a need for systematic investigations to guide the development of open pedagogy activities that delve into understanding the complexities of engaging with open pedagogy work in educational experiences across levels and contexts (Clinton-Lisell, 2021; Wiley, 2021).

This study aims to bridge the research-to-practice gap by looking at novel ways to nurture authentic interactions in online spaces that promote student persistence by addressing the following research questions: 1) How do open pedagogy practices support students in a community college setting? 2) How do students make meaning through open pedagogy practices? 3) How do students present their identities in open pedagogy practices?

## **Methods**

### **Study Design and Researcher Positionality**

This interpretive qualitative study (Erickson, 1986) focuses on the experiences of two groups of students in community college settings. This research is unique because it brings together people from different community college settings who made sense of open pedagogy. The researchers acknowledge their roles as faculty members and instructors and bring reflexivity to their reflection on interactions and interpretations of students' work (Pillow, 2003). Reflexivity, as described by Anderson (1989), involves a dialectical process encompassing the researcher's constructs, the informants' commonsense constructs, research data, the researcher's ideological biases, and the structural and historical forces shaping the social construction being studied. Julie was the instructor for some of the courses included in the study and was responsible for designing the open pedagogy assignments. Staci and Stephanie, faculty members

at four-year institutions, provided different perspectives on data analysis. As a result, they were able to offer multiple perspectives and entrance points for looking at the data. In the following sections, we describe the courses, open pedagogy activities, and their connection to the definition of open pedagogy, as well as the participants, data sources, and data analysis methods employed.

### **Participants and Research Context**

This study was conducted across introductory-level online courses at two community colleges. Community College One/Course One implemented open pedagogy practices in three Psychology courses with a total enrollment of 68 students, with 45 participants electing to participate in the study. Julie was the instructor for Course One, located in an urban setting in the US Southwest, with a population of 6,500 students. Of those students, 44% identify as BIPOC, 71% are enrolled part-time, and 46% identify as first-generation.

Community College Two/Course Two was located in the rural US Midwest. The open pedagogy practices were implemented in three sections of an English course with a total enrollment of 75 students, with 33 electing to participate in the study. The instructor for these courses assisted with data collection but elected not to participate in other ways. There are 3,000 students at this institution, with 20% identifying as BIPOC and 44% enrolled part-time.

Students enrolled in these courses and participating in the study were representative of the overall college populations at both institutions. Both courses incorporated activities aligned with our definition of open pedagogy using online asynchronous and synchronous modalities. In sum, 78 students elected to participate in the study (consented to have their reflective questionnaire responses and course activities analyzed), yielding a 55% response/participation rate.

### **Data Collection**

Table 1 provides an overview of the data collected, how they were analyzed, and examples. Data collection was ongoing throughout course design and implementation of open pedagogy assignments. After receiving institutional research board approval from both community colleges, data were collected from January 2021 to August 2021. Instructors of the courses collected data and stored it on shared digital space. Data include open pedagogy activity descriptions (collected from instructors), students' completed open pedagogy activities, reflexive memos and digital conversations between researchers and instructors, and reflective questionnaire responses related to students' experiences and perceptions of open pedagogy. In the following subsections, we highlight two key pieces of data collection that were the focus of our data analysis, specifically the open pedagogy activity descriptions and the reflective questionnaire.

**Table 1**  
*Data Sources, Analysis, and Examples*

Source	Analysis	Example (if available)
1) Activity descriptions	The descriptions of the activities were reviewed prior to the start of the study and revisited throughout analysis to ensure they met the criteria/tenants of open pedagogy – see Table 2	<a href="#">Descriptions</a>
2) Students' completed activities	For students who consented to participate in the study, their completed creations were reviewed for evidence of the tenants of open pedagogy – see Table 2	NA
3) Reflective questionnaire	Responses were analyzed using a discourse analysis to gain insights into student experiences and perceptions of open pedagogy activities	<a href="#">Questionnaire</a>
4) Reflexive memos	Kept by both instructors and researchers throughout the study and during analysis.	NA
5) Digital conversations	Compared themes from findings to email correspondence, twitter conversations, and zoom interactions.	Email, Twitter, & Zoom

### ***Open Pedagogy Activity Descriptions***

The activities in these courses align with our definition of open pedagogy outlined earlier in this article. This definition includes four key components: (1) emphasizing students as creators, (2) providing opportunities for collaborative creation, (3) focusing on real audiences, and (4) utilizing CC licenses. These open pedagogy activities promoted collaboration, creativity, and student agency. By engaging in these activities, students may develop a deeper understanding of the course material, enhance their critical thinking skills, and contribute to the collective knowledge of the learning community. Table 2 shows how the activities in each course aligned with the four fundamental tenets of open pedagogy, as defined earlier in this study.

***Community College One/Course One.*** Students completed two activities that fit our definition of open pedagogy in psychology courses across a semester, including the following:

- **Collaborative Content Revision:** In small groups, students worked together to revise and enhance an existing chapter in the OER textbook used for the course. Each group was able to select the chapter that they wished to revise. The content they created was made automatically visible to all students in the course and future students. The instructor justified this approach based on previous experiences with group work, emphasizing that students would benefit from sharing their work collectively rather than working in isolation.
- **Individual Infographic Creation:** Students engaged in an individual activity where they created an infographic that aligned with a specific chapter of the OER textbook. These infographics were then shared within the OER text utilized by the class. Given the individual nature of this task, students were given a choice to have their infographics included in the next version of the textbook.

***Community College Two/Course Two.*** Students completed three activities that fit our definition of open pedagogy in English courses across a semester, including the following:

- **OER Revision:** In the small group revision activity, students worked together to polish and improve a chapter in an OER accessible to all students in the course and future students. The instructor established clear guidelines and expectations for group work and ensured that students felt comfortable sharing their work with others. This collaborative approach allowed students to benefit from their peers' diverse perspectives and knowledge. By sharing the revised content with others, students contributed to improving the course materials and creating a valuable resource for future learners.
- **Creation of Supplementary Resources:** In this activity, small groups of students were tasked with creating supplemental resources such as quizzes, videos, charts, memes, or slideshows to complement the OER resource. Students could elect to have their work included in the next version of the text. This allowed students to take ownership of their learning and contribute their unique ideas and perspectives to the educational materials. By providing choices to students about being included in the next version, the instructor respects their autonomy and empowers them to decide whether they want to share their work more widely.
- **Individual Research and Sharing:** In the individually conducted research activity, students were free to explore a topic of interest related to the course content. They could share their research findings on the instructor's course website or keep the activity private. This activity encouraged students to delve deeper into a specific area of the subject matter and develop their research skills while connecting to their identities. By providing the choice to share or keep their work private, students had control over the visibility of their research and respect for their preferences and comfort levels. Sharing the research on the course website created an opportunity for knowledge exchange and inspired other students to explore related topics.

**Other assignment considerations.** Students in both courses were encouraged to share their work publicly and to pursue CC licensing. Many students elected to share their work publicly but have not pursued CC licensing. Table 2 shows how the assignments in each course aligned with the four fundamental tenets of open pedagogy.

**Table 2**  
*Open Pedagogy Activities Alignment with Open Pedagogy Tenets—Presence in Courses*

Tenet of Open Pedagogy	Community College One/ Course One Psychology	Community College Two/ Course Two English
<p>1) <b>Student-Centric Creation:</b> Open pedagogy begins with a focus on students as creators of information, rather than just consumers</p>	<p>Students revised the content of the course OER text or created an infographic</p>	<p>Students revised the content of the course OER text, created a supplementary resource, and shared research</p>
<p>2) <b>Collective Creation &amp; Collaboration:</b> Within open pedagogy, creation is collective through collaboration, as students are invited to remix current resources and create their own, utilizing digital tools to connect across time and space.</p>	<p>Students worked in small groups only for the OER chapter revision (remix) and provided one another with feedback</p>	<p>Students worked in small groups for two of the activities and provided one another with feedback in another</p>
<p>3) <b>Audience Engagement:</b> Open pedagogy assignments' digital and collective aspects are also connected to an authentic audience who can read and utilize materials in the moment and the future.</p>	<p>Students revised resources for use by their peers and in future courses – some elected to share publicly, but not all students</p>	<p>Students revised resources for use by their peers and in future courses – some elected to share publicly, but now all students</p>
<p>4) <b>Integration with OER and Creative Commons Licensing:</b> Students learn to utilize Creative Commons (CC) Licensing to identify and give credit to their knowledge alongside others.</p>	<p>Students encouraged by the instructor, but not required</p>	<p>Students encouraged by the instructor, but not required</p>

**Reflective Questionnaire**

To design open pedagogy activities that are responsive to the increasingly diverse online student population, instructors and course designers need to know what students prefer and what they value in making meaning, since the more students value a task, the more likely they are to engage and bring their identities which, in turn, is likely to impact social presence and persistence (Wigfield & Eccles, 2000). To explore student perceptions through this lens, we used a 6-item reflected questionnaire like questionnaires developed earlier by Clinton and Kelly (2020) and Hilton and colleagues (2019). The reflective questionnaire included 6-items related to the value and downsides of open pedagogy activities. It was a required assignment for the courses completed at

the end of the semester; however, students consented to have their responses and open pedagogy activities included in the study, knowing their decision would not impact their grades.

### **Data Analysis**

Data analysis was an ongoing and iterative process as we sought to locate recurring themes across artifacts and responses. The analysis in this article primarily focuses on community college participants' data set, consisting of 78 completed reflective questionnaires with other artifacts used to triangulate our analysis. We collaboratively coded the data via video conferencing meetings in Zoom. As we moved through the data, we used reflexive memos (Cohen et al., 2011; Patton, 2002) to document our thoughts and reflections throughout the analysis. We conducted inductive thematic analyses through six interrelated phases (Clarke & Braun, 2013); we modified the phases slightly to align with our study's design and research questions. The following subsection provides an overview of our data analysis.

- Phase 1. We familiarized ourselves with the data set by collaboratively annotating the content of the reflective questionnaire responses in a shared spreadsheet.
- Phase 2. We generated an initial coding scheme. We began by independently reading the reflective questionnaire responses and creating open codes (Merriam & Tisdell, 2016) as descriptive labels for varying aspects of the value students place on the open pedagogy activities and other connections across the curation process. We then confirmed results with one another and discussed any disparities until we reached a consensus across all authors. The open pedagogy course descriptions, students' activities, reflexive memos, and our digital conversations throughout the course assisted with consensus building. Then, we collectively collapsed and merged codes across our respective schemes to create broader categories related to student perceptions. We focused on themes that ran across both community college courses. While we see space for a deep dive into one setting or expanding a study to more community colleges, we found value in looking deeply across these two familiar spaces.
- Phase 3. We collectively searched for patterns of meaning. And we also looked at key quotations that highlighted the themes. In addition, we looked at responses or examples that defied patterns or themes to understand the significance of those events (Patton, 2002).
- Phase 4. We collectively verified the themes through key linkages (Merriam & Tisdell, 2016) by comparing the themes to the artifacts, including open pedagogy activity descriptions, completed activities, correspondence with course instructors, and reflexive memos.
- Phase 5. We collectively employed a discourse analysis (Gee, 2011) of the key quotes to understand how students placed value or made connections on specific aspects of the open pedagogy curation process. We analyzed specific quotes individually and then compared interpretations collectively for consistent considerations.

- Phase 6. This yielded the final analysis presented in the results section. We identified three notable interpretations that inform our conclusions: (1) collective creation, (2) context matters, and (3) audience awareness.

### Results

Table 3 highlights findings from data analysis with a primary focus on the reflective questionnaire responses with other artifacts used to triangulate our analysis. We identified three notable themes/interpretations that inform our conclusions: (1) collective creation, (2) context matters, and (3) audience awareness. In the remainder of this section, texture is added to the themes, along with students' thoughts about future open pedagogy activities.

**Table 3**

*Data Themes*

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Theme	Community College One/ Course One Psychology	Community College Two/ Course Two English
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**Collective  
Creation**

“I would have been more nervous to present my information if I had not had *my group by my side*. We had become experts *together* and having them research and present with me strengthened my belief in the validity of myself teaching on that subject. Had I done it alone and shared privately, I believe I would have not done as well a job because *I did not have the ideas of the others to work with*, as well as lacking the drive to find new information to share with my peers.”

“Although I’ve grown to really just prefer doing projects and things on my own and being self-reliant, I definitely think that *working with a group was the better way* to go for this. If I had done all of this on my own, *I wouldn’t have had other input from my group and I wouldn’t have built the friendships that I did through my project*. Also, some of my group members did the same as me in terms of really going deep into the research, and even though we didn’t end up using all of it for the project, *I learned a lot by having a group rather than if I just did it on my own. My group made it much easier for me to be comfortable with sharing publicly.*”

“That’s one thing I loved about this class, I got to see so *many different opinions on various topics. it overall helped me with my confidence* in my work and to voice my opinions better.”

“I think sharing it publicly with other students is encouraging. *It can be more intimidating to turn a project in to your teacher than it is to have a fellow classmate read and comment on it.*”

**Context Matters**

“I just feel like it *depends on what the presentation is about*. Certain topics may be *better off presented privately* rather than publicly. Other presentations are *better off presented publicly* so that everyone can be more knowledgeable and understand the concept better.”

"I would be fine with having work being *publicly shared every once in a while but not for every assignment*. When sharing our work privately we *use information that we have learned for ourselves more than publicly we share what we would want others to know and understand*."

“I think it all *depends on the class and topic* of work that I will be completed so I know how personal I am able to get without feeling like I was exposing myself too much.”

“*Group projects are pretty simple, so turning those in publicly is alright*. but the large projects that take more work or time AND are peer-reviewed would be *easier just to ask for you to review* it because some people's writing skills are way better than others, so they don't always get quality feedback, if they get any at all.”

**Audience Awareness**

“*I was worried about presenting and a little unsure if some of the images I had were correctly cited and whether I would have to state my citations*, but overall I don't think there any downsides after this experience, if there were/are I haven't thought of them yet.”

“I think it would depend on the type of project, but I would prefer to have projects that are privately shared because *I do have self-doubt and I do not want a bunch of people analyzing every piece of my work*.”

“Some costs were that I did see some *negative feedback and that didn't make me feel the best*, but I got over it.”

“Being vulnerable and emotional in front of others.”

**Collective Creation**

The option of working with a group or individually impacted students' experiences with open pedagogy. Students preferred the public sharing aspect of open pedagogy assignments with a group over individually curated projects. While research highlights the importance of offering students' opportunities to work together, the awareness that students had of the importance of collective creation was highlighted in both open pedagogy projects. Across both spaces, there was a sense of genuine connection to group members through language like “*friendship*” (Course One), “*my group by my side*” (Course Two), and “*I got to see so many different perspectives*” (Course Two). The students valued the collective nature for the social aspect of creating something together, where connections were made in the process of creating. The students also recognize the heteroglossic nature of language as something that can benefit all of them when they create together (Bakhtin, 1981). As one student in course two noted, “*I believe I would not have done as well a job because I did not have the ideas of the others to work with*” (Course One). Students recognized that this multi-layered use of language gave them space to build confidence with their peers. Instructors noted this growth in confidence over the semester and saw spaces where students used this combined language approach across their assignments.

### **Context Matters**

Students noted they would only want to share some of their work publicly. Moreover, when sharing openly, they are apt to share what they want others to know and understand, compared to sharing their work privately. Students across both spaces noted that they shared information they deemed necessary or exciting as they engaged in open pedagogy assignments. As a student from Course One noted, *“I just feel like it depends on what the presentation is about.”* Similarly, a student from Course Two explained, *“I think it all depends on the class and topic of work that I will complete.”* This question of the context of audiences came up in class conversations as assignments were described and was an ongoing discussion across the courses. One connected response to the context recognized that students were comfortable sharing what they had control over, and the context of the sharing was important. As one student in Course Two explained, *“If it isn't something that is too personal, I wouldn't mind sharing, but anything that crosses that threshold I would like to keep private.”*

### **Audience Awareness**

The context was related to students' understanding of the audience in both settings. This awareness showed a sense of vulnerability, perfectionism, and varying confidence levels about the content they were creating for an open source. Students had questions about, and were aware of, the role of the audience as it related to what they were creating. As one student in Course Two shared, *“Some pros of sharing it just to you is that it can't be judged by other people. Pros of sharing it publicly is that other people could get ideas off of you and you can hear what other people thought about your work.”* Similarly, a student from Course One explained, *“As audience changes, so does the manner in which the project is completed.”* This awareness highlights the challenges of engaging in open pedagogy practices and the rich opportunity it provides for students to engage in media literacy within their learning.

## **Discussion**

Aligned with existing research, this study illustrates the significance and complexity of implementing open pedagogy in online community college courses. We draw three recommendations from our findings. First, our findings indicate that students value open pedagogy and sharing some of their work openly, with a preference for collaborating. Thus, the design of open pedagogy activities should include the option of students working in a group to decrease anxiety about public sharing. Students should not be required to share openly; when they do, it should be via student-controlled platforms. Second, nurturing media literacies to include information about CC licensing should not be overlooked, as some students noted privacy concerns when sharing openly. Finally, institutional support is vital if open pedagogy is to be taken up by community college instructors. Taken together, these recommendations support the implementation of open pedagogy in ways that students value which, in turn, can support their persistence.

It is also important to highlight that this study occurred during the COVID-19 pandemic. Research revealed that college students' lives were significantly disrupted, adversely affecting their physical and mental well-being (Copeland et al., 2021). Consequently, these disruptions posed additional challenges for students in completing some of the online collaborative work. However, despite these difficulties, engaging in online group work provided some students valuable opportunities to connect with their peers and fostered a more robust community within

courses (Conklin & Dikkers, 2021). These factors have been central in supporting students' learning during the pandemic. In the remainder of this section, we connect our themes and recommendations to our research questions, elaborate on our recommendations, connect to prior research, and share limitations and future directions. *Table 4* provides an overview of the research questions alignment with themes and recommendations.

**Table 4**

*Research Questions Alignment with Themes and Recommendations*

Question	Theme	Recommendation
3) How do open pedagogy practices support students in a community college setting?	Collective Creation	Collaboration & Agency
2) How do students make meaning through open pedagogy practices?	Collective Creation	Collaboration & Agency
3) How do students present their identities in open pedagogy practices?	Audience Awareness	Media Literacies

### **Collaboration & Agency**

In this study, most students desired more open pedagogy assignments in their future courses. Aligned with our first and second research questions, responses indicated that open pedagogy allowed for a sense of collaboration and agency that was important to students' interest and involvement in learning. By creating collaborative content and fostering inclusive spaces, open pedagogy activities enhanced students' confidence and facilitated meaningful engagement with the subject matter. This connects to previous research around open pedagogy (Clinton-Lisell, 2021; Rollag Yoon & Gilpin, 2022, Clinton-Lisell & Gwozdz, 2023; Griffiths et al., 2018; Lazzara & Clinton-Lisell, 2022) and addressed the interaction deficits often found in online spaces (Kadokia & Owens, 2016; Majid et al., 2015; Mehall, 2020; Schultz et al., 2020).

As a result, open pedagogy activities should nurture inclusive spaces by allowing students to work in groups, which can alleviate anxiety associated with public sharing. While group work has been a longstanding practice in education, including online spaces, with research noting the positive impacts (Rollag Yoon & Gilpin, 2022; Kelly et al., 2022), the integration of group work into open pedagogy is not extensively discussed in the literature (Rollag Yoon & Gilpin, 2022). Nonetheless, collaborative content creation in group settings has enhanced students' confidence in sharing their work publicly (Rollag Yoon & Gilpin, 2022; Johnson & Johnson, 1989; Panitz, 1999). This increased confidence stems from peer support and assistance, and the nurturing environment in small groups as students collaborate to curate content for public sharing. Interestingly, even when working individually on open pedagogy assignments, some

students in our study still exhibited positive perceptions about open pedagogy and derived confidence from the feedback received from their peers.

Additionally, students should have control over the openness of their work using student-controlled platforms. It is also crucial to respect students' preferences regarding their work's openness and to give them control over their sharing process. Instead of the instructor posting students' work on a website, students should be able to use student-controlled platforms to post and remove their work as they see fit.

Moving forward, it is essential to consider how developing technologies will impact open pedagogy practices around collaboration and sharing. More research is needed to consider how instructors take up Social Annotation in ways that align with open pedagogy. In addition, Artificial Intelligence (AI) tools will continue to change how learners develop real-time and virtual collaboration skills (Wu et al., 2020) and provide in-the-moment feedback (Civics of Technology, 2023; MIT Technology Review, 2023; Saleh, 2023). It will be essential that future research takes up the impact of these AI tools on teaching and learning in various contexts and how these AI-supported tools might support or hinder public knowledge sharing, including OER and open pedagogy.

### **Media Literacies**

Aligned with our third research question, this study highlights the ways that open pedagogy practices create space for students to share their identities and that identity sharing must produce care for how we engage in online learning. This critical finding highlights the significance of nurturing media literacies, encompassing information about CC licensing (Creative Commons, 2021). This aspect should not be overlooked as it directly addresses concerns related to privacy and anxieties associated with open sharing. Educators should actively support the development of digital identities and teach media literacy skills, including navigating social media platforms (Morrell, 2015). Institutional librarians can support this work.

Furthermore, researchers should explore the connection between sharing publicly in open pedagogy and students' experiences with sharing on social media. This understanding will provide valuable insights into how these experiences influence and shape students' approach to open sharing. To address the issues associated with media literacies, it is essential to design relevant open pedagogy assignments that cater to these concerns. For example, assignments that involve revising OER, curating websites, or creating and sharing memes on social media can help students develop their media literacy skills while addressing privacy concerns.

Both individual instructors and educational institutions must acknowledge and address students' privacy concerns by discussing how information is already being shared, clarifying misconceptions, and exploring concepts such as appropriation and CC licensing (Creative Commons, 2021). In the evolving educational landscape, educators must prioritize teaching students how to access and evaluate information, discern its reliability, and distinguish trustworthy sources from unreliable ones. Educators must now guide students in locating reliable information, determining which sources to trust, and discerning reliable from unreliable sources. Resources such as Stanford's Civic Online Reasoning (2021) and Civics of Technology (2023) can assist students in becoming better evaluators and producers of digital content. By utilizing

resources shared, educators can help students become discerning consumers and creators of digital media while fostering critical thinking and reasoning abilities.

### **Supports for Implementation**

Not directly tied to a specific research question, yet still vital, is a call for support of implementing open pedagogy practices to fully embrace the possibilities of critical open pedagogy and the ways it makes space for all students. A robust level of institutional support is essential to facilitate the widespread adoption of open pedagogy activities like those shared in this study. This support can be achieved through large-scale initiatives like the "zero degrees" program, which has gained popularity among community colleges and led to the widespread implementation of OERs in place of textbooks (SPARC, 2019). Similarly, to facilitate the adoption of open pedagogy, it is essential to involve instructional designers across institutions and departments skilled in guiding faculty through incremental changes. Research suggests this approach effectively supports instructors embracing open pedagogy and other open practices (Werth & Williams, 2022).

In summary, implementing open pedagogy in community college courses is significant and complex, as highlighted by our findings and existing research. Our findings underscore the importance of considering students' preferences for collaborative work and sharing creations, addressing privacy concerns through media literacy education, and providing institutional support to promote the successful implementation of open pedagogy in community college courses. A deliberate and well-defined approach to implementing open pedagogy practices allows for evaluating their impact on student experiences, learning, and course outcomes, ultimately leading to improved student persistence and success.

### **Limitations & Future Directions**

As we look at the results of this study, we recognize that there is space for further understanding by interviewing students throughout their process of open pedagogy curation both to understand how they view the processes and to see how it differs from their other learning experiences more fully. This could also lead to future research on how students view their online identities as they share their work through open resources. As students begin to use AI to support their writing, studies are needed to help us understand how students engage in public idea sharing in multiple ways that work with or against using AI to curate open resources. Finally, there have been studies about open pedagogy and ungrading but a limited exploration of using both together. We suggest exploring open grading practices, commonly called ungrading (Kohn & Blum, 2020), impacting students' curation of open resources.

## **Conclusion**

In the current landscape, community colleges are distinctively positioned to harness the present moment and cultivate fresh opportunities while tackling persistent challenges. Key among these challenges is equitable access, student engagement, and student persistence, particularly for online learners that include historically underrepresented groups. This study sheds light on open pedagogy and its potential to enhance outcomes for community college students as we highlight the role of openness in creating an inclusive educational environment by leveraging open pedagogy to nurture online interactions that support student persistence. By seizing the potential of open pedagogy, community colleges have the opportunity to drive

meaningful change and make education more accessible and equitable for all students, particularly those who have been historically underserved.

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# Navigating Online Learning Through “Technological Frames”: A Qualitative Examination

Merve Basdogan  
*Texas Tech University, USA*

Curtis J. Bonk  
*Indiana University, USA*

## Abstract

This study is part of a larger critical discourse analysis (CDA) that examines technology-enhanced learning environments, such as online learning, e-learning, Web-based learning, computer-assisted learning, computer-mediated learning, and open and distance learning. The goal of this qualitative research was to analyze how educational technology scholars perceive and interpret technology in teaching and learning contexts. Using Carl Mitcham's typology of technological frames, which categorizes technology into four groups: (1) object, (2) knowledge, (3) activity, and (4) volition, we identified the types of technological frames that educational technology scholars use to define learning environments. The content analysis of nine semi-structured interviews showed that scholars primarily associate technology with volition (i.e., individuals' motivations, desires, will, culture, and consent regarding technology), followed by activity (i.e., technology related actions such as designing, drafting, crafting, programming, and analyzing) and object (i.e., tools), while technology as knowledge (i.e., facts, explicit and implicit skills, recipes, rules, beliefs, descriptive laws, principles, and experiences) was the least referenced technological aspect. Additionally, we discovered a new aspect of technology called “space.” The findings provide theoretical and practical insights into the literature on technological frames in online and distance learning. Importantly, insights into possible directions for research on online learning in the coming decade are offered.

*Keywords:* Technological frames, educational technology, Carl Mitcham, qualitative, philosophy of technology

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The landscape of education has undergone significant transformations due to the integration of digital technologies, including artificial intelligence, virtual reality, big data analytics, and other emerging technologies (Burbules et al., 2020; Guan et al., 2020). Nevertheless, the inherent complexity and uncertainty surrounding these technologies, such as the rapid evolution of the digital technologies and their immaterial, abstract functionalities, present challenges when it comes to interpreting and evaluating their impact (Spieth et al., 2021). The field of Educational Technology, which sits at the intersection of technology, learning, design, and communication (Bond et al., 2019) involves continually evolving terminologies to define technology-enhanced learning environments such as online learning, e-learning, Web-based learning, computer-supported learning, computer-assisted learning, virtual learning, and distance learning (Dağhan & Gündüz, 2022; Moore et al., 2011). These concepts are sometimes used interchangeably which, in turn, poses difficulties for researchers to perform meaningful cross-study comparisons (Moore et al., 2011). To better understand the rapidly changing digitization of higher education, we need to ask critical and skeptical questions about “the social, cultural, political and economic connotations of digital technology use in higher education” (Castañeda & Selwyn, 2018, p .1).

Therefore, exploring *technological frames* becomes crucial, as they capture the assumptions, expectations, and knowledge that individuals employ to comprehend the application and consequences of technology within specific contexts (Kaplan & Tripsas, 2008). Technological frames, also known as “cognitive lens,” “mental models,” “reference points,” “interpretive schemata,” “scripts,” and “cognitive maps,” examine how people assign meaning to technology (Orlikowski & Gash, 1994).

Recognizing that successful online learning demands more than mere access, the integration of intentional and supportive instructional designs becomes paramount (Redmond et al., 2018). For example, the strategic utilization of digital technologies such as learning management systems, discussion boards, wikis, blogs, social networks, and annotation tools can significantly enhance student collaboration, as long as they are chosen to align with the intended learning objectives rather than emphasizing tool usage alone (Oyarzun & Martin, 2023).

Studying individuals’ technological frames provides valuable insights for understanding the intricate relationship between scholars and digital technologies, particularly in the realm of technology-enhanced learning environments (Basdogan et al., 2022). For example, in a case study conducted within a faculty professional development context in the US, researchers analyzed faculty members’ technological frames to uncover the elements that filter, shape, and limit faculty perceptions and behaviors towards technology (Basdogan et al., 2022). The findings indicated that most faculty members viewed and described technology as tangible objects (90.6%) such as tools, devices, computers, and Web 2.0 apps. They also perceived technology as volitional (78.1%) and encompassing normative judgments related to its use, such as efficiency, role in enhancing life, and capacity to achieve goals. These results suggested that the heterogeneity of technological frames provides a balanced and comprehensive understanding and implementation of active learning technologies in online and face-to-face classes (Basdogan et al., 2022).

In addition, technological frames set boundaries in which individuals perceive and use technology within a social group (Olesen, 2014). For instance, in a longitudinal study conducted over a 10-year period, Olesen (2014) examined *technology-in-use* frames and *technology-strategy* frames of teaching faculty, senior managers, and staff. The author argued that addressing ingrained technological frames in an organization, such as reliability and availability of a technology, can be complex and that the frames held by dominant groups are difficult to change, even with ample communication and targeted training programs (Olesen, 2014).

On the other hand, Davidson (2002) argued that the interpretation of technologies can evolve over time as individuals engage with them in a specific context rather than being predetermined by specific features of technology. Hence, people, including those with similar experiences or resources, might form distinct expectations and beliefs about technologies, leading to diverse interpretation of technology (Treem et al., 2015).

Finally, understanding how people perceive technology is vital as “technological frames structure experience, allow interpretation of ambiguous situations, reduce uncertainty in situations of complexity and change, and provide a basis for taking action” (Lin & Silva, 2005, p. 50).

In this interpretive phenomenological study, we analyzed educational technology scholars’ technological frames to better understand how they perceive and interpret technology in various teaching and learning contexts. We have chosen educational technology scholars as participants for the following reasons: (1) they are specialists in technology-enhanced learning, albeit aligned with a variety of concepts such as online learning, e-learning, Web-based learning, computer-assisted learning, computer-mediated learning, and open and distance learning, (2) they have active research agendas that are influenced by the current changes in educational technology, and (3) they stand at the intersection of education and technology, allowing for a multidisciplinary technological frame analysis. We will introduce the technological frame analysis in the upcoming section and outline its application in the empirical research.

## Review of Literature

### Technological Frame Analysis

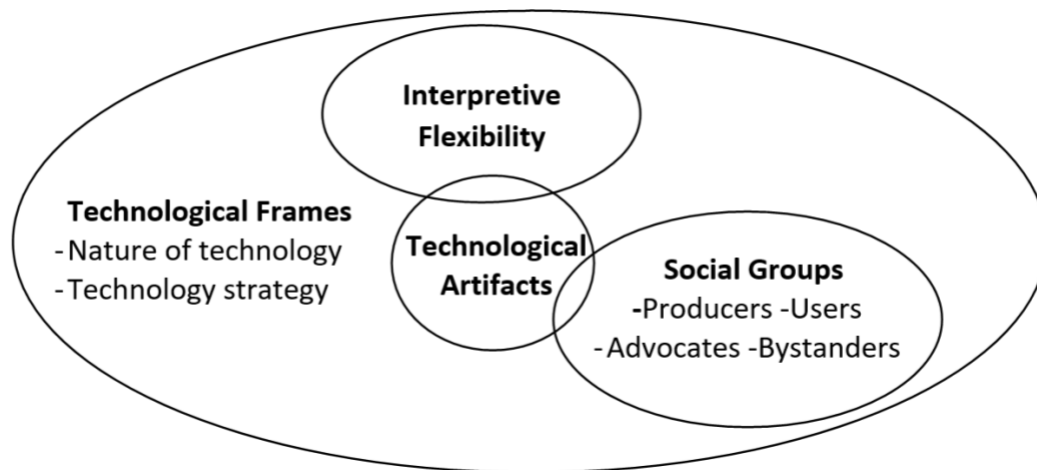
As a concept, technology is difficult to define due to its dynamic nature, which continuously adapts and expands in response to societal, cultural, aesthetic, and scientific advancements (Carroll, 2017). Olsen and Engen (2007, p. 457) point to this complexity in the following definition:

The term “technology” is a slippery one. The common perception is that technology is machines, devices, and tools used for some purpose. Technology is also understood as artefacts. The Concise Oxford Dictionary defines technology as the “science of practical or industrial arts; ethnological studies of the development of such arts; application of science.” Here, technology is understood as knowledge. However, this definition misses the hardware aspect that is the commonly held perception of technology in everyday language. Maybe the most common way of defining technology is to integrate artefacts and knowledge, for example “artefacts and knowledge about their operations.” But these definitions are missing the context in which all technologies exist.

The Social Construction of Technology (SCOT) concept developed by Pinch and Bijker (1984) addresses the missing piece: the social context of technology (Olsen & Engen, 2007). Researchers rooted in the technological determinism tradition view society and technology as distinct domains where technology evolves independently and influences and directs societal development. Influence, according to this view, does not flow in the opposite direction, from society to technology (Elle et al., 2010). In contrast, SCOT argues that human actions shape technology (Prell, 2009). SCOT consists of three interactive components: (1) interpretive flexibility, (2) social groups, and (3) technological frames as presented in Figure 1 (Bijker, 1995).

**Figure 1**

*Three Interactive Components of SCOT, Adopted from Bijker (1995)*



According to SCOT, technological developments and innovations are a result of social interactions among various individuals in relevant social groups (Bijker, 1995). Within these groups, meanings attached to technological artifacts are culturally constructed. In effect, this refers to the interpretive flexibility component of the model (Elle et al., 2010). Finally, technological frames include all elements that influence activities in social groups and flexible interpretations attributed to technological artifacts (Orlikowski & Gash, 1994). “These elements include goals, key problems, problem-solving strategies (heuristics), requirements to be met by problem solutions, current theories, tacit knowledge, testing procedures, and design methods and criteria” (Bijker, 1995, p. 123).

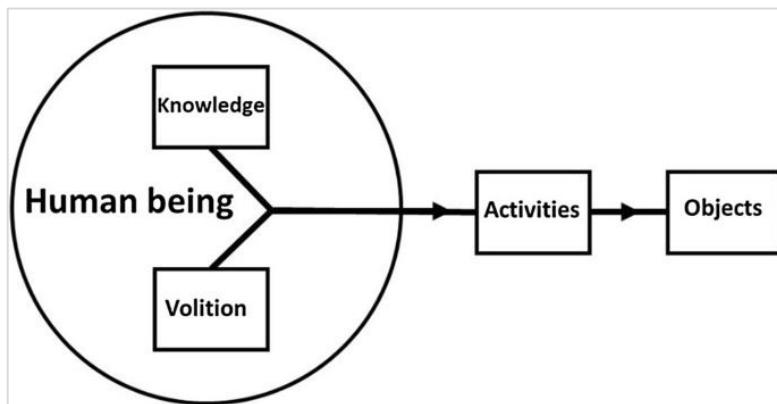
As an analysis technique, nearly three decades ago, Orlikowski and Gash (1994) first introduced technological frame analysis, which involves examining the assumptions, interpretations, and expectations that individuals hold about technology. Technological frames can be seen as perceptual lenses through which we filter and interpret the actions of others and our surroundings, enabling us to make sense of the ever-evolving technologies. This analytical approach is rooted in the social cognitive philosophy and organization change (Davidson, 2006). A technological frame deals with:

... the assumptions, expectations, and knowledge they [the subset of members] use to understand technology in organizations. This includes not only the nature and role of the technology itself, but the specific conditions, applications, and consequences of that technology in particular contexts. (Orlikowski & Gash, 1994, p. 178)

In their foundational work, Orlikowski and Gash (1994) identified several key themes related to technology. These themes encompassed the “nature of technology,” including its capabilities and functionality, the “technology strategy,” referring to strategic considerations behind its utilization, such as motivations and visions, and “technology in use,” the tangible outcomes resulting from its implementation and usage. This analytical technique has been referenced in a wide array of published literature including health care (Frennert et al., 2020; Huvila et al., 2021), business (Abdelnour-Nocera & Sharp, 2012; Davidson, 2006; Mengesha, 2010; Olesen, 2014; Treem et al., 2013), and computer science (Sedlack & Tejay, 2011). For example, Huvila et al. (2021) studied how patient accessible electronic health records (PAEHR) technology was framed by different age groups in Sweden. Results showed a variety of frames in young and older participants concerning the benefits of technology (technology-in-use) and how to improve the technology (technology strategy). In addition, Treem et al. (2013) examined how social media was perceived in a workplace in the US. Their findings suggested that younger individuals and frequent social media users outside of work had skeptical technological frames, while older workers and those less experienced with social media were optimistic about the potential benefits of social media. These studies emphasized the socially constructed nature of technology and how users perceive technology within various contexts depending on their age, educational background, and previous experience with specific technology.

Similarly, Carl Mitcham (1994) presented another viewpoint on technological frames called Manifestations of Technology Typology (Figure 2). In *“Thinking Through Technology,”* Mitcham (1994) proposed that technology can be comprehended in its broadest sense by considering four distinct aspects: (1) technology as an object, (2) technology as knowledge, (3) technology as activity, and (4) technology as volition. According to this framework, technology manifests itself in diverse ways, and individuals’ perceptions and experiences of each aspect may vary depending on their individual and social interactions.

**Figure 2**  
*Mitcham’s Manifestations of Technology Typology*



In this model, the *object* aspect encompasses both dynamic and static tools and devices, while the *knowledge* aspect encompasses theories, rules, terminologies, laws, and recipes. The *activity* aspect encompasses the various actions performed using or facilitated by technology, including design, development, motivation, analysis, and more. Finally, the *volition* aspect addresses ethical and moral considerations surrounding the utilization of technology.

Previous literature suggests that technology frames matter and that there are limited frame analyses in the technology-enhanced learning domain (Spieth et al., 2021). Utilizing Orlikowski and Gash’s frame analysis as a foundation (1994) in this research, we investigated the meanings that educational technology scholars attributed to technology-enhanced learning environments. The following primary research question guided our inquiry: How do educational technology scholars who specialized in various technology-enhanced learning concepts such as online learning, e-learning, Web-based learning, computer-assisted learning, computer-mediated learning, and open and distance learning perceive and interpret technology?

## Method

We employed Interpretive Phenomenological Analysis (IPA) as a research method to explore the meanings that educational technology scholars attach to technology-enhanced learning concepts, such as Web-based learning, E-learning, Computer-aided learning, Distance learning, Open learning, Online learning, and Computer-assisted learning. IPA is a qualitative research approach that focuses on understanding how individuals make sense of and derive meaning from their personal experiences (Emery & Anderman, 2020). In this context, the concept of meaning is regarded as fluid and constantly open to fresh insights, modifications, interpretations, and reinterpretations (Creswell, 1994). By applying IPA, we aimed to capture the nuanced perspectives and interpretations of the participants regarding the technology-enhanced learning environments.

To ensure the study's relevance and personal significance to the participants, a purposive sampling technique was employed (Noon, 2018) by inviting participants to provide rich first-person accounts of their experiences with the identified concepts (Smith et al., 2009). This approach enabled the investigation to capture detailed information from a specific group of individuals who have experienced the phenomenon of interest, as described in the following section.

### Data Collection

This study is a part of a larger critical discourse analysis (CDA) study. In the first step, we analyzed 191 doctoral dissertations written about various technology-enhanced learning environments in Turkey within the educational technology domain. Our purpose was to understand how these terminologies have been conceptualized theoretically and studied methodologically in academia by educational technology scholars hoping to promote sustainable terminology use in the educational technology field. These dissertations were retrieved from the thesis database of the Turkish Council of Higher Education. The following keywords have been searched separately: “Computer-Aided Learning/Education,” “Computer Assisted Learning/Education,” “Computer Supported Learning/Education,” “Distance Learning/Education,” “E-learning,” “Online Learning/Education,” “Open Learning/Education,” “Virtual Learning/Education,” and “Web-based Learning/Education.” The rationale behind the

inclusion of these keywords is rooted in the lead author's familiarity with these terms, gained through her academic research endeavors and practical roles, including positions as online learning designer, distance education coordinator, and e-learning designer. In addition, the second author has more than three decades of experience in online and distance education research and teaching which served to help validate the keyword selections.

In the current study, we invited the authors of those dissertations analyzed in the initial step (i.e., the CDA) for interviews. We conducted an online search for publicly available email addresses of the 191 dissertation authors and identified 68 individuals with valid addresses. Subsequently, invitations were sent to these addresses, resulting in 18 unsuccessful deliveries and 50 successful ones. At the end of two rounds of invitations via e-mails, nine individuals agreed to be interviewed.

Table 1 presents the pseudonyms for nine participants by their conceptual field as indicated in their dissertations and interview durations.

**Table 1**

*Pseudonyms for the Interviewees and the Conceptual Categories of Their Dissertations*

<b>Pseudonyms</b>	<b>Conceptual Category</b>	<b>Interview Duration</b>
Didem	Web-based learning	52m 53s
Halide	E-learning	59m 58s
Nilgün	Computer-aided learning	46m 7s
Tomris	Distance learning	1h 2m39s
Yaşar	Distance learning	1h 9m 18s
Nazım	Open learning	1h 12m 54s
Tarık	Open learning	1h 56s
Aziz	Online learning	58m 58s
Orhan	Computer-assisted learning	58m 39s

We used Zoom as the interview platform and the recorded interviews lasted about 45- 75 minutes. The interview protocol consisted of semi-structured questions, starting with “Can you please tell us about yourself and your study area?” The rest of the semi-structured questions were formulated based on the initial round of discourse analysis findings, incorporating emerging categories that pertain to the definitions of "space," "time," "agent," "power," and "level of operation" within each conceptual category (See Appendix A for the interview questions). For transcription, an online transcription software (i.e., Sonix) was used. To reach 100% accuracy, the first author listened to each audio file and manually fixed the errors in the automated transcription. After completing the transcription, we sent the files back to interviewees to get their approval for accuracy and to ask them if they want to add or remove anything. Two scholars (i.e., Orhan and Halide) revised and edited several parts of the interviews for precision.

**Participants**

The "Participants" section refers to the nine educational technology scholars who attended the interviews. Notably, in this interpretive phenomenological study, participant demographics, such as age, gender, or race, did not substantively contribute to our research questions to understand the relations among human beings (i.e., scholars who studied educational technology concepts) and technological artifacts (Frechette et al., 2020). Since we were

interested in educational technology scholars’ understanding of technology in the sense a philosophy “from” technology (Ihde, 2009), we associated the notion of the “demographics” of the study with the participants “conceptual interests” and “professional background.” To better describe the study context, the following section presents nine participants’ authentic life-story narratives. Each story title is a representation of the theme from a portion of their interview.

*Didem’s Story: Web-based learning as an Extension of the Human Body*

Didem is a faculty member in the Special Education Department at a university in central Anatolia. She is interested in the use of educational technology in the special education field. In particular, she seeks a professional specialty and visible outcomes of the technology in the lives of people who need it. She explained her professional interest as follows:

With my doctoral dissertation, I started to shift a little to special education. I had an interest in special education because I had already worked and [was] experienced with the visually impaired students for my doctoral dissertation study, so I had the chance to see how well my field worked. Sometimes when I was studying in my department, I felt aimless. I thought, you know, there is no core knowledge in the educational technology field, and there is a time when I have been lost in thoughts like, "am I in a department that is not useful to others?" In those thoughts, I then started working in the field of special education and I said "ok." So, you can really get what you do, and it is a field that's directly related to technology. Therefore, special education is now my second research interest. My interests are the use of technology, especially in the visually impaired students. Because technology [Web-based learning] is the only thing that can compensate for their eyesight. It can equate these people to the individuals who can see.

*Nilgün’s Story: Computer-aided Learning as an Extension of Human Cognition*

*Nilgün* is a research assistant in the Information Systems Engineering Department in a private university located in central Anatolia.

In my doctoral dissertation, I wanted to develop an application to work especially with people with disabilities. Because I have a disabled brother. My 19-year-old brother has intellectual disabilities. I went to a vocational high school and studied computer science. Since then, I have wanted to develop apps to support my brother's education. While doing my Ph.D., I also took courses in special education so that I could get to know this field. In order to develop an application, I had to understand what they needed and what kind of content I needed to develop, so I took some courses from Gazi University special education department. I started this process and wrote my dissertation to create an exemplary study in this field.

*Halide’s Story: An Instructional Designer’s E-learning Dilemma: Coffee or Tea*

Halide is an instructional designer in a distance education center of a university located in central Anatolia.

Since 2007, I have been officially working as an instructional designer at the distance education center of a public university in Turkey. I still work there. My studies, doctoral

dissertation and master's thesis are all in the field of e-learning. I am not just a lecturer in college. I have a role to play in developing instructional content. So, I am both a practitioner and an academic lecturer. Sometimes what I write or want to happen in my academic articles cannot happen in practice [We're laughing]. Theory and practice do not always match. This, of course, is because of cultural differences, lack of infrastructure, etc. I am recently very focused on video design. The design of video content. I am interested in cognitive processes.

*Tomris's Story: Distance Education in the Time of Capitalism*

Tomris taught philosophy to high school students for a long time in Turkey and then completed her doctoral degree in the adult education department. In her dissertation research, she critically analyzed the economic politics of the distance education centers in Turkey.

My bachelor's degree is in philosophy. After I finished my master's degree, I started the doctoral program because of my academic advisor's insistence. [We're laughing] I have studied women's education in my master's dissertation. At the time, I scanned news columns, it was discourse analysis research [project]. Then, when we encountered very important things about distance education in recent years, we wanted to discuss critically what distance education centers serve, what they are interested in, or how the meaning of university education is changing due to these distance education centers.

*Aziz's Story: Eternal Sunshine of the New Possibilities in Online Learning*

Aziz is an associate professor in one of the high-ranking central Anatolia universities.

I was more concerned with how a tool might be used effectively in [sic] education rather than its technical features. I am always interested in online learning. Since 2007, I have worked on various subtopics of online learning. For example, in my master's thesis, we looked at the relationship between learning preferences and learning style. Then it was suggested that learning style was a myth. Then I started my doctoral program. The concept of "sustainability" was popular at that time. I was always against those who defend "diffusion of innovation." I think the adoption of educational technology within a community should be different from the adoption of an anchor in the agricultural context among villagers. I think individual internalization process should be prioritized in the educational context.

*Orhan's Story: The Imperfect Union*

Orhan is a lecturer in the Department of Computer Education and Instructional Technologies at a large public university located in western Anatolia.

After I graduated, I started working as a computer education teacher in public schools. Meanwhile, in 2010, I started my master's degree at the same university and in the same department. Three years later, I started my doctoral program and got my degree in 2018. I was interested in computer-assisted training. But since we have been trapped in distance education lately, I am trying to research something related to distance education situations.



I am also interested in cyber psychology. It was this topic that usually appeared in [prestigious] journals like *Applied Psychology*, which I saw there, and I was intrigued. Since my advisor studied similar subjects, he gave me approval and we designed something. So, by computer-assisted environment, we mean *animations*. We explored the disfluency effect, the question of what contributes to upper cognitive decisions and successes.

*Nazım’s Story: Human Landscapes from Open Learning*

Nazım is a Communications faculty member at a non-profit private university in Istanbul.

I teach about television, camera, light, sound, studio techniques, and film production. I am also supervising graduation projects. I am one of those who witnessed and [was] actively involved in the process while the foundation of today's distance education system in Turkey was established. At that time [in the early 80s] a commission was formed to plan distance education. No one could even define education in that 15-member commission that I was involved in. It was natural. The unnatural part was the fact that all members were from fields such finance, business, and accounting but education.... When this commission first asked, “what do we do, how are we going to do?” no one had an answer. I took the floor and said, “First, we need to decide what is the ideal citizen we want to have in this school then we will decide the courses and content that will help us gain the values of this ideal citizen.”

*Tarık’s Story: Black Mirror-Bandersnatch*

Tarık is a professor in a distance education department in a large public university located in west Anatolia.

When I look at my professional history and background, I can say that I have around 25 years of experience. I keep conducting research as well as teaching in open and distance learning faculty.

Both our curiosity and important reports such as the "Horizon Report" or "World Economic Forum" guide our research. The new concepts that we learn from these reports. Because, you know, there is no age limit to learning. I am recently working more on the technology dimension and interaction. Artificial intelligence, artificial intelligence ethics, free will, choice, [and] prediction systems for the student to be successful. But if you look at my work lately, I have also been researching about inner and external motivation of adult learners. Gamification is one of them.

*Yaşar’s Story: Distance Learning Without Motivation: Birds Without Wings*

Yaşar is a researcher in a large public university located in western Anatolia.

I have been working in the field of open and distance learning since 2010. My background is English language education. However, after working in the field for 5-6 years, I got very interested in online learning environments. I completed my master's degree in 2012. Then, I received my doctoral degree in 2016 in the distance education department. I studied motivation design in my doctoral research. Especially in the groups

I taught, the lack of motivation was one of the biggest challenges. Motivation, engagement, and procrastination are my research interests.

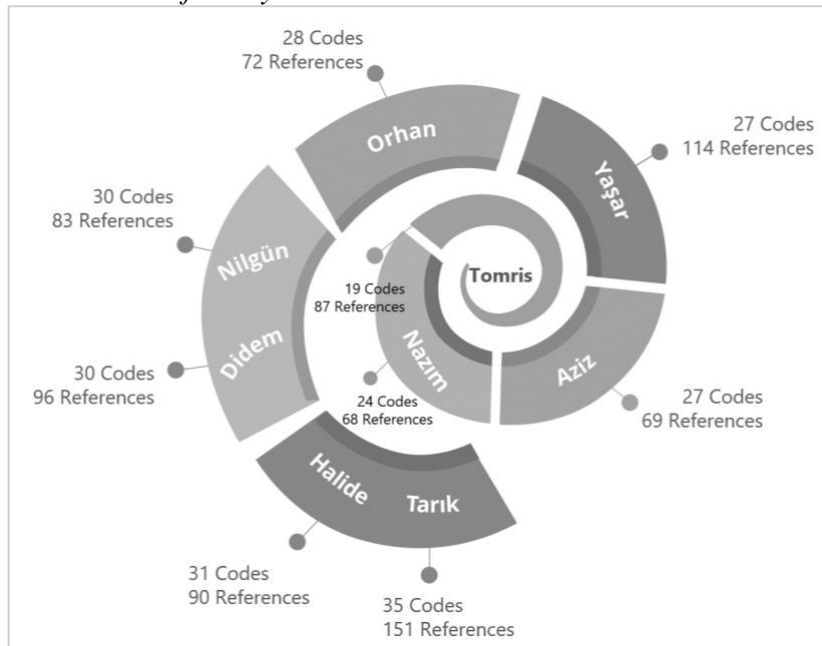
### Data Analysis

Content analysis technique, which is an objective, systematic, and numerical description of the text (Weber, 1990), was preferred to make valid inferences from the interviews with scholars who researched technology-enhanced learning environments. In this analysis, codes—the smallest units of text—included words, phrases, sentences, and paragraphs. The initial codebook was drafted using Carl Mitcham’s four elements of technology framework. In this codebook, the main codes were identified as: (1) Object, (2) Knowledge, (3) Activity, and (4) Volition.

The subcodes, on the other hand, were extracted from each interview text. This iterative process of coding is called “Snowball Coding” (Basdogan, 2021). In this coding technique, each interview was analyzed based on the cumulative codes of the previous interviews. Figure 3 presents the flow of the Snowball Coding technique and the number of codes and references emerged in the first round.

**Figure 3**

*The Number of Codes Emerged in Each Interview and the Number of References Used in the First Round of Analysis*



In the second step, the replicating codes were combined. Next, a comparison of the final code list was conducted with the second coder’s analysis. The second coder analyzed randomly selected interview data (i.e., around 30% of the entire text) individually. Table 2 presents the numerical elements of this content analysis and final codes.

**Table 2**

*Overview of Interview Coding Process*

<b>Content Analysis Elements</b>	<b>Count</b>
# Interviews coded	9
# Analyzed lines	4,650
# Final codes in NVivo	92
# References in NVivo	830
# Coding rounds	2
# Coders	2

The list of the codes under the four main categories Object, Knowledge, Activity, and Volition is presented in Figure 4.

**Figure 4**

*The NVivo Screenshots of the Emerging Coding Frame*

<b>Categories</b>			
<b>Activity</b>	<b>Volition</b>	<b>Objects</b>	<b>Knowledge</b>
Motivating	Non-institutionalized	Camera	Theories
Updating the course	Choice	Blogs	Design
Monitoring	Sustainability	YouTube channel	Accessibility
Providing variety	Empathy	Multiple mediums	Target audience
Involving students	Sense of security	Discussion boards	Instruction
Updating	Dedication	Vyond	Evaluation and Assessment
Feedback	Political economy	Articulate	General literacy
Building connection	Intention	Internet browser	Reliable date
Mentoring	Unintentional consequences	Prezi	Empirical studies
Learning	Ethics	Smart book	Digital literacy
Practicing	Institutionalized power	Kahoot	Models
Preparing	Value	Computer	Processes
Communicating	Aesthetics	Webpages	Readiness
Method	Human desire to learn	Screen sharing tools	Motivation
Interacting with		Camtasia	

**Findings**

It is found that *volition*, representing individuals’ attitudes, intentions, self-realizations, and normative judgments to use a technology was identified as most prevalent (39.0%). Volition was followed by activity (i.e., actions such as designing, creating, using, developing, and evaluating) (21.4%) and object (i.e., static and dynamic items such as printed books, TV, radio, internet, computers, mobile phones, e-text, or drones) (21.2%). The perception of technology as *knowledge* (i.e., theories, models, frameworks, skill sets, descriptive laws, recipes, and empirical

findings) was the least referenced (18.4%) manifestations of the technology in the coded data. Table 3 details the manifestations of the technology categories.

**Table 3**  
*The Frequency and Percentage of the Technology Categories*

Technological Frames	Occurrence
Object	84 21.2%
Activity	85 21.4%
Knowledge	73 18.4%
Volition	155 39.0%
<b>Total:</b>	<b>397</b> <b>100.0%</b>

**Volition**

In the volition category, 155 codes emerged, and it was identified that Tomris, who studied the current state of the distance education centers in Turkey from a critical perspective, used the most volitional references (n = 31) in describing technology. Tomris was followed by Tarik (n = 30), Yasar (n = 20), Aziz (n = 16), Halide (n = 15), Nilgun (n = 15), Nazim (n = 12), Didem (n = 8), and Orhan (n = 8) (see Figure 5).

**Figure 5**  
*Number of Codes by Interviewee in the Volition Category (i.e., NVivo output)*

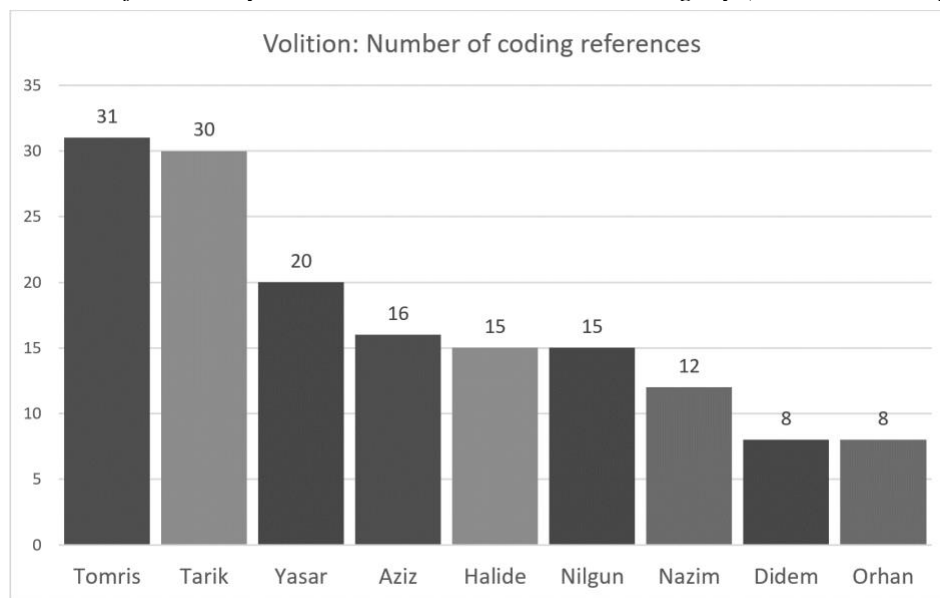


Table 4 presents the sub-categories of the volition category. *Value* is the most frequently identified (n = 84) element among these sub-categories. In this analysis, value refers to

participants’ normative claims that evaluate and describe an action or situation as good, bad, desirable, positive, negative, or acceptable.

**Table 4**  
*The Frequency of the Sub-categories in Volition*

<b>Volition</b>	<b>Frequency</b>
Value	84
Institutional power	12
Ethics	11
Human desire to learn	11
Intention	10
Political economy	8
Aesthetics	5
Unintentional consequences	4
Dedication	3
Choice	2
Empathy	2
Feeling of security	1
Noninstitutionalized	1
Sustainability	1
<b>Total:</b>	<b>155</b>

Tomris, Yasar, and Tarik were found to be using more value related volitional statements. For example, Tomris stated that an ideal director who runs a distance education center should not be someone with an engineering background. Similarly, Tarik argued that in open and distance learning technology is necessary condition but not sufficient. “The instructor **must know the LMS very well**. If he does not know it, he will not be able to use LMS’s features” [Emphasis added] [Appendix H, Line 184-189]. Another example is Nazim’s normative options regarding the qualifications of a faculty member who teaches in on online setting:

Every faculty **must be a good instructional designer**. When necessary, they should know how to ask for help to use the possibilities of technology to use in the online class. The bottom line is that online education is a serious business, and **it should get the seriousness** it deserves from the faculty. [Emphasis added] [Appendix G, Line 315-318]

*Institutional power* is the second most frequently identified (n = 12) element in the volition category. This sub-category refers to participants’ “we claims” that point to collective identity in which the volition emerges through institutional positioning. For example, as explaining the history of Anadolu Open University, Nazim claimed that “first, **we** need to decide what kind of citizens we need. Then we will decide which courses and learning objectives can be used to reach this goal in this open university” [Emphasis added] [Appendix G, Line 17-21]. Similarly, in response to the question about the instructor roles in the open learning, Tarik argued

“...we have lowered learners’ feeling of isolation in online settings” [Emphasis added] [Appendix H, Line 213-214].

The next sub-category, *ethics*, included interviewee’s moral principles to use a specific technological tool, activity, or knowledge in the learning environments. For example, Aziz who studied sustainability in online learning stated, “Honestly, I do not want my lecture video recordings to be shared outside the classroom. I do not know; it makes me nervous” [Appendix E, Line 561-562]. Yasar, further described his digital ethics related concerns in the following excerpt: “It is more difficult to prevent unethical behaviors of the students in remote learning environments” [Appendix I, Line 610-611].

The *human desire to learn* sub-category refers to individuals’ inner needs and readiness to use a specific technological object, knowledge, or method in teaching and learning situations. For example, Aziz emphasized the importance of the learners’ internal motivations to use educational technology.

The next identified sub-category under the volition aspect of technology is *intention*. This term refers to interviewee’s statements related with the role of the individual goals and objectives to use an educational technology. For example, Nilgun stated that her personal goals to help her brother with an intellectual disability shaped her research interest in the computer-aided learning field:

*Political economy* is a sub-category that was identified only in Tomris’s interview. This term refers to money-driven volition to adopt a specific technology. In her dissertation, Tomris studied the economic and political roles of the distance education centers and continuous education centers in Turkey. Using a critical lens, she observed that:

The goal of these centers is to generate income for the university. The people I spoke to, the very honest ones, were more openly saying, “yes, we set up distance education centers to make money, of course, it really brings in a lot of revenue.” [Appendix D, Line 394-399]

She also argued that these distance education centers resulted in *degree inflation* which is the devaluation of educational or academic credentials over time.

But increasingly, degree inflation emerged. At this point, it is not enough for people to graduate from one university. In this competitive market you have to get a master's degree. That is not enough. You are going to get a Ph.D. That is not enough, you have to have many program completions certificates. You must speak more foreign languages. Continuous qualification, qualification, qualification. It is indeed a diploma inflation. [Appendix D, Line 139-147]

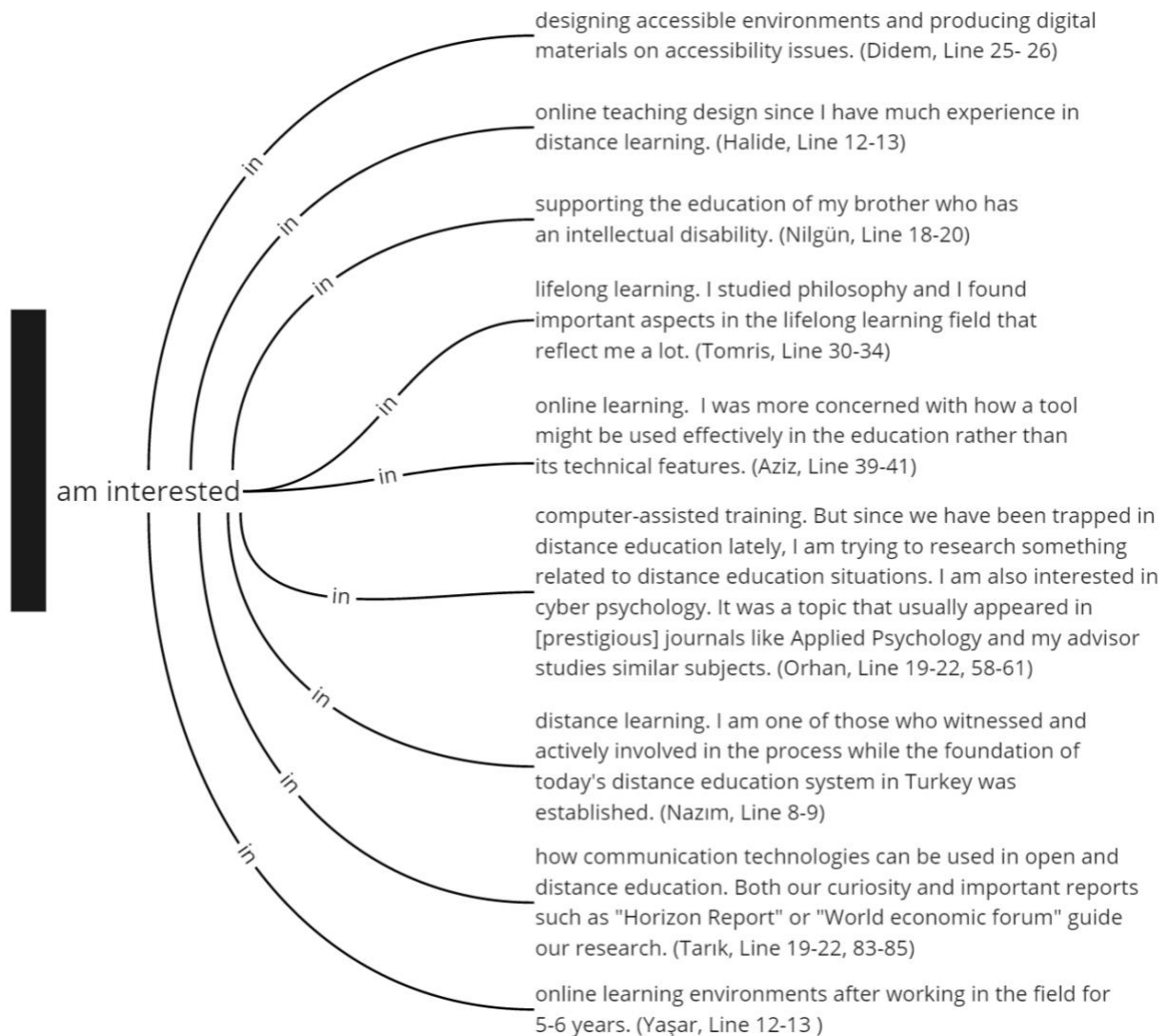
Although it seems that the purpose of these distance education centers is to train people under the concept of lifelong learning, in fact their main purpose is to train cheap human labor for the market. [Appendix D, Line 166-172]

The *aesthetics* category refers to the factors related to the artistic taste and beauty of an educational technology. For example, creativity [Appendix E, Line 254] and instructor’ ability to act/perform during online teaching [Appendix B, Line 185] and being energetic [Appendix G, Line 528] are some of the argued aesthetic features of an instructor teaching online found in the volition category.

### A “Mental Grasp” of Professional Identity

Participants’ emphasis on volition was also identified in their professional identity claims. Figure 6 presents nine interview participants’ research interests in the areas related to the educational technology fields. As noted, there is variety among interviewees’ motivations and intentions to pursue research on a specific topic. We categorized their interest claims into four main categories: (1) sense of duty, (2) theoretical preferences, (3) curiosity, (4) familiarity, and (5) career achievement.

**Figure 6**  
*Participants’ “I Claims” on Their Research Interests*



First, the *sense of duty* refers to researcher’s stimulus to carry out studies that will have a direct impact on people’s lives. For example, designing accessible learning environments for students who have visual disabilities [Didem, Line 25-26], supporting her brother’s education who has an intellectual disability [Nilgün, Line 18-20] and being among the leading group of people who founded the distance education in Turkey [Nazım, Line 8-9] are some examples extracted from the participants’ “I claims.”

The second theme, *theoretical preferences*, describes the researcher’s tendency to favor certain theoretical paradigms over others. For example, in his statement, “I was more concerned with how a tool might be used in education rather than its features and capabilities” [Line, 39-41], Aziz takes a position against the Diffusion of Innovation Theory and adds that he cares about the contributions of a technology to the field of education rather than it spread and adoption rate. Next, the *curiosity* theme refers to researcher’s interest to gain a deeper understanding of a phenomenon. The *familiarity* theme, on the other hand, describes a close acquaintance with the subject matter due to the long years of work experience [Halide, Line 12-13] and teaching experience [Yaşar, Line 12-13].

Finally, items coded in the *career achievement* theme pointed to achievement-oriented motivation. In one case, Orhan stated that he studied computer-assisted learning; however, he recently conducted research on distance learning due to the pandemic. Among the factors for the change in research interests was that the subject appeared in prestigious journals and his advisor’s research expertise was in distance learning [Lines 19-22, 58-61].

### Activity

In the activity category, 85 codes emerged. As detailed in Table 5, *interacting with peers, materials, and instructor* was the most prevalent (n = 20) sub-category in the activity dimension of technology. It was followed by *giving and receiving feedback* (n = 12), *communicating* (n = 11), *methodizing* (n = 9), *mentoring* (n = 8), *building connection* (n = 5), *practicing* (n = 5), *involving students* (n = 3), *providing variety* (n = 3), *updating the course* (n = 2), *monitoring* (n = 2), *preparing* (n = 2), *learning* (n = 1), and *motivating* (n = 1).

**Table 5**

*The Frequency of the Sub-categories in the Activity Category*

<b>Activity</b>	<b>Frequency</b>
Interacting with	20
Giving-receiving feedback	12
Communicating	11
Methodizing	9
Mentoring	8
Building connection	5
Practicing	5
Involving students	3
Providing variety	3
Updating the course	3
Monitoring	2

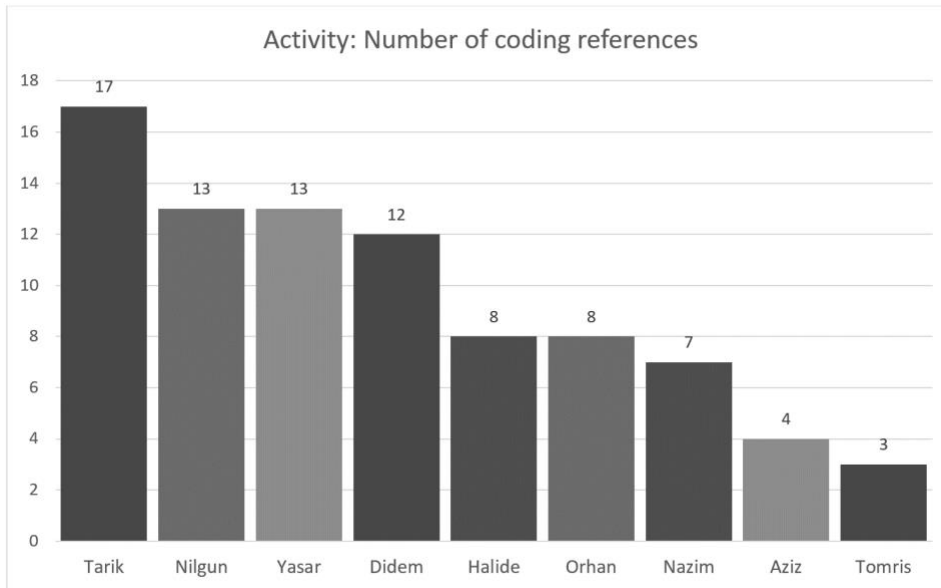


Preparing	2
Learning	1
Motivating	1
<b>Total:</b>	<b>85</b>

In terms of people, Figure 8 illustrates that Tarik, who studied interaction in the open and distance education, seemed to be using more activity related conceptions such as communicating, interacting, learning, methodizing, practicing, and preparing.

**Figure 7**

*Number of Codes by Interviewee in the Volition Category (i.e., Nvivo Output)*



**Object**

In the object category, 84 sub-categories emerged. Not too surprisingly, Learning Management Systems (LMS) was found to be the most frequently (n = 11) referenced object (Table 6). It was followed by Web 2.0 tools (n = 8), technical infrastructure (n = 7), videos (n = 6), learning resources (n = 5), WhatsApp (n = 5), interactive videos (n = 4), Zoom (n = 3), animation (n = 2), computer (n = 2), Internet browser (n = 2), Kahoot (n = 2), multiple mediums (n = 2), screen sharing tools (n = 2), Television (n = 2), a webpage for feedback (n = 1), Articulate (n = 1), blogs (n = 1), camera (n = 1), Camtasia (n = 1), chat rooms (n = 1), communication technologies (n = 1), concept maps (n = 1), discussion boards (n = 1), forums (n = 1), instruments (n = 1), learning content (n = 1), PPT presentations (n = 1), Prezi (n = 1), screen recorder (n = 1), Second Life (n = 1), smart book (n = 1), Turnitin (n = 1), Vyond (n = 1), and YouTube channel (n = 1).

**Table 6**

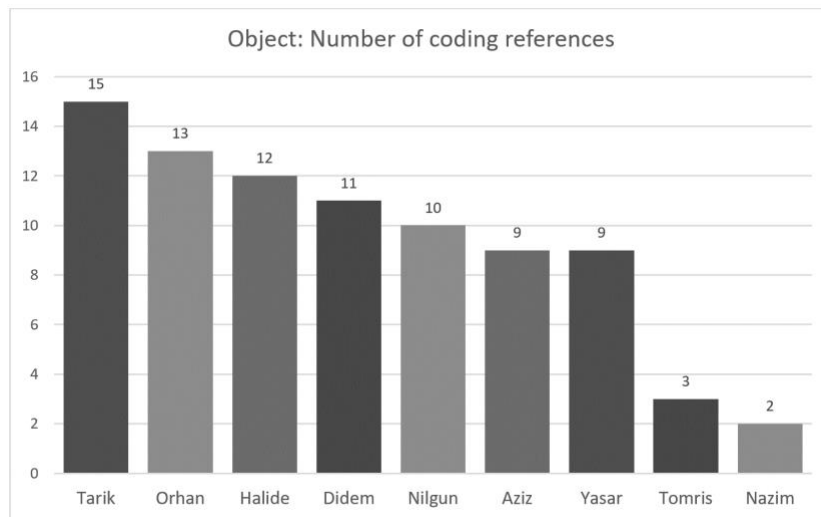
*The Frequency of the Sub-categories in the Object Category*

<b>Object</b>	<b>Frequency</b>	<b>Object</b>	<b>Frequency</b>
LMS	11	Camera	1
Web 2.0	8	Camtasia	1
Technical infrastructure	7	Chat rooms	1
Videos	6	Communication technologies	1
Learning resources	5	Concept maps	1
WhatsApp	5	Discussion boards	1
Interactive videos	4	Forums	1
Zoom	3	Instruments	1
Animations	2	Learning content	1
Computer	2	PPT presentations	1
Internet browser	2	Prezi	1
Kahoot	2	Screen-recorder	1
Multiple mediums	2	Second Life	1
Screen sharing tools	2	Smart book	1
Television	2	Turnitin	1
A webpage for feedback	1	Vyond	1
Articulate	1	YouTube channel	1
Blogs	1		
<b>Total: 84</b>			

Similar to the activity category, Tarik seemed to be using more references referring to the objects (Figure 8).

**Figure 8**

*Number of Codes by Interviewee in the Object Category (i.e., NVivo Output)*



Interactive videos, animations, Web 2.0 technologies, and Zoom were the most frequently cited objects by Tarik. Another interviewee who used many references of technological object was Orhan. Animations, technical infrastructure, videos, Web 2.0 tools, and WhatsApp were the most frequently mentioned in terms of object-related categories.

**Knowledge**

In the knowledge category (Table 7), 73 sub-categories emerged, and it was identified that the knowledge of theories is the most frequently (n = 32) emphasized knowledge type by the scholars interviewed. Among these theories, John Keller’s motivation model (Keller, 1987) ARCS (Attention, Relevance, Confidence, and Satisfaction) was the most frequently mentioned theory (n = 5). Other theoretical knowledge included motivation (n = 4), readiness, (n = 4), adult learning (n = 2), flip learning (n = 2), cognitive apprenticeship (n = 1), Community of Inquiry Model (CoI) (n = 2), individualized instruction (n = 1), novelty effect (n = 1), relevance (n = 1), self-regulated learning (n = 1), TPACK (n = 1), and transactional distance (n = 1).

The knowledge of target audience (n = 7), synchronous instruction (n = 6), digital literacy (n = 5), evaluation and assessment (n = 5), structured process (n = 5), empirical studies (n = 3), model (n = 3), design (n = 2), general literacy (n = 2), reliable data (n = 2), and accessibility (n = 1) are the other technological knowledge types identified in the nine interviews.

**Table 7**

*The Frequency of the Sub-categories in the Knowledge Category*

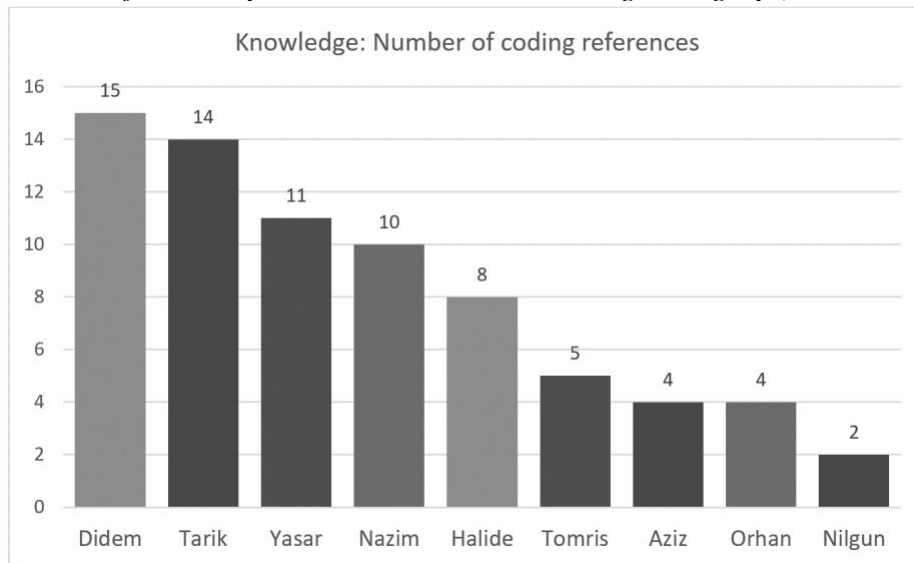
<b>Knowledge</b>	<b>Frequencies</b>
Theories	
○ ARCS	5
○ Motivation	4
○ Readiness	4
○ Adult learning	2
○ Flip learning	2
○ Cognitive apprenticeship	1
○ Community of Inquiry	2
○ Individualized instruction	1
○ Novelty effect	1
○ Relevance	1
○ Self-regulated learning	1
○ TPACK	1
○ Transactional distance	1
Target audience	7
Synchronous instruction	6
Digital literacy	5
Evaluation and assessment	5
Structured process	5
Empirical studies	3
Model	3

Design	2
General literacy	2
Reliable data	2
Accessibility	1
<b>Total:</b>	<b>73</b>

Figure 9 displays that Didem used more knowledge-related references (n = 15) in her interview, and she was followed by Tarik (n = 14), Yasar, (n = 11), Nazim (n = 10), Halide (n = 8), Aziz (n = 4), Orhan (n = 4), and Nilgun (n = 2).

**Figure 9**

*Number of Codes by Interviewee in the Knowledge category (i.e., NVivo Output)*



Nazim and Yasar referred more to the *knowledge of theories* compared to other participants. They particularly stated the critical role of motivation in distance and online learning settings as evidenced in the excerpt below.

To motivate students, first, the instructor should explain every piece of information with examples and detail how that knowledge can be used in the daily life. Second, the instructor should tell stories as much as possible [to] support the content. Also, small group projects are very crucial for the students. Finally, the instructor should appreciate students at every opportunity to support their self-efficacy. [Appendix G, Line 335-338]

Similarly, Yasar noted that “faculty should attract student’s attention to both subject and learning environment. Their strategy might be starting the lesson with a question or showing a picture” [Appendix I, Line 375-378].

## Discussion

Interpreting digital technologies becomes challenging due to their intricate and complex nature, leading to uncertainty (Kaplan & Tripsas, 2008). Previous literature suggests that technology frames matter because they shape perceptions, attitudes, and decision-making processes (Spieth et al., 2021). Hence, a comprehensive analysis of technological frames within technology-enhanced learning environments is essential for advancing instructional strategies that foster intentional and impactful educational outcomes (Castañeda & Selwyn, 2018). In this study, we investigated the technological frames that the educational technology scholars we had interviewed used as defining their experiences in/with technology-enhanced learning environments such as online learning, e-learning, Web-based learning, distance learning, computer assisted learning, computer mediated learning, and open learning. As noted earlier, Mitcham’s (1994), technological frame topology that includes four components: (1) object, (2) knowledge, (3) activity, and (4) volition guided our qualitative investigation.

Findings suggested that the *volition*, or an individuals’ attitudes, intentions, self-realizations, normative judgments, and ethical decisions to use a specific technology (Keirl, 2018) was the most prevalently identified technological frame in most of the interviews. It is important to note that scholars from the Web-based learning and computer-assisted learning categories used less references to the volition aspect of technology, whereas the participants from distance learning and open learning incorporated more volitional frames in their narrative. This can be explained by the emphasis on tools such as Web and computers in their names.

In *Thinking Through Technology*, Mitcham (1994, p. 247) argues that “the intelligent control of technology” depends on two things: (1) understanding “what we should do with technology, the end or goal toward which the technological activity ought to be directed,” and (2) grasping “the consequences of technological actions before the actual performance of such actions” (Mitcham, 1994, p. 260).

In line with Mitcham’s argument on the intelligent control of technology, the findings from the interviews suggested that the *value* claims including scholars’ normative judgments about what they should do with technology, how should they use technology, and who should control specific technology (Royackers & van de Poel, 2011) was the most prevalent theme identified in the volition aspect of technology as described under the technology strategy category in the study of Huvila et al. (2021). For example, the characteristics of ideal administrators and faculty in distance education centers as well as ideal instructors in online learning were among the key findings of this study. For example, being comfortable with the Learning Management System (LMS), being a good instructional designer, and having a warm, friendly, and effective interaction and communication style with learners were among the normative recommendations to be an effective online instructor.

Another important finding was *ethics* where the interviewees noted several moral principles regarding the consequences of the non-intelligent educational technology use. Thinking and planning on the *sustainability* of the educational technologies (Niederhauser et al., 2018) was one of the concerns shared by one of the interviewees (i.e., Aziz) under the ethics category. As highlighted by Mitcham (1994), technological volition relates to contemplating the

potential “consequences of technological actions before the actual performance of such actions” (Mitcham, 1994, p. 260).

In Turkey, one of the largest-scale, government-supported educational technology initiatives, *FATİH Project* (i.e., the Movement to Enhance Opportunities and Improve Technology) is a crucial example of lack of volitional thinking by the project initiators in terms of sustainability and educational ecologies. For example, Ekici and Yilmaz (2013, p. 334) argued that FATİH Project was an ineffective initiative for the Turkish educational system due to the unclear project goals, lack of communication among the stakeholders, and concerns regarding the political, technical, and financial sustainability of the project. Ekici and Yilmaz’s evaluation (2013) seems to be consistent with Tarik’s claim that “technology is a necessary condition but not sufficient.”

In addition to the sustainability, study participants also indicated other ethics-related concerns in the online, distance, and open learning environments, such as the distribution of faculty intellectual property (e.g., PPT presentations, recorded lecture videos, and exam questions) without the consent of the instructor (Liang & Chen, 2012). Accordingly, Halide who works as an instructional designer in a higher education institution and supports faculty for their instructional needs, noted that some faculty have asked her to disable the feature of “download video” in the LMS to prevent their video from being uploaded to YouTube. These concerns suggest that there is the lack of standardization in descriptive copyright statements of the course materials shared and distributed through LMS, e-mails, or video conference tools in Turkish higher education institutions. Digital licensing standards should be developed both for the individual work and collaborative work to circulate in the digital learning and teaching platforms.

Finally, *degree inflation*, the devaluation of academic credentials over time, caused and strengthened by the distance education centers in Turkey was an interesting discussion found under the volition aspect of technology (Castañeda & Selwyn, 2018; Goglio et al., 2022). This finding suggests that it is important to not only review the economic politics of the distance education centers and the financial contribution of online and distance learning courses to the university, but it is also vital to address and evaluate quality standards to ensure that the content, pedagogy, and tools of the courses are also considered.

As for the second prevalent frame, *activity*, refers to behavioral engagement with technological objects and knowledge. The current study revealed that activity-related conceptions used by the interviewees for all the conceptual categories included a variety of action verbs. These technology-activity verbs were divided into two groups: (1) Inter-activity and (2) Intra-activity. Inter-activity refers to instructors’ engagement with technology to interact with the students or other stakeholders such as instructional designers, administrators, and teaching assistants. This two-way interaction includes examples such as motivating, mentoring, lecturing, presenting, and communicating. The second type, intra-activity, refers to the instructor’s engagement with technology as interacting with the self. Intra-activities included instructor’s learning, preparing, updating, practicing, and planning behaviors in the online/open/distance/Web-based/e-learning environments.

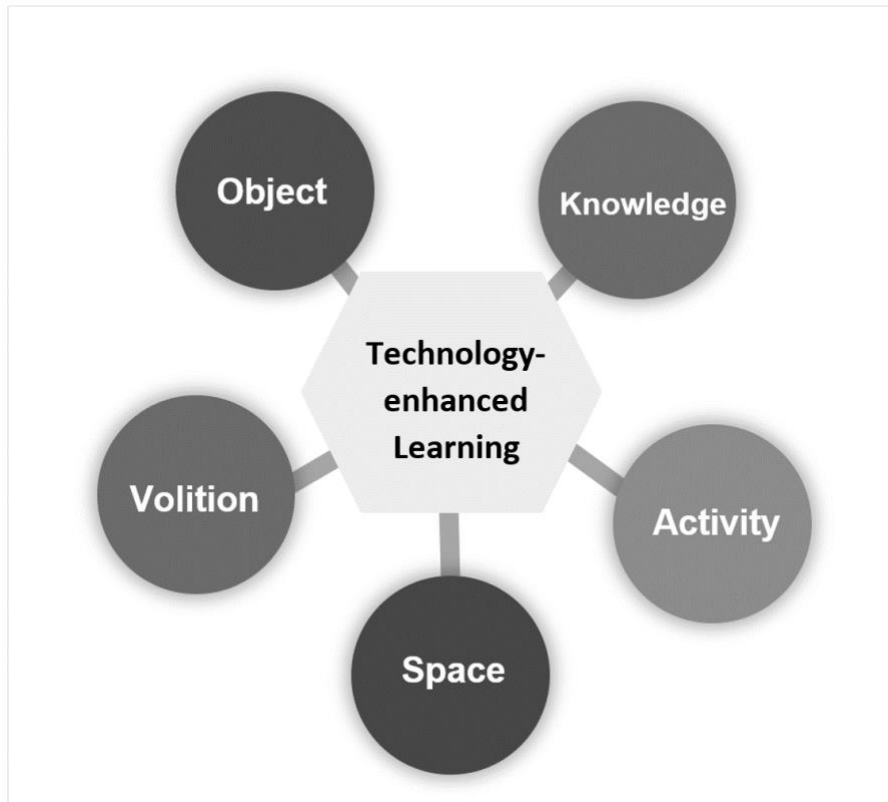
Third, the technological frames were also examined in terms of technological *objects*. Scholars from computer-assisted learning and open learning categories used more object related references in their narratives. Learning Management Systems (LMS) and Web 2.0 tools were the most frequently referenced objects by the study participants. In essence, it is not surprising to see the LMS and Web 2.0 tools on the top of this technological objects list due to their ease of use. For example, LMS platforms provide a structured and organized virtual space for both instructor and learners to communicate, collaborate, and exchange learning artifacts. Similarly, Web 2.0 tools provide external support to empower virtual students by giving them opportunities to collaborate, design, sketch, edit, modify, and publish the content (Hew & Cheung, 2013). Notably, one unanticipated finding was the use of a smartphone application, *WhatsApp*, as an alternative LMS for educational purposes as noted by these nine scholars. A potential explanation might be the simple interface of WhatsApp allows individuals to share text, audio, video, and figures with less clicks compared to a university’s secure LMS.

Finally, in the technological *knowledge* category, (1) factual knowledge (i.e., basic terminologies), (2) conceptual knowledge (i.e., theories, models, and frameworks) and (3) procedural knowledge (i.e., “How to” knowledge such as design, evaluation, and assessment) were identified in all categories except computer-aided learning. It is somewhat surprising that knowledge of theories was found in this study as the most prevalent knowledge type pointed out by the interviewees in all learning/teaching concepts. This result may be explained by the fact that theories provide a logical consistency and explanatory power to describe the targeted phenomenon (Reeves et al., 2008). Another surprising outcome was that none of the interviewees mentioned *reflective knowledge* (i.e., “Self” knowledge such as experience, introspection, reflection, and precedents) as interacting with technology. Particularly, the use or importance of previous experiences and the role of reflection in different learning and teaching platforms was not addressed by these nine educational technology scholars. This finding suggests that faculty tend to prioritize objective experiences over subjective ones.

The results of this study are significant in at least two major respects. First, by uncovering the technological frames, we generated empirical evidence on how educational technology scholars perceive and experience technology, with a hope to better design educational technology programs. Second, this research brings a new dimension to Carl Mitcham’s technological frames typology (1994). As indicated, in the original model, Mitcham describes that technology can be in four different formats including: (1) Object, (2) Knowledge, (3) Activity, and (4) Volition. In the interviews, all four of these aspects of technology were observed in all technology-enhanced teaching and learning situations with varying degrees. These findings echo Olsen and Engen (2007) who argue that technology is culturally and socially constructed. In addition, we identified a new technological frame, “Space,” as presented in Figure 10, that indicates the significance of context to understand technology as argued by the SCOT (Bijker, 1995).

**Figure 10**

*Manifestations of Technology in Five Ways- Object, Knowledge, Activity, Volition, and Space  
(Adapted from Mitcham, 1994)*



Scholars who studied various technology-enhanced learning concepts, described both the physical location and the non-physical location of the learning and teaching environment as referring to object, knowledge, activity, and volition aspects of technology. For instance, when they talk about online learning, the technological knowledge (e.g., peer learning), technological object (e.g., discussion forums), technological activity (e.g., replying to peers’ comment), and technological volition (e.g., respecting diversity in the class) were conceptualized in a space: the internet. In another example, the interview participant who described distance education as “a form of learning that happens anywhere anytime,” referred to an abstract space where technology-enhanced learning is manifested. Similarly, in the definition of computer-supported learning, “it is a training via computer presentation, CDs and floppy disks, and interactive applications...” the physical tool-based space was emphasized.

The question of how physical space influences human learning has been studied from both psychological and physical perspectives (Brooks, 2011; Chism, 2006). In the realm of environmental psychology, researchers explored concepts such as people's emotional connection to places, their comfort levels in different spaces, and how various environments can motivate and inspire (Graetz, 2006). Likewise, the researchers also investigated the physical aspects of space, including lighting, temperature, color, layout, and sound, to understand how these factors impact learning (Talbert & Mor-Avi, 2019).



The findings of the current study suggest that space matters online too, and, accordingly, we need additional research on how online space affects learning, cognitive engagement, motivation, and the overall educational experience. Such findings also echo McLuhan's (2006) notion of "the medium is the message," which underscores that the way information is delivered or transmitted through a medium has a profound impact on how it is perceived and understood, often overshadowing the content itself (McLuhan, 2006). Similarly, this study's results suggest that the medium, technology, preserves a multitude of communicative interactions where it becomes not only a mere object but also a space, knowledge, activity, and volition at once. For a comprehensive understanding of technology-enhanced learning, it is necessary to examine the interplay between these five dimensions as a cohesive whole.

### **Limitations**

This study has several limitations. The first limitation is that the interviews were carried out during the pandemic. Thus, study participants' responses to the interview questions might be affected by that unexpected teaching experience and other related societal constraints at the time. A second limitation concerns the generalizability or transferability of findings. Since data sources of this study are from Turkish context, the implementations of the findings in another context should consider cultural, social, political, and geographical variables.

### **Conclusion**

As Tarik, a professor of a distance education program, insightfully reflected on the intriguing Netflix show “Black Mirror Bandersnatch,” “technology shapes not only our experiences but also the very essence of our interactions.” This observation underlines technology's ability to blur the boundaries between reality and virtuality, compelling us to contemplate the significant role of technology in shaping our perceptions.

This interpretive phenomenological study was designed to explore the meanings that educational technology scholars attach to technology-enhanced learning environments. The findings highlighted the significance of *volition* as the most frequently identified frame regarding technology use. Surprisingly, theories were the predominant form of technological *knowledge* mentioned by the participants, suggesting their importance in understanding and explaining educational technology phenomena. Notably, the concept of *space* was introduced as a new technological frame, where our activities, intentions, and experiences take place. Analyzing the five dimensions of technology—object, knowledge, activity, volition, and space—offers researchers, educators, and educational technology practitioners a holistic understanding of how individuals interpret technology and recognize potential challenges within educational environments. By gaining insights from these technological dimensions, stakeholders can navigate the complexities of technology and collaboratively shape more effective and inclusive learning approaches.

### **Disclosures**

The authors declare no funding associated with this research. All authors have no conflict of interest to report.

**Data Availability**

Interview data for this study is available upon request. Please contact the first author for access to the data (Merve.Basdogan@ttu.edu).

**Ethics Board Approval**

This research study received institutional review board (IRB) approval from Indiana University's Human Research Ethics Committee (IRB Protocol Number: #1909857471).

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## Appendix A Interview Protocol

### INTERVIEW PROTOCOL

Critical Analysis of Online Education Concepts and Trends in Turkish Doctoral Dissertations

#### OPENING

- Greet the interview subject.
- Confirm that it is OK to record. Tell interviewee that you would like this permission on the recording. *[BEGIN RECORDING]* “May I ask you to give your permission to record our interview?”

*[After this point, if interviewee wants to stop, thank the interviewee again and stop the interview.]*

#### INTRODUCTION

We are conducting this study to understand the use of different concepts about online learning including e-learning, web-based learning, distributed learning, computer supported learning, computer assisted learning, computer mediated learning, virtual learning, open learning, online learning, and distance learning.

**Question 1:** We know that online education literature has many different forms of concepts that are sometimes used interchangeably. In your dissertation research, you studied <insert concept here>

Would you please tell us about yourself and your study area?

**Question 2:** How do you define <insert concept here> learning in your research?

- *After they share what their definition and if they do not elaborate*
  - If you don't mind sharing, can you tell me a bit more about the purpose, format, interactions, concerns and instructional goals of this type of learning?

#### TOOLS AND TECHNOLOGIES

**Question 3:** How are the tools and technologies in <insert concept here> learning to support teaching/learning activities used?

- Can you give me an example?
  - According to the example, clarify the connection between examples/artifacts and their definition.
- *If no*, what are the essential technical elements in a <insert concept here> learning design?

#### INSTRUCTOR ROLES

**Question 4:** When you look at the course designs in <insert concept here> learning, do you sense that instructors' roles change from the other type of learning designs in some way?

- *If yes*, can you bring an example to mind?
- *If no, then say* "what are the similar instructor roles in different online learning forms." (give time to think)

**Question 5:** How would an instructor of a <insert concept here> learning support communication and interaction among the learners and instructor?

- What do you think about community building among the students and instructors in <insert concept here> learning?



**Question 6:** Do you ever feel that the pedagogical approaches of teachers in <insert concept here> learning are different than other forms of online learning design?

- Would explain that for me? Give an example?

**Question 7:** Feedback is a good way to allow students to gauge their performance. How would <insert concept here> learning environments support feedback?

- Would you explain what are the ways assessing student performance in <insert concept here> learning?

#### **WRAP UP**

**Question 8:** Before we finish, I have a kind request from you:

- Can you please create a blank Microsoft Word Document or use a paper, and type/write down the most commonly used keywords, terms, or phrases in <insert concept here> learning such as terms, theories, processes, and instructional strategies.
- *Thank the interviewee for his/her help with the study.*

## Introduction to OLJ Volume 27, Issue 4

Peter Shea

*University at Albany, SUNY, USA*

Once again, on behalf of OLC, it is my pleasure to provide a brief overview of the final issue of 2023. In addition to the special issue from the AERA Online Teaching and Learning SIG, the December issue of the *Online Learning Journal* includes five articles from our regular submission process. These articles cover a broad range of topics including the evolving role of writing centers in support of online learners, humanizing online pedagogy, learner readiness in online and other digital contexts, and an intriguing investigation of online and classroom student outcomes.

The first article in this section is “A Writing Center’s Hybrid Approach to Supporting English Academic Writing Skills among L2 Postgraduates” by authors Mary Newsome, Mohammad Mollazehi, Mounia Zidani, Randa Sheik, and Jumana Amiry of Qatar University, Qatar. In this paper we are reminded that graduate students are increasingly expected to publish their own research (or collaborate with others to do so) prior to graduation. This places a significant burden on second language learners who must simultaneously learn specialized language while gaining understanding of research design, methods, analysis, and reporting. This mixed-method comparative study examines historical data to gain insight into the influence of a writing center’s hybrid approach to supporting the development of English academic writing skills among postgraduate second language learners. The paper concluded that such students not only prefer a hybrid and flexible approach to writing support, but that their faculty are willing to assist with this method and that this approach is associated with higher rates of publication prior to graduation. The study has implications for other writing centers and the general support of second language learners in post-graduate settings.

In “Humanising Online Pedagogy through Asynchronous Discussion Forums: An Analysis of Student Dialogic Interactions at a South African University” authors Fatima Vally Essa, Grant Andrews, Belinda Mendelowitz, Yvonne Reed, and Ilse Fouche investigate online learning through a pedagogical lens that aims to support engagement, collaboration, belonging, connection, interactive social learning, identity building, and personalized learning. The authors argue that this humanizing pedagogy is well suited to the context of transitioning to online learning during the COVID pandemic, especially in South Africa with its previous history of apartheid. Through thematic content analysis of students’ dialogic responses in online discussions, the paper reveals how the specific online instructional tasks enabled humanizing pedagogy by allowing students to use their authentic voices, to develop social connections, and to reflect affective and personal experiences. The authors maintain that interactive, asynchronous online forums can be effective tools to support humanizing online pedagogy when these forums are designed to encourage dialogic learning, use content that is relevant to students’ contexts, and give students agency by allowing them to select texts for discussion and share their diverse perspectives.

The next paper is “From Online Learner Readiness to Life-Long Learning Skills: A Validation Study,” by Mary Ellen Dello Stritto and Naomi Aguiar of Oregon State University and Carolyn Andrews of Brigham Young University. Readiness to learn in online settings has been a topic of interest for decades as educators and researchers came to realize that online learning required additional knowledge, skills, and attitudes from students beyond what is expected for classroom learning. For example, in early models of student readiness there was a focus on access to technology and confidence in an ability to manage one’s own learning. Later models have added and consolidated constructs to include such constructs as technology self-efficacy, online learning task self-efficacy, communication self-efficacy, and self-regulation efficacy. The authors review the history of online learner readiness and devise a new scale that improves upon existing measures. Through large-scale survey research with more than 10,000 respondents at two universities, the authors propose and test a new model that includes a more parsimonious framework. Through a factor analytic approach, they identify self-regulation efficacy, locus of control, communication efficacy, and technology efficacy as the core components of online learner readiness.

The next paper is “A Study on the Relationship between Domain Specific Self-Efficacy and Self-Regulation in e-Learning Contexts,” by Priyanka Gupta and Umesh Bamel of the IMI Institute in India. Focusing on the broader context of e-learning rather than strictly online learning and working in the context of India rather than the U.S., the authors develop a model that employs many of the same variables used in the previous study. However, these authors focus on a subset of constructs: academic self-efficacy and internet self-efficacy and their impact on self-regulation in e-learning contexts. Using a sample of more than 500 students and regression analysis, the findings highlight that academic and internet self-efficacy have a positive effect on self-regulation in an e-learning environment in a South Asian educational context.

In our final paper, Melanie Long of The College of Wooster, Karen Gebhardt of the University of Colorado, and Kelly McKenna of Colorado State University examine learning outcomes in “Success Rate Disparities Between Online and Face-to-Face Economics Courses: Understanding the Impacts of Student Affiliation and Course Modality.” Meta-analytic evidence suggests that online and classroom learning do not differ significantly in terms of student outcomes. This conclusion comes with a caveat—there is considerable heterogeneity of results across studies, with some studies finding better outcomes for classroom learners, some studies finding no significant difference, others finding online, and especially blended, students doing as well or better than purely classroom students do. The final paper in this section seeks to disentangle results indicating lower success rates by online students found in some studies by analyzing important student characteristics such as whether they are matriculated (affiliated/admitted/fee-paying), and whether they are fully online or mixing online and classroom instruction. Using both institutional data and survey data, the authors examine online versus face-to-face success gaps and student’s term modality (FTF, online, or mixed) as well as institutional affiliation (matriculation). They identify components using a fixed effects regression method and compare outcomes across four student groups: affiliated students who are enrolled in exclusively online courses, exclusively face-to-face courses, or in a mix of courses each term, as well as unaffiliated (external) students exclusively taking online courses. They conclude that although students in online courses are less successful on average, there is a lot of variance in

that group, and part of this gap is explained by the student's institutional affiliation and whether they exclusively take online courses. External students are the least successful in online courses while students who are affiliated with the institution fare much better. These findings have implications for student support and advising that could improve conditions for underperforming groups.

Many thanks to Patrick Lowenthal of Boise State University and Rob Moore of the University of Florida for their work on the special issue section of the journal. Many hours were devoted to curating, communicating, and editing this extensive issue and we are grateful for all of their efforts. Also a huge thank you to our other editors, authors, reviewers, copyeditors, and the staff at OLC for their many contributions to support the success of the journal.

Please consider joining OLC, our publisher, as a [community](#), [professional](#), or [institutional](#) member. The Online Learning Consortium provides support that allows OLJ to continue to publish as an open access journal, providing free access to scholarship as a service to the field. Your support, even as a free community member, is a way to give back to OLC and support our mission to remain open access and free.

# From Online Learner Readiness to Life-Long Learning Skills: A Validation Study

Mary Ellen Dello Stritto  
Naomi R. Aguiar  
*Oregon State University, USA*

Carolyn Andrews  
*Brigham Young University, USA*

## Abstract

One student success factor in higher education is students' readiness to learn. An increasing number of students are learning in multiple modalities and the boundaries between course modalities continue to blur. In this context, there is a need to reassess readiness for online learning in ways that can serve *all* 21st century learners. The purpose of this study was to re-develop and cross-validate a measure of online learner readiness with different online student samples from two universities in the United States (combined N = 10,143). The reduced 25-item instrument retained four latent constructs: self-regulation efficacy, locus of control, communication efficacy, and technology efficacy. The emergence of these four factors replicates previous scale development studies, although individual items diverge from previous readiness instruments. Current and future applications of this redeveloped readiness instrument, the Learning Skills Journey Tool, are discussed, with a specific focus on how it can serve students throughout their learning journey.

*Keywords:* Online learner readiness, scale development, validation

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Online learning has grown over the last 20 years (Allen & Seaman, 2017; Seaman et al., 2018), yet interest in student readiness to learn online endures (Capranos et al., 2022; Martin et al. 2020; Arum & Stevens, 2020). Broadly defined, *readiness* is the degree to which a community or individuals may be eager and prepared to benefit from information and communication technologies (ICT) (Dada, 2006). Through the lens of student success, researchers have focused on defining and measuring student readiness to learn online, including the skills and characteristics that enable students to learn well. In early research, technological skills were a central focus, including basic computer and Internet skills (e.g., Miltiadou & Yu, 2000). Rapid technological growth and expansion of online education led to changes in how online learning readiness is measured. The onset of the COVID-19 pandemic and the sudden shift to remote learning has further reinvigorated the debate about online learning efficacy, online learning readiness, and student success.

Traditionally, existing measures of online learner readiness are viewed as tools that can be used to prepare students for the online learning environment; students are encouraged to engage with readiness instruments before starting online degree programs (Milligan & Buckenmeyer, 2008). However, the online learning landscape has fundamentally shifted; the boundaries between “traditional face-to-face” students and “online students” are blurring. While there has been significant growth in the numbers of students earning their degrees entirely online (National Center for Education Statistics, 2022), students who are enrolled in traditional, residential programs are also taking an increasing number of online courses (Bayview Analytics, 2019). Fully online programs are also increasingly serving an adult-learner population of students who are completing degrees, changing careers, or upskilling (National Center for Education Statistics, 2022).

Regardless of whether a student is campus-based, fully online, a “traditional” student, or an adult learner, a key factor shaping the effectiveness of the online learning environment is the student’s degree of readiness (Artino, 2009; Galy et al., 2011; Kruger-Ross & Waters, 2013). Today all learners—including adult learners—need an essential set of skills that can equip them for the future of work in the 21<sup>st</sup> century. Therefore, there is a need to reassess readiness to learn online in ways that can serve all learners at any stage of life. In this paper, we report on the re-development and cross-validation of an online learner readiness instrument that builds on the work of Dray and colleagues’ Online Learning Readiness Survey (2011). In the following literature review, we summarize the central concepts of online learner readiness that informed the development of our readiness tool.

## **Literature Review**

Published literature on readiness for online learning began in 2000 with the psychological concept of self-efficacy (Bandura, 1989) as an overarching framework (Miltiadou & Yu, 2000). During this period, several surveys were developed to measure online learner readiness (e.g., McVay, 2000a & 2000b, Parnell & Carraher, 2003; Watkins et al., 2004; Bernard et al., 2004; and Smith, 2003 & 2005). In 2010, Hung et al. published the Online Learner Readiness Scale (OLRS) and Dray et al. (2011) published the Online Learning Readiness Survey (ORLS).

Following the development of these scales, a literature review by Demir and Yurdugul (2015) revealed that 50% or more of online learner readiness models included the following factors: a) competence of technology usage; b) self-directed learning; c) access to technology; d) self-confidence; and e) confidence in pre-requisite skills. Other frequent factors in readiness models included motivation and time management skills. More recently, Martin et al. (2020) reviewed readiness instruments and found four common constructs: online student attributes, time management skills, technical competencies, and communication competencies. In the following sections we summarize the literature on the readiness domains that have emerged across measures: self-efficacy, self-directed learning, technology capabilities, and communication.

### **Self-Efficacy**

Self-efficacy is the ability “to organize and execute the courses of action required to produce given attainments” (Bandura, 1997, p. 3). In psychological science, research has demonstrated the impact of self-beliefs or self-efficacy on cognitive processes and performance (Bandura, 1989; de Fátima Goulão, 2014; Simmering, et al., 2009). Dray et al. (2011) described the concept of readiness as defined in part by “self-concept/self-efficacy with academics” (pg. 31). For example, one of the earliest readiness instruments by Miltiadou and Yu (2000) applied different facets of self-efficacy (e.g., self-efficacy beliefs regarding communications technology) to the online educational environment; all items in this measure loaded onto a single self-efficacy factor. In the readiness instrument developed by Dray et al. (2011), items about self-efficacy included beliefs about degree completion, beliefs about responsibilities associated with problem solving, and self-efficacy in writing/communication.

Other scales at the time did not include similar self-efficacy dimensions beyond efficacy with technology or computer self-efficacy (e.g., Kerr et al., 2006; Hung et al., 2010). One exception is the Self-efficacy Questionnaire for Online Learning (SeQoL) developed by Shen et al. (2013) that defined 5 dimensions: self-efficacy to (a) complete an online course, (b) interact socially with classmates, (c) handle tools in a Course Management System (CMS), (d) interact with instructors in an online course, and (e) interact with classmates for academic purposes. Tsai et al. (2020) confirmed the factor structure of the SeQoL and cross-validated it with a sample from a different university.

Recently, Sun & Rodgers (2020) developed and validated the Online Learning Self-efficacy scale (OLSS). This scale applied the concept of self-efficacy to technology, task completion, interaction, and self-regulation. Items in this measure focused on student’s personal beliefs in their abilities in these four areas: a) technology use self-efficacy, b) online learning task self-efficacy, c) instructor and peer-interaction and communication self-efficacy, and d) self-regulation and motivation efficacy.

### **Self-Directed Learning**

While self-efficacy is the belief in one’s ability to control cognitive processes and academic performance, self-directed learning is the process by which a learner has both the motivation and the aptitude to initiate and direct their own learning (Zimmerman, 1989). Based on the widely accepted conceptual framework developed by Knowles (1975), self-directed

learning includes the ability to diagnose learning needs, develop learning goals, identify learning resources, implement appropriate learning strategies, and assess learning outcomes.

In the literature, self-directed learning is sometimes referred to as self-regulated learning (see Loyens, et al., 2008 for a review). Self-directed learning and self-regulated learning are similar in that both constructs require metacognitive skills (e.g., setting specific learning goals and creating strategies to achieve them) (Loyens et al., 2008). However, they differ in that self-regulated learning is conceptualized based purely on characteristics of the learner, whereas self-directed learning can apply to both learner characteristics and design features of the learning environment (Loyens et al., 2008). In measures of online learner readiness, both self-directed and self-regulated learning subscales focus on learner characteristics, which are measured in similar ways. For example, both the OLRS (Hung et al., 2010) and the OLSS (Sun & Rodgers, 2020) include items about goal setting and study plans, although the former refers to these items as measuring self-directed learning and the latter refers to these items as measuring self-regulated learning.

Online, one particularly important self-directed learning strategy is time management including ability to complete tasks on time. Not completing tasks on time is often attributed to academic procrastination, defined as intentionally delaying schoolwork that must be completed (Schraw et.al, 2007). Balduf (2009) found that poor time management or academic procrastination contributed to academic underachievement. Michinov et al., (2011) found that high-procrastinators' desire to drop-out spiked earlier and more frequently throughout the semester than low-procrastinators. Therefore, self-directed learning, which can increase a student's ability to complete tasks on time, is essential for online learning and is critical to overall student success.

Locus of control (LOC) is another construct associated with both self-directed and self-regulated learning. It is generally defined as a person's perceived control over life's outcomes. According to social learning theorist Julian Rotter (1966), internal locus of control (ILOC) is considered one facet of LOC—defined as the extent to which a person believes they control events that influence them as opposed to external factors. People with higher levels of ILOC believe they control the outcome, whereas lower levels of ILOC yield the control to factors outside their realm (Rotter, 1966).

Overall, the relationship between locus of control, self-directed learning, and self-regulated learning is reciprocal. Individuals with an internal locus of control are more likely to engage in self-directed and self-regulated learning, and engagement in self-directed and self-regulated learning is likely to lead to an internal locus of control. Therefore, success in self-directed and self-regulated learning depends on higher levels of ILOC (Deci et al., 1991; Jansenn & Carton, 1999; Cornoldi et al., 2003; Zhu et al., 2020).

### **Technology Capabilities**

Although more recent readiness measures focus exclusively on self-efficacy with technology (see Sun & Rodgers, 2020; Torun, 2020), readiness instruments have historically included a broader constellation of technology skills due to the shift from face-to-face instruction to computer mediated instruction. Early readiness instruments contained questions about



computer and Internet access, as well as what are now considered basic skills such as sending and receiving email, and saving and organizing files (e.g., Watkins et al., 2004).

Most online learner readiness instruments have factors such as computer skills (Kerr et al., 2016) or technological mastery (Parnell & Carraher, 2003). Some dimensions include confidence or comfort with technology (Bernard et al., 2004; Smith 2005; Shuib et al., 2018;), computer self-efficacy (Pillay et al., 2006; Pillay et al., 2007; Hung, 2010; Torun, 2020) and technical competencies (Yu & Richardson, 2015). In their unpublished follow-up studies on the OLRS, Dray and colleagues included an *information and communication technology engagement domain*, divided into four subscales: expectancy values, achievement values, locus of control, and self-beliefs (B. Dray, personal communication, 2019).

As online learning technology has developed, recent scales have included self-efficacy to interact with the course or learning management system (LMS) (Shen et al., 2013). Overall, the measurement of students' technology capabilities aligns with the broader psychological concept of self-efficacy. For example, Lin et al. (2016) developed the Mobile Learning Readiness Scale that assesses how students embrace mobile learning systems and includes a factor called "m-learning self-efficacy," which is made up of questions evaluating students' confidence in their knowledge of mobile learning environments as well as their confidence in their skills related to mobile learning.

### **Communication**

Many earlier readiness scales were focused solely on basic technology skills; however, several measures also assessed communication in online environments. Some measures focused on relationships and interactions, such as The Online Learner Readiness Self-Assessment (Watkins et al., 2004) or on the desire for interactions with instructors and students (see Bernard et al., 2004). Other instruments focused on students' communication self-efficacy (see Hung, 2010), including interactions with instructors, contributing to the online community, and communicating for academic and social purposes (Cho et al., 2009; Dray et al., 2011; Shen et al., 2013).

A more recently developed scale, the Student Online Learning Readiness (SOLR) (Yu 2014; see also Yu & Richardson, 2015), focused specifically on communication competencies in addition to technical skills. The SOLR scale contains four factors: social competencies with classmates; social competencies with instructors; communication competencies (based on the OLRS by Dray et al., 2011), and technical competencies. Aligned with the methodology of Dray et al. (2011), the SOLR is one of a few instruments to go through rigorous validity and reliability testing using factor analysis. In a 2018 follow-up study, Yu completed a confirmatory factor analysis of the SOLR and proposed it as a new conceptual model for online student retention.

In 2020, Martin et al. reviewed published readiness surveys and found communication competencies to be one of four common constructs. Students were also asked to report on both the importance of and their confidence in a) online student attributes (e.g., self-directed learning); b) technical domains (e.g., downloading software); c) time management (e.g., completing assignments on time); and d) communication (e.g., interacting and support-seeking). Interestingly, students were more confident in online student attributes, technical domains, and

time management than they were in the communication scale items. They also rated online student attributes, technical domains, and time management as less important. Martin and colleagues (2020) argue that students should be encouraged to reflect on all four constructs including communication, because they are critical to student preparation.

### **Purpose of the Study**

Across online learner readiness instruments, Martin and colleagues (2020) identified the four common dimensions that make up the skills/competencies required for student success. In many of these instruments, self-efficacy and/or self-directed learning is assessed within a specific domain, such as self-efficacy within technology or communication. However, concerns about measurement of these dimensions date back to Dray and colleagues (2011), who acknowledged the limitations of existing readiness instruments and sought to measure both learner characteristics and technology capabilities with methodological rigor in their OLRs. Farid (2014) argued that research on the validity and reliability of readiness instruments was lacking, and that instruments did not consistently agree on the dimensions of readiness. These concerns have not been resolved; in 2020, Joosten and Cusatis noted that many previous readiness instrument development studies lack rigor.

The study reported here was built upon the rigorous validation work of Dray et al.'s OLRs (2011). The 32-item OLRs included two subscales: learner characteristics and technology capabilities. Post-publication, the research team continued to refine the instrument in unpublished validation studies (2014). This refinement included further dividing the two subscales into sub-domains. Dray et al. were unable to continue working on the project and transferred their work to the author's research team. Our study involved a joint re-development, validation, and cross-validation study with large samples of online learners at two different higher education institutions. The research team is aware of only one other cross-validation of a readiness instrument across two university samples in the published literature (see Tsai, et al., 2020).

The purpose of this study was to re-develop an online learner readiness instrument that can be useful for the 21st century learning landscape and can be used in different university populations. An important part of this process included working directly with student success administrators, coaches, and advisors to understand the key elements that would be useful for their work with students and to ensure these elements were well represented in the scale re-development.

## **Method**

The authors completed a review of the current literature on online learner readiness and identified the main constructs in the published literature. They also reviewed open access readiness measures. In their 2014 unpublished work on the OLRs, Dray et al. divided the *learner characteristics domain* into the following three sub-domains: values, generalized locus of control, and self-beliefs. The values scale asked about perceptions and beliefs about college. This scale had poor reliability and was dropped by Dray et al. The generalized locus of control and self-beliefs subdomains had good reliabilities and were included in the current study. Dray et al.'s renamed *information and communication technology engagement domain* was divided into four subscales: expectancy values, achievement values, locus of control, and self-beliefs. The

expectancy values and achievement values subscales asked questions about access to computers and the importance of computers. These questions are now out-of-date, so they were not retained for this study. The locus of control and self-beliefs subdomains had adequate reliabilities and were kept and revised for the current study.

### Initial Scale Redevelopment

The authors consulted with student success administrators, coaches, and advisors at two higher education institutions about the key elements they sought to measure in a readiness scale that would be useful for their work with students. In a series of meetings, we asked the following questions: What does online learning readiness mean from your point of view? What signs or red flags do you identify that indicate a lack of readiness? What elements or concepts should we be measuring for online learning readiness? The qualitative responses were recorded by the research team. These meetings helped the research team focus on constructs to consider in the re-development of the scale. The following concepts were identified:

- a) Self-efficacy and locus of control
- b) Time management skills within the context of course work
- c) A proper study environment
- d) Communication with students and instructors
- e) Challenges with time, coursework, and commitments outside of work (work, family)

In addition to removing and updating items that were out-of-date, the initial revision of the scale added questions based on relevant constructs from the literature and re-ordered items. The initial revision was reviewed by a group of success coaches and individual interviews with two academic advisors at one of the collaborating universities. Both the success coaches and academic advisors suggested new items and item-wording revisions that were incorporated into the initial revision of the scale.

The initial revision of the scale included 41 items with the following seven subscales as shown in Table 1.

**Table 1**  
*Description of the Subscales in the Initial Scale Revision*

	<b>Description</b>	<b>Changes and Examples</b>	<b>Response Scale</b>
<b>Locus of Control (LOC) (7-items)</b>	Included all seven of the OLRs learner characteristics: generalized locus of control subdomain.	One item was re-worded: <i>How well I do in my classes is often the “luck of the draw”</i> replaced with “determined by chance.”	1=strongly disagree 2=disagree 3=agree 4=strongly agree
<b>Self-Regulation Efficacy (SRE) (8-items)</b>	Adapted from the OLRs learner characteristics: self-beliefs subdomain. The scale asked how well students can regulate their thoughts and behaviors to complete their course work.	Six of the OLRs items were retained with slight modifications. Two items were added that asked about creating a plan to complete given assignments and keeping up with weekly readings and assignments. The revised scale was renamed self-regulation efficacy	1=poorly 2=adequately 3=well 4=very well

<b>Educational Skills Efficacy (ESE) (3-items)</b>	Included three items from the OLRs learner characteristics: self-beliefs subdomain. This scale asked about specific skills that are important to online coursework: using library resources, remembering course content, and understanding independent readings.	The question about library resources was updated to reflect online and in-person use, “How well do you use the resources provided by the library (online or in-person) to get information for class assignments?”	1=poorly 2=adequately 3=well 4=very well
<b>Communication Efficacy (CE) (10-items)</b>	Included five original items from the OLRs learner characteristics: self-beliefs subdomain. This subscale asked about how well students communicate with group members and instructors.	Five new items added to the scale asked about communicating with and asking instructors for help. These new items were adapted from Shen et al. (2013). Example is: “How well do you clearly ask your instructor or teaching assistant (TA) questions?”	1=poorly 2=adequately 3=well 4=very well
<b>Efficacy Challenges and Commitments (ECC) (4-items)</b>	Created by the research team based on input from student success coaches. Items asked students about handling challenges and personal commitments that are outside of course work that might interfere with educational progress.	Example: “I put my coursework on hold when life becomes challenging.”	1=strongly disagree 2=disagree 3=agree 4=strongly agree
<b>Locus of Control Technology (LCT) (4-items)</b>	Included four items in the OLRs information and communication technology engagement: locus of control subdomain. Questions asked students to think about how they approach situations in which there is a technology related challenge that might interfere with their course work.	One item was changed from positively worded to negatively worded, so the scale had equal positively and negatively worded items. Example: “When I am asked to download new software that I’m not familiar with, I’m unable to get assignments done.”	1=strongly disagree 2=disagree 3=agree 4=strongly agree
<b>Technology Efficacy (TE) (5 items)</b>	Included four items from the OLRs information and communication technology engagement: self-beliefs subdomain. The scale asked students about their comfort with common technologies they need to complete tasks in an online course.	One item was added that asked about comfort with seeking help when technology was not working. Example: “How comfortable are you navigating an online learning platform (learning management system such as Canvas)?”	1=not at all 2=somewhat 3=very 4=perfectly

Six of the seven subscales were adapted from the OLRS. A new subscale, Efficacy Challenges and Commitments (ECC) included four items that were developed by the research team based on input from student success coaches. Coaches had encountered students who struggled with handling personal challenges and family or personal commitments. Previous online learner readiness scales did not measure this construct. In collaboration with the coaches, the authors developed four items that asked students about handling challenges and personal commitments that are outside of course work that might interfere with their educational progress. An example is: “I put my coursework on hold when life becomes challenging.”

### **Explanatory Text**

The authors collaborated with student success personnel to develop explanatory text that would follow each subscale. After responding to each sub-scale, participants would see the set of items again, followed by text that explained what the items were measuring and how their answers to the questions are related to skills needed to succeed as a student. An example of the explanatory text is shown below.

Questions 19-28 ask students about how well they communicate with classmates, group members, and instructors. Communication in online course is often text-based. Therefore, effective written communication is especially important.

At the end of the survey, participants were directed to a webpage containing resources to enhance their skills for online learning at their university.

### **Item Analysis**

The authors sought input from new students to inform the re-development and validation of the measure. The authors recruited a small group of six first-year undergraduate students to ask about their perceptions of a set of the readiness survey items with the following research questions: 1) Are the items measuring what is intended? 2) Do students understand the items as they are currently worded? 3) How can the item wording be improved?

Participants were asked:

1. What did the whole question mean to you?
2. Would you re-word the question? If so, how?
3. What did you think about when answering this question (have in mind)?

The feedback revealed that the items were measuring what was intended. For all the items, the students were understanding them as they were currently worded. Slight wording adjustments were made on a few items for clarity.

### **Recruitment**

The initial re-developed instrument was IRB approved and tested at two higher education institutions in the United States in the AY 2020-2021. The item analysis and initial validation study was conducted at University A. Online undergraduate participants in their first term who had never taken courses at University A were recruited for the validation study. This included only students seeking their first degree. Post- baccalaureate students were excluded as well as students who had taken online courses as non-degree students in the summer of 2020. Students at

University A were primarily recruited through the online orientation Canvas module, required before beginning online courses. Recruitment involved a video message about the study and a link to the survey administered via the Qualtrics online survey platform (Qualtrics, Provo, UT). The data collected from this sample informed scoring criteria, subscale creation, reliability, and validity for the revised instrument.

The instrument was cross-validated with students at University B with all enrolled online students. At University B the instrument was embedded in the opening module of all online courses. Prior to the study, University B was using another readiness instrument in all of their courses which was replaced with the study instrument. Students were asked for their consent to take part in the research project and completed the instrument in Qualtrics before proceeding with the course.

### **Participants**

**University A.** The survey data yielded 1,060 unique responses. Participants who did not consent to the study ( $n = 24$ ), who indicated they were not adults ( $n = 11$ ), and who provided incomplete data ( $n = 160$ ) were removed from the data set, yielding 865 remaining participants. Three additional participants were removed because they indicated that they had started taking courses at University A prior to the 2020 academic year ( $n = 862$ ). Of these 862 participants, 123 were part of a comparison group who primarily took face-to-face courses. These participants were excluded from the analyses, resulting in a total sample of 739 online students (median age = 28-years-old, mean age = 30.5 years,  $SD = 8.44$  years, range = 18 – 64-years-old; 37.1% male, 58.2% female, 2.3% “other” or “prefer not to identify”, 1.2% genderqueer/gender non-conforming, and 1.2% transgender). Of the 739 participants, 72.1% identified as White, 10.8% identified as two or more races, 7.8% identified as Hispanic/Latino, 5.7% identified as Asian, 2.7% identified as Black or African American, and 0.4% identified as either American Indian, Alaskan Native, Native Hawaiian, or other Pacific Islander. There were three participants (0.4%) who did not report their race/ethnicity.

**University B.** At University B, 18,160 finished responses were recorded. Participants who did not consent or qualify to participate ( $n = 6,042$ ), whose responses could not be verified ( $n = 732$ ), and who provided duplicate responses ( $n = 1,978$ ) were excluded from the analysis. Four additional participants were excluded because they reported being less than 18 years old. The final sample consisted of 9,404 online students (median age = 21, mean age = 21.2,  $SD = 2.81$  years, range = 18 – 62;  $n = 9,334$  reporting on age). Of these participants, 85.9% identified as White, 4.9% identified as two or more races, 3.8% identified as Hispanic/Latino, 2.5% identified as Asian, 1.1% identified as either American Indian, Alaskan Native, Native Hawaiian, or other Pacific Islander, and 0.5% identified as Black or African American (1% of participants preferred not to report their race/ethnicity;  $n = 9,404$  reporting on race). Participants were not asked to report their gender in the online Qualtrics survey at University B.

### **Data Analysis Procedure**

To develop a parsimonious scale that captured learner readiness, we first conducted an exploratory factor analysis (EFA) on all original seven subscales (LOC, SRE, ESE, CE, ECC, LCT, TE; 41 items) with data from online students ( $n = 739$ ) at University A, a large public university in the Pacific Northwest. The reduced set of items and subscales produced by the EFA

were then evaluated using confirmatory factor analysis (CFA). This reduced scale was then cross-validated using CFA with a large sample of online students at University B, a private university in the Intermountain West ( $n = 9,404$  students).

## Results

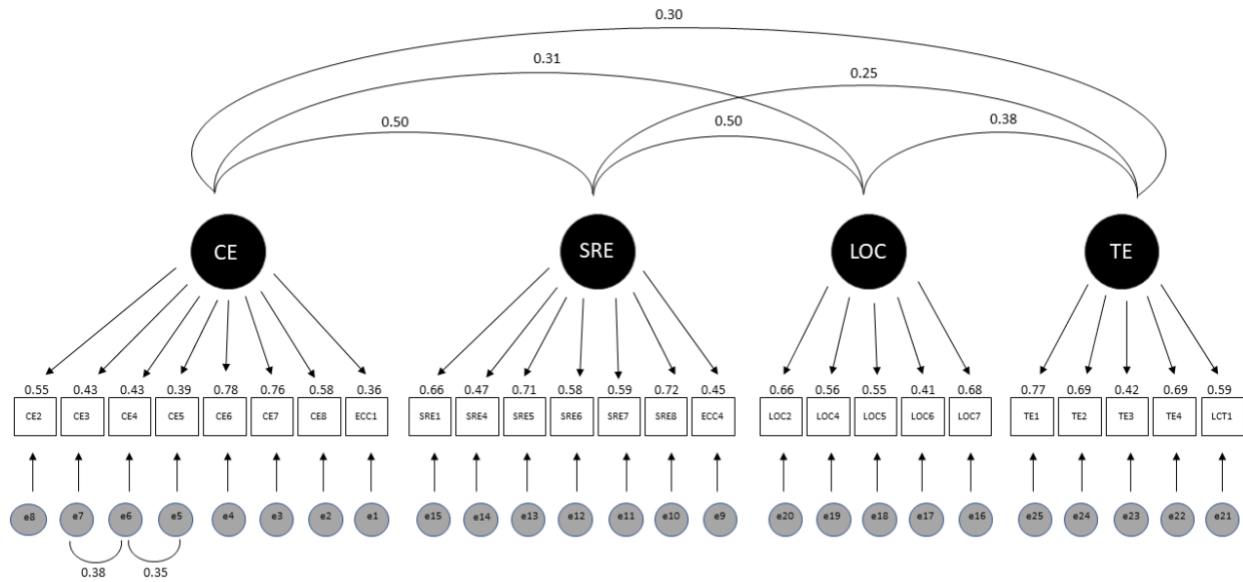
### Scale Development at University A

#### *Exploratory Factor Analysis.*

Exploratory analyses yielded no missing data points on the 41 items assessing online learner readiness. We conducted an EFA with IBM SPSS Statistics (Version 27) software, using an estimation with an oblique rotation to allow for correlations among the latent constructs. Based on the extant literature, we had no reason to assume that the latent constructs that compose online learner readiness would be orthogonal. Retention criteria was set to eigenvalues greater than 1.0 and for ease of interpretation, small factor loadings ( $< .20$ ) were suppressed. Initial results with all 41 items revealed a 9-factor solution, accounting for 55.14% of the total variance. However, 40% was accounted for by the first four factors alone. Using an iterative approach, items that were strongly cross-loaded across factors or weakly loaded onto multiple factors were eliminated as they were difficult to interpret. Through this process, ECC, LCT, and ESE subscales were dropped; note however that two items from the ECC subscale and one item from the LCT subscale were retained in the final model. One ECC item loaded onto the CE subscale and another ECC item loaded onto the SE subscale. The one LCT item loaded onto the TE subscale (see Appendix A for the full results of the EFA). This final model consisted of 25 items that loaded separately onto four different factors, accounting for 46.25% of the variance; the emergent factors were self-regulation efficacy (7 items), technology efficacy (5 items), communication efficacy (8 items), and locus of control (5 items).

**Confirmatory factor analysis.** Results of the EFA were then tested via Confirmatory Factor Analysis (CFA) using AMOS (Version 28) software with maximum likelihood estimation. The purpose of this analysis was to test the overall fit of the model and to examine correlations among the latent variables. Modification indices were used to improve model fit. Following best practices regarding the use of modification indices (see Kline, 2011), only one change was implemented in the final model (correlated error variance among two items in the CE subscale) (See Figure 1). Based on well-established fit criteria, the model was an acceptable fit for the data (see Table 2). As expected, latent variables were positively correlated; the strongest correlations were between communication efficacy and self-regulation efficacy, and self-regulation efficacy and locus of control. Examination of the standardized regression weights revealed that the individual items were strong indicators of their respective latent constructs, and each item accounted for a significant portion of the variance within each construct ( $R^2$  range = .13 - .61,  $ps < .05$ ).

**Figure 1**  
*Confirmatory Factor Analysis Model for University A*



**Table 2**

*Goodness of Fit Statistics Used to Assess CFA Models at Institutions A and B*

Fit index	Acceptable fit criteria*	University A	University B
CFI	$0.90 \geq CFI \leq 0.95$	.92	.90
AGIF	$0.85 \geq AGFI \leq 0.90$	.92	.93
IFI	$0.90 \geq IFI \leq 0.95$	.92	.90
RMSEA	$0.05 \geq RMSEA \leq 0.08$	.04 <i>CI</i> [.04 - .05]	.05 <i>CI</i> [.050 - .052]

\*see Hu & Bentler (1999); Kline (2011)

**Cross-Validation at University B**

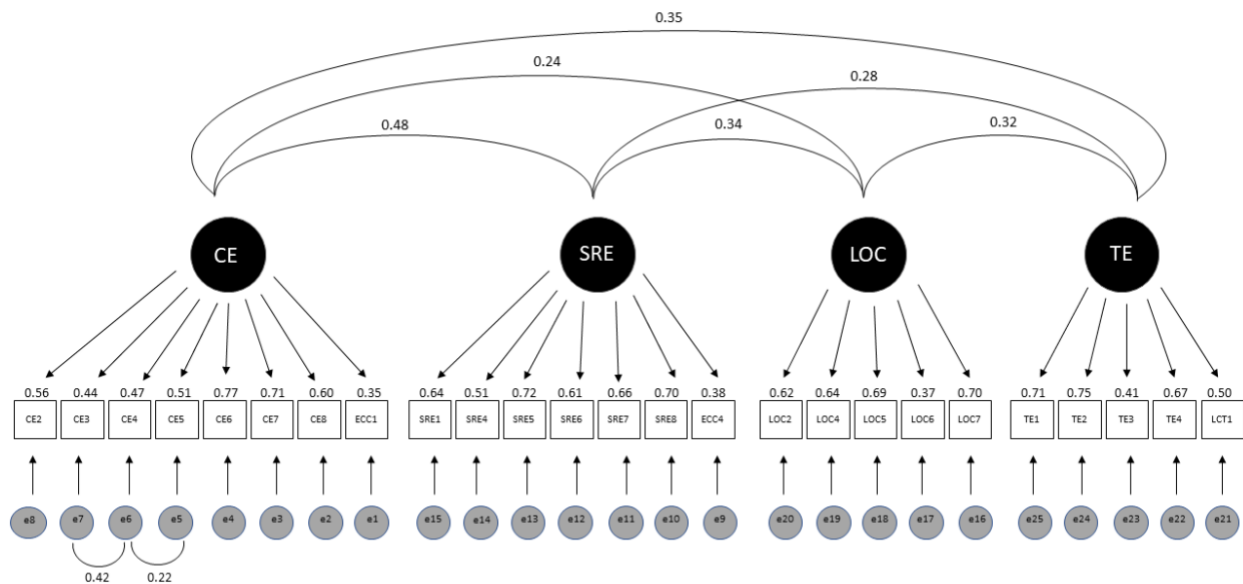
After confirming model fit at University A, the model was cross-validated using CFA with a different sample of online students located in another region of the United States.



**Confirmatory Factor Analysis**

Exploratory analyses of the data from University B indicated missing data on the individual items included in the model. Missing data ranged from 10 – 58 points across these individual items (0.1% - 0.6% of the data; see Table 3 for descriptive statistics). Given the small percentage of missing data overall, no formal analysis of missing data was conducted. Missing data points were imputed using AMOS® version 28 software prior to the CFA analysis. Results of the CFA are shown in Figure 1. As was found at University A, the model was an acceptable fit for the data based on well-established margins (see Table 2). The latent constructs were again positively correlated, the strongest of which was between communication efficacy and self-regulation efficacy. Similarly, standardized regression weights revealed that the individual items were strong indicators of their respective latent constructs (see Figure 2), and each item accounted for a significant portion of the variance within each construct ( $R^2$  range = .13 - .58,  $p < .05$ ). Table 3 reports the reliability for each subscale, as well as the standardized regression weight for the items within each subscale. Descriptive statistics for each item as well as items that were removed from the model are also included.

**Figure 2**  
*Confirmatory Factor Analysis Model for University B*



**Table 3***Results of the CFA at University B Including Descriptive Statistics and Reliabilities by Subscale*

Subscales	CFA Results			
	$\beta$	SE	M	SD
<b>Locus of Control (LOC) <math>\alpha = .73</math>; AVE = 0.38; CR = 0.75</b>				
LOC 7: My grades are basically determined by things beyond my control, and there is little I can do to change that.*	.698	.022	1.62	.58
LOC 5: There is little I can do about my performance in college.*	.694	.021	1.44	.56
LOC 4: How well I do in my classes is often determined by chance.*	.642	.022	1.72	.61
LOC 2: No matter what I do, I can't seem to do well in my classes.*	.618	.019	1.75	.62
LOC 6: When I do poorly in a class, it's usually because I haven't given my best effort.	.366	.021	3.07	.66
<b>Self-Regulation Efficacy (SRE) <math>\alpha = .80</math>; AVE = 0.38; CR = 0.80</b>				
SRE 5: How well do you motivate yourself to do coursework?	.718	.024	2.83	.80
SRE 8: How well do you keep up with the weekly readings and assignments?	.697	.024	3.03	.82
SRE 7: How well do you complete tasks independently?	.664	.021	3.36	.70
SRE 1: How well do you finish homework assignments by deadlines?	.642	.054	3.51	.68
SRE 6: How well do you create a plan to complete the given assignments?	.610	.026	2.92	.90
SRE 4: How well do you arrange a place to study without distractions?	.507	.024	2.71	.87
ECC 4: I put my coursework on hold when life becomes challenging.*	.380	.018	2.13	.67
<b>Communication Efficacy (CE) <math>\alpha = .79</math>; AVE = 0.32; CR = 0.78</b>				
CE 6: How well do you communicate with your instructor in writing?	.765	.026	2.96	.79
CE 7: How well do you clearly ask your instructor or teaching assistant (TA) questions?	.714	.027	2.85	.84
CE 8: How well do you express your opinions to the instructor respectfully?	.598	.024	3.12	.79
CE 2: How well do you express your opinion in writing to others?	.558	.066	2.88	.84
CE 5: How well do you give appropriate feedback to others, even when you disagree?	.515	.022	2.89	.76
CE 4: How well do you actively communicate when working as part of a group?	.467	.019	3.33	.68
CE 3: How well do you contribute your fair share of work in a group?	.437	.016	3.56	.58
ECC 1: I seek help when there are challenges in my life.	.355	.018	2.95	.70
<b>Technology Efficacy (ET) <math>\alpha = .73</math>; AVE = 0.39; CR = 0.75</b>				
TE 2: How comfortable are you finding and listening/watching assigned audio or video resources on the Internet?	.747	.033	3.47	.63
TE 1: How comfortable are you downloading and installing new software on your computer or other device?	.714	.023	2.93	.87
TE 4: How comfortable are you navigating an online learning platform (learning management system) such as Canvas?	.675	.020	3.12	.75
LCT 1: When I am asked to download new software that I'm not familiar with, I'm unable to get assignments done.*	.501	.017	3.09	.67
TE 3: How comfortable are you using social networking sites such as Facebook, Twitter, Instagram, Snapchat or others like them?	.408	.022	3.24	.86

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**Dropped Items (subscale in parentheses)**

*The more effort I put into my classes, the better I do in them. (LOC)*

*I see myself as largely responsible for my performance throughout my college career. (LOC)*

*How well do you study when there are other interesting things to do? (SRE)*

*How well do you concentrate on coursework? (SRE)*

*How well do you create a plan to complete the given assignments? (SRE)*

*How well do you use the resources provided by the library*

*(online or in person) to get information for class assignment? (Education Skills Efficacy- ESE)*

*How well do you remember information presented in class and textbooks? (ESE)*

*How well do you understand the main ideas and important issues of readings without guidance from the instructor? (ESE)*

*How well do you seek help from your instructor or teaching assistant when needed? (CE)*

*How well do you promptly inform your instructor when an unexpected situation arises? (CE)*

*How well do you participate in class discussions? (CE)*

*How well do you give appropriate feedback to others, even when you disagree? (CE)*

*Even when my computer isn't working, I find a way to get my assignments done. (TE)*

*If I can't access online course content, I try several strategies to access it. (TE)*

*When the technology I'm using isn't working, there is nothing I can do until it starts working again. (TE)*

*How comfortable are you asking for help when your technology is not working?(TE)*

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\* Item was reverse coded.

Note: Reliability and descriptives were calculated with imputed data

## Discussion

The purpose of this study was to re-develop and cross-validate a measure of online learner readiness that can be useful for 21st century learners. Two universities jointly re-developed and cross-validated a readiness scale with different student populations. The reduced 25-item instrument retained four of the seven subscales: self-regulation efficacy, locus of control, communication efficacy, and technology efficacy. The emergence of these four subscales replicates previous readiness instruments, suggesting that the latent constructs that make up readiness to learn online have remained fairly stable over time.

However, the individual items used to measure these latent constructs have evolved from the original readiness instruments and vary among more current models. For instance, the communication efficacy scale that emerged from this study focused on students' beliefs about their communication capacities, while Martin et al.'s (2020) shorter SROL communication subscale has questions about the communication technologies themselves. Similarly, our communication subscale differs from both the SOLR (Yu, 2018) and SeQoL (Shen et al., 2013), that have a greater emphasis on social and academic communication with classmates. Finally, the SOLR's technical competencies subscale (Yu, 2018) asks more global questions about basic functions in online courses while the technology efficacy subscale that emerged in this study asks about comfort with software, audio, and video resources.

The instrument we developed and validated shares greater conceptual similarities with more current models of online learner readiness. The recently published SROL (Martin et al., 2020) has some overlap with the self-regulation efficacy subscale that emerged and has specific questions about time management that also align with our self-regulation efficacy subscale. Like the OLSS (Sun & Rodgers, 2020), our instrument shares an emphasis on self-efficacy, and the OLSS includes four latent constructs that are similar to our measure. However, the items

defining the OLSS constructs differ significantly from our own. The OLSS technology use-self efficacy construct is focused primarily on confidence in searching and using websites, and the online learning task efficacy construct is focused on confidence in doing tasks in the LMS. Further, the OLSS instructor and peer interaction communication construct is focused on community, connectedness and belonging. Finally, the largest OLSS construct, self-regulation and motivation efficacy contains items asking how the student motivates themselves to do specific self-regulation tasks.

Although our findings show consistency in the latent constructs that make up online learner readiness, the instrument cross-validated here includes an often-overlooked motivational construct: locus of control. To date, few published online learner readiness scales have directly measured locus of control, which is associated with learning outcomes in online courses (one example is Kerr, et al., 2006). Locus of control refers to an individual's perception of the degree to which they have control over the outcomes in their life (Rotter, 1966). A person with an internal locus of control perceives themselves as having control over their own life and the events that occur within it, while a person with an external locus of control perceives the events in their life as being controlled by external factors such as luck or fate. Characterized by the individual's initiative, self-motivation, and responsibility for their own learning process, self-directed learning is managed by the degree of internal locus of control. Our measure contributes to literature on readiness by including some of the questions measuring generalized locus of control tested in follow-up work on the OLRS by Dray and colleagues (2011).

Our approach to this study addresses sampling bias in the readiness literature as cited by Yu (2018) by including students across two different online institutions. Further, the cross-validation of our readiness instrument improves the potential generalizability of our scale and adds to the small number of current studies that have taken similar approaches (see Martin et al., 2020; Sun & Rodgers, 2020; Tsai et al., 2020). Finally, we are not aware if other validated instruments have been designed to provide built-in benefits for student participants. We accomplished this by including explanatory text that was revealed after participants answered questions in a particular subscale; this provided students with some insight as to what their responses might indicate about their readiness for online learning.

### **Limitations and Future Directions**

It is important to note several limitations to this study. Although both CFA models at Universities A and B accounted for a significant amount of variance, there was also a large amount of residual variance in online learner readiness unaccounted for in both models. This could be due to multiple factors that can impact readiness to learn online, such as age and employment status, which have been found to impact online learner readiness (Firat and Bozkurt, 2020). Further, online learner readiness measures—including our validated instrument—rely on self-report. It remains unclear the extent to which students' perceptions of their online learner readiness skills align with objective indicators of those skills. One possible way to examine this alignment is to determine the extent to which readiness to learn online is predictive of academic performance outcomes.

The published literature includes a limited number of studies assessing the predictive value of readiness measures. A few studies have concluded that self-directed learning is a predictor of academic success (Kirmizi (2015); Cigdem & Ozturk (2016); Torun (2020)). The next phase of our collaborative research is to test the predictive value of our instrument by tracking the enrollment status and academic outcomes of the students over a period of one year after completing the instrument.

### **Applications**

Administrators and student success professionals have an interest in understanding the needs of their students to target specific interventions to meet those needs. An online learner readiness instrument can be used as a tool to support students as they enter an online program via student orientation or the beginning of a student success coaching relationship. The tool can be used to understand what specific resources are needed to support their academic success. Another purpose of online readiness instruments is for students to self-assess competencies, where they may struggle, particularly with the flexibility of an online environment. However, a study by Wladis and Samuels (2016) showed that a readiness survey did not predict student success. They cautioned that online readiness surveys could discourage students from enrolling in online classes even when they were not at risk of poorer outcomes by learning online. The authors suggested helping students understand how to interpret the findings of readiness surveys (Wladis & Samuels, 2016).

It is important to be intentional about how to implement online learner readiness scales. The student success professionals we partnered with argue that these types of scales should be used as tools for professional learning and growth. Furthermore, in discussion with advisors and student success coaches, they expressed interest in a readiness instrument that could be used as a *positive* tool for student exploration within the context of coaching and advising. The authors designed this instrument to be useful for assessing and developing the skills of all learners regardless of their stage of life (i.e., first-year student, adult student changing careers, etc.). As technology is more heavily infused in *all* learning environments, this instrument is relevant for online, hybrid, and face-to-face learners. Finally, dimensions of learner readiness in our measure might be more broadly applicable to all learners in higher education—particularly given the recent advancement in course modalities resulting from the COVID-19 pandemic.

Based on the intention that the instrument be used for continual, or lifelong learning and development, the authors intentionally named this newly revised instrument the **Learning Skills Journey Tool (LSJT)**, thus removing the term “readiness” from the name. This chosen name reflects how this tool is being implemented at the two universities. At University A, student success coaches are embedding the LSJT into the online orientation for incoming online students and including resources associated with each of the subscales. Coaches will be following up with students, using the instrument to discuss developing skills to be more successful online students. At University B the instrument is embedded in all online classes and includes recommended resources associated with each subscale.

### **Future Applications**

The learning skills in our readiness instrument are essential for a learner's educational journey. However, little is known about students' cognitive and emotional readiness for learning online, particularly for K-12 students. Theoretically, some of the first-year students in our current study were recent college and career-ready high school graduates. Since learning skills are teachable and develop over time, administering this instrument to high school students in their first year and using individual data to provide targeted skill-building support, theoretically would give them a college and career readiness advantage. The LSJT will be administered to incoming high school students in the Fall 2023 cohort enrolled at University B's high school. The students' progress will be tracked across their four years to help to identify gaps earlier in a learner's journey.

### **Concluding Comments**

In promoting best practices for a 21<sup>st</sup> century college education, the AAC&U's Liberal Education & America's Promise (LEAP) initiative defined an essential set of learning outcomes to equip students with the attitudes, knowledge, and skills to be prepared for the challenges of a complex world (American Association of Colleges & Universities, 2022). Among the four learning outcomes is engaging the personal or social responsibility of students, which includes the development of the foundations and skills to learn for themselves, essential for lifelong learning. The LSJT developed here is one such way for students, as well as those dedicated to their success, to assess these essential skills for learning. This instrument could be administered across students' tenure within a course, program, or degree to examine how these skills develop over time. Such application of this instrument could serve students by promoting opportunities for self-reflection, as well as instilling the idea that readiness to learn is a constellation of skills that develop over the course of the learning journey.

### **Declarations**

The authors have no conflicts of interest to declare.

All co-authors have seen and agree with the contents of the manuscript and there is no financial interest to report.

We certify that the submission is original work and is not under review at any other publication.

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## Appendix A

### Results of the EFA on Readiness scale at University A

Factor	Eigen values	% variance explained	Item	Factor Loadings				<i>M</i>	<i>SD</i>
Self-regulation Efficacy  $\alpha = .79$	5.63	22.52	SRE 8. How well do you keep up with weekly readings and assignments?	<b>.78</b>	-.07	-.03	.05	3.02	.79
			SRE 1. How well do you finish homework assignments by the deadlines?	<b>.73</b>	-.01	.004	-.001	3.32	.73
			SRE 5. How well do you motivate yourself to do coursework?	<b>.73</b>	-.02	.03	.05	2.88	.79
			SRE 6. How well do you create a plan to complete the given assignments?	<b>.70</b>	.03	.03	-.15	2.87	.93
			SRE 7. How well do you complete tasks independently?	<b>.64</b>	.01	.03	.03	3.54	.64
			ECC 4.I put my coursework on hold when life becomes challenging. *	<b>.50</b>	.02	-.06	.14	2.95	.68
			SRE 4. How well do you arrange a place to study without distractions?	<b>.44</b>	.09	.14	.01	2.82	.94
Technology Efficacy  $\alpha = .73$	2.28	9.12	TE 1. How comfortable are you downloading and installing new software on your computer or other device?	-.05	<b>.81</b>	-.03	.05	3.40	.78
			TE 4. How comfortable are you navigating an online learning platform (learning management system such as Canvas)?	.03	<b>.77</b>	-.03	.05	3.50	.63
			TE 2. How comfortable are you finding and listening/watching assigned audio or video resources on the Internet?	.07	<b>.73</b>	.03	.03	3.73	.49

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			ET 3. How comfortable are you using social networking sites such as Facebook, Twitter, Instagram, Snapchat, or others like them?	.02	<b>.60</b>	.04	-.16	3.21	.95
			LCT 1. When I am asked to download new software that I'm not familiar with, I'm unable to get assignments done. *	-.06	<b>.58</b>	.05	.25	1.50	.61
Communication Efficacy $\alpha = .78$	2.11	8.42	CE 6. How well do you communicate with your instructor in writing?	.06	-.10	<b>.74</b>	.03	3.18	.78
			CE 7. How well do you clearly ask your instructor or teaching assistant (TA) questions?	.01	-.08	<b>.74</b>	.11	2.97	.83
			CE 8. How well do you express your opinions to the instructor respectfully?	-.07	-.04	<b>.66</b>	.18	3.37	.73
			CE 5. How well do you give appropriate feedback to others, even when you disagree?	-.10	.04	<b>.65</b>	-.11	2.85	.80
			CE 4. How well do you actively communicate when working as part of a group?	.03	.08	<b>.65</b>	-.11	3.15	.76
			CE 2. How well do you express your opinion in writing to others?	.05	.05	<b>.60</b>	-.02	3.15	.84
			CE 3. How well do you contribute your fair share of work in a group?	.18	.16	<b>.46</b>	-.05	3.54	.60
			ECC 1. I seek help when there are challenges in my life.	.05	.02	<b>.41</b>	.05	2.89	.73
Locus of Control $\alpha = .70$	1.55	6.19	LOC 7. My grades are basically determined by things beyond my control, and there is little I can do to change that. *	.07	-.02	.04	<b>.74</b>	1.40	.55

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LOC 4. How well I do in my classes is often determined by chance.*	.04	-.07	.10	<b>.65</b>	1.52	.59
LOC 2. No matter what I do, I can't seem to do well in my classes. *	.21	.11	-.05	<b>.63</b>	1.52	.56
LOC 6. When I do poorly in a class, it's usually because I haven't given it my best effort.	-.16	.11	-.03	<b>.61</b>	3.22	.69
LOC 5. There is little I can do about my performance in college. *	.14	.02	.06	<b>.56</b>	1.30	.54

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\* Item was reverse coded.

# A Study on the Relationship between Domain Specific Self-Efficacy and Self-Regulation in E-learning Contexts

Priyanka Gupta

Umesh Bamel

*International Management Institute New Delhi, India*

## Abstract

Self-regulation has been found to be integral to academic learning in traditional classroom environments. Social cognition theory highlights the significant relationships between academic self-efficacy, internet self-efficacy, and work experience in years on self-regulation in the context of traditional classroom learning. However, there is a lacuna in the literature on the significance of these relationships in the context of e-learning. The exponential growth of e-learning and changes in business environment necessitate a study to examine the effect on self-regulation in the context of e-learning. This research is based on a sample of 525 management students from a business school in South Asia. The findings highlight that academic and internet self-efficacy have a positive effect on self-regulation even in an e-learning environment. e-learning here refers to interactive online learning, in a university setting. The findings have significant implications for both theory and practice as they build on the existing literature. We suggest use of training-based interventions for promoting self-regulation which subsequently would facilitate higher e-learning efficacy.

*Keywords:* social cognition theory, e-learning, self-regulation, academic self-efficacy, internet self-efficacy, regression

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Self-regulation is integral to learning (Park & Kim, 2020; Usher & Schunk, 2018; Panadero et al., 2016; Zimmerman, 2008). “Self-regulation (or self-regulated learning) refers to self-generated thoughts, feelings, and actions that are planned and systematically adapted as needed to affect one's learning and motivation” (Schunk & Ertmer, 2000, p. 631). Self-regulation involves the process whereby learners engage in behaviors that help them achieve academic goals. While several studies have been conducted to understand self-regulation in greater depth, a majority of these have been centered around the traditional classroom set-up. In this research study we examine self-regulation in the context of e-learning. As a learner experiences the phenomena of learning differently in traditional and e-learning environments (Fadol et al., 2018), thus, there is an urgent need to assess self-regulation behavior in the context of e-learning (Gupta & Bamel, 2023). Such research will build on the existing literature as it examines self-regulation and the variables that are positively associated with self-regulation in the context of e-learning.

*e-learning* refers to the “use of information and communication technologies to enable access to online learning/teaching resources” (Rodrigues et al., 2019). Although e-learning is not a new phenomenon, the rapid advancement of technology (Tsekeris, 2018) has led to its inclusion in learning extensively. Proliferation of technological devices such as desktops, laptops, smartphones, and tablets facilitate a rapid rise in e-learning. The exponential increase in acceptance and implementation of e-learning programs globally (Arbaugh, 2016; Cavanagh et al., 2020) is also an outcome of changes in the business environment, such as prevalence of knowledge workers (Capestro & Kinkel, 2020), gig work (Wood et al., 2019), and unforeseen events such as the COVID-19 pandemic (Zhao et al., 2020). Such environmental phenomena require individuals to learn new skills with greater agility (Sessa & London, 2015; Kruchoski, 2016). e-learning provides the necessary platform and flexibility through customization of cost, functionality, content, pace, pedagogy, and environment, which facilitates learning with greater agility (Kunzia & Elis, 2014; Jahnke et al., 2020).

Extant literature posits that learning that take place in an online environment is influenced by relationship between constructs such as academic self-efficacy, internet self-efficacy, work experience in years, and self-regulation (Bandura, 1986, 2019; Zhang & Galletta, 2014; Bradley et al., 2017). Thereby, the theoretical framework presented in this research paper examines in detail the relationships between above-mentioned constructs in the context of e-learning.

In this research paper we invoke social cognition theory (Bandura, 1977; 1986; 2019) to study individual learning behaviors in the context of e-learning. The extant literature from social cognition theory encapsulates several studies on the delineated constructs in the context of traditional classroom learning (Schunk & DiBenedetto, 2020; Kimiagari & Baei, 2022; Shkëmbi & Treska, 2023). Further, the literature also examines social cognition theory in the context of impact of technology on learning, (Barnard et al., 2009; Bandura, 2019; Al-Fraihat & Sinclair, 2020). We call on social cognition theory to examine the delineated constructs; that is, academic self-efficacy, internet self-efficacy, experience in years, and self-regulation in the context of e-learning.

Empirical studies confirm self-regulation is an essential construct for success in e-learning (Barnard et al., 2009; Bradley et al., 2017; Kimiagari & Baei, 2022) yet few studies have looked at the relationship between domain specific self-efficacy, such as academic self-efficacy, internet self-efficacy, and experience in years on self-regulation in the context of e-learning. Such research is mandated as self-regulation has been deeply researched and accepted as an essential construct for achieving superior learning outcomes in traditional classroom environment. We now need to examine the significance of self-regulation in e-learning environment so as to develop mechanisms for higher e-learning efficacy.

As the objective of this research study is to examine the relationships of domain-specific self-efficacy; that is academic self-efficacy, internet self-efficacy, and years of experience on self-regulation when learning takes place in e-learning environment; to address these research objectives, the below research questions have been posed:

- (a) What is the relationship between academic self-efficacy and self-regulation in an e-learning context?
- (b) What is the relationship between internet self-efficacy and self-regulation in an e-learning context?
- (c) What is the relationship between work experience years and self-regulation in an e-learning context?

These research questions will help to build on the existing literature in the context of e-learning. The findings will add to both theory and practice. The research questions help to examine relationships that, if true, will augment the relevance of self-efficacy and self-regulation in the context of e-learning. Self-efficacy and self-regulation hold an integral place in classroom learning. Thus, we seek to examine these constructs in the e-learning context. Further, we examine experience to understand its effect on self-regulation (Endedijk & Cuyvers, 2022). This association highlights to teachers and trainers the need to develop training interventions to supplement self-regulation behaviors, as the literature from social cognition theory affirms a greater need for self-regulation in e-learning environment. Also, an empirical examination of the above-mentioned relationships will act as a guideline on the dependency of self-regulation with each predictor. Such a guideline can be used as a measure by teachers and trainers in their pedagogy to attain higher e-learning efficacy (Bradley et al., 2017; Duchatelet & Donche, 2019; Blau et al., 2020).

## **Theoretical Framework and Hypothesis**

In this research paper we refer to social cognition theory (SCT) (Bandura, 1986; Zimmerman et al., 2008; 2009; 2017; Usher & Schunk, 2018; Schunk & DiBenedetto, 2020) as a foundation to discuss the theoretical framework and present the conceptual model. Social cognition theory is based on a model that emphasizes reciprocal relationships between a person's cognition, behaviors, and the environment (Bandura, 1986). Thus, it is a relevant framework to examine the variables in the backdrop of environmental changes such as rise in e-learning and need for agile learning as discussed above. Also, social cognition theory provides the mechanisms to assess the impact of technology on learning (Barnard et al., 2009; Bandura, 2019). This allows for an examination of the study constructs in the context of e-learning. The

flow of this section is as follows. First, we define and discuss the study constructs and then we discuss their interrelationships, which leads us to our hypotheses.

### **Self-Efficacy**

Self-efficacy is defined as “beliefs in one’s capabilities to organize and execute the course of action required to produce given attainments” (Bandura, 1977, p. 3). Self-efficacy in cognition can be achieved via the four elements as detailed in social cognition theory (Bandura, 1977). These four elements are personal mastery, which entails developing knowledge, skills, and abilities; vicarious learning; which refers to gaining confidence by observing another person do the same task; verbal persuasion, which points to developing conviction by listening; and emotional arousal, referring to getting energized (Bandura, 1977; 1986).

Social cognition theory also explains the significance of domain-related forms of self-efficacy. Domain specific self-efficacy such as academic self-efficacy or internet self-efficacy can have a differentiated influence on learning (Bandura, 2006). Such differentiation helps to emphasize greater specificity in attaining superior learning outcomes.

### ***Academic Self-Efficacy***

Academic self-efficacy can be defined as the “conviction that one can successfully execute behaviors which can result in superior academic outcomes” (Bandura, 1977, p. 193). Individuals who demonstrate high academic self-efficacy are able to self-regulate their learning more effectively (Bandura, 2006), and thereby academic self-efficacy has a higher positive correlation with positive learning outcomes (Schunk & Ertmer, 2012). Empirical studies confirm academic self-efficacy is positively related with outcomes even when learning takes place in e-learning environment (Moreno & Cavazotte et al., 2017). This postulation is also supported by the literature in self-efficacy theory that confirms that the “positive relationship between strength of an individual’s self-efficacy and probability of successful performance is virtually identical for the similar and the dissimilar tasks at 84% for an individual” (Bandura, 1977; 2006).

### ***Internet Self-Efficacy***

Internet self-efficacy refers to “confidence and comfort an individual has in working on the internet. Internet refers to the level of comfort with computers or digital devices, as well as the ability to navigate the nuances of online communication over the internet” (LaRose & Eastin, 2004). Research confirms that training and past experience in using the internet increases internet self-efficacy. Individuals with high internet self-efficacy readily adopt self-regulation, leading to a higher positive association with learning outcomes even in e-learning environments (LaRose & Eastin, 2004; Paraskeva et al., 2009; Landrum, 2020).

### **Self-Regulation**

Self-regulation is an integral aspect of social cognition theory. Self-regulated learning can be defined as, “an active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, and behavior, guided and constrained by their goals and the contextual features in the environment” (Pintrich, 2005, p. 453). Learners who engage in self-regulation believe that learning is a systematic process and learning outcomes can be controlled. Thus, they take responsibility for their learning by engaging in self-regulatory strategies (Pintrich, 2005; Park & Kim, 2020).

Self-regulation delineates the strategies that individuals consciously adopt to achieve their goals (Schunk & DiBenedetto, 2020). Self-regulation strategies can broadly be classified into three categories: behavioral, which involves self-observation; environmental, which involves adjusting environmental conditions; and covert, which involves adjusting cognitive and affective states (Zimmerman & Kitsantas, 2005). Some key self-regulation strategies are planning and organizing, resisting distractions, making environment more conducive to learning, monitoring self-behavior, self-reflection, managing resources such as time and effort, taking interests in tasks and having a self-improvement mindset (Kizilcec et al., 2016; Panadero, 2016; 2017).

There are several models in the literature to study the conceptualization of self-regulation construct. One of the most popular and comprehensive models used in academic research is the three-phase cyclical model by Zimmerman (Panadero & Tapia, 2014; Panadero, 2017; Zimmerman et al., 2017). As each phase reinforces the next phase leading to a self-sustaining cyclical process, there exists a spiral effect leading to more effective outcomes (Zimmerman & Moylan, 2009, p. 304). Each phase in the self-regulation cyclical model is influenced by the environment as detailed in the self-cognition theory. Self-regulation approaches adopted by an individual equips to regulate both skill and will behaviors which provides a comprehensive learning environment and leads to more effective learning (Schunk, 2012).

The first phase, forethought, provides for a platform on which to perform. The second phase, performance, explains how learning influences cognition and affect. The third phase, self-reflection, provides evaluative feedback for the learners. Theorists state that self-regulated learners are driven by motives of self-efficacy and further self-efficacy and self-regulation reinforce each other (Bandura, 1977; 2005; Schunk & Estmer, 2012; Valverde-Berrocso, 2020).

### ***Self-Regulation & e-learning***

Empirical literature confirms the study of self-regulation becomes more relevant in e-learning environment (Paraskeva et al., 2009; Broadbent et al., 2021). In e-learning, self-regulation mechanisms are not a “nice to have”: they are a required behavioral strength to achieve better outcomes (Santhanam et al., 2008; Sharp & Sharp, 2016). During e-learning the need for self-direction and self-motivation is much more as the interaction is through a technology platform. As self-regulation behavior of individuals increases individuals set more challenging goals. This can lead to more effective e-learning (Zhao & Ye, 2020).

### **Self-Efficacy & Self-Regulation**

Learning outcomes can be measured statistically to investigate the magnitude of change among constructs. For instance, in an empirical study, the correlation between prior grades and subsequent grades was found to be  $r = .23$ . However, when self-efficacy mediates this relationship, the actual correlation was  $r = .56$ ; displaying an increase of 26% in predicted correlation (Zimmerman et al., 1992). Clearly self-efficacy can positively affect academic learning outcomes. Further, “the positive relationship between strength of self-efficacy and probability of successful performance is virtually identical for the similar and the dissimilar threats at 84%” (Bandura, 1977). Thus, we present our case; that self-efficacy can positively

affect academic learning outcomes in all learning environments; traditional and e-learning (Bandura, 1977; Zimmerman et al., 1992; 2009; Pintrich, 2005).

Extant literature from social cognition theory also highlights that self-efficacy and self-regulation reinforce each other (Schunk & Ertmer, 2012). Individuals who demonstrate these behaviors develop the impetus to achieve superior learning outcomes in both traditional and e-learning environments (Bandura, 1977; Usher & Schunk, 2018). The behavioral mechanisms inherent in self-efficacy and self-regulation reinforce and nurture cognitive growth that facilitates learning (Bradley & Browne, 2017; Schunk & DiBenedetto, 2020). Self-regulated learners have higher motivation, they display more proactive behaviors towards goal achievement and set more challenging goals that enables learning efficacy in any environment (Yen et al., 2016; Usher & Schunk, 2018; Chopra & Madan, 2021). Thus, the author proposes hypothesis 1 and hypothesis 2 as below:

*H1: Academic self-efficacy will be positively associated with self-regulation in e-learning environment.*

*H2: Internet self-efficacy will be positively associated with self-regulation in e-learning environment.*

### **Experience in Years**

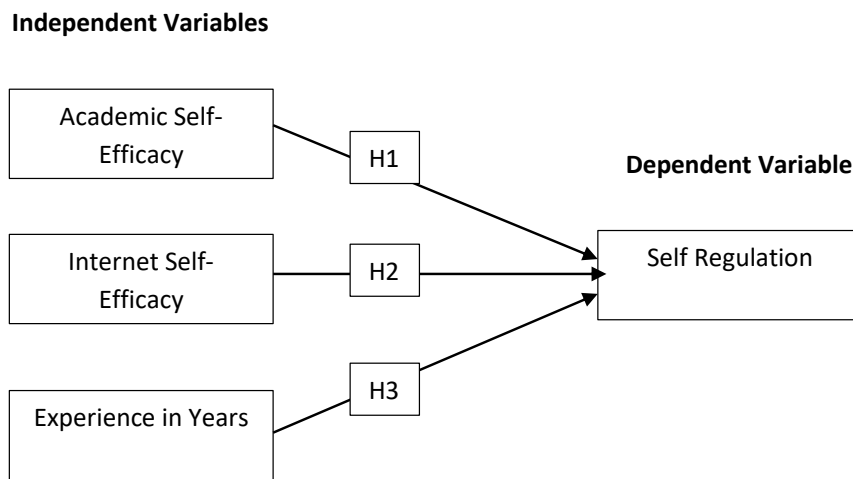
Literature states the number of years an individual spends working can have a positive influence on e-learning outcomes (Landrum, 2020). While working, individuals develop their skills in using the internet and computer as well as other communication skills and ability to handle unknown situations. An individual's self-efficacy and self-regulation improve from experience. Every time an individual executes these approaches he builds on his confidence; this sets the stage for superior learning next time. Further, past experience helps an individual to overcome any unique challenges during e-learning (Bandura, 1977). Experienced individuals are more likely to have a peer group with whom they can communicate and extend help as and when needed. This ensures that learning can continue to take place without any barriers (Zimmerman & Kitsantas, 2005; Lim, 2020). Past experience also provides individuals with the skills to plan and organize their day to meet their learning needs and pick an environment or location that is most conducive for learning. Thus, the author proposes hypothesis 3 as below:

*H3: Experience will be positively associated with self-regulation in an e-learning environment.*

Figure 1 presents the conceptual model graphically. The conceptual model presented below has been laid out as follows: academic self-efficacy, internet self-efficacy, and experience in years are the three independent variables and self-regulation is the dependent variable. The relationships between these variables are examined in the context of e-learning. Academic self-efficacy is relevant for academic learning (Bandura, 2006). Internet self-efficacy is relevant in the context of learning in e-learning environment (Landrum, 2020). Experience in years is also related with self-regulation positively (Tseng & Yeh, 2019). The dependent construct self-regulation is critical as it is considered an essential element for success of e-learning (Valverde-Berrococo, 2020; Broadbent et al., 2021).

**Figure 1**

*Conceptual Model*



## Method

This paper uses the statistical technique of multiple regression to examine the empirical relationships among the constructs. As multiple regression methodology allows for the conceptual model to have one dependent variable and many independent variables it is a robust technique for the presented conceptual model (Wolters & Bazon, 2013; Sujatha et al., 2023). The known values of the independent variables simultaneously help to predict the unknown values of dependent variables. The effect of each independent variable is distinctly analyzed. SPSS (version 20) was used to carry out the analysis of the data.

## Sampling and Sample

The data was collected from a diverse postgraduate student population of a premier business school in Southeast Asia using simple random sampling technique. Confidentiality of all respondents has been maintained. The self-report survey had 40 questions and took about 8 minutes to complete. Data has been collected on demographics such as gender and area of specialization. The data was collected from a sample of 570 postgraduate management students. Forty-five responses were nullified in data clean-up due to missing values; 525 complete responses have been considered for analysis. Thus, the accepted response rate is 92%. Of the total 525 participants, 70% were male and 30% were female. Table 1a captures demographic details of the sample data in tabular form.

**Table 1a**  
*Demographics of Sample Data*

Variable		n	%
Gender	Male	369	70%
	Female	157	30%
PGDM Elective	Finance	315	59%
	Marketing	211	41%
Experience ( <i>in years</i> )	1–2	105	20%
	3–4	368	70%
	5–6	53	10%

### **Instruments**

#### ***Academic Self-Efficacy (ASE)***

To examine the effect of academic self-efficacy on self-regulation, the “Self-Efficacy for Self-Regulated Learning” (SESR) scale by Albert Bandura was deployed (Bandura, 2006; Usher & Pajares, 2008). This is a 10-item unidimensional comparative scale with questions such as “Finish my homework assignments by deadlines,” “Get myself to study when there are other interesting things to do,” etc. Responses were measured as a percentage on a scale of 0 to 100. To allow for comparative analysis with other scales in this study the data was converted to a 5-point Likert-type response format having values ranging from strongly agree (5) to strongly disagree (1). Scale was verified for validity & reliability (Bandura, 2006).

#### ***Internet Self-Efficacy (ISE)***

To examine the effect of internet self-efficacy on self-regulation, the General Internet self-efficacy (GISE) scale was used. GISE consists of the confidence to overcome basic challenges in working on the internet. This scale is based on the seminal work of Eastin and LaRose (2000). The GISE comprises three questions, such as “I feel confident in understanding terms/words related to Internet use” etc. The questions were presented in a 5-point Likert format with values ranging from strongly agree (5) to strongly disagree (1). The scale has been successfully deployed in Asia. GISE Scale demonstrates a Cronbach alpha of 0.90 (Schenk & Scheiko, 2011; Jokisch et al., 2020).

#### ***Self-Regulation (SR)***

To examine self-regulation, the online self-regulation questionnaire the OSLQ scale was deployed (Barnard et al., 2009). The (OSLQ) is a 24-item scale with questions such as “I set standards for my assignments in online courses,” “I allocate extra studying time for my online courses because I know it is time-demanding,” “I summarize my learning in online courses to examine my understanding of what I have learned,” etc. The questions were presented in a 5-point Likert format with values ranging from strongly agree (5) to strongly disagree (1). The OSLQ consists of six subscale constructs, which include environment structuring, goal setting, time management, help seeking, task strategies, and self-evaluation.

The existing research in e-learning has focused on using the motivated strategies for learning questionnaire (MSLQ) and the Metacognition Awareness Inventory (MAI). In this research paper, we used the (OSLQ) online self-regulation questionnaire to conduct this analysis. Unlike the MSLQ and MAI, the OSLQ has been tested in an e-learning environment and OLSQ is a more comprehensive construct to examine all self-regulation strategies (Jansen et al., 2017 Yen et al., 2016; Lim, 2020; Palalas & Wark, 2020). Also, the scale has been deployed successfully in Asia (Lim, 2020). The Cronbach alpha for subscales ranged from 0.85 to 0.92 (Barnard et al., 2009).

### ***Experience in Years (EXP)***

Each respondent was requested to share the years of work experience. The data was collected on a continuous scale with years of experience ranging from one to six years (Chawla & Sodhi, 2011).

### ***Control Variables***

The respondents' gender and business elective have been modelled as control variables in this study. Gender and business elective have been collated as ordinal variables (Chawla & Sodhi, 2011; Chopra & Madan, 2021)

### ***Scale Reliability***

Scale Cronbach alpha values confirm the internal consistency between items in a scale. All three scales were found to have a robust Cronbach alpha. An alpha of 0.7 and above is considered highly reliable (Chawla & Sodhi, 2011; Bonett & Wright, 2015).

### ***Common Method Variance (CMV)***

As this study used self-report instruments to collect data from respondents, common method variance CMV was a potential threat. "Most researchers agree that common method variance (i.e., variance that is attributable to the measurement method rather than to the constructs the measures represent) is a potential problem in behavioral research" (Podsakoff, 2003). In this paper, this threat was addressed at the point of data collection by adopting a two-pronged approach. First, data on independent and dependent variables was collected in no specific order by mixing the sequence of the scale questions. Second, unique IDs were used by each respondent to ensure complete anonymity and confidentiality of the data.

## **Results**

Multiple liner regression was performed in SPSS on the data collated through the self-report surveys. The analysis of the data and results are presented in this section. Table 1b presents the descriptive statistics for the data.



**Table 1b**  
*Descriptive Statistics*

					1	2	3
		N	Mean	Std. Dev	Correlation		
1	ASE_MEAN	524	3.43	0.578	1	0.274	0.075
2	ISE_MEAN	524	3.622	0.8648	0.274	1	0.380
3	EXP_MEAN	524	3.202	1.2745	0.075	0.380	1

As per Table 2, which highlights the R square values for our model, 48% of the variance in dependent variable is caused by the independent variables present in this model. R square and adjusted R square point to the percentage variance in dependent variable caused by independent variable(s). R square increases as the number of independent variables increase but adjusted R square may not as adjusted R square considers degrees of freedom. As adjusted R square in given model is close to R square, the model shows high reliability at an acceptable value of 0.485.

**Table 2**  
*Model Summary*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	0.699	0.488	0.485	0.30495	0.488	165.351	3	520	0

As per Table 3, which highlights the F values of the model, p at 0.000 is statistically significant at 95% confidence interval and thus we have a significant F. In regression F statistic highlights the significance of R square as it is an output of ANNOVA procedure or analysis of the variance. A large F value such as in Table 3 indicates that variation among construct means is not by chance.

**Table 3**  
*ANOVA Table*

Model	Sum of Squares	df	Mean Square	F	Sig.(p)
Regression	46.131	3	15.377	165.4	0.000
Residual	48.358	520	0.093		
Total	94.489	523			

In Table 4 below, the standardized beta coefficients of regression indicate the statistical relationship between each of the independent variables and the dependent variable. The p value at p = 0.000 shows a statistically significant relationship between academic self-efficacy (ASE) and dependent variable self-regulation (SR). This proves our hypothesis 1: (H1) holds true. That is, academic self-efficacy will be positively associated with self-regulation in an e-learning

environment. As per standardized beta, 60.2% of the variance in dependent variable is caused by academic self-efficacy.

Similarly, the p value for p at 0.000 shows a significant relationship between internet self-efficacy (ISE) and dependent variable self-regulation (SR). This proves our hypothesis 2: (H2) holds true. That is, internet self-efficacy will be positively associated with self-regulation in an e-learning environment. As per standardized beta, 22.5% of the variance in dependent variable is caused by internet self-efficacy.

A standardized beta coefficient contrasts the strength of the association of each individual independent variable on the dependent variable. The absolute value of standardized Beta ( $\beta$ ) confirms that academic self-efficacy (ASE) has a greater impact than internet self-efficacy (ISE). There does exist a statistically significant relationship between ASE, ISE, and SR. We can say that people with higher self-efficacy positively associate with being self-regulated even in an e-learning environment and, per literature, such an association will enable superior outcomes in e-learning.

However, the p value for p at 0.959 indicates that experience in years is not associated with self-regulation. This disproves hypothesis 3, thus (H3) is not accepted. That is, as per the data in this study, experience in years is not positively associated with self-regulation in an e-learning environment.

Table 4 highlights the outcome of regression and the statistical significance of the standardized beta values. To reaffirm, ASE and ISE are positively and statistically associated with SR at a confidence interval of 95%. EXP does not have an association with SR in the context of e-learning.

**Table 4**

Coefficients: Significance Codes: \*p < 0.1, \*\*p < 0.05, \*\*\*p < 0.01

Model	Unstd. Beta	Std. Error	Std. Beta	t	Sig (p)	95% C. I.	
						Lower	Upper
(Constant)	1.507	0.089		16.925	0.000	1.332	1.682
ASE_MEAN	0.443	0.024	.602***	18.46	0.000	0.396	0.49
ISE_MEAN	0.111	0.017	.225***	6.399	0.000	0.077	0.145
EXP_MEAN	0.001	0.011	0.002	0.052	0.959	-0.022	0.023

Table 5a and 5b highlight the level of multicollinearity. Multicollinearity measures the correlation between independent variables. A variance inflation factor (VIF) that is less than 10 and a tolerance which is greater than 0.20 is acceptable. From Table 5a, we observe values of VIF and tolerance are within bounds and thus we deduce that there is no overlap between the

independent variables. This indicates correlation among independent variables is minimal and regression can be performed.

**Table 5a**  
Collinearity Statistics

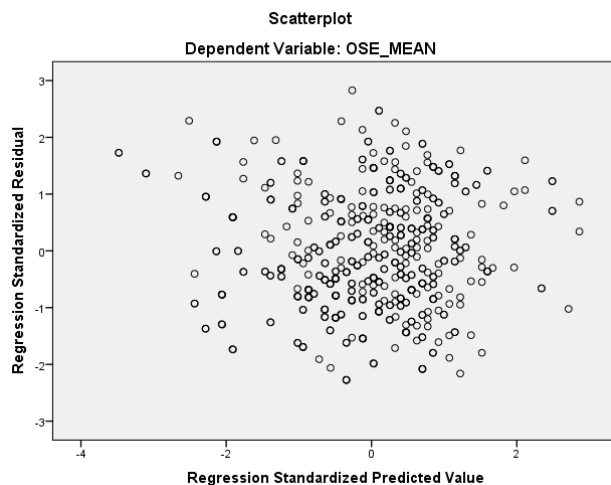
Model	Unstd. Beta	Std Error	Std. Beta	t	Sig (p)	Tolerance	VIF
(Constant)	1.507	0.089		16.925	0.000		
ASE_MEAN	0.443	0.024	0.602	18.46	0.000	0.924	1.082
ISE_MEAN	0.111	0.017	0.225	6.399	0.000	0.795	1.257
EXP_MEAN	0.001	0.011	0.002	0.052	0.959	0.855	1.17

**Table 5b**  
Coefficient Correlations

Model	EXP_MEAN	ASE_MEAN	ISE_MEAN	
Correlations	EXP_MEAN	1.000	.032	-.375
	ASE_MEAN	.032	1.000	-.266
	ISE_MEAN	-.375	-.266	1.000

Further, the presence of any multicollinearity can be graphically checked through heteroscedasticity of the error terms in the regression equation ( $U = y - \hat{y}$ ). In Figure 3 the graph of the data confirms the absence of multicollinearity and heteroscedasticity. This also helps to verify the outcome of this multiple regression model.

**Figure 3**  
Homoscedasticity of Residuals



## **Discussion & Implications**

The findings in this study can prove meaningful for individuals undertaking e-learning programs, learning & development leaders, corporate trainers, academics, organizations, and research institutes (Naz et al., 2020; Teo et al., 2020; KPMG Report, 2021). The study findings add to the extant literature as we find that hypothesis 1 (H1) and hypothesis 2 (H2) hold true. H1 confirms a statistically significant relationship between academic self-efficacy and self-regulation in the context of e-learning (Honicke & Broadbent, 2016) and H2 confirms a statistically significant relationship between internet self-efficacy and self-regulation in the context of e-learning (Paraskeva et al., 2009). Thus, the findings from H1 & H2 clearly indicate that self-regulation is dependent on domain specific constraints; that is academic self-efficacy and internet self-efficacy. H3 indicates that self-regulation however does not co-relate with work experience in years. Implications for academics and practitioners are discussed below.

### ***Theoretical Implications***

The findings in this paper build on the extant literature. The conceptual model examined in this study highlights the significant effect that academic self-efficacy and internet self-efficacy can have on self-regulation even in an e-learning environment (Hull, 2017). The findings extend the boundary conditions of social cognition theory as the delineated variables hold strong even in an e-learning environment (Bradley et al., 2017; Duchatelet & Donche, 2019). Thus, from the examination of domain-specific self-efficacy (Bamel et al., 2017) on self-regulation we can derive that the tenets of self-efficacy, personal mastery, vicarious learning, verbal persuasion, and emotional arousal hold strong even in an e-learning environment.

Also, the findings from hypothesis 3 can be explained by the fact that the sample represents a student population from business school. Students need greater interventions in the form of program design and peer support mechanisms to enhance self-regulation behaviors in an e-learning environment (Huie et al., 2014; Dignath-van Ewijk et al., 2015). Research confirms there is an immediate need for increased interventions to enhance self-regulation behaviors (Lai & Hwang, 2021).

### ***Practice Implications***

The findings in this paper can be used by practitioners and academics as criteria for formulating interventions that equip individual learners to develop essential traits to enhance self-efficacy and self-regulation (Makarius & Larson, 2017). Individuals can develop the requisite behaviors when facilitated through pedagogy, customized course content, formative feedback, and other approaches (Blau et al., 2020; Lai & Hwang, 2021). Such interventions form the core of strategic HRM (human resources management) best practices as they focus on organizational talent development goals that lead to skill augmentation.

The findings in this study also support the case for deployment of organization-wide LMS (learning management systems) that are customized to the learning styles of different stakeholders (An & Carr, 2017; Shishakly et al., 2021). Such customized learning management systems increase learner involvement and reduce the chances of drop-out (Noesgaard, 2016). Learning Management systems equip learners with all the benefits provided by an e-learning environment such as anytime, anywhere learning. Amazon is known to spend up to \$1 million on

employee trainings, supported by e-learning LMS platforms. As per ATD, organizations have 218% higher income and 24% higher profit margins when offering comprehensive learning programs (ATD Report, 2019), which can be deployed across diverse stakeholders because they are customizable.

### **Conclusion**

The objective of this study was to examine the statistical relationship between self-efficacy, experience in years, and self-regulation in an e-learning environment. This study builds on the literature in this field, as very few prior studies have focused on examining the discussed relationships in the context of e-learning. The study has important implications for individuals in both academic and professional environments. This research is pertinent and relevant due to the exponential growth of e-learning in recent years; the global e-learning market was about \$107 billion in 2015. It is predicted that by 2025, the global e-learning market will be valued at \$325 billion as enrolment in e-learning programs by individuals pursuing higher education is increasing at a CAGR of 25% globally (ATD Report, 2019).

This study has a few drawbacks that can be addressed in future research. First, the findings of this research should be verified through other non-business school student populations. Second, the findings should be further supplemented through a mixed-method study. A mixed-method study will include qualitative interviews that will help highlight the other key approaches individuals adopt to ensure efficacious outcomes in e-learning environment. Third, such a study can be further expanded by including mediating and moderating variables such as parental support and socio-economic background (John et al., 2018).

### **Declarations**

The authors confirm there are no conflicts of interest.

The authors declare no funding for this research.

The authors confirm they have adhered to the ethical guidelines such as informed consent and confidentiality while collecting and utilizing the data, but do not state approval from a specific ethics board.

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**Success Rate Disparities Between Online and Face-to-Face Economics Courses:  
Understanding the Impacts of Student Affiliation and Course Modality**

Melanie G. Long

*The College of Wooster, Wooster, USA*

Karen Gebhardt

*University of Colorado Boulder, USA*

Kelly McKenna

*Colorado State University, USA*

**Abstract**

Students enrolled in online courses tend to be less successful as measured by the rate of A's, B's, and C's than students enrolled in face-to-face courses. Yet little work has been done addressing whether these gaps vary depending on students' broader relationship with the university, including whether they are degree-seeking students and whether they take any face-to-face courses. We use institutional data on Economics enrollments between 2012 and 2018 at a mid-sized land-grant university to deconstruct online/face-to-face success gaps into a student's term modality (or modalities) and institutional affiliation components. We identify these components by using a fixed effects regression methodology and comparing outcomes across four student groups: affiliated students who are enrolled in exclusively online courses, exclusively face-to-face courses, or in a mix of courses each term, as well as unaffiliated (external) students exclusively taking online courses. Although students in online courses are less successful on average, part of this gap is explained by the student's institutional affiliation and whether they exclusively take online courses. External students are the least successful in online courses while students who are affiliated with the institution fare much better. We examine potential reasons for these patterns using survey data from several online courses. These findings suggest that institutions should take steps to ensure that institutional support services and activities exist and extend to students in online courses.

*Keywords:* Online learning, economics, success gaps, higher education, institutional affiliation, institutional conditions

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Online learning has experienced rapid growth in U.S. higher education over the past twenty years, accelerated further by the COVID-19 pandemic (Palvia et al., 2018; Xu & Xu, 2019). As online learning encompasses an increasingly diverse set of programs and a broader student base, it is more important than ever to understand the determinants of student success in online courses.

Online courses have been found to have lower levels of success as measured by the percentage of students earning an A, B, or C course grade. These success rates frequently fall below 70% or 60% and, in some cases, even lower and are typically significantly lower than those found for face-to-face courses (Boston & Ice, 2011; Greenland & Moore, 2014; Hachey, Wladis, & Conway, 2013; Morris, Finnegan, & Wu, 2005; Patterson & McFadden, 2009).

Many studies have found a relationship between success rates and student characteristics. However, few studies have examined the impact of students' *affiliation* with the institution—that is, whether the student is admitted as a degree-seeking student at the college or is taking courses as a non-admitted student. Students' affiliation with the institution shapes their access to support services, their opportunities for substantive interactions with peers and instructors, and other factors that may influence their probability of success (Kuh et al., 2006). We contribute to the deep literature on student success by examining how institutional affiliation relates to student success across course modalities.

This study draws on a novel dataset that includes comprehensive institutional data from seven years (2012-2018) of online and face-to-face economics course enrollments at a Mid-sized Land-Grant University (MLGU). These data allow us to separate students into groups based on their affiliation to the university and their mix of course modalities by term (i.e., exclusively face-to-face, exclusively online, or a mix of modalities). We identify “naïve” gaps in success rates between online and face-to-face economics course enrollments before using multivariate regression to examine how institutional affiliation, typical modality, demographics, and other student characteristics influence success rates independent of modality. Next, we merge these institutional data with results from surveys administered to students in six online economics courses in Fall 2017 and Spring 2018. The surveys elicit student perceptions of online learning and of their own learning strategies, in addition to gathering more detailed information on student background such as work status and family care responsibilities. The survey findings offer additional insight into why success in online course enrollments may vary by institutional affiliation and demographic dimensions as examined in the institutional data.

This study seeks to understand whether and, if so, why institutional affiliation and typical modality influence success in online and face-to-face economics courses. Although studying economics courses in particular is not the goal of this research, it is still of interest for two reasons. First, introductory economics courses are often taken by students from a variety of majors and serve as prerequisites for students outside of the economics major (e.g., business students). Second, these courses frequently have lower than average success rates when compared to non-economics courses (Denny, 2014; Edwards, 2000; Stock et al., 2013).

The paper begins with a brief review of the relevant literature, focusing on research related to institutional conditions, such as student-centered support structures, resources, and activities, and their relationship to student success. It then examines the study's methods and describes the results. Finally, recommendations are presented, and the paper concludes.

## **Literature Review**

A growing number of students are enrolled in fully online degree programs or mixing online with face-to-face enrollments within a term or degree program (Allen & Seaman, 2007; Protopsaltis & Baum, 2019). Therefore, understanding and supporting student success independent of the modality of the course in their degree program is essential to further improving higher education outcomes. To inform our study of the relationship between institutional affiliation and modality success gaps, we begin by outlining the literature on success disparities before addressing the role of institutional conditions specifically.

### **Success Disparities**

There is a deep body of research related to differences in online and face-to-face success rates in higher education at the institutional level, such as at fully online institutions (Boston & Ice, 2011) or at community or technical colleges (Aragon & Johnson, 2008; Wladis, Conway, & Hachey, 2017; Xu & Jaggars, 2014), at the master's or undergraduate degree level (Cochran et al., 2014; Patterson & McFadden, 2009). There is even more research completed at the individual course level (Horspool & Lange, 2012; Johnson & Palmer, 2015; Zhan & Mei, 2013). While some studies show low or no success gaps (Figlio, Rush, & Lin, 2010; Nguyen, 2015), the preponderance of studies show gaps exist (Helms, 2014; Fendler, Ruff, & Shrikhande, 2018).

Many of these studies find a relationship between modality success gaps and student or course characteristics. For example, significant differences in success exist based on gender, academic readiness, and number of online courses taken (Aragon & Johnson, 2008). This success gap can be large for male students (Brown & Liedholm, 2002) but non-existent for female students (Figlio, Rush, & Yin, 2010). Additionally, success rates have been shown to vary by course type, where major course requirements generally have higher success than elective courses and upper division courses have higher success than lower division courses (Greenland & Moore, 2014; Wladis, Conway, & Hachey, 2017).

Some research focuses on success within a particular modality, such as identifying student attributes or behaviors that lead to success in an online course. For example, differences in exhibited learning strategies between younger and older students may reflect differences in the extent of self-regulated learning mastery (Andrade, 2015; Artino, 2007). Online learning often requires a higher level of self-regulated learning mastery than on-campus learning (Nicol & Macfarlane-Dick, 2006). Yet those who are new to online learning may not be aware of the strategies that are conducive to success in an online environment (North, 2016).

### **Institutional Conditions**

Another strand of research focuses on institutional conditions and their corresponding relationship to student success. This literature is of particular relevance to our research question exploring how institutional affiliation and typical modality are related to student success across modalities. Institutional conditions, such as policies, programs, practices, and cultural properties,



shape students' access to support resources, contribute to opportunities for substantive interactions with peers and instructors, and create other environments that may influence success (Kuh et al., 2006; Kuh et al., 2011). Many studies detail how these institutional conditions and the accessibility of resources and activities support success, but there is limited research examining how these institutional conditions differ based on course or program modality and whether such differences explain student success gaps between course modalities. We highlight some work linking institutional conditions to student success and discuss how institutional affiliation can help us understand differences in success between course modalities.

Research has shown that students tend to be more successful when supportive institutional conditions exist, where success can be measured by grades earned, GPA, first-semester performance, persistence and retention, or degree completion (Tinto, 2010). Supportive conditions include those in which students can, for example, access resources such as technology support (Britto & Rush, 2013), create community (McKenna, Gebhardt, & Altringer, 2019), and access academic or mental health support (Cooper, 2010; LaPadula, 2003).

Many resources or activities are only for students who are affiliated with the university (i.e., admitted to the university, are degree-seeking, pay university fees). Examples include academic advising and coaching, wellness and mental health support, technology resources and related support, military and veteran services, many student organizations, and other social events. As a result, students who are unaffiliated (external) have fewer institutional resources and activities available. The evidence shows that having less access to these resources may impact student success. For instance, Stassen (2003) explored success differentials between students who are and are not enrolled in a campus learning communities (i.e., a residential academic program, talent advancement program, or honors college learning community). These findings suggest that first-semester performance and one-year retention is higher for students participating in these programs.

Even among affiliated students, access to institutional resources may differ depending on the student's typical course modality. Some forms of institutional support are available independent of course modality; for instance, technical support is commonly offered by institutions and is crucial to the success of students (Britto & Rush, 2013). However, some forms of support are not made available in the same forms to the face-to-face and the online student, even if they are affiliated. Student services, such as academic advising and coaching, mental health services, or activities that promote a sense of community are institutional conditions that support success (LaPadula, 2003). These services exist for students whether they are physically on campus or not, but they are often implemented differently. For example, at MLGU, academic advising is typically conducted in person for face-to-face students while online students meet with their advisor on the phone or virtually. Additional resources and activities are based physically on the campus, such as campus-based learning programs like residential academic programs, sport clubs and intramurals, and many more student organizations, among others. Affiliated students who take exclusively online courses may have access to these campus-based resources and activities but are unlikely to access them because they do not live nearby.



In general, students have different levels of access to institutional resources and activities depending on whether the student is affiliated with the university and the modality of courses taken by the student. Students who are affiliated with the institution have greater, but potentially different, access to these resources and activities, which may increase their chance for success as compared to students who do not have access to these resources or activities. In this study, we seek to understand how this institutional affiliation is related to student success across course modalities.

## Context of the Study

MLGU is a mid-sized public, land-grant research university. As of 2018—the most recent year of data used in this study—the university enrolled about 33,800 students. Most of these students were enrolled in face-to-face programs (85%) of which 85% were undergraduates and 15% were graduate students or in a professional degree program. Approximately 11% were enrolled in online programs. The remaining enrolled students were guest students, employees using their study privilege, study abroad students, and others, such as students external to the university.

The MLGU Economics Department is in the College of Liberal Arts and offers bachelor's (online and face-to-face), master's, and PhD degrees. Admission criteria to the bachelor's programs are identical for the online and face-to-face modalities. As of Spring 2018, there were 484 undergraduate major or minor students (379 declared economics majors face-to-face, 37 declared economics majors online, and 68 declared minors). Each academic term (spring, summer, and fall), the department offers 12 to 15 online courses, ranging from core courses to electives. For each of these courses, one section is offered online, and typically one or more additional sections are offered face-to-face. The prerequisite requirements for individual courses are identical across modalities. Roughly 16% of all economics enrollments during Spring 2018 were taught online.

During the time period under study, all online economics courses at MLGU integrated best practices in course design as described by the Quality Matters standards (<https://www.qualitymatters.org/qa-resources/rubric-standards/higher-ed-rubric>) and the OLC OSCQR Course Design Review Scorecard (<https://onlinelearningconsortium.org/consult/oscqr-course-design-review/>). Key elements of course design included the integration of frequent low-stakes assessments, opportunities for students to get to know the instructor and other students, and courses designed for easy navigation. Many courses also benefited from instructional design assistance from the university's centers for learning and teaching. Additionally, the instructors teaching online courses at MLGU frequently teach the same course face-to-face at the same time.

## Methods

This research applies simple and multivariate regression methods to two datasets: institutional data on undergraduate economics enrollments at MLGU between Spring 2012 and Spring 2018 ( $n = 39,203$ ) and survey data corresponding to a subset of these enrollments ( $n = 97$ ) in selected online economics courses in Fall 2017 and Spring 2018. We begin by describing the institutional and survey data before detailing the methodology applied to each.

## Institutional Data

Enrollment-level data on undergraduate economics courses at the university were retrieved by the university's Office of Institutional Research, Planning, and Effectiveness, Online Division, and Research and Analytics team, and by the authors using university administrative tools. An "enrollment" is defined as a student enrolled in an economics course for a specific modality (online or face-to-face), term, and year (e.g., a student enrolled in Principles of Microeconomics online in Spring 2018). The same student may appear in multiple enrollments during a term if they were enrolled in more than one economics course. Each enrollment is associated with a particular course outcome (an A – F grade or withdrawal).

Two adjustments distinguish the analytical subsample ( $n = 39,203$ ) from the entire population of economics enrollments. First, only the 14 courses that had been taught both online and face-to-face at least once in the study period were included. For comparison, a total of 31 undergraduate courses were listed in the 2017-18 course catalog (omitting internships, supervised college teaching, seminars, and independent study courses). However, the 14 courses include all core courses for the economics major and a range of lower- and upper-division electives. Second, some students in the seven-year period took courses in a format that was neither online nor face-to-face. Most of these students were attending MLGU courses outside of the institution through an international study program. These 197 enrollments were dropped from the analysis.

Each enrollment is classified by the modality of that course section in that term (online or face-to-face). They are also separated into four groups based on the student's affiliation with the university and the modality of their other courses during that term (their "typical modality"): (1) affiliated students taking a mix of online and face-to-face courses ("mixed modalities"), (2) affiliated students taking exclusively online courses, (3) students external to the university, and (4) affiliated students taking exclusively face-to-face courses. When discussing results, we will refer to "course modality" when referring to the modality of a certain enrollment and "typical modality" when referring to the mix of modalities for a student in a term.

Students in the (1) "affiliated, mixed modalities" group generally are admitted, degree-seeking students who take most of their courses face-to-face but supplement with online courses. These students may be observed as enrolled in one or more online and/or face-to-face economics courses in a term. (2) "Affiliated, exclusively online" students are primarily admitted students pursuing their degree fully online in economics, agricultural business, or another major. (3) "External" students are not admitted to MLGU but are enrolled in an occasional course as transfer credit for their home university, as professional development, or for personal interest. Affiliated, exclusively online and external students will exclusively be observed enrolled in online economics courses each term. (4) "Affiliated, exclusively face-to-face" students are only taking face-to-face courses during that term. These students will exclusively be observed enrolled in face-to-face economics courses each term.

Affiliated students include some non-admitted students who are affiliated with the university as a faculty, staff member, or guest student. Students may enroll as a guest if they are on academic probation and hope to increase their GPA or are taking a small number of courses for other reasons. They are eligible to use campus services and participate in activities, and they

may live in campus housing if enrolled in enough credits. In our dataset, 63 enrollments out of 39,203 correspond to guest enrollments. For most guest students, we do not have enough information to definitively ascertain their student group. We observe all enrollments for some of these students, allowing us to correctly classify them as affiliated and exclusively online (12 enrollments) or exclusively face-to-face (6 enrollments). The remaining 45 have been categorized as mixed modalities enrollments.

These typical modality classifications are made based on the entirety of each student's enrollments in each term, not only their economics courses. The institutional dataset includes the total number of online and face-to-face courses in which each student is enrolled each term. Therefore, a student who appears in the dataset in exclusively face-to-face economics enrollments can nonetheless be characterized as a student who takes a mix of modalities if they took at least one non-economics course online that term. This characteristic of the data means that some but not all students in the "affiliated, mixed modalities" group will be observed in both online and face-to-face courses. Of the 3,434 enrollments associated with students in the affiliated, mixed modalities group, 15% (507) are linked to students who are enrolled in both online and face-to-face economics courses in a particular term. This corresponds to about 7% of unique student-terms observed among the affiliated, mixed modalities group.

Summer enrollments required careful consideration. Students who enroll exclusively in online courses during summer terms would by default be considered "affiliated, exclusively online" or "external." However, many of these students are in the "affiliated, mixed modalities" or "affiliated, exclusively face-to-face" group in at least one other term—that is, they are admitted students typically enrolled in a mix of online and face-to-face courses or exclusively face-to-face courses in fall and spring terms. These students' connection to face-to-face courses makes it misleading to classify them as external or exclusively online students. As a result, these summer enrollments are categorized as "affiliated, mixed modalities" students. Summer students enrolled in exclusively online courses who have taken only online courses in previous terms are coded as "affiliated, exclusively online" or "external" students, as appropriate.

Among the enrollments in the analytical sample ( $n = 39,203$  undergraduate enrollments), 37% were associated with students identifying as female (and the remaining 63% identifying as male), 18% with historically underrepresented students, 20.1% with students majoring in Economics, and 21% with first-generation students. The average student age associated with enrollments was 21.1 years old. In terms of the four affiliation-modality groups, (1) 9% of enrollments corresponded to affiliated, mixed modalities students, (2) 3% of enrollments were affiliated, exclusively online students, (3) 6% of enrollments were external, exclusively online students, and (4) 82% of enrollments were affiliated, exclusively face-to-face students. The proportion of exclusively face-to-face students roughly matches the composition of the university. The affiliated, exclusively online group is smaller than seen at MLGU in 2018 in part because there was no fully online degree program in Economics until 2015.

### **Survey Data**

Survey data were collected from students in three online economics courses in Fall 2017 and in Spring 2018, for a total of six course sections. The survey was administered to students enrolled in Principles of Microeconomics (72 students), Intermediate Microeconomics (69

students), and the History of Economic Thought (31 students). These courses were selected because they represented the range of departmental course offerings (i.e., a lower-division general education course, an intermediate required course for majors, and an intermediate elective course for majors).

The survey collected information on student characteristics and demographics that could be linked to both the motivation to pursue and outcomes of online learning. These included whether the student had care responsibilities, whether they were working, the reasons why they were taking this economics course, the reasons why they were taking the course online, and the grade they expected to earn in the course. We also directly assessed the student's online learning attitudes, beliefs, and behaviors using Likert-scale questions discussed in more detail below.

The survey was administered twice each term in an online format: first approximately one month after the start of the term and again in the last month of the term. Students accessed the online survey through the course learning management system. They were encouraged to complete the survey through multiple email communications, but course instructors did not require completion. Of the 172 students enrolled in the three courses, 111 unique students responded during at least one round of the survey, for a total of 167 observations. Only one student responded to the survey in both terms. The survey was identical in each round. Results from the first round of each survey are used (97 observations).

In this study, we focus attention on the 19 Likert-scale questions measuring students' agreement with a range of statements about their learning practices and online learning in general. The statements are listed in Table 1 and categorized according to the theme that they investigate: student characteristics, comfort with technology, community, and self-regulated learning mastery. These survey items were developed by the authors to capture determinants of student success in online courses as discussed in the literature review (McKenna, Gebhardt, & Altringer, 2019; McKenna, Altringer, Gebhardt, & Long, 2022).

**Table 1**  
*Likert Scale Survey Questions by Thematic Grouping*

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<i>Student characteristics</i>	
1.	I learn best when taking online classes.
2.	Online learning allows me to have a more flexible schedule
7.	How I learn in online classes is not that different than how I learn in on-campus.
8.	I feel like I can better balance my work and life when taking online classes.
16.	I have support from my family and friends to successfully complete this class.
 <i>Comfort with technology</i>	
3.	I am comfortable with technology
4.	I am confident that I can find what I need when I use different websites.
 <i>Community</i>	
5.	I learn best when I feel connected to other students
6.	I learn best when I feel connected to the instructor
18.	My learning is improved when I can connect with classmates through discussions or other ways.

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19. I do better in class when I know something personal about my instructor and fellow classmates (such as hobbies or pets).

*Self-regulated learning mastery*

9. I work through all the required materials in a course. For example, I always read the book and review the class notes, view videos, and complete practice problems.

10. I am persistent and keep trying even when I get something wrong or am frustrated

11. I tend to complete assignments at the last minute.

12. Frequent quizzing or other assignments keeps me on track with studying the course

13. I am good at scheduling time each week to study and work on assignments.

14. My friends and family would say that I have a lot of self-discipline.

15. I usually jump directly to an assignment without reviewing class materials

16. I get help when I need it by emailing the instructor, attending office hours, or posting my questions to a discussion board.

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All questions answered on 1-10 scale, where 1 indicates “Strongly disagree” and 10 indicates “Strongly agree.”

## **Empirical Strategies**

The goals of this study are to determine whether success gaps by course modality are partly explained by students’ institutional affiliation and their typical modality and to examine potential reasons for this heterogeneity. In addressing the first research question, we leverage the fact that the institutional data includes variation in both affiliation and typical modality. We use simple differences in conditional means across groups before turning to multivariate regression to control for confounding student and course characteristics. The second half of the analysis uses the survey data to examine whether the experiences and perspectives of affiliated and unaffiliated (external) students who are (or are not) fully online may explain some of the observed variation in student success by group.

This research takes a specific perspective on defining “student success.” We consider an enrollment to be successful if the student earns an A, B, or C for the course grade. An unsuccessful enrollment occurs when a student earns a D, F, or withdraws from the course or university. We exclude Ds from our definition of successful students because, at many institutions of higher education including MLGU, students must maintain an overall 2.0 average (i.e., C average) and students must earn a C or better for the course to count towards a major/minor or to transfer to a different college or university.

To disentangle the impacts of current course modality from affiliation and typical modality, we start by finding the difference in success rates across modalities among affiliated, mixed-modality students. As noted above, some of these students are observed in both online and face-to-face economics courses in the dataset. The difference in outcomes by course modality among this group should be less influenced by selection bias because individual characteristics that impact success in both modalities similarly will be canceled out. However, there is still room for some selection on unobservable characteristics because we do not observe every student in both modalities and students may select which courses to take online and which ones to take face-to-face.

We apply multivariate regression to determine whether success rate disparities are explained by affiliation, typical modality, or other student or course characteristics, accounting

for relationships among these factors. Student success is modeled as a linear function of the independent variables. For each enrollment in term  $t$  associated with student  $i$  and course  $k$ , the following linear probability model is estimated using the institutional data:

$$ABC_{ikt} = \beta_0 + \beta_1 \mathbf{StudentChars}_{it} + \beta_2 \mathit{Modality}_{ikt} + \beta_3 \mathit{Group}_{it} + \alpha_t^{AY} + \alpha_t^{Term} + \alpha_k^{Course} + \epsilon_{ijt} \quad (1)$$

where  $\alpha_t^{AY}$ ,  $\alpha_t^{Term}$  and  $\alpha_k^{Course}$  are academic year, term, and course fixed effects, respectively. As discussed by Xu and Jaggars (2014), course fixed effects are particularly important to account for the possibility that students sort into online (or face-to-face) sections of certain courses for reasons systematically linked to success rates (e.g., perceived difficulty). A stochastic error term,  $\epsilon_{ij}$ , accounts for all other determinants of the probability that an enrollment will end with an A, B, or C in the course. The vector  $\mathbf{StudentChars}_{it}$  includes multiple fixed and time-varying characteristics of the student associated with each enrollment. Student characteristics include age, gender, historically underrepresented status as defined by race and ethnicity, whether the student is an Economics major, and whether the student has full-time status. The variable  $\mathit{Modality}_{ikt}$  equals 1 if the enrollment was in an online section of course  $k$  and 0 if in face-to-face section of the course. Finally,  $\mathit{Group}_{it}$  is a categorical variable that indicates which of the four affiliation-modality groups student  $i$  was part of in term  $t$ . In a variant of this model, the associations between the independent variables and student success are allowed to vary by student group to determine whether there is heterogeneity in the predictors of success.

Students may appear as separate enrollments multiple times per term and/or across terms. Unobserved characteristics may make certain students more or less successful across all of their enrollments. As a result, we assume that error terms  $\epsilon_{ijt}$  are uncorrelated across enrollments associated with different students and that the error terms are correlated across enrollments of the same student. These assumptions are stated formally in Equations 2 and 3 below:

$$E(\epsilon_{ijt} | \mathit{StudentChars}_{it}, \mathit{CourseChars}_{ijt}, \mathit{AY}_t, \mathit{Term}_t) = 0 \quad (2)$$

$$E(\epsilon_{ijt}, \epsilon_{i'j't'} | x_{ijt}, x_{i'j't'}) = \begin{cases} 0 & \text{if } i \neq i' \\ \sigma^2 \Omega_i & \text{if } i = i', jt \neq j't' \\ \sigma^2 & \text{if } i = i', j = j', t = t' \end{cases} \quad (3)$$

This violation of the classical regression assumptions would lead standard errors to be underestimated and is corrected in our analysis using clustered standard errors (Williams, 2000) where clustering is applied at the student level. Clustered standard errors are used both in calculating the statistical significance of differences in means and in the regression analysis.

The analysis of the survey results proceeds similarly to the institutional data, except that only differences in means and simple (univariate) regression analysis are used. The relatively small sample size precludes the use of multivariate regression in this part of the study.

## Results

Consistent with previous research, the descriptive institutional data indicates that success rates are higher in face-to-face courses. In online economics courses, 4,646 enrollments out of 6,012 (77%) were successful, whereas 28,940 of 33,191 face-to-face enrollments (87%) were

successful. However, as shown in Table 2, these overall success differentials by delivery method conceal variation by affiliation that is consistent with our predictions about the role of institutional affiliation. Among online enrollments, the group that is not affiliated closely with the university (i.e., external to the university) has significantly lower success rates (74%) relative to affiliated student groups (from 77% to 87%). Meanwhile, there is no statistically significant gap in course outcomes between exclusively face-to-face students and mixed modalities students when enrolled in face-to-face courses.

Comparing outcomes across modalities and across affiliations in Table 2 offers a way of identifying a “current course modality” component of success gaps among the students who have the typical modality of affiliated, mixed modalities. By this measure, the apparent success disparity between face-to-face and online enrollments of 9.91% (87% – 77%) overstates the narrower course modality-only success disparity among mixed modalities students of 6% (86% - 81%).

**Table 2**

*Proportion of Successful Students by Course Modality and Affiliation, 2012–2018*

Course Modality	Student Group	Enrollment	Success Rate
Online	<b>All</b>	6012	77%
	(1) Affiliated, mixed modalities	2437	81%
	(2) Affiliated, exclusively online	1068	77%*
	(3) External, exclusively online	2507	74%***
Face-to-face	<b>All</b>	33191	87%
	(1) Affiliated, mixed modalities	997	86%
	(4) Affiliated, exclusively face-to-face	32194	87%

Stars indicate statistically significant differences in means relative to affiliated, mixed modalities category (conditional on course modality) at the 1%, 5%, and 10% levels. Standard errors are clustered at the student level.

As with success gaps, affiliated, mixed modalities students are also more similar to exclusively face-to-face students in terms of student characteristics than other online groups (Table 3). Affiliated and external students exclusively enrolled in online courses are older, on average, (26.8 and 25.0 years old, respectively) than in face-to-face courses (20.5 years old). The gap is much smaller for affiliated students taking a mix of course modalities (21.8 years old on average). By definition, external students are never Economics majors at MLGU, while other affiliated students who take some or all courses online are more often Economics majors (30% and 40%) than their exclusively face-to-face peers (20%). The same groups of online affiliated students include more women than the affiliated, exclusively face-to-face group, and the opposite is true for external, exclusively online students. The representation of minority students is approximately constant across affiliated groups and higher among external students.

**Table 3**

*Average Student Characteristics by Course Modality and Affiliation, 2012–2018*

	<b>Affiliated, exclusively face-to-face</b>	<b>Affiliated, mixed modalities</b>		<b>Affiliated, exclusively online</b>		<b>External, exclusively online</b>	
Age	20.47	21.84	***	26.75	***	25.04	***
Minority Student	17%	17%		21%		30%	***
Female	37%	45%	***	47%	***	24%	***
First-Generation Student	22%	22%		40%	***	3%	***
Economics Major	20%	30%	***	40%	***	0%	***
<i>n</i>	32194	3434		1068		2507	

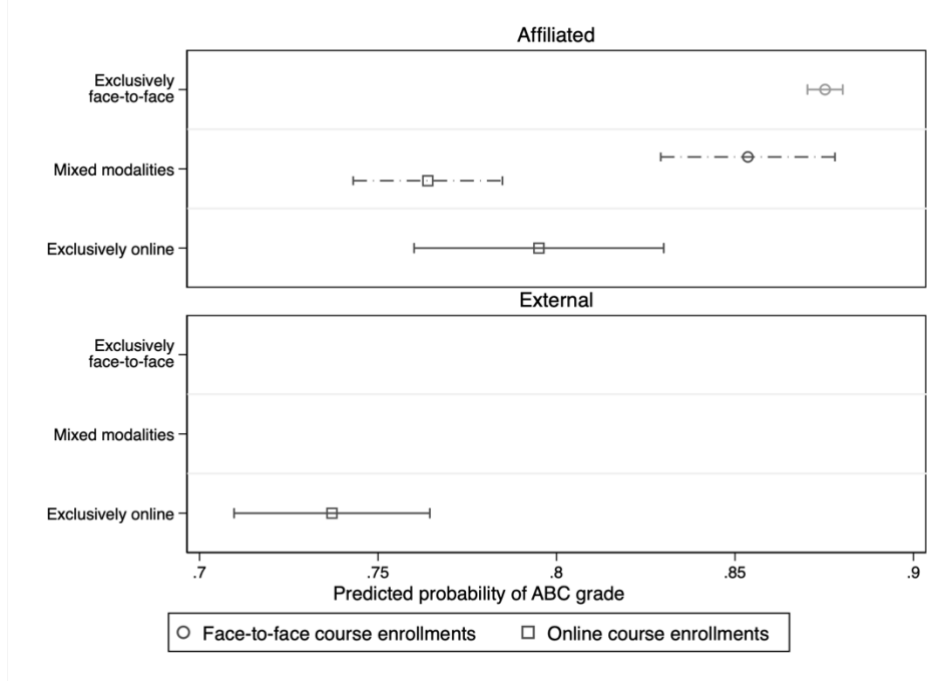
Stars indicate statistically significant differences in means relative to the affiliated, exclusively face-to-face category at the 1%, 5%, and 10% levels. Standard errors are clustered at the student level.

These results suggest that differences in student characteristics may explain part of the success gaps by affiliation and modality. Figure 1 presents the results of estimating the multivariate regression model in Equation (1) by plotting estimated probabilities of success by affiliation, typical modality, and course modality, controlling for student characteristics. If a simplified regression model is estimated that does not account for student group, the course modality success gap conditional on other control variables is 11.1 percentage points and is statistically significant ( $p < 0.001$ ). When affiliation and typical course modality are controlled for, the multivariate regression results are qualitatively consistent with the differences in averages presented in Table 2. As shown in Figure 1, online enrollments have higher rates of success among affiliated, mixed modalities students ( $p < 0.10$ ) and affiliated, fully online students ( $p < 0.01$ ) than among external students. There is a smaller and statistically non-significant gap between mixed and fully online affiliated students when taking online courses ( $p = 0.11$ ).



**Figure 1**

*Predicted Probability of Success by Affiliation, Typical Modality, and Course Modality*



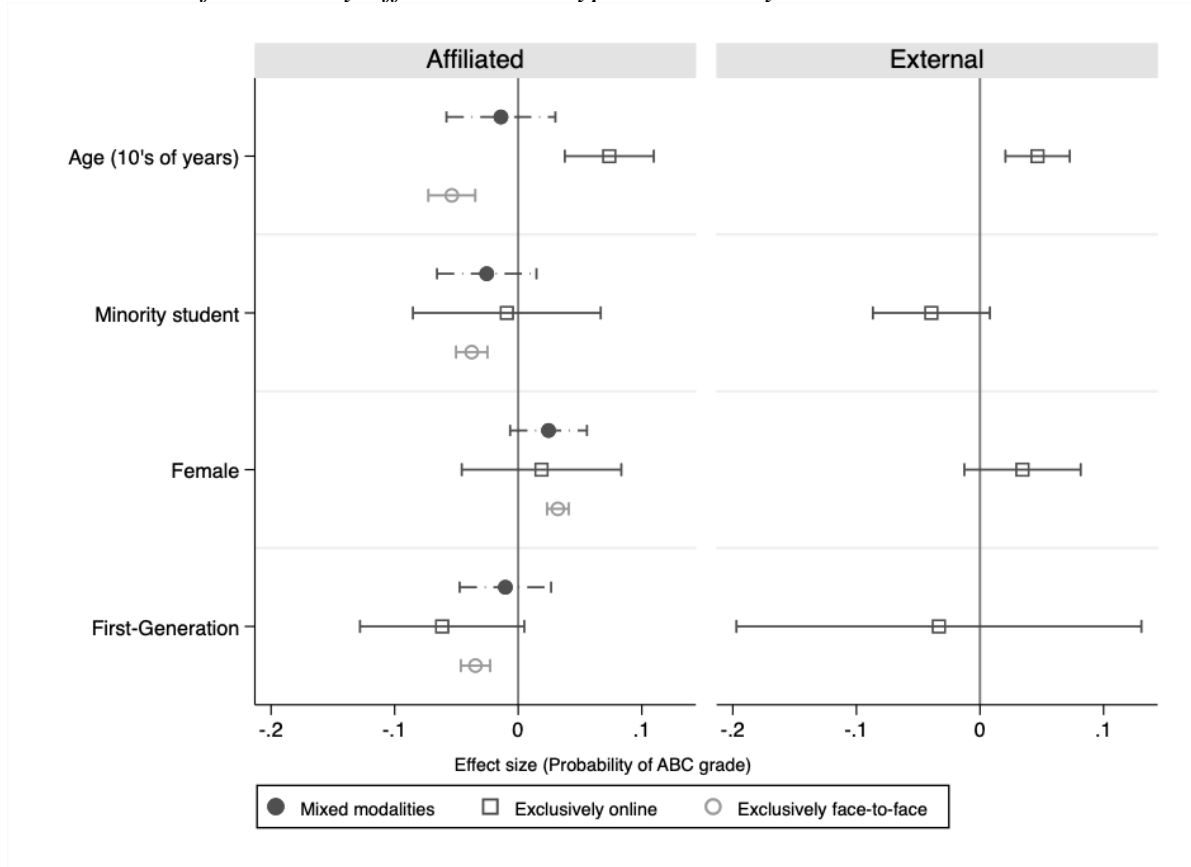
Points indicate predicted probability of success for a given student enrollment holding all other student characteristics constant. Bars indicate 95% confidence intervals for the predicted probabilities. Standard errors are clustered at student level. Estimates control for full-time status, first-generation status, whether student is an Economics major, academic year fixed effects, course fixed effects, and term fixed effects.

Meanwhile, the difference in outcomes between online and face-to-face course enrollments *within* the group of affiliated, mixed modalities students again points to an online/face-to-face success gap, but one that is smaller than the “naïve” success gap without accounting for affiliation and typical course modality. Holding other factors constant, online course enrollments within this group are 9.1 percentage points less likely to end with an A, B, or C grade than face-to-face course enrollments ( $p < 0.001$ ). There is a much smaller difference in outcomes (2.9 percentage points) between face-to-face course enrollments among the mixed modalities group versus those among the exclusively face-to-face students ( $p < 0.10$ ).

To summarize the above findings, we find 1) small success gaps by typical modality alone, 2) moderate success gaps by affiliation alone, and 3) large gaps by course modality alone that 4) shrink when group affiliation and typical modality are controlled for.

Figure 2 summarizes selected regression coefficients from estimating separate models for each of the affiliation-typical modality student groups. These results indicate whether the relationship between success and student characteristics varies across groups. For most characteristics, the impact on outcomes is statistically indistinguishable from zero for the exclusively online and mixed modalities groups. For exclusively face-to-face students, belonging to a minority group, identifying as male, or being first generation are associated with lower rates of success.

**Figure 2**  
*Determinants of Success by Affiliation and Typical Modality*



Bars indicate 95% confidence intervals. Standard errors are clustered at student level. In addition to variables shown, estimates include controls for full-time status, first-generation status, whether student is an Economics major, academic year fixed effects, course fixed effects, and term fixed effects.

However, student age has significant and opposite impacts on student success depending on course modality and affiliation. For students taking exclusively online courses regardless of affiliation, a ten-year increase in age is associated with a five- to seven-percentage-point *increase* in the probability of course success. The same increase in age among exclusively face-to-face students is associated with a five-percentage-point *decrease* in the probability of success. Given that the average probability of course success in the sample is 86%, a five-point decrease represents a 5.8% effect size relative to the mean.

The summary statistics and regression results using the population of economics course enrollments suggest that students who are successful in online courses tend to be those affiliated with the university and older exclusively online students. To better understand the relationship between affiliation, typical modality, age, and other student characteristics, we disaggregate the survey data by affiliation (Table 4) before examining the relationship between affiliation and the self-reported reported answers to selected survey questions (Figure 3).

As reported in Table 4, about a quarter of the survey data enrollments were associated with affiliated, mixed modalities students (22 of 97), and another quarter were external to the

institution (28). The largest group was affiliated, exclusively online students (47). The affiliated, exclusively online enrollments have the highest success rates in online courses, followed by the affiliated, mixed modalities student enrollments and external student enrollments. Compared to students enrolled in a mix of modalities, exclusively online students are older, less likely to be female, more likely or as likely to be working, more likely to have children, and more likely to be providing care for children or others.

**Table 4**  
*Online Enrollment Outcomes by Affiliation, Typical Modality, and Age and Student Characteristics (Survey Sample)*

	<b>Affiliated, mixed modalities</b>	<b>Affiliated, exclusively online</b>		<b>External, exclusively online</b>	
<i>Outcomes</i>					
% A, B, or C grade	73%	96%	**	64%	
<i>% A,B, or C by age group (n)</i>					
22 and under	79% (19)	100% (10)	**	46% (11)	*
23 and over	33% (3)	95% (37)		77% (17)	***
<i>Student characteristics</i>					
Age	21.27	28.79	***	25.25	***
Minority Student	9%	19%		29%	*
Female	77%	40%	***	36%	***
First-Generation Student	23%	47%	**	0%	**
Economics Major	27%	40%		0%	**
Working	50%	72%	*	50%	
Children at home	5%	19%	**	11%	
Caring for children or others	5%	26%	***	18%	
<i>n</i>	22	47		28	

Stars indicate statistically significant differences in means relative to affiliated, mixed modalities category at the 1%, 5%, and 10% levels. Standard errors are clustered at the student level.

The gaps in average success rates by student group in Table 4 conceal a relationship between age and outcomes similar to that which was observed in the institutional data. Within the survey sample, students who are 23 years of age or older make up 79% of affiliated, exclusively online students, 61% of external students, and only 14% of affiliated, mixed modalities students. Among external students, older students have success rates (77%) that are comparable to those of younger affiliated, mixed modalities students (79%). The small number of older students in the latter group mean that comparisons are suggestive but should be interpreted with caution.

To better understand sources of variation in outcomes across affiliations, we compare levels of agreement to the 19 Likert scale survey questions. Student groups had largely similar

responses on all but seven questions. The results for these areas of difference are presented in Figure 3. They include both technology questions, two student characteristics questions, one community question, and two self-regulated learning mastery questions. Figure 1 generally shows the difference between a given student group and the affiliated, mixed modalities group, except for Question 1, where the difference is relative to the affiliated, exclusively online group. Negative values indicate lower levels of agreement among the given group.

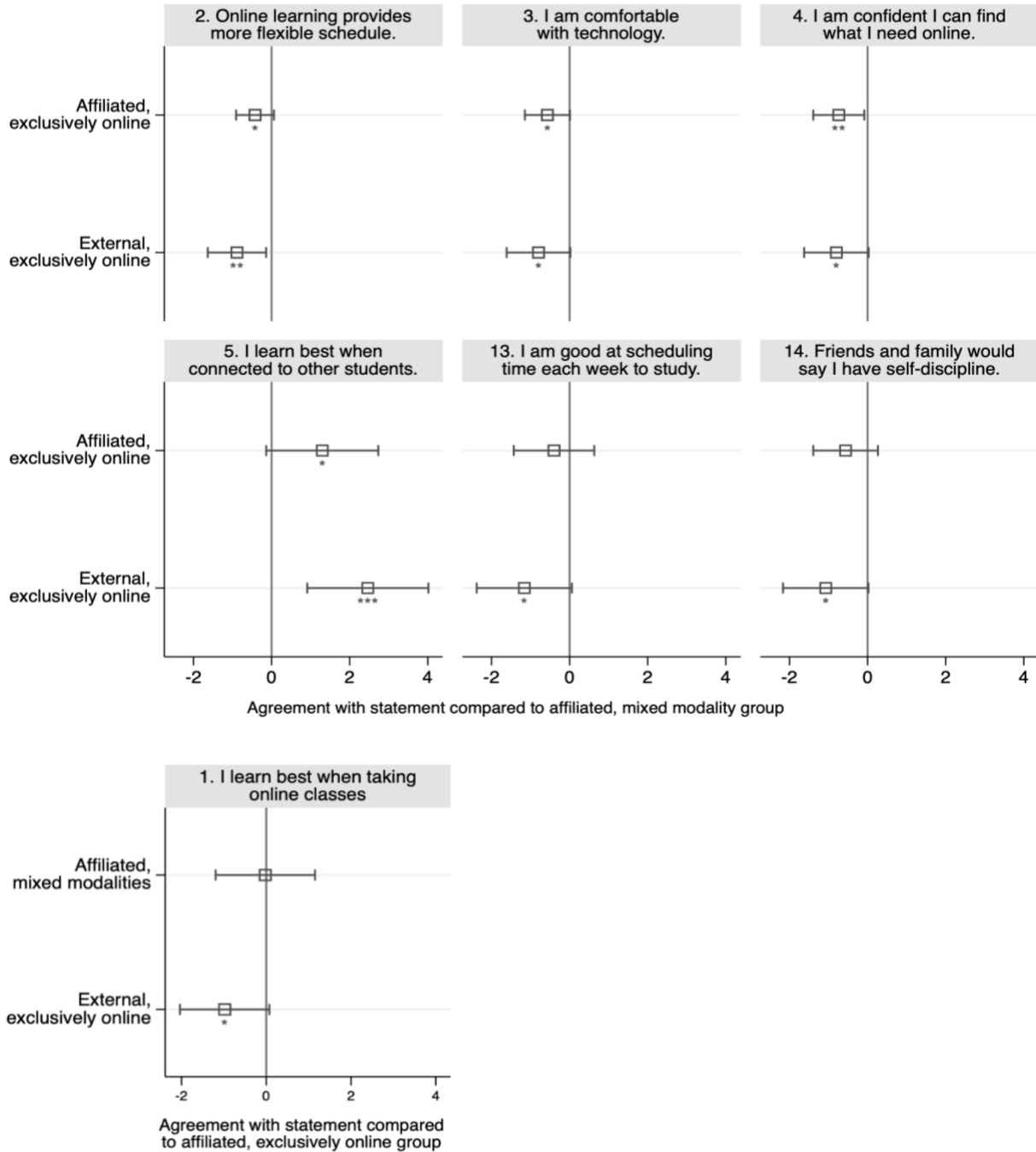
The results indicate that students who study *exclusively* online often have different perspectives on online learning than those who also take face-to-face courses. Both groups of exclusively online students expressed greater concerns about technology than the mixed modalities group. Their average level of agreement remained high (between 8.42 and 8.98) but was between 0.56 and 0.80 points lower than the responses for their mixed modalities peers (9.22 and 9.55 for each of the two technology questions). Scheduling flexibility was also less salient for exclusively online students, with similar levels of agreement and differences as the technology question.

External students stand out from their affiliated peers in three respects. Most broadly, this group is less likely to feel that they “learn best when taking online classes” than affiliated exclusively online students, with levels of agreement that were on average about one point lower (5.68 average) than their affiliated peers (6.64 average). There is suggestive evidence of a similar gap with affiliated, mixed modalities students. The difference in means between affiliated, exclusively online and external students was significant at the 10% level, and the difference between affiliated, mixed modalities and external students fell short of conventional significance levels ( $p = 0.168$ ).

Second, external students are more likely to describe connection with other students as supporting their learning in the course, reporting average agreement of 6.46 on a 1 to 10 scale to the statement, “I learn best when I feel connected to other students,” compared to 4.00 for affiliated, mixed modalities students and 5.30 for exclusively online students affiliated with the university. All groups had high levels of agreement for the analogous community statement regarding connection to the instructor, with a slightly higher (but statistically comparable) average of 8.11 for external students compared to affiliated, mixed modalities students (7.50).

Finally, external students expressed the most doubts about their study habits and time management ability. While mixed modalities students expressed relatively strong agreement with the statements “My friends and family would say that I have a lot of self-discipline” (8.50) and “I am good at scheduling time each week to study and work on assignments” (7.91), external students’ levels of agreement were approximately 1.1 points lower on average for both statements. These gaps were significantly larger than those for affiliated, fully online students.

**Figure 3**  
*Differences in Response to Seven Selected Likert Scale Survey Questions by Affiliation and Typical Modality*



Bars indicate 95% confidence intervals on parameter estimates. Stars indicate statistically significant difference relative to comparison group at the 1%, 5%, and 10% levels. Standard errors are clustered at student level.  $N = 97$  for all questions except Question 3, where  $N = 96$ .

The institutional data suggested that the relationship between age and student success differed for exclusively online students, raising the possibility that online students' perspectives on technology, self-regulated learning mastery, or community could mediate the age-success relationship. Of the seven Likert scale survey questions where responses differed by affiliation, only responses to the "I learn best when I feel connected to other students" question was systematically (and positively) correlated with age ( $p < 0.05$ ). To the extent that older external students are 1) more community seeking and 2) more likely to be successful than their younger counterparts, there is suggestive evidence of a community-age-affiliation link.

The survey data confirmed that students' experiences, behaviors, and concerns in online courses vary systematically by their typical modality and affiliation. Students who exclusively take online courses are less confident in their use of technology and less likely to see online learning as a source of flexibility in their schedules than their mixed modalities peers. Compared to affiliated students, external students also expressed stronger concerns about effective study habits and interests in course community, with the latter being heightened among older external students.

## Discussion and Conclusion

This study blended institutional data on seven years of online and face-to-face economics course enrollments at a mid-sized land-grant university with survey data from a subset of these courses to reexamine success gaps by course modality. Unlike previous work, we deconstructed these success gaps into typical modality, course modality, and affiliation components. We eliminated multiple sources of selection bias in a multivariate regression framework by using a rich set of control variables, applying course fixed effects, and leveraging novel data on mixed modalities students. The survey data elicited students' perceptions of online learning and their own behaviors in online classrooms.

The results indicated that current course modality only explained a portion of success gaps between online and face-to-face enrollments. Being unaffiliated with the institution (external) also resulted in lower rates of success. Conversely, affiliated mixed modalities students perform similarly to their exclusively face-to-face peers when taking online courses. The relationship between student characteristics and success also varied systematically across affiliation and typical modality. Among exclusively online students, older students tend to be more successful, while the opposite is true among exclusively face-to-face students.

Our survey of students in three online courses revealed that students' behaviors and concerns in online courses vary by student group. First, exclusively online students were less likely than their mixed modalities peers to describe online courses as allowing for scheduling flexibility. This gap may stem in part from the constraints faced by exclusively online students and their broader positionality. As our survey data confirmed, these programs often serve students with pre-existing work and care responsibilities that make attending in-person classes challenging.

External, exclusively online students may not see online courses as a *source* of flexibility in their academic schedules but instead as partly a *response* to scheduling inflexibility in the rest of their lives. Mixed modality students, by contrast, may see choosing online courses as part of shaping their overall schedule of coursework around other responsibilities and preferences.

Second, students who are most distant from the brick-and-mortar campus—external, exclusively online students—were the least confident about their ability to effectively use technology or manage their time. Similar but generally smaller differences are present for exclusively online students who are affiliated with the institution (e.g., online degree-seeking students). These gaps may have multiple sources. Affiliation shapes access to relevant support services such as technical support, mental health resources, and academic coaching. We would expect external, exclusively online students to have the least access to these resources among students enrolled in online courses, followed by affiliated, exclusively online students, and finally affiliated, mixed modalities students. Moreover, the scheduling considerations discussed above may trump concerns about technology mastery for exclusively online students. Self-selection by technology preferences may be more salient for mixed modality students.

Finally, external, exclusively online students express the greatest interest of all groups in developing class community, followed by affiliated, exclusively online students. There is suggestive evidence that interest in cultivating community is one explanation for the age-affiliation-success relationship observed in the institutional data. The experience of students outside of the classroom may again play a role in these findings. While mixed modalities and affiliated online students may have a sense of *macro* (institution-level) community through their interaction with peers on campus, in other classes, and in residence halls, external and exclusively online students are less likely to. The latter group may seek out *micro* (class-level) forms of community more often. A similar effect may be in play for older students if they feel disconnected from the campus community of (traditionally aged) students.

Attention to heterogeneity among online students is even more critical in the aftermath of the COVID-19 pandemic, which introduced online learning to an unprecedented number and range of students—from K-12 to adult learners (Kaiser & McKenna, 2021). To serve this wide range of students, institutions and instructors will need to recognize that students will come to online courses with different needs and concerns. The pandemic may have also changed online students in ways that this study is unable to capture because data collection occurred prior to the pandemic (2018). Awareness of online learning rose dramatically in 2020 and 2021. Students and their families may have formed opinions of online education based on rapid shifts from face-to-face to online or hybrid modalities. The perceptions of affiliated and external students at MLGU may have changed during this time, with effects that are not clear *a priori*. We also acknowledge that we cannot rule out potential bias in our estimates. Fixed effects account for time-invariant course characteristics that may explain success gaps and may be correlated with modality. Similarly, we account for some of the unobservable differences between students by examining the success gap by course modality *among* the group of students who are enrolled in both types of courses, although the data do not include enrollments in both modalities for most mixed modalities students. Despite these methodological choices, student characteristics other than affiliation and typical modality may drive the success gaps that we observed.

Our findings are a reminder that there is no *single* “modality success gap.” Students’ perspectives on and challenges in online courses differ depending on their broader affiliation with the university and access to its resources and activities. We believe that these insights should inform strategies for the institution and its instructors. As online learning encompasses a broader range of programs and students, reducing course modality success gaps will require interventions tailored to the needs of students across the affiliation-typical modality spectrum. We propose three recommendations for institutions and instructors based on our results.

First, supportive institutional conditions, and the corresponding resources and activities, must exist and be appropriate for and accessible to students across course modalities. As institutions continue to expand online courses and programs, and students increasingly mix the modalities of their courses within terms and enroll in online programs, resources and activities should be developed that support the common and different needs of these students. For example, the institution should ensure that core student support services have robust face-to-face and virtual counterparts (e.g., online Writing Center appointments, mental health support, technology support), provide opportunities for social engagement and community-building activities for students within and across modalities, and develop resources and activities specifically for the face-to-face student (e.g., residential academic program) and the online student (e.g., program to help develop the online student’s self-efficacy skills).

Second, there needs to be proactive outreach to students across modalities communicating the availability of those institutional resources and activities. Instructors play a key role in this recommendation and should gather information about students’ relationship with the institution and comfort with online learning and technology. They can then respond accordingly with messaging strategies that range from collective to individual outreach (Gebhardt & McKenna, 2019) offering technology resources, suggesting study strategies, and, in general, sharing resources and activities. To avoid singling students out, instructors can send the entire class reminders about useful resources or community-building activities. This may help bridge success gaps, particularly for fully online students who are more likely to be disconnected from these resources. For example, our results indicated that students who are taking exclusively online courses may actually be less confident than mixed modalities students in their understanding of relevant technologies and in their ability to manage coursework.

Finally, the institution and its instructors need to know and accept that some resources and activities may only support success with certain groups of students. For example, an instructor should build in opportunities for community building in online courses, while recognizing that students will vary in their self-perceived need for such opportunities. As discussed above, external students in a given online class may appreciate moments of virtual interaction more than affiliated peers who find fulfilling sources of community through on-campus activities. Previous work has found that opportunities for community development and student engagement with peers and instructors can be effectively developed in online courses and can promote student success (Rovai, 2002; Schaeffer & Konetes, 2010; Shelton, Hung, & Lowenthal, 2017).

Online economics courses at MLGU included community-building components in their online courses such as discussion boards. McKenna, Gebhardt, and Altringer (2019) and McKenna, Altringer, Gebhardt, & Long (2022) propose a framework for optimal discussion



board structure and present evidence that these forums can, when well designed, provide a robust sense of community for online students. If older and external students are more likely to recognize the importance of this engagement, they may position themselves to be more successful. Instructors could hold a meta-conversation with students about the benefits of engagement with instructors and peers to encourage all students to make the most of these opportunities.

The improved understanding of differences in success rates from this study may steer colleges and universities to conduct targeted research to better understand why these differences exist and then develop and maintain adequate student support services, course design support for faculty, and interventions to eliminate success gaps. The results suggest that success gaps can be narrowed by being aware that students' challenges as online learners will vary based on their backgrounds and broader relationship to the university and taking proactive steps to connect students who may feel disconnected from the institution to their peers and to campus resources.

### **Declarations**

The authors have no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

All data were collected in accordance with protocols approved by an ethics review board (IRB) at Colorado State University, USA.

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# A Writing Center's Hybrid Approach to Supporting English Academic Writing Skills among L2 Postgraduates

Mary Newsome  
Mohammad Mollazehi  
Mounia Zidani  
Randa Sheik  
Jumana Amiry  
*Qatar University, Qatar*

## Abstract

Postgraduate research plays an important role in the knowledge economy, yet attrition rates among postgraduates remain a global concern. Numerous studies have cited anxiety around academic writing as a primary cause for declining completion rates, particularly among L2 students. Further exacerbating the problem is the acceleration of academic life where students are often expected to publish multiple papers prior to graduation. Despite assumptions that L2 postgraduates matriculate with requisite English academic writing skills, countless studies suggest otherwise. Such students face significant challenges developing these skills and accessing relevant institutional support, which calls for innovative solutions. This mixed-method comparative study analyzes historical data to understand the impact of a writing center's hybrid approach to supporting the development of English academic writing skills among L2 postgraduates. Findings reveal that postgraduate students require flexibility in accessing academic writing support and prefer online and distance options over traditional, in-person support. Additionally, findings indicate that program faculty are willing to collaborate with writing centers to support students' academic writing through a hybrid approach. Study findings also suggest that participants from the hybrid approach are more likely to publish prior to graduation compared to those from the traditional approach. These findings offer important insight for higher education administrators, writing centers, faculty, and postgraduate students as the "onlining" of higher education accelerates in the post-COVID era.

*Keywords:* English academic writing, L2 graduate students, hybrid support, writing centers, online learning

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Students pursue postgraduate study to develop highly specialized knowledge and skills. This advanced learning is intended to produce experts capable of advancing a topic of study throughout their academic career, particularly through publication of scientific work (Ibrahim et al., 2017). However, the acceleration of academic life means that students are expected to produce more sooner, and this source of anxiety and frustration has contributed significantly to declining completion rates among postgraduates at both brick and mortar institutions (Cho & Hayter, 2020) and in fully online programs (Meyer, Preisman, & Samuel, 2022).

Although there is limited data on the actual global attrition rates, it has been estimated that more than half of postgraduates fail to complete their degree (Litalien & Guay, 2015) and many cite anxiety around thesis writing as a primary cause (Young et al., 2019; Panger, Tryon, & Smith, 2014). Huang (2013) suggests that academic English is no one's mother tongue and points out that while L1 students (those studying in their first language) and L2 students (those studying in a language other than their mother tongue) have vastly different attitudes about seeking English academic writing support, both require it. Nonetheless, it is undeniable that L2 students face additional academic writing challenges (Lin & Morrison, 2021). For instance, L2 students have difficulty engaging in academic criticism (Cheng, 2006), citing source material (Jomaa & Bidin, 2017), avoiding grammatical mistakes (Huwari et al., 2017), and employing a rich, academic vocabulary in their writing (Hawari et al., 2022). Nonetheless, most postgraduates are expected to publish before graduation; however, they often receive little dedicated academic writing instruction to help them do so (Holmes et al., 2018). Furthermore, studies have shown that while postgraduates believe it is important to develop these skills, they struggle to find the time (Rigler et al., 2017; Sutton, 2014).

While much has been done to improve the quality of writing support provided to postgraduate students (McCarthy & Dempsey, 2017; Tremblay-Wragg et al., 2021), the underlying issue of enhancing students' *access* to needed support has received much less attention. Consequently, the current study seeks to contribute to the limited body of literature exploring challenges to academic writing at the postgraduate level and enhancing students' access to relevant institutional support. More specifically, the purpose of this paper is to understand the impact of a writing center's hybrid approach to supporting the development of English academic writing skills among L2 postgraduate students. The implications of this work are relevant to higher education administrators, faculty, supervisors, writing center staff, and postgraduates, particularly English L2 students.

## **Literature Review**

### **Academic Writing in Postgraduate Study**

Strong academic writing skills are essential for success in postgraduate education and for active participation in the scientific community (Ibrahim et al., 2017). Academic writing has been defined as a cognitive skill that engages students in a complex process involving the synthesis of gained knowledge (Defazio et al., 2010) to critically and clearly articulate reasoning into new ideas (Ondrusek, 2012). In academic writing, students are required to connect ideas, concepts, and theories using advanced skills and applying "depth and breadth" learning (Lavelle & Bushrow, 2007). Although it is often assumed that postgraduate students have acquired strong academic writing skills prior to matriculation (Plakhotnik & Rocco, 2016), studies have shown that these students lack necessary skills such as proposal writing (McCarthy & Dempsey, 2017), evaluating and citing source material (Walter & Stouck, 2020), writing effective literature

reviews (Bair & Mader, 2013), synthesizing theories and scientific works (Walter & Stouck, 2020), and familiarity with scientific scholarly conventions (Jeyaraj, 2020). Furthermore, basic academic writing skills such as mechanics, clarity, structure, and paragraph-building have been identified as additional weaknesses among L2 postgraduates (Keong & Mussa, 2015; Mehar Singh, 2019). Moreover, although Holmes et al. (2018) reported anxiety and low self-efficacy about academic writing among both L1 and L2 postgraduate students, a study conducted by Zotzmann and Sheldrake (2021) found that L2 students had lower confidence and less positive beliefs about their writing ability than L1 students.

### **Challenges for Writing Centers**

Writing centers play a crucial role in academe because regardless of the changes that take place in higher education, students will continue to want and need support (Kail, 2000). Kail (2000) points out that only writing centers have both the willingness and ability to engage student writers “sentence by sentence, phrase by phrase, word by word, comma by comma, one-to-one” (p. 25). Kail adds that while no one else can or wants to do this work, everyone wants it done. Unfortunately, writing centers face many challenges to their efforts. To begin with, the persisting assumption of many faculty and administrators that postgraduates should arrive skilled in academic writing seriously hinders student success. Aldrich and Gallogly (2020), for example, point out that students internalize these assumptions in the form of shame, insecurity, or imposter syndrome (p. 307), which often leads to procrastination, anxiety, low self-efficacy, and avoidance from seeking needed support (Gernatt & Coberly-Holt, 2019; Rahimi & Hall, 2021). In addition, many Higher Education Institutions (HEIs) leave the issue of addressing postgraduates' academic writing skills to thesis supervisors.

However, studies have shown that supervisors lack the time and know-how to teach their mentees the ins and outs of academic writing (Cotterall, 2013; Whitman et al., 2014), and, unfortunately, studies have shown that problems in academic writing rank among the top sources of conflict between students and supervisors (Adrian-Taylor et al., 2007). Alostath (2021) reported the primary method used by supervisors to improve academic writing consisted of simply encouraging students to read more scholarly work, while Basturkmen et al. (2014) found that supervisors emphasized linguistic accuracy in thesis feedback because it requires less time and effort than content-oriented feedback. Several studies have also suggested that students are unclear about thesis feedback provided by their supervisors and have difficulties following up due to supervisor time constraints (Saeed et al., 2021; Xu, 2017).

None of this is to suggest, however, that writing centers can meet students' needs without the help of program faculty and thesis supervisors. To the contrary, the advanced nature of academic writing at the postgraduate level requires attention to disciplinarity, which is best addressed when writing center staff, faculty, and supervisors work together to support students (Aldrich & Gallogly, 2020). Finally, postgraduate students' demanding schedules pose significant challenges for writing centers as well (Nicklin et al., 2018). A study conducted by Davis (2012) suggests that roughly 82 percent of postgraduates work and study, while more than half have full-time employment. Research has also linked the financial conditions of postgraduate students to rising attrition rates and burnout, which leaves little time or energy for the development of academic writing skills (Litalien & Guay, 2015; Rigler et al., 2017). Nonetheless, postgraduates have a desire to improve their academic writing skills, but as Nicklin et al. (2018) point out, those desires are often overshadowed next to the priorities of program



requirements, family obligations, and financial constraints. Consequently, writing centers need more flexible and innovative ways of supporting postgraduate students' academic writing needs.

### **Traditional Approach to Postgraduate Writing Support**

When the postgraduate writing center involved in this study was established in 2018, it employed a traditional approach to supporting students characterized by one-to-one in-person consultations and one-off writing workshops. During this period, students could schedule an appointment by accessing the center's website and emailing staff. The center also accepted appointments on a walk-in basis, which were manually logged using Excel. In-person workshops were scheduled on a semester basis and posted online. The center's workshop schedule was also shared with students via email at the start of each semester. Workshop attendance was also recorded manually using Excel. Writing center staff prepared a written post-support summary following one-to-one appointments and workshops as part of the center's continuous evaluation and periodic reporting. Self-evaluation during the center's first four semesters of operation revealed several challenges and shortcomings affecting the approach used to support students. To begin with, most postgraduates (even advanced students) lacked fundamental English academic writing skills needed at the graduate level. Furthermore, most postgraduates (more than half) were employed, and many were married with children, which created time constraints around visiting the center for needed support.

Additionally, Doha (the capital of Qatar) is a small city of only 132 square kilometers with a population of 2.3 million inhabitants, so even for students without work commitments, dealing with congested traffic to visit campus for supplemental writing support posed serious time challenges for students. Further complicating the issue was that writing center staff are considered academic non-teaching employees, which means they are responsible for being on campus during the day. Therefore, staff needed to stay late on most days to be available to support postgraduates who were attending their classes in the evenings. Such long hours were causing burnout and fatigue among staff. Consequently, several innovative changes were implemented in the postgraduate writing center, which comprised the center's hybrid approach.

### **Hybrid Approach to Postgraduate Writing Support**

**Hybrid One-to-One Consultations.** Due to the time constraints postgraduates struggle with, the center implemented a hybrid approach to one-to-one consultations, which provided students much-needed flexibility. Rather than expecting students to find time between work/family obligations, congested traffic, and evening courses to physically visit the center, a user-friendly online appointment system was created where students could request writing consultations via web, in-person, or phone (many students in the current context find phone appointments useful and efficient when they are at work or commuting). Additionally, students were able to indicate what area of support they needed, with whom they would like to schedule, and attach any relevant material such as a writing passage or source material pertaining to the purpose of the visit. Upon logging in to the system, students' university information (i.e., student ID, college/program, level, etc.) was imported and students were prompted to make a few additional selections to generate an automatic email notification for the appropriate writing specialist. In turn, the specialist confirmed and coordinated the meeting request via the students' preferred method (WebEx, Zoom, Google Duo, phone, face-to-face, etc.). The idea behind this approach is that students are not expected to take on additional inconveniences to meet with center staff such as using a complicated appointment system or downloading an unfamiliar

application needed for an online session. Instead, the center is flexible to the mode of communication comfortable for the student, be it an in-person meeting, phone call, or video/voice call via an online conferencing tool. The online appointment system provided basic descriptive analytics for continuous enhancement and ad hoc reporting.

**Webinars and a Grad Student Blackboard Community.** Two other key changes implemented by the center were (1) transitioning in-person only lectures/workshops to online webinars and (2) establishing a Grad Student Blackboard Community. Consequently, academic writing lectures were presented as live, online webinars, which were recorded and uploaded to a video library within the Grad Student Blackboard Community. Whether students were able to attend a live webinar or not, this change allowed them to watch/re-watch relevant webinars at their own convenience. Additionally, building the webinar library allowed the center to offer a wider variety of content targeting different stages/levels of the writing and research process as opposed to repeating a handful of the most popular sessions each term/year. The Blackboard community also provided access to a variety of other important resources such as style guides, learning modules, thesis/dissertation databases (i.e., ProQuest and the institutional repository), thesis templates, handouts, tutorials, discussion boards, supplemental reading, as well as grad humor. In addition, the Blackboard community was intended to facilitate a student-friendly infrastructure of support by providing a centralized point for accessing information and resources, communicating with other students, contacting center staff, and connecting to other university support such as the library, counseling services, and student grants. Finally, the Blackboard community aimed to cultivate a sense of community and camaraderie among students. All postgraduates were automatically enrolled in the Grad Student Blackboard community each term and remained part of the community while they were enrolled at the university. The Blackboard Community also provided useful analytics for periodic reporting and evaluation.

**Lecture Requests.** Because evidence shows postgraduate students lack adequate academic writing skills, have barriers to developing these skills, and face tensions with thesis supervisors over academic writing, the center implemented a lecture request system. This system allowed faculty teaching postgraduate students to request a lecture from among a list of topics relevant to academic writing and writing for publication. Center staff delivered the requested lectures at the regularly scheduled class times, which was a convenient option since students were already required to attend, and the content of the requested lectures supported the achievement of course objectives. Also, faculty used this system to recommend new lecture topics to writing center staff, which opened communication between the center and faculty creating a culture of collaboration around postgraduate writing support. The lecture request system was also used to provide additional feedback regarding the specific academic writing and research issues postgraduates faced in various disciplines.

**Flexible Working Hours for Center Staff.** The four academic writing specialists working in the center involved in the current study are considered academic non-teaching staff and are, consequently, expected to be on campus during the day. Since most postgraduate students are only available in the evenings and to avoid staff burnout, the center implemented flexible working hours. With flexible hours, staff were able to keep a weekly log of one-to-one consultations, webinars, and lecture requests held in the evenings and deduct those hours from the time they needed to be on campus in the mornings. For example, a specialist giving an hour webinar and a two-hour lecture request after 2:30 pm could come in three hours later the same morning. Although the trust system was very effective in the current study, confirming staff hours can be easily accomplished by checking meeting request and lecture request system reports.

### **COVID-19 Interruption**

The global COVID-19 pandemic beginning in early 2020 caused a massive interruption to higher education due to the sudden and forced closure of virtually all HEIs (Marinoni & Land, 2020). Many institutions, for example, lacked adequate contingency plans for the transition to remote learning (Hodges et al., 2020), and, in many cases, faculty and students alike lacked the skills needed for successful online teaching and learning (Baczek et al., 2021). The postgraduate writing center in the current study was not exempt from these interruptions. Postgraduate students and faculty were understandably overwhelmed with the new mode of learning and the different skills and competencies expected of them. Consequently, activity in the writing center slowed down significantly in the first few months. It is important to point out that postgraduate study was mandated to be remote for one semester (spring 2020), after which postgraduates were able to attend classes, while undergraduates were still expected to attend online. This is likely due to the smaller class sizes at the graduate level, which allowed for easier adherence to precautionary measures.

## **Methods**

A mixed-methods research design was used in this comparative study to understand the impact of the center's hybrid model for supporting the development of English academic writing skills among L2 postgraduate students. In this approach, both quantitative and qualitative data were collected and analyzed for meaningful interpretation (Creswell & Plano Clark, 2011). Specifically, the study explored the impact of the center's transition from offering traditional writing support to a hybrid support approach by analyzing frequency data for the following: (1) one-to-one consultations, (2) workshops/webinars, (3) lecture requests, and (4) Blackboard Community. Additionally, the study analyzed data extracted from the institutional postgraduate research experience exit survey to examine the relationship between the center's support approach and postgraduates' perceptions regarding the usefulness of that support as well as whether the support approach impacted students' publication status. Finally, historical data in the form of qualitative feedback from center staff and postgraduate students was compiled and analyzed to support study findings and provide further insight. The philosophical underpinnings of this study are rooted in the tenets of pragmatism where the aim is to better understand "what works" in a particular context (Tashakkori & Teddlie, 1998; Creswell & Plano Clark, 2011).

## Study Context

The current study took place in a postgraduate writing center at a large national university in Qatar during spring 2022. The study examined data collected in the center from spring 2019 to fall 2021, which encompassed two different approaches to supporting the development of students' English academic writing skills: the traditional approach (spring 2019 to fall 2019) and the hybrid approach (spring 2020 to fall 2021). Discussion of the center's two approaches (traditional and hybrid) is provided in the sections below. The center involved in this study was established in spring 2018 and has a staff of four academic writing specialists. The center serves a student population of approximately 1,400 students enrolled in more than 50 graduate programs where most programs (76%) use English as the medium of instruction. Furthermore, the postgraduate student body consists of 63 percent females and 37 percent males of which 30 percent are Qatari nationals and 70 percent are non-Qatari. The average age range of postgraduate students is 24 to 36 years old, and more than half of the postgraduates are employed. Although the center provides academic writing and research support to postgraduates studying in both Arabic and English, the current study focuses on support for English academic writing among those L2 students enrolled in programs where English is the medium of instruction.

## Data Collection

Frequency data for the different types of academic writing support was extracted from the center's end of semester reports and the descriptive analytics provided through the center's online meeting system, lecture request system, and Grad Student Blackboard Community from spring 2019 to fall 2021. Data was disaggregated by the introduction of the hybrid approach to student writing support. Consequently, data from spring 2019 to fall 2019 comprised the "traditional approach," while data from spring 2020 to fall 2021 comprised the "hybrid approach." In the traditional approach, frequency data was collected for one-to-one appointments, in-person workshops, and workshop attendance. Because the intent of the hybrid approach was to increase students' access to academic writing support by providing flexible online and distance options in addition to in-person options, the hybrid approach collected frequency data for the following: one-to-one consultations (in-person, online, and phone), in-person workshops, in-person workshop attendance, webinars, webinar attendance, webinar views on the Grad Student Blackboard Community, and lecture requests. In addition, descriptive data was extracted from end of semester reports for Lecture Request topics by college. To examine the impact of the hybrid approach to supporting the development of English academic writing skills among postgraduates, data from the traditional approach was compared to data from the hybrid approach.

To help understand the impact of the center's hybrid approach, the researchers also extracted data from the Postgraduate Research Experience Survey (PRES) for the period of traditional support (spring 2019 to fall 2019) and the two most recent semesters of hybrid support (spring 2021 and fall 2021) for analysis. The PRES survey (Park et al., 2007) was adapted to fit the local context by the Office of Graduate Studies at the institution involved in the current study and is administered as an exit survey to graduating students every semester. It is important to note that while all graduating students receive the exit survey via their institutional email, completing the survey is optional. Furthermore, the PRES survey is provided to students in Arabic and English where students have the option to complete the survey in their preferred language. Although the 40-item survey is comprised of six scales (Supervision, Intellectual

Environment, Infrastructure, Thesis/Dissertation Examination, Goals and Expectations, and Industry Engagement), only the below item (see Table 1) pertains exclusively to the postgraduate writing center. To assess whether there was a significant difference in students' perceptions of the usefulness of academic writing support between the two approaches, both parametric (independent sample t-test) and non-parametric (Mann-Whitney U test) statistical tests were employed to analyze the survey responses. The outcomes of the independent sample t-test and the Mann-Whitney U test are discussed in the findings section.

**Table 1**

*Relevant PRES Item*

<b>Item No.</b>	<b>Item Description</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
14	The additional support provided through the Office of Graduate Studies helped me improve my academic writing and research skills	Strongly Agree	Agree	Unsure	Disagree	Strongly Disagree

Because the current study is concerned with English academic writing, only responses from the English version of the survey were considered. Consequently, of the n = 287 graduating students invited to take the PRES survey from the period of traditional support, n = 70 participated, which represents a response rate of 24%. Of those students invited to take the PRES survey from the period of hybrid support (n = 355), n = 84 participated, which also represents a response rate of 24%. To determine whether there was a significant difference among students' perceptions about the usefulness of academic writing support in the two approaches, a non-parametric test, Mann-Whitney, was used to analyze survey responses. Additionally, and because publishable research is commonly considered a measure of successful academic writing (Li & Flowerdew, 2020), the researchers also explored the relationship between the support approach used by the postgraduate writing center and students' publication status. For those respondents who completed the English version of the PRES survey during spring 2019 and fall 2019 (traditional approach) and spring 2021 and fall 2021 (hybrid approach), the researchers extracted responses to the demographic item identifying whether the student had published an academic paper out of their research prior to graduation and performed a Pearson Chi-square test. The results of the Pearson Chi-square test are discussed in the findings section.

Finally, to support the quantitative analysis and provide additional insight regarding the impact of the hybrid approach used by the postgraduate writing center, the researchers gathered feedback data that had been submitted by students and writing center staff during the period of hybrid writing support. Qualitative feedback was compiled from end of semester reports, post-appointment summaries, webinar chats, email, and the Grad Student Blackboard Community discussion boards. To maintain the anonymity and confidentiality of the participants, all identifying information was removed from the feedback data before analysis. The feedback was then analyzed for patterns and themes.

## Results

### Increase in One-to-One Consultations

Table 2 presents a comparison of the frequency of one-to-one consultations in the two approaches (traditional and hybrid) used in the center. As seen in Table 2, there was an increase in the frequency of one-to-one consultations using the hybrid approach compared to the traditional approach. More specifically, in the two semesters of traditional support there were 156 in-person meetings, while there was a total of 220 consultations (phone and online) in the first two semesters of the hybrid approach, representing a 41% increase. Likewise, the frequency of both online and phone consultations consistently increased each semester over the last two years. Furthermore, although physical meetings were available, very few students chose that option for the past four semesters (5%) preferring instead online meetings (57%) followed by phone sessions (38%).

**Table 2**

*Frequency of One-to-one Consultations*

Approach	Term	In-person Sessions	Online Sessions	Phone Sessions	Total
Traditional	Spring 2019	84	-	-	84
	Fall 2019	72	-	-	72
Hybrid	Spring 2020	0	63	39	102
	Fall 2020	12	70	48	130
	Spring 2021	6	82	53	141
	Fall 2021	10	108	74	192
Total		184	323	214	721

### Increase in Frequency of and Attendance to Webinars

There was also an increase in both the frequency of and attendance to academic writing workshops using the hybrid approach. Table 3 shows 15 in-person workshops with a total attendance of 115 postgraduates during the period of traditional support compared to 39 webinars and a combined virtual attendance of 354 students in the first two semesters of hybrid support. This represents a 160% increase in workshops offered and a 207% increase in attendance in just one year. The low number of webinars (nine with an overall attendance of 105) in spring 2020 can be attributed to the interruption caused by the COVID-19 pandemic. Nonetheless, over four semesters of hybrid support there was a total of 112 webinars and a combined virtual attendance of 1,108 students. Furthermore, the establishment of the Grad Student Blackboard Community enabled the writing center to build an extensive academic writing and research webinar library, which allowed postgraduates to access needed webinars at their own convenience. Consequently, Blackboard webinar views were also analyzed each semester and treated as post-event attendance. With this perspective, the total attendance/views for the 112 webinars provided during the hybrid approach was 5,585. In fact, the webinar library accounted for the majority of students' participation. For example, in the most recent semester of hybrid support (fall 2021) the center delivered 41 webinars, which garnered an attendance of 449 students and 2,677 Blackboard views.

**Table 3***Frequency of Workshops/Webinars and Attendance*

<b>Approach</b>	<b>Term</b>	<b>In-person Workshop</b>	<b>Physical Attendance</b>	<b>Webinars</b>	<b>Webinar Attendance</b>	<b>Blackboard Views</b>	<b>Total Attendance</b>
Traditional	Spring 2019	7	52	-	-	-	52
	Fall 2019	8	63	-	-	-	63
Hybrid	Spring 2020	-	-	9	105	-	105
	Fall 2020	-	-	30	249	966	1215
	Spring 2021	-	-	32	305	834	1139
	Fall 2021	-	-	41	449	2677	3126
Total		15	115	112	1108	4477	5700

**Demand for Collaborative Support**

The center also yielded positive outcomes from the implementation of the lecture request system, which allowed faculty to invite center staff to their classes to deliver academic writing/research lectures. The lecture request system was implemented in January 2021 and resulted in 42 lecture requests in its first year (see Table 4), which suggests a demand for writing centers to collaborate with postgraduate programs to support the development of academic writing and research skills among students. The results presented in Table 4 also suggest that faculty in both STEM and non-STEM disciplines believe their postgraduates lack the requisite academic writing skills needed at the postgraduate level. Finally, the results suggest that postgraduates in a variety of colleges need support with not only the basics of academic writing (i.e., paraphrasing and paragraph building) but also more advance topics such as developing good research questions, demonstrating critical thinking in writing, and strategies for getting published.

**Table 4***Frequency of Lecture Requests and Topics by College*

Term	Requests	Lecture Topic	College
Spring 2021	20	Introduction to Academic Writing	Education
		Understanding Writing as a Process	Education/Arts & Sciences/ Pharmacy
		Building Body Paragraphs	Education/Pharmacy
		Sentence Style and Variety	Education/Pharmacy
		Writing Reflections and Writing e-Portfolio	Education
		Overview of Qualitative Research Design	Arts & Sciences
		Methods of Qualitative Data Collection & Analysis	Arts & Sciences
		Developing Qualitative Research Questions	Arts & Sciences
		Understanding Plagiarism and Similarity	Pharmacy
		Referencing with Zotero	Pharmacy
		Avoiding Plagiarism through Proper Citation	Pharmacy
		Quoting, Paraphrasing, and Summarizing	Pharmacy
		Constructing an Argument	Pharmacy
		Editing vs Proofreading and When to do Both	Pharmacy
Critical Thinking in Scientific Writing	Pharmacy		
Creating a Good Poster	Law		
Fall 2021	22	Introduction to Academic Integrity	Education
		Understanding Writing as a Process	Education
		Building Body Paragraphs	Education
		Referencing Source Materials	Education
		Approaching the Literature Review	Arts & Sciences
		Avoiding Plagiarism through Proper Citation	Education/ Business/Arts & Science/Sharia & Islamic Studies/ Engineering/Health Sciences/Pharmacy
		Understanding Intentional/Unintentional Plagiarism and Similarity	Education/ Business/Arts & Science/Sharia & Islamic Studies/Engineering/Health Sciences/Pharmacy
		Strategies for Getting Published before Graduation	Arts and Science/Education/Sharia & Islamic Studies

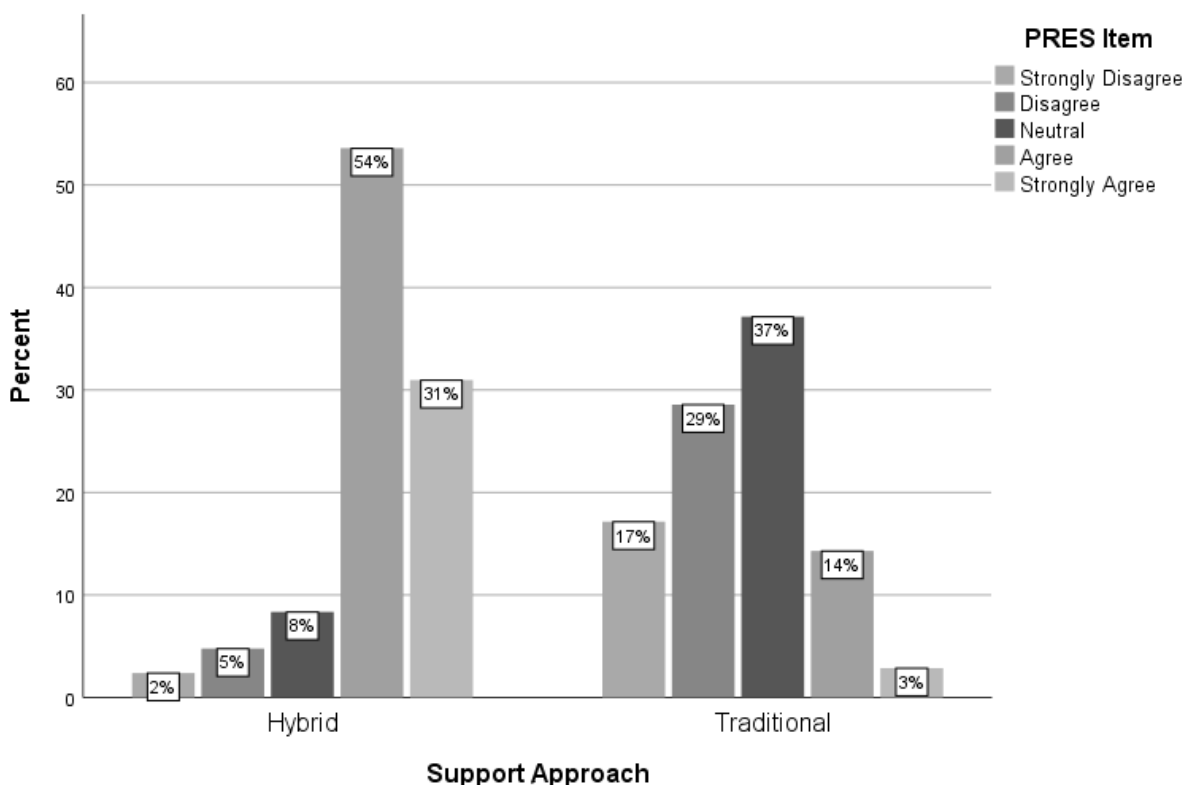
**Postgraduate Research Experience Survey Results**

To explore the impact of the center's hybrid approach to supporting English academic writing among postgraduates, data from the relevant item of the PRES survey was extracted for the period of traditional support and the two most recent semesters of hybrid support (spring 2021 and fall 2021), and a cluster bar chart, independent sample t-test, and Mann-Whitney U test were conducted. Based on Figure 1, among those who experienced the hybrid approach, 54% agreed and 31% strongly agreed that the support was useful for improving their academic writing and research skills. Only 2% strongly disagreed, while 5% disagreed, and 8% remained neutral regarding the usefulness of the hybrid approach. In contrast, for those who experienced the traditional approach, a smaller percentage of participants agreed (14%) and strongly agreed (3%) that the support was useful. However, a larger percentage of participants either strongly disagreed (17%), disagreed (29%), or remained neutral (37%) about the usefulness of the traditional approach for improving their academic writing skills. Moreover, the study conducted both an independent sample t-test and a Mann-Whitney U test to compare students' perceived usefulness of the support provided by the postgraduate writing center for improving their academic writing skills between the hybrid and traditional approaches. The results revealed that



students in the hybrid approach (N = 84, Mean = 4.06, SD = 0.90) reported significantly higher perceived usefulness than those in the traditional approach (N = 70, Mean = 2.57, SD = 0.03). The independent sample t-test demonstrated a significant difference in perceived usefulness between the two groups,  $t(152) = 9.586, p < .001$ . Additionally, the Mann-Whitney U test corroborated these findings with a significant chi-square value,  $\chi^2(1) = 62.398, p < .001$ .

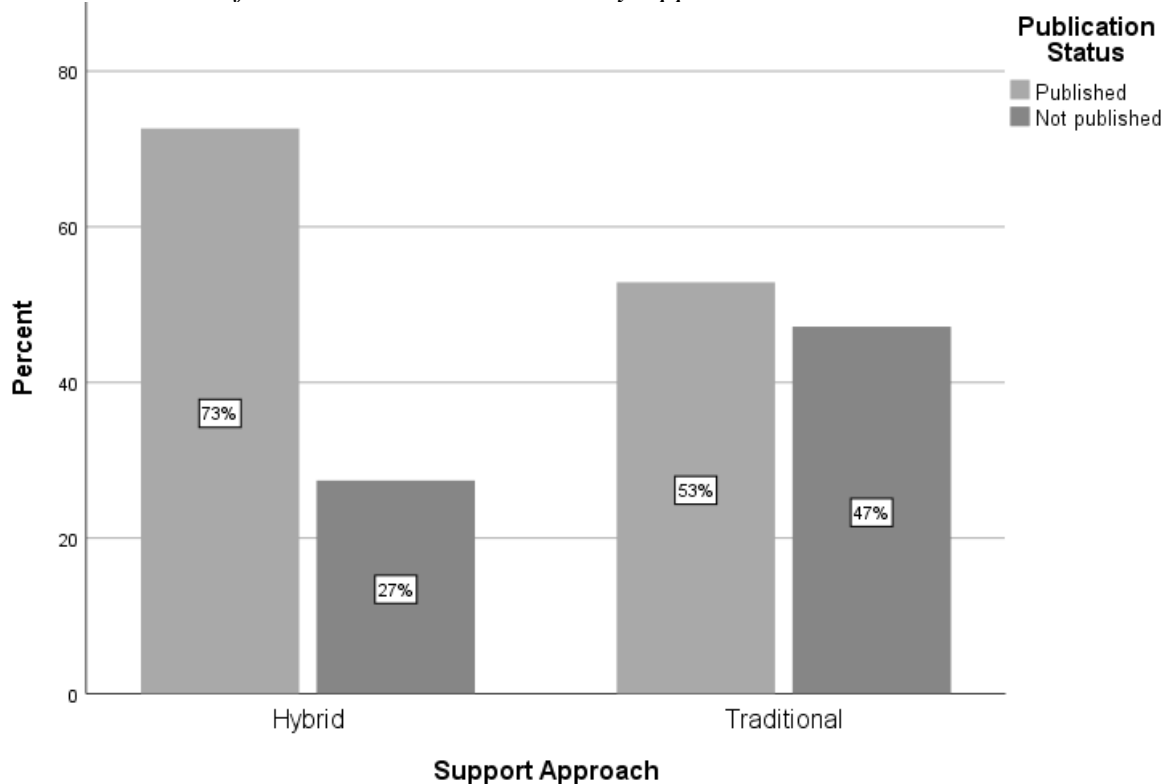
**Figure 1**  
Cluster Bar Chart of PRES Survey Item by Approach



The authors also explored the relationship between the support approach used by the postgraduate writing center and students' publication status by analyzing students' responses to a demographic item on the survey regarding whether they had published an academic paper out of their thesis prior to graduation. Consequently, a Pearson Chi square test was used. Figure 2 shows the relationship between the center's support approach (traditional and hybrid) and students' publication status. As depicted in Figure 2, a comparison of students' publication status before graduation reveals a notable difference between the two support approaches. In the group that received traditional support, 53% of students published prior to graduation, whereas 73% of those who received hybrid support achieved the same milestone. A chi-square test revealed a significant relationship between the center's approach to academic writing support and students' publication status,  $\chi^2(1) = 6.444, p < .001$ , with a Cramer's V of 0.205. These findings suggest that the hybrid approach employed by the center to foster academic writing skills may contribute to students' ability to get published before graduation.

**Figure 2**

*Cluster Bar Chart of Student Publication Status by Approach*



### **Qualitative Feedback from Postgraduates and Center Staff**

The use of student and staff feedback to improve quality in higher education is well documented (Henderson et al., 2019; Razinkina et al., 2018). Consequently, the researchers relied on qualitative feedback from postgraduates and center staff to support study findings and offer unique insight regarding the impact of the hybrid approach explored in this study. An analysis of the feedback gathered from historical data in the center suggests two general takeaways: (1) postgraduates need flexible ways of accessing academic writing support, and (2) writing center staff feel empowered using a hybrid approach. Table 5 provides evidence to support.

**Table 5**

*Qualitative Feedback from Postgraduates and Writing Center Staff*

<b>Takeaway 1: Postgraduates need flexible ways of accessing writing support</b>	
<b>Source Scenario</b>	<b>Students' Feedback</b>
A female master's student in Pharmacy via webinar chat	<i>I'm in a small resting room at the hospital working 12 hours a day; I'm grateful I can attend online even if I am exhausted. This is really great to be able to join.</i>
A second-year master's student in Computing via one-to-one Zoom meeting	<i>It's a blessing to meet during the weekend; it's very hard for me to manage during the week with classes and work, but please ignore if my 4-year-old comes in while we're working.</i>
An Engineering Management doctoral student via one-to-one phone consultation	<i>I'm calling on my lunch break because it's the only time I can talk to you. I really need your help on organizing my lit. review.</i>
A Gulf Studies master's student via one-to-one phone consultation	<i>I'm meeting you at work, I'm sorry in case my boss calls, I will have to leave you.</i>
An Environmental Sciences PhD student via one-to-one on WebEx	<i>When will yesterday's webinar be available on the Blackboard community? I couldn't attend because of work, but I need help with how to organize the lit. review. I want to watch it before I have to meet my supervisor.</i>
A master's student in Public Health via email	<i>I want to share that we face a lot of challenges that limit us from attending your great sessions. We finish work at 2pm and most of us have classes at 4 pm, so we are usually driving to campus during the time of your webinars. I really appreciate that you are recording those sessions for us to use later.</i>
<b>Takeaway 2: Writing center staff feel empowered using a hybrid approach</b>	
Excerpts from self-evaluations and end of semester reports prepared by writing center staff	<i>I love the flexibility we have now and how it allows us to reach more of our students. The best part is when students call in for a quick meeting to clarify a few points before they need to submit a piece of writing, and they end the meeting by saying things like "You saved me!" or "I don't know what I would have done without you". I think it really helps build their confidence by reinforcing their thinking and writing, and that gives me a lot of satisfaction.</i>
	<i>I have noticed that the more flexible we are in how we meet with students, the more they reach out to us for support. I actually see more students in less time because I don't have so much down time waiting around the office for students to show up.</i>
	<i>It's logical that we need to adapt to students' schedules; we have all been in their shoes and know the demands on them; it's about empathy. We tried the traditional approach, and it worked to a certain extent. But, since shifting to the new way, there has been a real change; we simply meet more students. It's very motivating to keep supporting students this way. It definitely requires me to be more available outside typical work hours. One might say I work more, but that's not true; I just work differently now. If I work with a student during the weekend, I just compensate for that time somewhere else in the week. In fact, I actually spend far less time in the office even though I see more students; it's nice to be able to help students from the comfort of my own home also. I don't get overwhelmed because my work is so flexible now, which helps me be more patient with students.</i>

The qualitative feedback provided above offers useful insight into the unique challenges graduate students face and aligns with recent studies urging universities to provide more student support services virtually (Bouchey, Gratz, & Kurland, 2021). Furthermore, such feedback illustrates how implementing a more flexible, hybrid approach to supporting academic writing at the postgraduate level can be beneficial for not only students but staff as well. These findings confirm other studies suggesting a hybrid work model offers employees a greater work-life balance, more job satisfaction, and increased productivity (Kurdy, Al-Malkawi, & Rizwan, 2023). However, such an approach can only be successful if staff are accepting of the implications for their schedules and, perhaps most importantly, there is trust and transparency among the team and management to maintain a motivating and supportive environment. This feedback is intended to spark dialogue around innovative ways of enhancing postgraduates' access to supplemental support.

## Discussion

This study suggests several key findings. First, postgraduate students are more inclined to request one-to-one writing consultations when they have the flexibility of being able to do so without needing to physically visit campus. These findings compliment recent studies indicating that students, whether enrolled in face-to-face or online classes, benefit from online support options and that sustainable learning environments in all contexts should use class designs that take distance learning into account (Ashida & Ishizaka, 2022). Secondly, findings suggest that while live webinars are more convenient for students than in-person workshops, the flexibility of accessing content remotely via a webinar library offers students the most convenience. These findings are supported by a recent study among Saudi medical students conducted during the pandemic, which found that while students were satisfied with both synchronous and asynchronous learning, students believed that asynchronous learning helped them manage their time better (Alzahrani et al., 2023). With graduate students' busy schedules and need to prioritize academic classes, a distance approach to providing supplemental writing support seems useful. Thirdly, study findings suggest that program faculty are willing to collaborate with writing center staff to develop the English academic writing skills of their students.

These findings may serve as some consolation to recent studies highlighting the challenges writing centers face in recruiting highly qualified tutors with specialized knowledge in target fields to support the needs of postgraduates (González, & Videgaray, 2022). That is, rather than burdening writing centers with further recruitment challenges, study findings suggest that center staff and program faculty can work together using a lecture request tool to maximize on each other's expertise to support students at a time when they are already required to be present. Furthermore, study results suggest that postgraduates in a variety of colleges and disciplines need support with fundamentals as well as more advanced aspects of academic writing, which is well-supported in the existing literature (Newsome, 2023; Jeyaraj, 2020; Mehar Singh, 2019). Additionally, study findings suggest that students perceive a hybrid approach to supporting the development of academic writing skills to be more useful than that of a traditional support approach and that students from a hybrid approach are significantly more likely to publish prior to graduation. One possible explanation is that a hybrid approach allows the center to offer more support on a wider array of topics to a greater number of students than a traditional approach. In addition, the hybrid approach offers students more flexibility in terms of how they access support as evidenced by the findings reported in this study.

## **Limitations and Future Research**

The relatively low response rate to the PRES survey was a limitation in the current study. Additionally, the survey had only one-item dedicated to evaluating the quality of academic writing support provided by the center, which allowed for limited insight regarding students' perceptions. Because the PRES survey is an exit survey that is administered to graduating students by the Office of Graduate Studies each semester after they apply for graduation, the writing center involved in this study had no authority to modify the survey items. Furthermore, students received a single email invitation inviting them to participate in this optional survey; therefore, the center was not able to send reminder emails to potentially improve the response rate. Consequently, more studies are needed investigating students' perceptions of the usefulness of a hybrid approach for improving their academic writing skills using instruments designed particularly for that purpose. Another limitation of the study is its generalizability. Because the study focused on a hybrid support approach at a single postgraduate writing center, the results have limited generalizability to other writing centers or academic support services in different settings. Future studies could include more diverse samples and various institutions to broaden the applicability of the findings. This would help to further validate study findings and offer a deeper understanding of how best to support the development of postgraduates' academic writing skills.

## **Conclusion**

Despite assumptions that L2 postgraduate students matriculate with the English academic writing skills required to do well in graduate study and produce scientific publications, study findings align with existing literature to suggest otherwise. In fact, the current study confirms that postgraduates across all disciplines lack requisite academic writing skills and face significant challenges accessing needed support. This mismatch between skills and expectations can lead to feelings of anxiety and desperation, imposter syndrome, isolation, and even depression. While faculty and thesis supervisors are often expected to fill this gap, most are unable to do so because they either lack the time or the know-how. Even when institutions have centers dedicated to supporting academic writing at the postgraduate level, like in the current context, students struggle to find time to take advantage of such support, despite it being a priority. Consequently, postgraduates need flexibility in how they access academic writing support. The current study explored the impact of a writing center's hybrid approach to supporting the development of English academic writing skills among L2 postgraduates, and several key findings emerged. Firstly, postgraduates prefer online and distance options for receiving academic writing support compared to in-person options. Secondly, postgraduates perceive a hybrid support approach as more useful for improving their English academic writing skills than a traditional support approach. Similarly, study findings suggest that providing flexible ways for postgraduates to access needed academic writing support likely has a significant impact on helping them publish prior to graduation. Findings also reveal that while faculty find the academic writing skills of postgraduates to be inadequate, they are willing to collaborate with writing center staff to support the development of their students' skills. The findings from this study are intended to ignite discussion around the English academic writing challenges L2 postgraduates face and to encourage more research efforts aimed at finding innovative approaches to supporting the development of these skills.

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### **Declarations**

The authors declare no conflicts of interest in this research. The data used and analyzed in the current study are available from the author upon reasonable request.

### **Ethics Approval**

This study was approved by Qatar University Institution Review Board under Research Ethics Approval Number QU-IRB 1385-E/20.

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# Humanising Online Pedagogy Through Asynchronous Discussion Forums: An Analysis of Student Dialogic Interactions at a South African University

Fatima Vally Essa

Grant Andrews

Belinda Mendelowitz

Yvonne Reed

Ilse Fouche

*University of the Witwatersrand, South Africa*

## Abstract

Humanising pedagogy has been a focus of recent research as more universities move to online and blended models of instruction. Online learning has been linked to feelings of isolation, disconnection, and depersonalisation of the learning experience for many students. In South Africa, the shift to online instruction took place in the context of the Covid-19 pandemic and recent student movements that brought attention to how the country's violent history resulted in structural inequalities in terms of race and class that affect learning environments. Thus, humanising pedagogy also meant recognising and addressing how students' contextual challenges might affect their feelings of connection in the learning environment. In this article, we present a case study of a first-year course at a South African university where we used online discussion forums that required students to engage with weekly forum tasks. Through thematic content analysis of students' dialogic responses on these forum tasks, we demonstrate how the tasks facilitated humanising pedagogy by allowing students to use their authentic voices, to form social connections, and to reflect their affective and personal experiences. We argue that interactive, asynchronous online forums can be effective tools to facilitate humanising online pedagogy when these forums are designed in ways that encourage dialogic learning, use content that is relevant to students' contexts, and give students agency by allowing them to select texts for discussion and share their diverse perspectives. Our analysis also showed limitations to forum discussions which include students echoing responses and instances of silencing and unsupportive group dynamics.

*Keywords:* Online learning, forum discussions, humanising pedagogy, critical dialogic pedagogy

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In March 2020, South Africa went into a hard lockdown due to the SARS-CoV-2 coronavirus pandemic, with people confined to their homes except for meeting essential needs like buying groceries or seeking medical care. During this phase of the lockdown, all institutions of higher learning in the country moved to online teaching and learning in what became known as emergency remote teaching (ERT), a form of online education where curricula that had originally been designed for face-to-face instruction are rapidly transferred to the online space due to emergency conditions (Hodges et al., 2020). In light of this sudden move online, a number of challenges arose for students, particularly in the South African context which is marked by inequality and a long history of racial and cultural oppression that still affects learning environments in complex ways. The issue of isolation has been noted in many contexts of online learning, a feeling heightened by the social distancing that was required to limit the spread of the coronavirus (see Harris et al., 2021; Fouche & Andrews, 2022; Parker et al., 2021). Specifically, Parker et al. (2021) noted that online learning can feel “dehumanizing” (p. 119) due to students missing a sense of “closeness between themselves and others in the learning environment” (p.126). This is contrasted with a humanising pedagogy which can “maintain [a] sense of human presence” (p.120) even in the often-isolating online learning environment.

Humanising pedagogy has been explored by many scholars (for example, Fataar, 2016; Zinn et al., 2016; Kajee, 2021; Mendelowitz et al., 2022), and common themes emerge in literature on humanising pedagogy, including a focus on pedagogical strategies that can facilitate “learning communit[ies], engagement, collaboration, belonging, connection, interactive social learning, social presence, identity building, [and] personalized learning” (Parker et al., 2021, p. 120). In South Africa, humanising pedagogy is viewed as a way to acknowledge and challenge the legacy of oppressive systems like apartheid and the impact of inequality on education. This includes recognising and addressing how students might be denied forms of access to education due structural and social factors (Fataar, 2016). In this article, we engage with a “humanizing pedagogy that respects and uses the reality, history, and perspectives of students as an integral part of educational practice” (Bartolome, 1994, p. 173). We explore a case study of how we reconceptualised pedagogy and worked to humanise a first-year online course at a South African university during ERT through the use of dialogic asynchronous online forums. We use the methodology of thematic content analysis to explore students’ interactions on these forums, and to identify how the forums enabled and restricted aspects of humanising the online learning environment. While many students still expressed severe challenges during online learning, we argue that the elements of humanising pedagogy we observed in these forum interactions can act as a foundation for more effective learning in online courses, particularly in contexts like South Africa where many students often do not have the resources to engage in synchronous online interactions. However, we argue that these forums need to be carefully designed to provide contextually-relevant forms of humanising pedagogy, which involves tapping into the diversity of resources, experiences and perspectives of students through meaningful dialogic engagement.

### **The South African Higher Education Context**

In understanding the complexity of online learning, it is useful to first explore the dynamics of higher education in South Africa. The history of colonialism and the system of apartheid, which legislated the racist oppression and exploitation of Black people and other racial groups to the benefit of the minority white population, still impacts educational settings today. Most Black students are the first in their families to have access to tertiary education

(Tiroyabone & Strydom, 2021) and many do not speak English as their home language; however, English is the language of instruction at most institutions of higher learning. In addition, the fact that well-resourced universities were often classified as “whites only” during apartheid means that these spaces still carry symbolic and structural elements of colonialism and apartheid. This is demonstrated in the fact that despite positive changes in demographics in recent years, a disproportionate number of academic staff are still white in South Africa (Breetzke & Hedding, 2018) and the rate of student demographic transformation at some universities has been incredibly slow (Carolissen, 2022).

The 2015 and 2016 #RhodesMustFall movement shone a light on not only the symbols of oppression like statues and names of buildings, but also the myriad ways that Black students continue to be violated and excluded on university campuses in South Africa (Khan, 2017). The subsequent #FeesMustFall student movement focused on the fact that the cost of tertiary education had skyrocketed, financially excluding students from low-income backgrounds. Students demanded fee-free education, since in a country with one of the highest unemployment rates in the world, education could be a pathway for Black people to uplift themselves and their families out of poverty (Griffiths, 2019). In light of these recent student movements and the tensions they exposed in higher education spaces, the pandemic and move to ERT was an additional strain on vulnerable students that required targeted and contextually-relevant interventions. A humanising pedagogy, like we worked to institute in the course under discussion, must be cognisant of the social and educational context in order to enable “a pedagogy that engages the full and ever evolving humanity of people” (Fataar, 2016, p. 20).

### **Challenges of Online Teaching and Learning During ERT**

Many challenges around teaching and learning emerged during ERT in South Africa, including a lack of time for preparation of online courses due to the abrupt shift to online learning during the pandemic, constrained resources like information and communication technologies (ICT) or internet access, and insufficient institutional support for staff and students to adapt to the functionality of online learning management systems (LMSs) ( Fouche & Andrews, 2022; Jaggars, 2021). These challenges added to the personal, emotional and financial hardship that many students were already experiencing. Higher education institutions made efforts to provide emotional and technological support to students, but they were only able to reach a limited number of students (Jaggars, 2021).

Students living in rural areas were particularly disadvantaged during the move to online learning, as they face a range of structural constraints and poor basic service delivery in their home areas, such as “electricity supply that is inconsistent and [internet or mobile] network coverage that is poor” (Hedding et al., 2020, p. 1). Many students had home environments that were un conducive to online learning due to overcrowded homes, insufficient learning spaces and a lack of privacy; in addition, the fact that the lockdown required school-aged children to remain at home also meant that some students were tasked with more childcare and other household tasks (Fouche & Andrews, 2022). Students and staff also experienced emotional challenges due to fear, stress, and the death or illness of friends and family because of the Covid-19 pandemic (Hansen-Brown et al., 2022). Thus, while the move to online learning was necessary to limit the spread of the Coronavirus, it exacerbated existing problems in the South African higher education system.

As a response, we employed online discussion forums as a space for students to engage in critical dialogue. Online forums are message boards where discussions can take place (Kaur, 2011). It provides a space for learning, engagement, and interaction to occur without meeting face-to-face, even if members are logged on at different times (Kaur, 2011). On an online forum such as those we made use of in our LMS, members of the course site can post and respond to one another by posting messages, images and voice notes, and use the “like” function to show agreement with a post. A growing body of research has shown that online forums have the potential to enhance learning outcomes (Abawajy & Kim, 2011; Kadagidze, 2014; Gleason, 2020; Tomic et al., 2020; Mendelowitz et al., 2022). Abawajy and Kim (2011, p. 696) also add that “discussion forums offer a unique opportunity where some of the most important learning such as engagement in learning task, deeper levels of understanding, increased metacognition, increased motivation and divergent thinking can happen.” However, this can only occur if the students engage in constructive dialogue and are receptive to peer learning.

### **Humanising Pedagogy**

A humanising pedagogy recognises that “[e]ducation is, or it should be, person-centred” (Devis-Rosenthal & Clark, 2020, p. 3), and that in addition to learning outcomes one should acknowledge and foreground emotions, identities and personal experiences in pedagogy, including aspects of sociocultural and economic diversity (cf. Maistry, 2015; Fataar, 2016). A humanising pedagogy creates a sense of social connectedness in learning environments that might be isolating or alienating (cf. Harris et al., 2021). As suggested by Zinn et al. (2016) our pedagogy “needed to take into account who the [student] was, and where they were coming from in terms of their prior knowledge and assets—for example, background, languages, contextual, and experiential knowledges—as key aspects of practicing a humanising pedagogy” (73). This highlights that a humanising pedagogy empowers students to have agency in their learning, it amplifies and respects student voice, and it is linked to “emotions, care and compassion [as well as] mutual vulnerability and social justice” (73).

In South African research, humanising pedagogy is conceptualised as a means to deepen engagement and strengthen learning by focusing on structural and psychosocial dimensions and contexts, and simultaneously valuing students’ knowledges, identities, and diverse experiences and forms of agentic participation in their learning (Fataar, 2016; Zinn et al, 2016; Zembylas, 2018). Fataar (2016, p. 19) notes that humanising pedagogy requires a recognition of the “social-subjective” dimensions of students, where their “life knowledges” are valued and meaningfully engaged, and “knowledge is participative and generative, not simply consumed.” We recognise the community of inquiry framework as a model for social learning which understands educational experiences as influenced by social presence, cognitive presence and teaching presence (Garrison et al., 2000). While this model is significant in many approaches to humanising pedagogy, it does not adequately centre the diversity of students and their contexts and how these might impact on the educational experience, and unlike the approach to humanising pedagogy outlined by many South African researchers, it does not have a central focus on social justice or critical pedagogy. Garrison et al. (2000, p. 94) define social presence in the community of inquiry model as “the ability of participants in a community of inquiry to project themselves socially and emotionally, as ‘real’ people (i.e., their full personality), through the medium of communication being used.” They furthermore note that indicators of social

presence are “emotional expression – emoticons, autobiographical narratives; open communication – risk-free expression, acknowledging others, being encouraging; group cohesion – encouraging collaboration, helping, and supporting” (102).

While this definition addresses the basic conditions of how students can practise agency, form supportive communities, and assert themselves as “real” people in the learning environment, it does not fully consider questions of unequal access and how identities, histories, conflict, and diverse personal experiences that students bring to the online environment are significant in learning processes. Through the design of our online forums, we encouraged dialogic interaction between students and established spaces for them to capitalise on their existing resources and repertoires to provide epistemological access. We also draw on Freire’s (2003) concept of re-humanisation which positions students at the centre of their learning by valuing prior knowledge, resources, and diverse identities.

Our conceptualisation of humanising pedagogy through critical dialogic engagement highlights how human interaction, personal identities, emotion, cognition, and pedagogical design intertwine to shape learning. This is important for theory and practice in unequal contexts like South Africa as it is responsive to the conflict, histories, political realities, and “messiness” of interactions in these contexts. We see this messiness as demonstrated in the uncontrollable, unpredictable, and deeply personal engagements that at times took place in the forums, or what Zinn calls the “daily reality of conflicting views and perspectives, informed by diverse histories and lived experiences” (Zinn et al., 2016, 73). In our data, we illustrate dialogic interactions that stemmed from the humanising pedagogy we employed in the course. We illustrate how students alternate between personal and critical engagement as a result of the way we structured our forum tasks to promote critical dialogic engagement.

### **Humanising Pedagogy Through Critical Dialogic Interaction**

Critical dialogic theory is centred around using dialogue to socially construct meaning, affirm the social worlds of students, and critique and produce authentic texts. Bakhtin (1984) and Freire (1993) both place emphasis on the role of dialogue in education. Bakhtin problematises the linear sequence of information and knowledge being passed down from teacher to student, explaining: “...truth is not born nor is it to be found inside the head of an individual person, it is born between people collectively searching for truth, in the process of their dialogic interaction” (Bakhtin, 1984, p.110). Freire’s (1993) notion of dialogic pedagogy emphasises the mutual learning amongst those in dialogue in a learning environment. A critical dialogic framework recognises learning as a collaborative, dialogic, and social journey of inquiry and critique.

Veloria and Boyes-Watson (2014) advocate for life experiences to be valued within academic spaces through dialogic engagement as it creates a sense of value, voice, and understanding for students which offers them access to capitalise on a wide range of resources that is often ignored in academic spaces. They argue for educators to broaden the scope of what constitutes knowledge within academic spaces because only through dialogue are we capable of understanding who students are and bridge gaps of difference of “age, race, socioeconomic status [,] educational level, [and] epistemological orientation” (72).

We found that the online forums enabled “[s]tudents [to] have dialogues with texts, with self and others [peers and lecturers]”. In addition, in responding to texts and peers on the forum,



they draw on their identities, their socio-cultural contexts, and affect. Through this process of multiple dialogues students gain access to disciplinary knowledge and reconfigured knowledges” (Mendelowitz et al., 2022, p. 25). However, merely providing the space for forum discussions is insufficient to promote critical dialogic engagement, or to engage with the social justice element of humanising pedagogy that we argue for. Our data suggest that dialogic engagement was most effective when it was encouraged in the structure of forum questions, and authentic engagement was strengthened when contextually relevant materials were used and when students were asked to bring materials for discussion that were meaningful to their everyday experiences.

## Methodology

Our study was driven by the following research questions:

1. How do online forum discussions facilitate a humanising pedagogy by fostering social, emotional, and critical academic interactions during learning?
2. What are the affordances and limitations of using online discussion forums to humanise online pedagogy?

## Context

The data for this article were collected from the online forum discussions for the English 1 Media Stories course in 2020. This course was the first English I course to take place during ERT. Students only had one month of teaching and learning on campus before South Africa went into a hard lockdown. Since they were first-year students with limited social and academic engagement at university, these students required more support and guidance during the shift online.

The University of the Witwatersrand (Wits) in Johannesburg, where the current case study was conducted, is a relatively well-resourced university in an urban setting. However, the student body is diverse, and many students who stay at university residences usually live in rural or other poorly resourced areas. While the university loaned laptops to thousands of staff and students early in the pandemic, there were sometimes delays in receiving the devices, and the number of students in need of ICT support still outweighed the supply of equipment. Many students at our institution thus made use of cell phones to do online lessons or shared devices with family members or others in their communities (Fouche & Andrews, 2022), and this led to struggles with completing synchronous online lessons and tasks. In addition, mobile data is often prohibitively expensive for students, and despite the university providing some data, this was also subject to delays or was at times shared with others in students’ household so that it became insufficient for online learning for many. As a response to the connectivity and ICT constraints students faced, the university mandated that lecturers design undergraduate courses to have low demands on data, and live video lectures were discouraged. Our English I course, Media Stories, only included short videos and mostly provided lessons in the form of text and static images.

One of our major concerns with asynchronous online learning was that it could be isolating for students to not interact with instructors or fellow students in synchronous fashion, and Harris et al. (2021) explain that live, synchronous lessons are effective formats to challenge isolation as they “can offer students important access to personal connectivity and interactivity”

(116). However, due to our context, synchronous lessons were not feasible, and instead we were forced to be innovative in including features in our course that could tap into the affordances of synchronous interactions while remaining asynchronous. We introduced asynchronous forum discussions in an effort to humanise our online course and create a space for dialogic interaction, as well as to be cognizant and responsive to the context we worked in. The forum tasks were assigned each week to ensure regular engagement, since, as argued by Woodcock (2009, p. 101) “[s]uccessful online courses include features that scaffold time management, pacing of work, timely completion of tasks, the use of appropriate learning strategies, and a student’s sense of the ability to succeed.” Research has also suggested that online forums can be “highly student-centered, democratic, and free of institutionalized patterns” (House-Peters et al., 2019, p. 93), adding to a sense of autonomy in learning.

### **Participants**

A total of 327 students were registered for the English 1 Media Stories course, which is a compulsory course for students in the Bachelor of Education program majoring in English Studies. To encourage more familiarity between forum members and make the online space inviting for dialogic interaction, we arranged the class into ten groups of between 32-33 students. Arranging the class in smaller groups creates a safe online learning environment that facilitates academic success in higher education by establishing a space for community building (Shea et al. 2006). We randomly selected three of the ten forum groups for analysis to have a manageable amount of data for this article.

Students were asked for consent to use their forum responses for research purposes, and only 17 students from the three selected groups who provided explicit consent were included in this study. Pseudonyms are used to ensure confidentiality, and any identifying details of individual students were removed from the discussion of the data. Excerpts have been lightly edited for clarity, but we took care to preserve the voices of students as far as possible to demonstrate aspects of humanising pedagogy. We draw on Bakhtin (1984) and Thesen’s (2013) conception of voice as “dialogic and multiple... We want our voices to carry ideas across spaces and to reach receptive readers with whom we establish a relationship” (Mendelowitz et al, 2022, p. 24).

### **Data Analysis**

We chose the method of thematic content analysis to show the strategies students used in their online interactions and how these reflected the affordances and limitations of the type of humanising pedagogy we employed. Content analysis is “a systematic coding and categorizing approach used for exploring large amounts of textual information unobtrusively to determine trends and patterns of words used, their frequency, their relationships, and the structures and discourses of communication” (Vaismoradi et al., 2013, p. 400). In thematic content analysis, the codes generated in the process of content analysis are organised into themes in order to offer meaningful lenses to understand large quantities of data. Two of the authors who were the instructors on the course were involved in organising and coding the data. The process involved reading through each individual post across the three groups that students submitted every week for the course. Sections of the original posts and the thread responses by peers were coded according to categories that included personal, social, and critical academic resources that were

employed in each interaction, as well as the tone and style of responses. The coding was checked and verified by all authors of this article.

Based on the codes generated, we identified three relevant themes under which we discuss our data: i) *echo chambers versus diverse perspectives*; ii) *unsupportive group dynamics and silencing of peers*; and iii) *engaging with personal identity and affect*.

For the course, we set up the forum discussions to be task-oriented to ensure academic engagement with course content, and we did not limit students to a particular length or number of posts to encourage ongoing learning throughout the week, as new posts were frequently added due to the asynchronous nature of the forums. We also included topics, themes, and content that provide epistemic access and scope for personal engagement and reflection to humanise the online space. Some of the weekly topics included: the role of the media during the Covid-19 pandemic, political news stories in South Africa, language choices and positioning, and sharing and engaging with news headlines and news photographs. Most of the tasks required students to respond to one another's posts to share differing perspectives or to offer feedback on their classmates' analyses. This strategy ensured some level of interaction, although follow-up discussions on these exchanges were rare.

## Results and Discussion

In this section, we present and analyse data from the weekly online forums under the three identified themes. We explore the affordances and limitations of humanising pedagogy that we identified in our data in relation to the theoretical and conceptual framework outlined above. Under each of the themes, we also reflect on the ways that our approach to humanising pedagogy was effective in promoting critical dialogic engagement that led to deeper learning.

### Echo Chambers Versus Diverse Perspectives

While there was generally a lack of inter-student communication beyond the mandated one or two responses in some tasks, there were moments of prolonged engagement and multiple responses to some students' posts that emerged in the forums. Inter-student engagement was generally lower in the earlier weeks of the course across groups, possibly indicating a lack of confidence with the academic discourse required in the course, and the fact that students were still struggling to employ their authentic voices in the online learning space. However, one group shared multiple posts in response to a question from the student Thabiso in an early forum task, providing encouraging statements, affirmation, and additional ideas, as illustrated in the extended exchanges below:

**Thabiso:** Since we all have different social positions and ideologies when reading media texts. Is there a wrong way of understanding the messages conveyed by the media and is it possible for one ideology to outweigh the others?

**Melissa:** Hi Thabiso, Great question - I would like to give my opinion, and that is that I do not believe that there is a wrong way of understanding a message, of course depending on the context. [...] as a democratic state here in SA [South Africa], I would never want to believe that one ideology should outweigh another unless it is for the good of all the citizens in that country.

**Ayanda:** Hi Thabiso I also agree with you, because as people we are different and sometimes we expect different things. The reason might be the differences in culture or society beliefs that influence the way we understand the messages conveyed by media.

**Munir:** Hello Thabiso. Great question, I would not say that it is wrong on its own, because that is each individual's capacity. One thing that can be a solution is that everybody can enrich themselves with correct ways of interpreting the media, a way in which no one side is biased, things are mentioned as is.

Devis-Rosenthal and Clark (2020, p. 8) emphasise that respect for diverse opinions is an important component of humanising pedagogy, and this is evident in the original post by Thabiso as he begins by saying “we all have different social positions and ideologies when reading media texts.” This is an indication that he is aware of the diverse ideologies and backgrounds that exist for students in the group. Indicating this upfront creates a welcoming space for students to engage with the question, no matter what their perspective is. The tone of curiosity and acceptance in Thabiso's question could have influenced the high level of engagement on the post. This reflects the character of online forums being potentially “democratic” spaces (House-Peters et al., 2019, p. 93) where a multiplicity of voices is encouraged as long as these voices maintain the tone of respect.

Within the post, Thabiso asks his question “Is there a wrong way of understanding the messages conveyed by the media and is it possible for one ideology to outweigh the others?” as a form of “sense making” (Devis-Rosenthal and Clark, 2020) showing how forums can be powerful tools for epistemic access to work with difficult course content (Mendelowitz et al., 2022). Criticality is evident in his question, as it relates to power relations and social inequalities by considering whose ideology is more powerful. We specifically designed the forum task to engage students' critical thinking about media texts in contexts, asking them to answer questions about the role of media, how context shapes understanding of media texts, and our relationship with the media we consume. Students were then also asked to respond to and critique at least one other student's answers. This task structure was an effort to humanise the online learning environment by prompting students to recognise the potential for “conflicting views and perspectives” (Zinn et al., 2016, p. 73) and to engage in dialogic learning through creating the space to challenge social power structures through online conversations. Thabiso's question shows an awareness of differing “social-subjective” realities (Fataar, 2016, p.19) and how news might reproduce dominant ideologies that serve to oppress and marginalise some identities or perspectives.

However, the responses that Thabiso receives from his peers lack critical engagement and do not explore the possibility of power differentials in relation to competing ideologies. These students do not consider dominant and non-dominant ideologies that exist in society even though this question creates an opportunity to critically engage with the topic and to share more personal or context-specific ideas, and the desire to foster “group cohesion” (Garrison et al., 2000, p. 94) through a supportive community of inquiry might have stunted critical engagement. While there seems to be a diversity of perspectives and voices presented, the answers might still be “safe” and students might not be willing to challenge one another or voice controversial opinions in the forums. Effectively, it becomes an echo chamber, defined as an environment “in which the

opinion, political leaning, or belief of users about a topic gets reinforced due to repeated interactions with peers or sources having similar tendencies and attitudes” (Cinelli et al., 2021, p. 1). This might reflect a significant disadvantage of online forums where the element of criticality becomes secondary to the drive to create supportive and friendly learning environment and reinforce dominant perspectives. This interaction seems to have been an instance where intervention or further probing by the course facilitator could have strengthened the level of critical engagement, particularly in pointing to diverse “life knowledges” (Fataar, 2016, p. 19), but the large student numbers in the course meant that the facilitators could not read or respond to all of the forum posts each week during ERT.

Another forum dynamic that sparked extended engagement occurred when some students demonstrated misunderstandings of the course content, and other students stepped in to correct them. This demonstrates how understanding is enabled through lengthy responses, and multiple students were able to share their perspectives and learn from their peers. The lengthier exchanges enabled more criticality in the way students engaged and allowed them to claim their own academic voices (Mendelowitz et al., 2022). Many of these posts also demonstrate the aspect of agency (Devis-Rosenthal and Clark, 2020, p. 8), a factor closely linked to social presence as defined by Garrison et al. (2000) in their community of inquiry model. Students recognise that they can shape the discourse in the forum and that their knowledge and perspectives are valid, an important part of authentic dialogic learning (Bakhtin, 1984; Freire, 1993) and humanising pedagogy where “knowledge is participative and generative, not simply consumed” (Fataar, 2016, p.19).

A thread in the week 1 forum task involved eight students, and each of them added some disagreement or support to the answers of their peers. The original post in this example is by the student Pule, and many other students responded to him. The theme of the task drew on the role of the media during the Covid-19 pandemic; therefore, the heavy engagement could be due to a link between personal and academic lives, as students were engaging academically with a topic that affected their lives in multiple ways, and they also attempt to rectify Pule’s misunderstanding of how media texts function across modes and genres. Some of the responses to Pule are illustrated below.

**Pule:** The role of the media is to create an awareness of this global pandemic to those who are not affect by it and how they can help to prevent the spread. The news does not change when it is conveyed from newspapers to TV because the TVs and newspapers all convey the same message which is to prevent the spreading out of the pandemic.[...]

**Tamara:** I disagree somewhat to your answer, I think that the news changes, depending on what you look at and depending on the author of the specific information you are viewing.

**Fortunate:** and to add to your answer [...], i also think the role of media in this global pandemic is to create a way for people to access information and also act as a link between the events of reality and the receivers of information which is us the people whom consume this information.

**Sally:** I agree with Tamara that news changes depending on what you look at and on the author of the specific information you viewing but I also agree with you Pule that news sometimes don’t change it’s just that the television adds some information that the newspaper did not cover

Many students who participated in this exchange had clearly read all the responses that came before theirs and took those earlier responses into account when providing their perspectives, as Fortunate and Sally show awareness of what Tamara had posted before them. This demonstrates a complex interactional structure where students might be participating at various points of an ongoing discussion at different times. The tone of these exchanges is also much less playful, friendly or informal than many other interactions on the forum, such as many interactions where students used emoticons or informal greetings. There were some supportive statements, for example Tamara's "I disagree somewhat", indicating that Pule was perhaps on the right track with some of his thinking, and Fortunate also challenges Pule through the qualifier "to add to your answer". This qualifier indicates that students recognise that negative feedback might be unpleasant to receive, but the students still want to help Pule correct some misunderstandings and attempt to make the online forum a pleasant and non-judgmental space, a form of strengthening social cohesion and respecting the affective dimensions of learning (Devis-Rosenthal & Clark, 2020; Parker et al., 2021) while maintaining critical dialogic engagement. Students in this example draw on one another as resources and learn through peer feedback, an affordance of online forums highlighted by Kaur (2011) and Tomic et al. (2020).

While there is no indication from Pule that he had read the replies and developed his thinking through the community on the forum, it is evident that the other students who participated in the thread were actively engaging and testing out their own understanding of the course content, and as this is a public forum, other students in the group are also able to benefit from reading this exchange of ideas. However, the discussion still feels decontextualised and does not adequately engage with the sociocultural dimensions which are important in the type of humanising pedagogy we worked to enact in this course (see Maistry, 2015; Fataar, 2016). For example, students do not question why Pule and Tamara might have had such different reactions to media based on their cultural, linguistic or economic backgrounds, or based on the types of media they were exposed to in their everyday lives.

While these reactions were all from early in the course, and the forum tasks progressively became more direct in asking students to engage with their identities and environments, an intervention from the facilitator might have deepened the engagement. For example, students could be asked to reflect on the types of media they regularly engage with, and how these might differ from their classmates in terms of language, content, style or function. This intervention might have helped to further the humanising pedagogy through encouraging reflection on unequal access to particular forms of media in the South African context, thus more closely aligning with "a pedagogy that engages the full and ever evolving humanity of people" (Fataar, 2016, p. 20).

### ***Unsupportive Group Dynamics and Silencing of Peers***

A sense of social cohesion and support was not established in all instances. Some struggled to engage effectively with their peers which affected participation, engagement and group dynamics. Some students used a form of critical questioning that might have been alienating for other students, especially in light of historical inequalities in South Africa. An example is shown below. One student, Lindiwe, posts her ideas about a news article discussing a case of corruption in South Africa. Lindiwe's opinion of the article is a fairly simplistic reflection of the story's facts with a focus on the way that media can affect the sense of justice experienced by readers in exposing corruption. Another student, Melissa, responds to Lindiwe:

**Melissa:** Hi Lindiwe,

I have 2 questions relating to your answers above. 1. What makes you feel that this article would bring a reader peace and justice? Would the reader not be angry or upset? If you were reading this at the time it was published, would you feel at peace? 2. Is it the medias responsibility to bring justice? They can most definitely rally the masses and cause pressure but I do not believe that it is their duty to bring justice, hence the reason no answer to what will happen next was written, very little opinion was given in this report, its intention was to expose the corruption.

I agree with your first statement in the linkage between the image and the title, and the uncovering of the truths to the public, I would just like to get an idea of your thoughts because mine were so very different.

Best of luck for the rest of the week :)

Melissa uses a questioning approach in an attempt to understand the reasoning behind Lindiwe's response which could be read to indicate her willingness to understand different perspectives. However, she poses a question and immediately gives her own firm opinion without creating a supportive space for Lindiwe to re-engage. This comes across as dismissive of Lindiwe's original post, showing little support or affirmation of diverse perspectives.

It is evident that Melissa establishes "agency" (Devis-Rosenthal and Clark, 2020, p. 8) and asserts her identity in her response to Lindiwe. Melissa also shows that she might be open to engage in critical dialogue with Lindiwe (Mendelowitz et al., 2022), where she is able to challenge her groupmate and resist the tendency seen in many other threads to simply become echo chambers (Cinelli et al., 2021). Melissa is one of the most dominant students in her group and her approach and agency is mimicked by other students in the group who draw on Melissa's direct questioning style and authoritative tone when they join the conversation.

It is important to note that "dialogue is shaped by how the speaker imagines the addressee" (Mendelowitz et al., 2022, p. 24) and a speaker's persona on online forums is partly shaped by their linguistic choices and tone which can establish power relations or reinforce existing unequal relations. Thus, the response might have stifled discussion and limited critical engagement from Lindiwe as her sense of belonging (Devis-Rosenthal and Clark, 2020, p. 7) on the forum might have been compromised, and she might have experienced this thread to be a space where her perspective and voice were not respected. Unspoken in this interaction is the fact that Melissa is white and Lindiwe is Black, and in the context of the history of oppression in South Africa, these racial dynamics still impact online discussions, particularly since students are able to post profile pictures on the LMS or might be "read" in racial ways based on their names, linguistic repertoires or styles of interaction. The fact that Lindiwe responds to many other students, but avoids responding to Melissa even though she is directly addressed by her multiple times in later forum discussions, might show how interpersonal dynamics impact on the nature of interactions in the shared online space. These conflicts arise in many learning environments, and are part of the "messiness" that we discussed when characterising an authentic humanising pedagogy that recognises "diverse histories and lived experiences" (Zinn et al., 2016, p. 73).

While the large number of weekly posts from students meant that the facilitators were unable to pick up on these dynamics at the time they occurred, an effective humanising pedagogy

would not shy away from addressing moments that reflect broader social realities. In the example, Melissa seemingly assumes that Lindiwe shares her own political orientation and reaction to the events described in the article, while in reality Lindiwe might have offered a vastly different perspective if engaged in a more respectful or curious way. The fact that these dynamics emerged in the forum shows the potential for the forum tasks to work within a humanising pedagogy when contextually-relevant topics are used as the basis for dialogue, but it also shows how tone and affect might stifle engagement. An intervention from the facilitator, in line with humanising pedagogy, might have asked the students to reflect on how political affiliation, exposure to different media, or dynamics of race and culture might have impacted on the way they read the story differently.

### ***Engaging with Personal Identity and Affect***

The forums often became a space for students to share their own anxieties, challenges or personal perspectives in indirect ways. Students could share common ground on how the media had been creating fear or panic in their lives during the pandemic. Therefore, they could create a link between their personal and academic lives, making learning a more meaningful experience that incorporated multiple dimensions of their lives (Devis-Rosenthal and Clark, 2020; Veloria & Boyes-Watson, 2014).

In the threads below, students draw on their shared experiences and need for hope to establish a space where they felt able to discuss emotions in relation to the content of the task. As the weeks progressed, students also became more familiar with one another and this would show in the patterns of engagement, as students showed more familiarity with those they responded to. This created a sense of community in the groups analysed. Many of our students are from economically disadvantaged backgrounds, and the history of apartheid in South Africa means that Black people still often suffer systemic oppression. Students' voices were clear in their advocacy roles when this was not necessarily asked for in the questions, demonstrating that students were using the course content to consider their own lives and societies and the social effects of the pandemic they were witnessing in the communities around them. This also links to Fataar's (2016, p. 19) framework of humanising pedagogy, as students were given the space to express their "social-subjective" realities.

One of the richest forum tasks in relation to the way that students could bring of themselves to the online interactive space was the task in Week 5 of the course, where students could select any image from a news story that they wanted to discuss in the forum. While this task was very broad and students were not restricted in terms of their image selection, the vast majority of the images selected by students focused on three main themes. We interpreted this narrow range of themes in students' image selection as telling of how they bring their personal experiences to the forums, as they use the online space to indirectly voice the affective and sociocultural dimensions of their lives. The first theme is police violence, and many images of uniformed police with weapons or enacting violence were included in the forum discussions across the three groups. During the lockdown in South Africa, police violence was prevalent, and South Africa generally has alarmingly high rates of police violence, especially in impoverished communities. The second theme is poverty and how this affects people's everyday lives and their ability to ensure that they can take protective measures against the spread of Covid-19. Students generally expressed a great deal of sympathy for those who were living in impoverished



communities through their discussions of the images they selected. The third theme was the fear and uncertainty around reopening schools during the easing of lockdown restrictions. As the students were all pursuing degrees in Education, their future careers in schools would naturally be significant to them, and they reflected this through news stories that focused on school environments.

In one group, the student Sheldon posts an image depicting police monitoring an impoverished Black community during lockdown. The responses focus on the fact that the only group depicted in the image are Black people, reflecting an awareness of the unequal social impact of lockdowns and disease. One response reads:

**Fortunate:** the image you provided positions me to think and feel sad towards the Black community, as they are the ones included in the image. i thus think the image might have been cropped a bit as some parts might have been cut out from the image, like perhaps there could've been white people cropped so as to make the headline more about Black people being the ones suffering from the Covid 19. [...] if i could ask, is the headline of that image about Black people?

Only Black students responded to Sheldon's image, perhaps signaling a personal awareness of racism and how this is reproduced through media. Fortunate specifically explains that he feels "sad" at viewing the image, and questions whether there might have been ideological reasons for representing the community in the particular way the image does. Students thus clearly intermingle criticality and their understanding of course content, such as the concept of cropping that Fortunate refers to, with their affective dimensions and sociocultural awareness. They indicate a desire for social justice in the way that images are selected to represent particular communities and empathise and identify with those who are oppressed.

An example from the theme of police brutality shows the emotionally charged nature of students' forum responses, even when they spoke in abstract or generalised terms and did not personalise feelings of anger, despair or frustration. The student Kim posted a picture of protesters with a sign reading "I can't breathe" in reference to the police killing of George Floyd in the U.S., and explained:

**Kim:** The picture above positions the reader to feel as if he or she is too taking part within the march for George Floyd, strong feelings such as hate and anger towards the police that stood and watched as a white male sent George to his death. [...]

**Tumisang:** Black people are tired of not being treated equally as white people and this is the time that black lives matters must be taken into consideration. [...]

The dialogue that occurs between Kim and Tumisang illustrate their frustration with police brutality and racism against Black people. This shows a heightened sense of criticality and how the online space became humanised over the period of five weeks as each week the students demonstrate a greater willingness to engage with affect and to reflect on their "life knowledge" (Fataar, 2016, p. 19), as Tumisang relates broader frustrations around racism to this media story about the U.S.

Dialogue was significant in week 5 as the task involved critical analysis of images and language use in the media, while drawing on course content and an extended range of personal and social resources. As Mendelowitz et al., 2023, p. 54) explain, “[d]ialogism extends way beyond a conversation between two or more people. It refers to multiple dynamic interactions with the self, with others and with texts and cultural resources”. The dialogue in week 5 draws on aspects of social presence in terms of putting forth personal views, discussing the news story as a group and drawing on news media and one another as cultural resources when trying to make sense of the stories and images. The online learning environment became a space to express a holistic form of voice that melds the personal and academic dimensions. This promotes epistemic access as students navigate between their personal lives and academic engagement, recognising that their life experiences can also be valued as forms of knowledge in a dialogic learning environment. Deeper forms of engagement become possible by creating the space for this type of critical dialogue, and through our task design that asked students to bring their own texts for discussion, a humanising pedagogy was enabled as students relied on their cultural resources to consider how the course content interacted with their lived realities (Veloria and Boyes-Watson, 2014).

## Discussion

Online pedagogy has become increasingly prevalent in higher education settings, and this mode was effective to ensure the continuation of teaching and learning during the Covid-19 pandemic. We implemented the use of asynchronous forum discussions in our first-year English course to meet the needs of our students and to eliminate feelings of isolated learning in an attempt to humanise the online learning space. In developing an approach for humanising pedagogy that incorporated the community of inquiry model as well as the social justice imperative advocated by South African researchers (Garrison et al., 2000; Fataar, 2016; Zinn et al, 2016; Zembylas, 2018), we implemented an intervention that included three components -: we designed tasks in ways that encouraged critical dialogue through the use of online forums, used content that enabled students to draw on and reflect on their diverse contexts, and enabled students to select texts that were important to them for online discussion. This article explored the dialogic interactions between students on the online forums, and through thematic content analysis, we argue that the humanising elements were able to enrich students’ learning experiences and foster dynamic forms of engagement on the forums as the tasks encouraged students to engage using their authentic voices, incorporating both the personal and academic dimensions and promoting diverse perspectives.

Writing as a form of dialogic interaction enables intertextual histories and cultural resources and repertoires to surface (Mendelowitz et al., 2023). In comparison to contact learning, the weekly forum responses offered students time and space to think deeply, research, reflect and edit their work before posting it online, which resulted in many rich responses and well-developed discussions (Kaur, 2011; Tomic et al., 2020). The permanence and visibility of the written mode and online forums allowed students opportunities to revisit and continue conversations over time. This allowed for broader and more complex dynamics of interaction, such as students asking and responding to tangential questions within particular forums, or students creating long threads of responses that demonstrated an understanding that the audience of their work included not only the person that they were replying to, but potentially also

included the course facilitators and every other student assigned to their forum group. In some lengthy threads, students clearly took into consideration multiple earlier comments from other students as they formed their responses. These layered webs of interactions enabled forms of dialogic engagement that would not have been possible if students were simply completing tasks in isolation, and demonstrate a more organic, humanising online learning environment enabled by asynchronous forums.

The forum discussion groups established an academic learning community amongst students who participated in the course. It resulted in student engagement with content and one another in ways that were predominantly collaborative, affective and supportive, and the discussions we analysed indicate that students were actively working to better understand the topics in the course through these dialogues. The tone and style of responses played a role in how others responded and seemed to be a factor in whether students returned to the discussions. Friendly responses that showed a willingness to listen and learn from others created a positive group dynamic which encouraged dialogic interaction amongst the students, while overly-critical or authoritative responses seemed to discourage future engagement. Methods of ensuring supportive engagement, while not compromising criticality, could be an important topic for further research.

As the weeks progressed and the group members became familiar with one another, students responded more critically to the tasks and used a greater understanding of concepts from the course when responding to one another, which indicated the development of students' academic voices and greater agency. The online forums were student-centred, with limited input from the instructors, which encouraged autonomy where students took it upon themselves to assist one another and rectify misunderstandings by peers. The affordance of safety created by the online mode resulted in a high number of students responding to the tasks, with a much greater range of voices contributing than we experienced during face-to-face classroom interactions.

The weekly online forum tasks indirectly offered scope to draw on students' personal lives and current issues. Many students used the forums as a space to express concern, sympathise and support one another's fears and frustrations about issues that they were experiencing. Students could rely on cultural resources including their own experiences or emotions, and bring their own texts for discussion, which allowed for a greater diversity in the types of "life knowledges" (Fataar, 2016, p. 19) that were engaged. We argue that this is an important aspect of humanising pedagogy which must be considered in diverse and unequal contexts like South Africa, and in analysing our data, we identified instances where these interactions allowed for greater epistemic access and deepened engagement by students recognising that their knowledge, perspectives and resources were valuable (Zinn et al., 2016).

One major limitation of the forums was that students rarely revisited the forums to follow up on responses, and we could not track how many of the responses each student had read. Therefore, we cannot attribute the success of the course solely to the forum tasks or to the intervention we outline in this article. While the purpose of the forums was to alleviate isolated learning and to humanise the online space, including a focus on social justice, a lack of responses

could have been isolating in its own way. Future research could explore the effectiveness of more facilitator engagement, particularly if more resources are available to facilitators.

## Conclusion

Online pedagogy has become increasingly prevalent in higher education settings, and this mode was effective to ensure the continuation of teaching and learning during the Covid-19 pandemic. We implemented the use of asynchronous forum discussions in our first-year English course to meet the needs of our students and to eliminate feelings of isolated learning in an attempt to humanise the online learning space. In developing an approach for humanising pedagogy that incorporated the community of inquiry model as well as the social justice imperative advocated by South African researchers (Garrison et al., 2000; Fataar, 2016; Zinn et al, 2016; Zembylas, 2018), we implemented an intervention that included three components -: we designed tasks in ways that encouraged critical dialogue through the use of online forums, used content that enabled students to draw on and reflect on their diverse contexts, and enabled students to select texts that were important to them for online discussion. This article explored the dialogic interactions between students on the online forums, and through thematic content analysis, we argue that the humanising elements were able to enrich students' learning experiences and foster dynamic forms of engagement on the forums as the tasks encouraged students to engage using their authentic voices, incorporating both the personal and academic dimensions and promoting diverse perspectives.

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Online forum discussions can be an effective way of facilitating a humanising pedagogy, but for this space to be humanising, careful attention must be paid to the design of tasks and the content students are asked to engage with. As more institutions worldwide move to blended learning, a humanising pedagogical approach can enable a supportive learning environment that values academic success, integrates students' existing resources and respects their authentic voices.

## **Declarations**

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

The authors assert that approval was obtained from an ethics review board (IRB) at the University of the Witwatersrand, South Africa.

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