Introduction to the June 2025 Issue of Online Learning

Peter Shea PhD, Editor-in-Chief, OLJ
University at Albany, State University of New York

This issue of *Online Learning* presents a robust collection of fifteen articles that reflect current themes in online education, including leadership perspectives, innovative instructional design, faculty development, and the learning experiences of diverse student populations. The studies span K–12, undergraduate, and graduate settings, offering both national and international perspectives on pressing challenges and solutions in online learning.

Administrative Perspectives

"Academic Leadership Perceptions of Online Program Quality and Course Design" by Amanda Goetzke (Abilene Christian University) and Andrew Lumpe (Relay Graduate School of Education) examines how institutional leaders perceive the quality and design of online programs. Their quantitative study finds that leadership support, quality assurance practices, and faculty development are key to program success.

EADTU Conference Special Issue

"Integrity and Motivation in Remote Assessment" by Henrietta Carbonel, Angelo Belardi, and Jean-Michel Jullien (UniDistance Suisse, Switzerland) and Jen Ross (University of Edinburgh, UK) explores how students and instructors navigated integrity and motivation challenges during the shift to remote assessment. Their qualitative findings highlight the role of ethical assessment design, transparency, and institutional policies in maintaining engagement.

Faculty, Professional Development, and Online Teaching

"Examining Faculty Perceptions of Distance Course Quality Review Feedback" by Kristy Plander, PhD, and Renee Hathaway, PhD (Bryan College of Health Sciences), and Deb Maeder, EdD (Western Governors University) examines how faculty experience and respond to quality review processes. Findings show that constructive, actionable feedback fosters meaningful course improvements and instructor growth.

"It's a Situationship: How Online Contingent Faculty Talk About Their Needed Support" by Yvonne Earnshaw (Kennesaw State University) and Mary Ann Bodine Al-Sharif (University of Alabama at Birmingham) presents a qualitative analysis of the support needs of contingent online faculty. The research underscores the importance of equitable access to resources, recognition, and clear communication.

"An Exploration of Dynamic Decision-Making That Supports the Design of Authentic Learning Experiences in Online Environments" by Jill E. Stefaniak and Fan Yang (University of Georgia) and Meimei Xu (University of Houston) investigates how instructional designers make decisions when creating authentic online learning environments. The study reveals that iterative, flexible, and collaborative approaches are central to effective design.

Instructional Support of Online Student Interactions

"Design of Interactive Spaces for Promoting Parental Involvement: Strategies Used by EFL Teachers" by Dongni Guo, Roberto L. M. Ramos, Yingru Zhao, and Qi Sun (University at Albany) examines how EFL teachers use digital spaces to engage parents. Their findings point to the value of visual tools, interactive platforms, and regular communication in enhancing parental involvement.

"Enhancing Online Mathematics Learning: The Cohesive Work of an Instructional Platform and an Instructional Team" by Sarah Hoffman, Madeyo Darnell, and Patricia Moreira (University of Arizona) used a descriptive-correlational research design to explore this connection in the context of an online asynchronous math course across eight semesters. Results showed improved student participation and performance in their online asynchronous course.

"We're All Squares on a Screen: Interpersonal and Intrapersonal Opportunities and Limitations of Online Intergroup Dialogue" by Grant R. Jackson (Texas Tech University), Sarah M. Schiffecker (Texas Tech University), and Oleksandra Poquet (Technical University of Munich) explores student experiences in online intergroup dialogues. Results highlight gains in reflective thinking alongside challenges in building deep interpersonal connections.

Qualitative Perspectives

"A Qualitative Study of Kindergarten Through Grade 6 Tutors' Experiences Implementing Synchronous, One-On-One Online Tutoring as Literacy Intervention" by Valarie Algee (American College of Education) explores the experiences of tutors delivering online literacy support. Tutors emphasize the importance of building rapport, adapting instructional strategies, and ensuring technological ease.

Students, Community, and Online Learning

In "Using an Online Engagement Framework to Redesign the Learning Environment for Higher Education Students: A Design Experiment Approach" Melissa Fanshawe, Alice Brown, Petrea Redmond (University of Southern Queensland) describe the redesign of two online Initial Teacher Education courses, using the Online Engagement Framework (OEF) for higher education. Results demonstrated that students highly valued the cognitive, behavioural, and emotional elements of their redesigned online courses.

"Offline versus Remote Teaching: Exploring Cultural Minority Student and Teacher Perceptions of Inclusive Learning Environments in Higher Education" by Rinotha Senathirajah, (Avans University of Applied Sciences, Breda, the Netherlands) and Jana Vietze and Marieke Meeuwisse (Erasmus University Rotterdam) investigates how cultural minority students and teachers perceived changes in the inclusiveness of their HE learning environment during the transition from offline to remote teaching. Thematic analysis revealed four teaching principles that contributed to the perceived inclusiveness in both the offline and remote learning environment.

In “New Normal in Higher Education for the Post-COVID-19 World: Reimagining and Re-examining Factors for Student Success in Online Learning” by Hungwei Tseng and Chris Inman (Jacksonville State University), online survey data were collected from 182 undergraduate and graduate students enrolled in at least one fully online course. Findings indicated that a student’s online learning experience was a critical factor in determining the student’s attitudes when facing future online courses that were diverse and required autonomy.

In “Gamifying English Proficiency: A Needs Analysis for EFL Student Course Design” by Yazid Basthomi, Francisca Maria Ivone M. Kharis and Joko Slamet (Universitas Negeri Malang, Indonesia), the study applied a cross-sectional survey methodology to comprehensively gather data on the goals, preferences, and challenges faced by the EFL students across various academic levels. The findings reveal valuable insights into learner motivations, preferred learning methods, and the potential impact of gamification on language acquisition.

“Impact of Laboratory Exercises on the Achievement of Undergraduate Learning Outcomes in Online STEM General Education Courses Among Working Adult and Returning Students by Kristen A. Miller, Shelli N. Carter, and Joseph Marrac (American Public University System) explored identical science classes, with or without an online laboratory to determine gains in content mastery. Results indicated astronomy and physics students in online laboratory courses showed significant gains in mastery of learning outcomes, while biology students in online courses showed more mixed results.

Finally, “Impact of Culturally Relevant Pedagogy on Black Learners Enrolled in Online Undergraduate Mathematics Classes by Alexandra Schindel and Lauren Hennings (University at Buffalo), investigated Culturally Relevant Pedagogy (CRP) as a way to improve the experience of Black learners in mathematics classrooms. Results show that as a result of the use of culturally relevant problems as part of the online course, specifically in weekly discussion boards and written reflection assignments, participants showed improved engagement, confidence, and motivation towards learning mathematics.

We thank the authors, reviewers, and the OLJ editorial team for their contributions to this issue. Together, these articles offer valuable insights into the practice, innovation, and scholarship of online learning today.

Academic Leadership Perceptions of Online Program Quality and Course Design

Amanda Goetzke
Abilene Christian University

Andrew Lumpe
Relay Graduate School of Education

Abstract
The purpose of this study was to examine college and university leaders' background in, perceptions of, and experiences with the administration of high-quality online programs and design of online courses. The population of this study included academic leaders at higher education institutions within the state of Texas from 2- and 4-year undergraduate and graduate, public and private, for-profit and non-profit institutions that had at least one 100% online program. A quantitative research design was used through the distribution of a survey that contained two parts: part one asked questions related to the background demographics of the leader and their respective institution replicated from Fredericksen's 2017 survey of higher education leaders with additional supplemental questions while part two was a replication of two sections of the Online Learning Consortium's Scorecard for the Administration of Online Programs. Data were analyzed through multiple methods including descriptive, correlation, and causal comparative statistics. Findings include describing current academic leaders' and institutions' background demographics and the perception of online program quality held by academic leaders. Recommendations are provided to institutions looking to improve online program quality or hire an administrator for online programs. Online program quality may be improved by institutions establishing a process for the development/redesign of online courses, establishing course development standards, and requiring faculty to collaborate with instructional designers.

Keywords: Online quality, distance education, course design, academic leaders, instructional design, online programs, Online Learning Consortium Scorecard

Goetzke, A. & Lumpe, A. (2025). Academic leadership perceptions of online program quality and course design. *Online Learning, 29* (2), pp. 1–24. https://doi.org/10.24059/olj.v29i2.4410

Distance education demand continues to increase across U.S. higher education institutions (Seaman et al., 2018), with 35% of students enrolling in an online course in the fall of 2018 (National Center for Education Statistics, 2021). In response to this continual growth, academic leaders must be able to overcome the obstacles associated with providing high-quality distance education for students. Challenges that administration face include providing adequate instructor support, applying best practices to course design, reducing technology barriers, and maintaining organizational structures that allow faculty members to offer high quality online courses that meet student needs (Nemetz et al., 2017; Sanford, 2017; Scoppio & Luyt, 2017; Tannehill et al., 2018).

Concern over ensuring high quality online courses in higher education institutions was amplified by the COVID-19 pandemic, further highlighting the need for quality online courses (Means, Neisler & Langer Research Associates, 2020). However, determining a measure for quality is challenging when there is no agreed upon definition for "quality online courses" (Allen & Seaman, 2016; Inside Higher Ed, 2019; Shelton, 2010). Regardless of the differences of opinion over what constitutes a quality online course, research has shown that academic structures (Garett et al., 2020b; Tannehill et al., 2018), quality standards (Baldwin, Ching & Hsu, 2018; Zimmerman et al., 2020), and attention to course design (Bolliger & Martin, 2021; OLC, 2018, Sadaf et al., 2019; Zimmerman et al., 2020) are essential elements of high-quality online courses.

Background

As online higher education enrollment within the United States continues to increase, academic administrators must be aware of factors impacting the quality level of online programs. This study aims to understand the perceptions of academic leaders regarding their online course quality. Understanding how academic leadership perceptions influence course design is important due to the direct impact on course quality and, ultimately, student experience (Bigatel & Edel-Malizia, 2018; Scoppio & Luyt, 2017).

Quality Online Courses

Within higher education, especially among faculty members, negative perceptions about online course quality as inferior to face-to-face instruction have persisted (Allen & Seaman, 2013; Picciano et al., 2010) even though numerous researchers, including Nguyen (2015), have concluded that online learning is equally effective as face-to-face courses. This negative perception has shifted, however, as more faculty gain experience with online courses. For instance, Allen and Seaman (2013) found that 77% of faculty members perceive online delivery of learning objectives as comparable to or better than face-to-face instruction. Despite this positive shift in perceptions of online education, it is critical that academic leaders understand what factors influence quality online courses so that the acceptance of their effectiveness persists.

Conflicting recommendations can be found in the literature on best practices and factors that contribute to the quality of online courses. To further complicate the issue, faculty member and academic leaders within one institution may have different views on course quality (Allen & Seaman, 2016; Inside Higher Ed, 2019). Baldwin, Ching, and Hsu (2018) reviewed six evaluation instruments providing administrators, instructional designers, and course designers with essential standards for quality online courses which included a focus on course design and standards. Similar guidelines were echoed in Lewis's (2021) list of best practices for online course content; however, unique to Lewis are detailed guidelines around course content such as including a syllabus and providing a course overview for students.

Attention to course design is an essential element of high-quality online education since course design impacts both student performance and engagement (Bolliger & Martin, 2021; OLC, 2018; Sadaf et al., 2019; Zimmerman et al., 2020). Understanding student expectations and maintaining course quality through effective online course design is an important consideration for academic leaders as their perceptions have the potential to impact course quality (Tannehill et al., 2018). For example, negative perceptions of online learning increased as courses were forced online during the COVID pandemic (Means, Neisler & Langer Research Associates, 2020). Administrators need to be aware of the concerns and challenges related to course design and how their perceptions may influence the course development process and impact course quality (Tannehill et al., 2018; Ulrich & Karvonen, 2011).

Online Quality Standards

A critical challenge facing online higher education is the quality of online programs, including concerns on how to measure quality programs as there is no standardized model (Allen & Seaman, 2016; Inside Higher Ed, 2019; Shelton, 2010). The necessity of quality standards for online courses was further highlighted by the COVID-19 pandemic (Zimmerman et al., 2020). Multiple researchers have identified the use of institutional standards to guide online development as the most important contributing factor to ensuring quality online programs (Baldwin, Ching, & Friesen, 2018; McGahan et al., 2015; Parscale et al., 2015) and a negative impact to online program success when institutional standards are not used (Baldwin, Ching, & Hsu, 2018).

In 2000, the Institute for Higher Education Policy (IHEP) published "Quality on the Line: Benchmarks for Success in Internet Based Distance Education," which established 24 standards for quality online education. Using the original IHEP standards, Shelton's 2010 Delphi study sought to determine the relevance of the IHEP standards, resulting in the creation of 70 quality indicators and a scoring system known now as the Online Learning Consortium (OLC) Quality Scorecard for the Administration of Online Programs (Littlefield et al., 2019). In addition to the creation of the OLC Scorecard, the Quality Matters Rubric was also established as a result of a study with funding from the U.S. Department of Education as researchers desired scalable quality online programs that were informed by research (Littlefield et al., 2019). These scorecards provide a framework for administrators which assist in budget concerns, process alignment and identification of needs at both the program and institutional level for distance education (Littlefield et al., 2019).

Starting in 2010, OLC released its first scorecard to provide administrators with a mechanism to evaluate the quality of online program administration (Online Learning Consortium, 2021a). According to the Online Learning Consortium (2021b), the scorecard is beneficial in strategic planning for program improvement, benchmarking, developing high quality online courses, and evaluation and demonstration of quality administration. In Fredericksen's (2017) survey of academic leaders, the OLC was the most common institutional membership (77% of institutions surveyed). Ensuring that institutions and academic leaders possess a similar understanding of course quality has the potential to positively impact online programs within higher education.

Administrative Factors Related to Quality Online Programming

To create quality online programs, administrators need knowledge of planning and continual improvement strategies in addition to the knowledge faculty must have on best practices in online teaching (Littlefield et al., 2019). At the administrative level, additional factors must be considered to ensure the quality of a program, including institutional support, technology support, course development and instructional design, teaching and learning, faculty support, student support, and finally, evaluation and assessment (Online Learning Consortium, 2018).

The large increase in online programs due to student demand caused a fundamental shift in academic structures and the administration of programs supporting these courses, resulting in online courses becoming a significant part of university culture and a change agent for how institutions handle policies and responsibilities (Garrett et al., 2020b). How the institution structures their online programs impacts other departments throughout the organization, including academics, enrollment, student services, and information technology (Paolucci & Gambescia, 2007). Pedro and Kumar (2020) conducted a review of literature of 13 online quality frameworks, including the OLC Scorecard, to determine the institutional services necessary to support quality online teaching. They found that institutions need to provide support in technical skills, course design standards, professional development, instructional design, program/course effectiveness, and academic and administrative support for students, including accessibility.

The role of Chief Online Officer (COO), a title used to describe the most senior leader responsible for online education in higher education, has recently expanded its responsibilities (Garrett et al., 2020a). In a national survey of leaders in online higher education, most participants were in positions newly created within the past 5-6 years with 60% of administrators overseeing all types of courses at their institution (Fredericksen, 2017). COOs identified major responsibilities as including faculty training, instructional design, quality assurance, online policies, and course development. Those surveyed stated that their top three goals for the next five years were to improve or maintain quality of online learning, support faculty and professional development for online teaching, and increase student engagement and success. Institution goals for the next five years also had the top goal of increasing quality; the other two highest goals were increasing online course offerings and online enrollment.

Given that leadership positions in online higher education are relatively new for most universities (Garret et al., 2020a), further research is warranted to understand how these academic leaders understand their role relevant to quality course design and delivery. Understanding current academic leaders' perceptions of the instructional design role and their academic goals may provide insight into the perceived knowledge gap in quality course development.

Purpose of the Study

The purpose of this quantitative research study was to examine college and university leaders' background in, perceptions of, and experiences with the administration of high-quality online programs and design of online courses. The following research questions were used for the study:

> RQ1: How do higher education academic leaders perceive the quality of online programs at their institution based on their reported score on the Online Learning Consortium Scorecard for the Administration of Online Programs?
>
> RQ2: What are the background demographics of current higher education academic leaders who administer online programs?
>
> RQ3: What is the correlation between a higher education academic leaders' reported score on the Online Learning Consortium Scorecard for the Administration of Online Programs and demographic variables?
>
> RQ4: Is there a significant difference between an institution's use of course development standards, requirement of instructional designers to collaborate with faculty, and the use of an established process for the development/redesign of new and existing online courses and a higher education academic leaders' reported score on the Online Learning Consortium Scorecard for the Administration of Online Programs?

Methods

Multiple quantitative research designs, including descriptive, correlational, and causal comparative designs were utilized in this study to investigate academic leaders' background in, perceptions of, and experiences with the design and administration of high-quality online courses and programs.

Population and Sample

The study population consisted of academic leaders of online programs serving at two- and four-year undergraduate and graduate level public and private, for-profit and non-profit higher education institutions within the state of Texas that had at least one 100% online degree program. Trade schools such as culinary programs were eliminated from the population. In the Fall of 2021, there were a total of 234 higher education institutions in the state of Texas (National Center for Education Statistics, n.d.). After removing duplicate institutions and institutions that did not have at least one 100% online degree program, as well as removing our own institution, 150 eligible institutions remained.

This study was approved by an Institutional Review Board (IRB) before any study participants were recruited or data collected. IRB ethical guidelines were followed during this research study including the anonymous collection of data and secure storage of de-identified data on a password-protected secure hard drive. Participants were assured of confidentiality as we did not collect any identifying information such as the participant's name, email address, or institution in the survey.

Websites, organization charts, web searchers, and direct inquiry with institutions led us to identify one academic leader as the administrator of online programs for each institution. Job titles of survey participants included variants of online learning, education technology, learning and teaching centers, deans, vice presidents, and directors. Surveys were distributed to the identified academic leaders containing a prequalification question on the survey to prevent ineligible academic leaders from participating. If the first identified academic leader did not participate in the survey, then a second academic leader identified from the institution was asked to participate in the survey. Participants received multiple reminders via email about participating in the survey, which included the benefits of participation.

Materials and Instruments

A quantitative survey was deemed an appropriate instrument for answering the research questions. Qualtrics, a web-based survey tool, was used to administer the survey. This professional survey tool was selected because it was provided by the authors' institution, allowed for complex survey response collection, and provided participant anonymity. The survey consisted of two main sections: the first collected background information from the academic leader and the institution at which they serve, and the second collected academic leaders' perceptions of online program quality at their institution. Fredericksen (2017) surveyed United States higher education leaders in online learning with a 30-question, multiple-choice survey. Questions from his original survey were duplicated with permission and used to design section one of the survey. Additional questions were added to supplement Fredericksen's original survey to learn more about current academic leaders and their institutions. These additional questions ascertained professional certifications, number of training sessions attended, current job title, amount of time dedicated to the administration of online programs, classification of institutions as for-profit or non-profit, and specific enrollment questions related to the number of students participating in online courses and degree programs. As the study focused on perceptions of quality online program administration, we also wanted to understand the current policies and practices at the institution participating in the survey.

The second section of the survey utilized the Online Learning Consortium Scorecard for the Administration of Online programs (Online Learning Consortium, 2018). This scorecard consisted of seven sections: Institutional/Administration Support, Technology Support, Course Development/Instructional Design, Teaching and Learning, Faculty Support, Student Support, and Evaluation and Assessment. Given the goals of this study to examine relationships between online higher education academic leaders' background in, perceptions of, and experiences with the administration of high-quality online programs and design of online courses, two sections of the scorecard (Institutional/Administrative Support and Course Development/Instructional Design) were included. These two sections focused on how administrative leaders perceive the quality of their online programs. These sections from the OLC Quality Scorecard Suite for the Administration of Online Programs were replicated exactly with permission from the OLC and utilized the same scoring method as prescribed by the OLC.

Reliability and Validity

Face validity was used for section one of the survey that included demographic questions (Teo, 2013). The second section of the survey consisted of two subsections from the OLC Quality Scorecard for the administration of online programs. In 2000, the Institute for Higher Education Policy was commissioned by National Education Association and Blackboard, Inc. to identify quality indicators in online higher education (Shelton, 2010). The results of Shelton's research provided a scorecard with 70 quality indicators adopted by the OLC which became the quality scorecard for the administration of online programs. Validity of the quality indicators that make up the scorecard was achieved through Delphi methodology resulting in evidence for content validity.

Reliability for the OLC scorecard can be ensured by either intra-rater reliability or inter-rater reliability. The OLC provides a handbook to guide individuals completing the scorecard (Online Learning Consortium, 2018). This handbook, written by the original participants of the Delphi study by Shelton (2010), ensures intra-rater reliability by training an individual reviewer on correct use of the OLC scorecard to assess online programs for quality. For inter-rater reliability, the OLC scorecard uses training through the handbook to ensure multiple reviewers accurately assess online programs for quality. Institutions can submit their scorecard for an official review by the OLC which will review the grading of the scorecard to ensure consistency across the evaluations (Online Learning Consortium, 2021b). While the OLC uses training, handbooks, and official reviewers to ensure inter-rater reliability, the method for scoring the rubric in this study was self-reporting by academic leaders. Since inter-rater reliability is not feasible for this study, internal consistency analysis was used to ensure reliability in the survey results. Using Cronbach's coefficient alpha for internal consistency determined to what degree items of the survey are correlated among each other (Teo, 2013).

The survey instrument designed for this study combined Fredericksen's 2017 survey (section one) and the OLC's quality scorecard for the administration of online programs (section two); both were shown to be valid and reliable instruments.

Data Collection and Analysis Procedures

Survey results were anonymous and securely captured through Qualtrics, a survey and data analysis tool. SPSS was used to conduct the statistical analyses of the data. Various types of quantitative research design techniques and statistical analysis were used to answer the research questions, including descriptive, correlational, and comparative statistical analysis. Research Questions 1 and 2 were analyzed using descriptive statistics, specifically mean, mode, frequency counts, and data normality check. Correlation research design was utilized for Research Question 3. Research Question 4 was a comparative research design where statistical analysis was used to determine any significant difference among variables.

After the data were collected, the mean, standard deviation, and normality check were conducted before a one-way analysis of variance (ANOVA) and an independent t-test were applied. For the ANOVA tests, if a significant omnibus difference was found, a Tukey post hoc test was conducted to indicate where the differences occurred among the groups (Laerd Statistics, 2018).

Results

Forty-one academic leaders completed the survey. The overall survey response rate was 27.3%. In the sections below, we include the findings for each research question.

Research Question 1

RQ1: How do higher education academic leaders perceive the quality of online programs at their institution based on their reported score on the Online Learning Consortium Scorecard for the Administration of Online Programs?

Survey respondents completed two sections from the Online Learning Consortium Scorecard for the Administration of Online Programs. Section one investigated Institutional/Administration Support scored on a scale of 0-3 in which 0 = deficient, 1 = developing, 2 = accomplished, and 3 = exemplary. The total number of points for this section was 24 points. Section two consisted of two different subsections related to course development, the first being Course Development: Institution or Program Level (33 points) and the second being Course Development: Course Level (21 points). The same 0-3 scale was used for scoring each of these subsections.

Among the three scorecard subsections, Course Development: Course Level had the highest mean score (2.39 ± .47) followed by Course Development: Institution or Program Level mean score (2.08 ± .57), with Institutional/Administration Support having the lowest mean score (1.92 ± .60).

The researchers of this study created a metric referred to as the Online Learning Consortium (OLC) scorecard total quality score calculated by averaging the results of all questions across the three scorecard subsections yielding a total quality score. The subsections included Course Development: Course Level, Course Development: Institution or Program Level and Institutional/Administration Support. The perceived OLC total quality score evaluated by academic leaders was a mean score of 2.11 ± .51.

Research Question 2

RQ2: What are the background demographics of current higher education academic leaders who administer online programs?

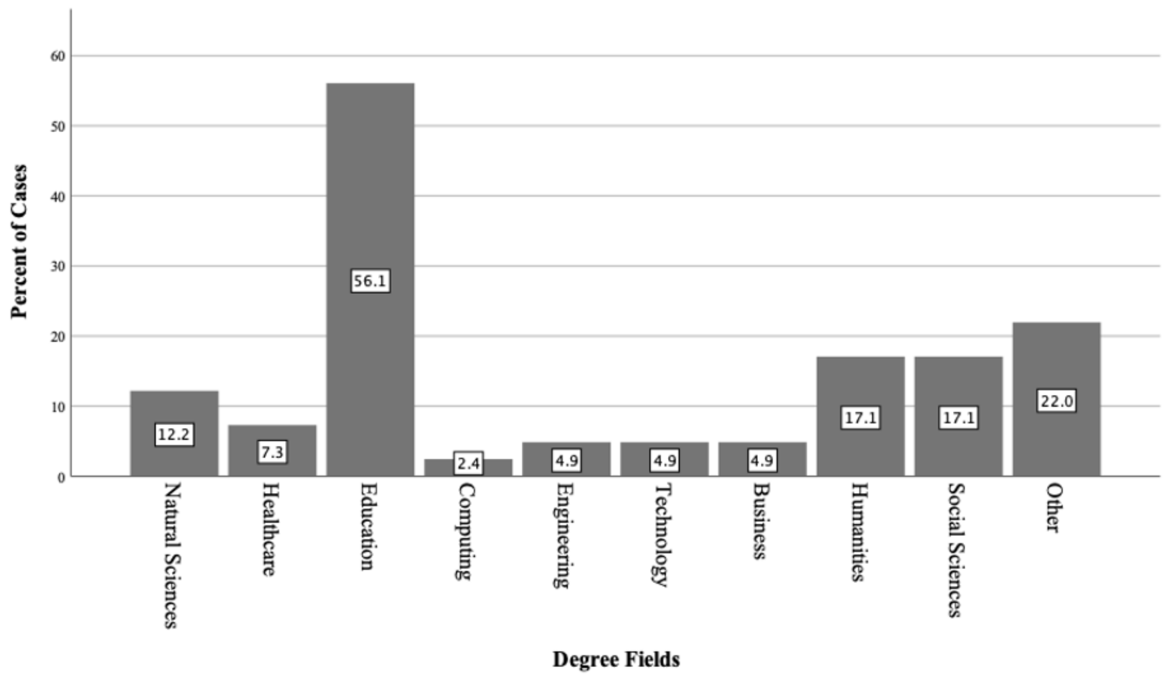
Academic Leader Demographics and Backgrounds

Survey participants had similar representation from female and male subjects with most respondents being female (58.5%). Participant ages ranged from 35 to 78 years with an average age of 55 years. Most participants (80.5%) had completed a Doctorate degree and 19.5% had completed a Master’s degree.

Participants were asked to identify their degree field and all applicable fields. As revealed in Figure 1, most participants (56.1%) had earned at least one degree in education. Participants who selected “other” (22%) included response categories of leadership, library science, educational technology, industrial technology, nursing, religion, and instructional design.

Figure 1

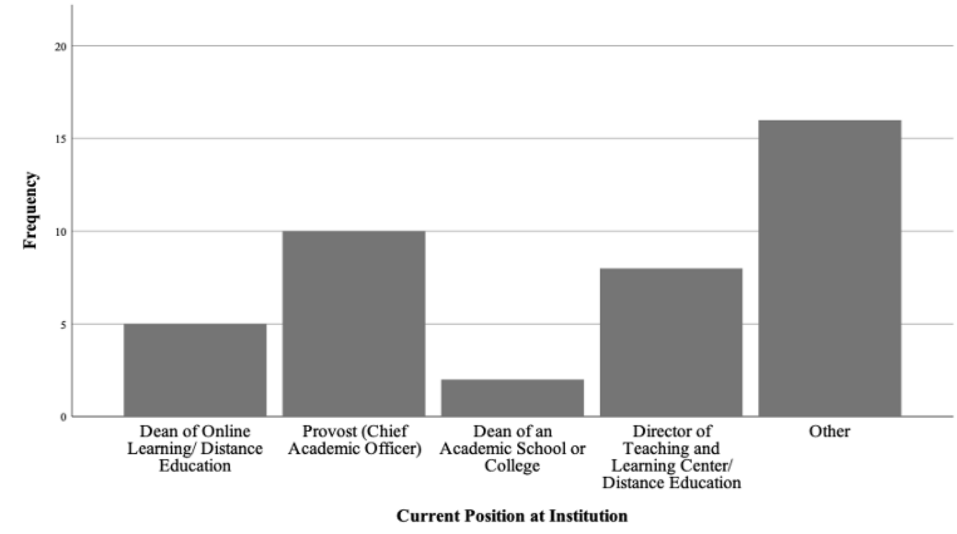
Degree Fields Earned by Participant



Participants were asked to indicate their current position at their institution (Figure 2). The largest category, which was selected by 16 participants, was “other.” Within this category, 50% of participants identified their role as Vice Provost/President or Associate/Assistant Provost/President. The next largest group in the “other” category (37.5%) consisted of various types of Deans, including executive and associate level deans.

Figure 2

What Is Your Current Position at Your Institution?



Participants were asked to provide the number of years in their current position and responses demonstrated that 61% of participants had been in their roles for five years or less. Participants were asked to list how many years of experience they had in the following areas: total teaching (including in-person, hybrid, and online), online teaching, and online curriculum development/instructional design. Participants had an average of 20 years of total teaching experience, 12 years teaching online, and 14 years of online curriculum development/instructional design.

Participants were asked to indicate which of the professional certifications/trainings related to online learning they had received and to check all that applied. Most participants (51.2%) did not possess any of the certifications or trainings listed (see Table 1). The next largest group (22%) had earned a Quality Matters (QM) Peer Reviewer certification. The "other" category encompassed a wide variety of responses, including institution-specific training, University Professional and Continuing Education Association (UPCEA), library training, coursework related to adult learning, self-taught, workshops, Texas Digital Learning Association (TxDLA) accessibility certification, and applying the Quality Matters (QM) rubric.

Table 1

Professional Certifications/Trainings Related to Online Learning

Professional Certification/Training	Percent of Cases
I do not have any of these certifications and/or trainings	51.2
Quality Matters (QM) Peer Reviewer	22.0
Other	19.5
Blackboard Academy	14.6
Online Learning Consortium (OLC) Online Teaching Certificate Program	12.2
OLC Institute for Emerging Leadership in Online Learning	12.2

Moodle Educator Certification Program	9.8
QM Review Course for Program Reviews	9.8
Association of College and University Educators (ACUE) Certification Program for Effective Teaching Practices	7.3
OLC Advanced Online Teaching Certificate Program	7.3
QM Online Facilitator Certification	7.3
EDUCAUSE Institute	4.9
Canvas Certified Educator	2.4
D2L Brightspace Teaching and Learning Certificate Program	2.4
OLC Master Series	2.4
QM Higher Ed QM Coordinator Training	2.4
QM Master Reviewer Certification	2.4
QM Course Review Manager Certification	2.4
Society for Information Technology and Teacher Education TETC PD Courses	2.4
Canvas mastery Connect Leadership Series	0.0
EDUCAUSE LX (Learning Experience Pathways)	0.0
International Society for Technology in Education (ISTE) Certification for Educators	0.0
Society for Information Technology and Teacher Education TETCs 1-3: Planning to Teach with Technology	0.0
Society for Information Technology and Teacher Education TETCs 4-7: Applying Knowledge for Technology to Teacher Education 01	0.0
Society for Information Technology and Teacher Education TETCs 8-11: Foundations of Technology in Teacher Education 01	0.0
Society for Information Technology and Teacher Education TETCs 12: Resolving Technology Issues 01	0.0

Institution Demographics

Most of the institutions surveyed (53.7%) belong to the Doctoral University (R1, R2, or R3) Carnegie classification system. Master's institutions represented 12.2% of the institutions and 31.7% were baccalaureate colleges. It was found that 68.3% of participants surveyed worked at public institutions and 31.7% at private institutions. Participants selected whether their institution was non-profit or for-profit, resulting in the majority (90.2%) of institutions surveyed being non-profit.

Each participant was asked three enrollment questions about their institution, including the number of students currently enrolled, the number of students registered in at least one online course, and the number of students participating in an online degree program. The average institution size surveyed was 15,804 students with a range between 135 and 110,000 students. The number of online students averaged 9,367 with a range between 17 and 60,000 students. The average number of students participating in an online degree program (3,761 students) was less than the number of students in an online course. Some institutions reported having online students, but no students enrolled in an online degree program.

Academic leaders were asked to identify all organizations/associations listed in Table 2 to which they or their institution belonged. The organization with the highest membership rate was the Online Learning Consortium (OLC) at 61.1% followed by Quality Matters (QM) at 55.6%, and Educause (ELI) at 38.9%.

Table 2

Membership of Organizations/Associations

Organization/Association	Percentage of Cases
Online Learning Consortium (OLC)	61.1
Quality Matters	55.6
Educause (ELI)	38.9
United States Distance Learning Association (USDLA)	36.1
Other	36.1
Association for the Advancement of Computing in Education	8.3
International Society for Technology in Education (ISTE)	5.6
Society for Information Technology and Teacher Education	2.8

Academic Leaders Roles and Responsibilities

Participants were asked to identify groups/departments for which they had direct responsibility related to online education, checking all that apply. The three groups most commonly under the direct responsibility of online program administrators included faculty development and training (85%), online learning policy development (77.5%), and course design (70%).

Table 3

Groups/Departments Under Direct Responsibility in Relation to Online Education

Groups/Departments	Percentage of Cases
Faculty Development and Training	85.0
Online Learning Policy Development	77.5
Course Design and/or Multimedia Development	70.0
Instructional Design	65.0
Learning Management Systems (LMS)	60.0
Academic/Educational Technology	52.5
Center for Teaching and Learning	40.0
Library Support for Faculty	37.5
Faculty IT Support	32.5
Other Department	20.0

Administration Policies and Procedures

This section of the survey had questions related to the policies and procedures for online program administration. When asked whether their institution had a clearly defined process for the development/redesign of new and existing online courses, 61% of academic leaders indicated that their institutions do have a process while an additional 31.7% are working to establish a process. Institutions lacking a process represented a minority (7.3%). Academic leaders were also asked whether their institution established course development standards for the development/redesign of online courses. The majority (73.2%) of institutions do have standards and 22% are currently working towards establishing a process. Only 4.9% of institutions lack course development standards. Participants were asked whether their institution requires faculty to collaborate with instructional designers in the development/redesign of online courses. It was found that 56.1% of institutions required collaboration with instructional designers and 43.9% did not require collaboration.

Research Question 3

> RQ3: What is the correlation between a higher education academic leaders' reported score on the Online Learning Consortium Scorecard for the Administration of Online Programs and demographic variables?

The goal of this research question was to determine whether relationships exist among any of the demographic variables collected from academic leaders or their institution and the reported scores on the Online Learning Scorecard for the Administration of Online programs.

Listed below (Table 4), each subsection scorecard was compared against academic leader and institution demographic variables. The Institutional/Administration Support Scorecard was positively correlated with the academic leaders' age, number of years of online teaching experience held by the academic leaders, and the numbers of professional organizations/ associations to which academic leaders or institutions belong. The Course Development: Institution or Program Level Scorecard subsection was positively correlated with the academic leaders' age, number of years of online teaching experience held by the academic leaders, and the number of years of online curriculum development/instructional design experience held by the academic leaders. Finally, the Course Development: Course Level Scorecard subsection is positively associated with academic leaders' age, number of years of total teaching experience held by the academic leaders, number of years of online teaching experience held by the academic leaders, and the number of years of curriculum development/instructional experience held by the academic leaders. Additionally, each OLC scorecard subsection was positively correlated with each other.

Table 4

Correlation Between Scorecard and Demographic Variables

Description	Institutional/ Administration Support Scorecard	Course Development: Institution or Program Level	Course Development: Course Level
Age	.597**	.377*	.345*
Years in Current Position	.239	.190	.211
Total Teaching Experience	.268	.247	.323*
Online Teaching	.346*	.393*	.501**
Online Curriculum Development	.292	.332*	.481**
Carnegie Classification	-.217	-.307	-.212
Total Student Enrollment	.225	.233	.055

Online Course Enrollment	.156	.149	.010
Online Degree Enrollment	.088	.137	.008
Number of Certifications by Participant	-.051	.181	.244
Number of Organizations by Part. and/or Inst.	.368*	.320	.262
Institutional/Administration Support Scorecard	-	.737**	.691**
Course Development: Institution or Program Level		-	.821**
Course Development: Course Level			-

Note: *correlation is significant at the 0.05 level (2-tailed). **correlation is significant at the 0.01 level (2-tailed).

Research Question 4

RQ4: Is there a significant difference between an institution's use of course development standards, requirement of instructional designers to collaborate with faculty, and the use of an established process for the development/redesign of new and existing online courses and a higher education academic leaders' reported score on the Online Learning Consortium Scorecard for the Administration of Online Programs?

The goal of this research question was to examine differences in the OLC scorecard total quality score (average of all questions across the three subsection scorecards) evaluated by academic leaders, and an institution's use of course development standards, requirement of instructional designers to collaborate with faculty, and the use of an established process for the development/redesign of new and existing online courses. The data were checked for normality and the statistical tests being used were robust, so ANOVA tests and an independent t-test were conducted to answer this research question (Laerd Statistics, 2018). Additionally, a Bonferroni correction was applied to the statistical analysis because three multiple comparisons were conducted using the same subjects and the dependent variable to avoid a type I error (Sauder & DeMars, 2020). An ANOVA test was used for two of the variables (institution's use of course development standards and use of an established process for the development/redesign of new and existing online courses) that required comparison. An independent t-test was used for the requirement of instructional designers to collaborate with faculty variable because the comparison occurred between only two groups.

The first survey question related to policies and processes of online program administration asked survey participants whether their institution had a clearly defined process for the development/redesign of new and existing online courses. Participants could choose one of three options: yes, no, or working towards establishing a process. To compare the OLC scorecard total quality score against the use of institutional processes for online course development, an ANOVA test was conducted.

Institutions with a defined process for the development/redesign of online courses displayed the highest OLC scorecard total quality score mean (2.37) followed by institutions that did not have a process (1.96) while institutions working towards establishing a process having the lowest average OLC scorecard total quality score mean (1.65). A significant mean difference in institutional process for course development and OLC scorecard total quality score was found ($F(2, 38) = 14.657$, $p = <.001$). A Tukey post hoc test was conducted to determine how the institutional process for course development compared to one another. There was a significant difference in the mean OLC scorecard total quality score of the institutions working on a process for development and the mean OLC scorecard total quality score at institutions that do have an established process for development (p = <.001). There was no significant mean difference between institutions that do have a process and those do not have a process (p = .213 and the schools that do not have a process and those that are working towards one (p = .443).

The second survey question, related to policies and processes of online program administration, asked participants whether their institution established course development standards for the development/redesign of online courses. Participants could choose one of three options: yes, no, or working towards establishing standards. To compare the OLC scorecard total quality score against the use of course development standards, an ANOVA test was conducted. Institutions with course development standards had the highest OLC scorecard total quality mean score (2.27) followed by institutions that do not have standards (1.96) while institutions working towards establishing standards having the lowest average OLC scorecard total quality mean score (1.64). A significant mean difference was found in the ANOVA test ($F(2, 38) = 7.110$, p =.002). A Tukey post hoc test was conducted, revealing a significant difference between the mean OLC scorecard total quality score of the institutions working towards establishing course development standards and the mean OLC scorecard total quality score at institutions that do have an established course development standards (p = .002). There was not a significant mean difference between institutions that do have course development standards and those that do not (p = .617) and the institutions that do not course development standards and those that are working towards establishing standards (p = .621).

The final process and policy survey question, related to online program administration, asked academic leaders whether their institution required faculty to collaborate with instructional designers in the development and redesign of online courses. To determine whether there was a difference between collaboration with instructional design and the OLC scorecard total quality score, an independent t-test was conducted. The average total quality score for institutions that require instructional design collaboration was 2.28 while for the average total quality score for intuitions that do not require instructional design collaboration was 1.90. A significant difference in the means for requiring an instructional designer to collaborate with faculty in the development/redesign of online courses with the OLC total quality score and not requiring an instructional designer was found ($t(39) = 2.581$, $p = 0.014$).

Discussion

Summary of Results

In this study we sought to examine college and university leaders' backgrounds in, perceptions of, and experiences with the administration of high-quality online programs and design of online courses. The study was designed to understand how academic leaders perceive quality and what factors may impact their perceptions in the administration of online programs. The quantitative survey consisted of two main sections: the first collected background information from the academic leader and their institution, and the second collected academic leaders' perceptions of online program quality at their institutions.

Research Question 1 sought to garner academic leaders' perceptions about the quality of online programs at their institution to gain an understanding of how online programs are being perceived by those administering them. Academic leaders assessed the quality of their institution's online program(s) using two sections from the Online Learning Consortium Scorecard for the Administration of Online Programs, Institutional/Administration Support and Course Development/Instructional Design. The Course Development/Instructional Design section of the scorecard contains two subsections, a) Course Development: Institution or Program Level and b) Course Development: Course Level. This resulted in three scorecard subsections being evaluated by academic leaders. Survey respondents completed their assessment using the prescribed OLC scorecard grading scale in which 0 = deficient, 1 = developing, 2 = accomplished, and 3 = exemplary.

In comparing the three scorecard subsections assessed by academic leaders, the Course Development: Course Level scorecard had the highest mean score followed by Course Development: Institution or Program Level, and finally Institutional/Administration Support. When placing the mean scores on the OLC scorecard grading scale, the Course Development: Course Level quality was scored as accomplished approaching exemplary. The Course Development: Institution or Program Level quality score was accomplished, and the Institutional/Administration Support quality score was developing, almost accomplished.

In addition to looking at each scorecard subsection's average score, all questions across the three scorecards were combined to create what this study refers to as the Online Learning Consortium (OLC) scorecard total quality score. The mean total quality score of institutions surveyed placed the quality score for the administration of online programs at "accomplished," indicating that this is how current academic leaders in the state of Texas perceive the quality of their institutions' online programs.

For Research Question 2, we collected background demographics of academic leaders' administering online programs to provide context into who is leading online programs and to describe their institutional makeup. The synthesis of the participants is as follows: academic leaders on average were 55 years old, ranging from 35 to 78 years in age and 61% had held their role 5 years or less. The majority (81%) had a doctoral degree and 56% held a degree in education while 51% of academic leaders did not have any professional certifications/trainings related to online learning. Participants had an average of 20 years of total teaching experience, 12 years online teaching, and 14 years of online curriculum development/instructional design. Leaders held a variety of job titles, including Provost, Vice Provost/ President, Dean (at various levels), and Director of Teaching and Learning Centers/ Distance Education. Half of the participants spent 10 hours or less per week dedicated to online program administration and when ranked, teaching/learning was the highest priority of academic leaders related to online learning.

The institutions of these academic leaders were mostly non-profit (90%) and 68% were public with about half (54%) designated as Doctoral institutions by Carnegie classification. Of institutions surveyed, the average number of students participating in one online course was 9,367 students with a range of 17 to 60,000 students. Organizations that most institutions and/or academic leaders belong to include the Online Learning Consortium (61%) and Quality Matters (QM), (56%). Most institutions (73%) have established course development standards for the development/redesign of online courses, with about half (56%) requiring faculty to collaborate with instructional designers in the development/redesign of online courses. Finally, 61% of institutions have a clearly defined process for the development/redesign of new and existing online courses.

Research Question 3 sought to understand relationships between an institution's quality score on the three scorecard subsections from the OLC Scorecard for the Administration of Online Program and demographic variables. A positive correlation between academic leaders' age and years of online teaching experience with each of the three scorecard subsections was found. Total teaching experience was only positively correlated to the Course Development: Course Level scorecard subsection. Online curriculum development experience was positively correlated with both Course Development scorecard subsections and was significant for the Course Level scorecard subsection. Age was significantly correlated with the Institutional/ Administration Scorecard further emphasizing the need for seasoned professionals in high level leadership roles dedicated to online programs. The number of organizations that an institution and/or academic leader belonged to positively correlated with the Institutional/ Administration Support scorecard. All three of the OLC scorecard subsections positively correlated with each other indicating a relationship between improving the quality score of one scorecard with improving the quality scores of the other scorecards.

Research Question 4 aimed at understanding whether an institution's OLC total quality score from the OLC Scorecard for the Administration of Online Program would be impacted based on whether the institution had established standards for course development, required instructional designers to collaborate with faculty, and included a process for the development/redesign of new and existing online courses. When reviewing all three variables, there was a significant difference in the OLC total quality score. A significant difference in the OLC total quality score occurred between institutions who had course development standards and institutions who were working on establishing course development standards. A significant difference in the OLC total quality score also occurred between institutions who had a course development process and institutions who were working on establishing a course development process. Finally, a significant difference in the OLC total quality score occurred between institutions that require faculty to collaborate with instructional designers and institutions that do not require collaboration.

Implications for Practice

This study demonstrates several implications for online program quality within higher education. Online education is critical to current higher education institutions because of the financial sustainability it provides as traditional enrollment decreases while distance education increases (Allen et al., 2016; Brown, 2018; Garrett, et al., 2020a). Academic leaders should distinguish themselves in this saturated market (Brown, 2018); one way to do so is through high quality online programs.

In this study, academic leaders assessed the total quality score of online programs to be "accomplished" when following the OLC scorecard scoring scale. Across institutions, academic leaders perceive that their institutions consistently achieve a high level of quality in the Course Development: Course Level scorecard subsection. One area for institutional improvement would be to focus on the quality indicators in the Institutional/Administration Support scorecard subsection and on quality indicators that address governance related to online learning, process for online education continuous improvement, strategic planning for resource allocation, sufficient resource allocation, and continuous improvement to the strategic plan for online programs. Leaders should reflect on how distance learning is being supported because the structure of online programs within an institution impacts other departments throughout the organization (Paolucci & Gambescia, 2007).

Academic leaders can compare themselves to the demographic information synthesized from this study to identify areas for professional development and continual growth such as participation in professional certifications or trainings. We also found a positive correlation between academic leaders' age and years of online teaching experience with each of the three scorecards. Based on the results of this study, higher education institutions looking to improve their online program quality may benefit from hiring a seasoned professional with an increased number of years of online teaching experience with additional experience in online curriculum development/instructional design. Institutions looking to improve their online program quality or fill vacant positions can use these demographic variables to inform their decision making related to academic leaders of online programs.

Implementing best practices in course design can directly impact online program quality. Researchers demonstrated that a lack of any quality standards at an institution negatively impacts an institution's online program success (Baldwin et al., 2018). As shown in this study, there was a significant difference in online program quality between institutions who had established course development standards and a defined process for course development versus institutions who were working towards standards. Institutions working towards establishing processes and course development standards should see an improvement in their online program quality once course development standards and processes are established.

Collaborative partnerships between faculty and instructional designers may alleviate course development and design issues as well as close the knowledge gaps in online course design best practices (Bazluki et al., 2018; Scoppio & Luyt, 2017). But higher education institutions are not providing adequate support to reduce this gap (Sanford, 2017). This lack of support was confirmed in this study through a significant difference in OLC total quality scores between institutions requiring faculty to collaborate with instructional designers and those that did not. Resource allocation for online programs was a concern identified by leaders. To improve online programs, institutions should consider how resources are currently being allocated to online programs, addressed by quality indicator six under Institutional/ Administration Support scorecard subsection. Furthermore, institutions or academic leaders may consider joining the Online Learning Consortium or Quality Matters as the number of organizations an institution/academic leader belonged to did positively correlate with the quality score for Institutional/Administration Support Scorecard.

Recommendations

Recommendations for further research include replicating this study on a national scale rather than within the state of Texas. Expanding this study to include all of the sections from the OLC Quality Scorecard for the Administration of Online Programs rather than those focused on in this study would provide a more comprehensive total quality score for online programs. Future studies could also compare different degree programs within or across institutions to discover variation in quality.

This study could also be modified to collect quality perceptions from multiple individuals rather than one academic leader per institution. It may also be insightful to see how online program quality perceptions vary among academic leaders within the same institutions. This could be done through conducting a qualitative study, allowing the researcher to gain additional insight from multiple perspectives and details regarding specific quality indicators. Beyond the use of instructional designers, course development standards, and establishing a process for course development, further research could look at additional practices and policies in place at institutions that may significantly impact online program quality. This could be done both through additional quantitative as well as qualitative research design studies.

Limitations

There are several limitations of this study. The most impactful limitation was the sample size. While we reached out to every eligible institution within the state of Texas to participate, the survey had a 27.3% response rate, indicating that the sample may not be representative of all academic leaders' perceptions. Furthermore, in this study, only the state of Texas was sampled, and findings cannot be generalized to all academic leaders within online higher education.

Of those who participated in the survey, all data collected were completely anonymous. However, respondents may have been skewed towards scoring the quality of their online programs higher than the actual quality level. The ongoing COVID-19 pandemic, which forced many institutions to rapidly shift to online education, may have influenced how academic leaders and their respective institutions perceive online course quality. It is also important to note that only self-reported perceptions of quality were gathered. No official quality score or review was conducted of an institution's online programs or courses.

While this study was aimed at collecting the perspectives of the highest-level decision makers over online education at each institution, the most appropriate person may not have been the participant of the survey. Additionally, online program administration duties may be housed with more than one individual, and this survey was designed to only capture one individual's perspectives per institution.

Conclusion

In this study we sought to examine college and university leaders' backgrounds in, perceptions of, and experiences with the administration of high-quality online programs and design of online courses. Current academic leaders in the state of Texas perceived the quality of their institution's online program(s) at the "accomplished" quality level. In the three scorecard subsections from the Online Learning Consortium Quality Scorecard for the Administration of Online Programs assessed by academic leaders, the scorecard subsection Course Development: Course Level had the highest mean quality score. Analysis of the quality indicators within the scorecards revealed that institutions may benefit from addressing how resources are currently being allocated to online programs to improve quality.

Demographic information of current academic leaders and their respective institutions within the state of Texas demonstrated that a seasoned professional with substantial online teaching experience might improve an institution's online program quality. Improving the quality score of one scorecard subsection may also improve the quality score of other scorecard subsections in the administration of online programs as these scores are positively correlated. Institutions should be encouraged that implementing course design standards, establishing a process for course development, and having faculty collaborate with instructional designers in online course development does directly impact online program quality.

Online program quality will continue to be a concern of higher education leaders across institutions. The results of this study may be used to help improve online program quality by understanding how academic leaders perceive quality and what factors may impact their perceptions in the administration of online programs. As online education continues to evolve, future research should continue to focus on understanding the factors that directly impact online program quality as distance education will remain critical to higher education institutions and its leaders.

Declarations

The authors declare no conflicts of interest.

Acknowledgement

The authors would like to thank Eric Fredericksen for allowing us to replicate his 2017 survey and the Online Learning Consortium for permitting us to use the Online Learning Consortium Quality Scorecard for the Administration of Online Programs in this study.

Ethics Approval

This study was approved by the Abilene Christian University Institutional Review Board (approval no. 21-186) on December 08, 2021.

References

Allen, I. E., Seaman, J., Babson Survey Research Group, & Quahog Research Group, L. (2016). Online report card: Tracking online education in the United States. *Babson Survey Research Group*. https://files.eric.ed.gov/fulltext/ED572777.pdf

Baldwin, S. J., Ching, Y. H., & Friesen, N. (2018). Online course design and development among college and university instructors: An analysis using grounded theory. *Online Learning*, *22*(2), 157–171. https://files.eric.ed.gov/fulltext/EJ1181407.pdf

Baldwin, S., Ching, Y. H., & Hsu, Y. C. (2018). Online course design in higher education: A review of national and statewide evaluation instruments. *TechTrends: Linking Research & Practice to Improve Learning*, *62*(1), 46–57. https://doi.org/10.1007/s11528-017-0215-z

Bazluki, M., Gyabak, K., & Udermann, B. (2018). Instructor feedback on a formal online course quality assurance review process. *Online Journal of Distance Learning Administration*, *21*(2), 1–9. https://eric.ed.gov/?id=EJ1183063

Bigatel, P. M., & Edel-Malizia, S. (2018). Using the "indicators of engaged learning online" framework to evaluate online course quality. *TechTrends: Linking Research and Practice to Improve Learning*, *62*(1), 58–70. https://doi.org/10.1007/s11528-017-0239-4

Bolliger, D. U., & Martin, F. (2021). Critical design elements in online courses. *Distance Education*, *42*(3), 352–372. https://doi.org/10.1080/01587919.2021.1956301

Brown, V. (2018). Scaling up while maintaining quality in online degree development. *Online Journal of Distance Learning Administration*, *21*(3), 1–9. https://eric.ed.gov/?id=EJ1191465

Fredericksen, E. E. (2017). A national study of online learning leaders in U.S. higher education. *Online Learning*, *21*(2). https://doi.org/10.24059/olj.v21i2.1164

Garrett, R., Legon, R., & Fredericksen, E. E., (2020a). *CHLOE 4: Navigating the mainstream: The changing landscape of online education 2020*. Quality Matters. https://www.qualitymatters.org/qa-resources/resource-center/articles-resources/CHLOE-4-report-2020

Garrett, R., Legon, R., Fredericksen, E. E., & Simunich, B. (2020b). *CHLOE 5: The pivot to remote teaching in Spring 2020 and its impact. Quality Matters*. https://www.qualitymatters.org/qa-resources/resource-center/articles-resources/CHLOE-5-report-2020

Inside Higher Education. (2019). *2019 Survey of faculty attitudes on technology.* https://www.insidehighered.com/system/files/media/IHE_2019_Faculty_Tech_Survey_20191030.pdf

Laerd Statistics. (2018). *One-way ANOVA*. https://statistics.laerd.com/statistical-guides/one-way-anova-statistical-guide.php

Lewis, E. (2021). Best practices for improving the quality of the online course design and learners experience. *Journal of Continuing Higher Education*, *69*(1), 61–70. https://doi.org/10.1080/07377363.2020.1776558

Littlefield, M. B., Rubinstein, K., & Laveist, C. B. (2019). Designing for quality: Distance education rubrics for online MSW programs. *Journal of Teaching in Social Work*, *39*(4/5), 489–504. https://doi.org/10.1080/08841233.2019.1658691

McGahan, S. J., Jackson, C. M., & Premer, K. (2015). Online course quality assurance: Development of a quality checklist. *InSight: A Journal of Scholarly Teaching*, *10*, 126–140. https://files.eric.ed.gov/fulltext/EJ1074062.pdf

Means, B., Neisler, J., & Langer Research Associates. (2020). *Suddenly online: A national survey of undergraduates during the COVID-19 pandemic*. Digital Promise. https://digitalpromise.org/wp-content/uploads/2020/07/ELE_CoBrand_DP_FINAL_3.pdf

National Center for Education Statistics. (2021). *How many students take distance learning courses at the postsecondary level?* https://nces.ed.gov/fastfacts/display.asp?id=80

National Center for Education Statistics. (n.d.). *College navigator.* https://nces.ed.gov/collegenavigator/?s=TX&l=92+93+94&ct=1+2+3&ic=1+2

Nemetz, P. L., Eager, W. M., & Limpaphayom, W. (2017). Comparative effectiveness and student choice for online and face-to-face classwork. *Journal of Education for Business*, *92*(5), 210–219. https://doi.org/10.1080/08832323.2017.1331990

Nguyen, T. (2015). The effectiveness of online learning: Beyond no significant difference and future horizons. *Journal of Online Learning & Teaching*, 11(2), 309–319. https://jolt.merlot.org/Vol11no2/Nguyen_0615.pdf

Online Learning Consortium. (2018). *OLC quality scorecard for the administration of online programs.* https://onlinelearningconsortium.org/consult/olc-quality-scorecard-administration-online-programs/

Online Learning Consortium. (2021a). *OLC quality scorecard suit.* https://onlinelearningconsortium.org/consult/olc-quality-scorecard-history/

Online Learning Consortium. (2021b). *OLC quality scorecard review.* https://onlinelearningconsortium.org/consult/olc-quality-scorecard-review/

Paolucci, R., & Gambescia, S. F. (2007). Current administrative structures used for online program offerings in higher education. *Online Journal of Distance Learning*

Administration, *10*(3). https://eric.ed.gov/?id=EJ1065642

Parscale, S. L., Dumont, J. F., & Plessner, V. R. (2015). The effect of quality management theory on assessing student learning outcomes. *S.A.M. Advanced Management Journal*, *80*(4), 19–30.

Pedro, N. S., & Kumar, S. (2020). Institutional support for online teaching in quality assurance frameworks. *Online Learning*, *24*(3), 50–66. https://doi.org/10.24059/olj.v24i3.2309

Picciano, A. G., Seaman, J., & Allen, I. E. (2010). Educational transformation through online learning: To be or not to be. *Journal of Asynchronous Learning Networks*, *14*(4), 17–35. https://files.eric.ed.gov/fulltext/EJ909909.pdf

Sadaf, A., Martin, F., & Ahlgrim-Delzell, L. (2019). Student perceptions of the impact of quality matters–certified online courses on their learning and engagement. *Online Learning Journal*, *23*(4), 214–233. https://doi.org/10.24059/olj.v23i4.2009

Sanford, D. (2017). Course format and learning: The moderating role of overall academic performance. *International Journal of Management Education*, *15*, 490–500. https://doi.org/10.1016/j.ijme.2017.08.003

Sauder, D., & DeMars, C. (2020). Applying a multiple comparison control to IRT item-fit testing. *Applied Measurement in Education*, *33*(4), 362–377. https://doi.org/10.1080/08957347.2020.1789138

Seaman, J. E., Allen, I. E., & Seaman, J. (2018). Grade increase: Tracking distance education in the United States. In *Babson Survey Research Group*. Babson Survey Research Group. https://files.eric.ed.gov/fulltext/ED580852.pdf

Scoppio, G., & Luyt, I. (2017). Mind the gap: Enabling online faculty and instructional designers in mapping new models for quality online courses. *Education and Information Technologies*, *22*(3), 725–746. https://doi.org/10.1007/s10639-015-9452-y

Shelton, K. (2010). A quality scorecard for the administration of online education programs: A Delphi study. *Journal of Asynchronous Learning Networks*, *14*(4), 36–62. https://doi.org/10.24059/olj.v14i4.163

Teo, T. (2013). *Handbook of quantitative methods for educational research*. Brill Sense.

Tannehill, D. B., Serapiglia, C. P., & Guiler, J. K. (2018). Administrative or faculty control of online course development and teaching: A comparison of three institutions. *Information Systems Education Journal*, *16*(3), 26–34. https://files.eric.ed.gov/fulltext/EJ1179295.pdf

Ulrich, J., & Karvonen, M. (2011). Faculty instructional attitudes, interest, and intention: Predictors of web 2.0 use in online courses. The Internet and Higher Education, 14(4), 207–216. https://doi.org/10.1016/j.iheduc.2011.07.001

Zimmerman, W., Altman, B., Simunich, B., Shattuck, K., & Burch, B. (2020). Evaluating online course quality: A study on implementation of course quality standards. *Online Learning*, *24*(4), 147–163. https://files.eric.ed.gov/fulltext/EJ1277443.pdf

Integrity and Motivation in Remote Assessment

Henrietta Carbonel
UniDistance Suisse, Switzerland
Henrietta.carbonel@unidistance.ch

Angelo Belardi
UniDistance Suisse, Switzerland
Angelo.belardi@unidistance.ch

Jen Ross
University of Edinburgh, UK
Jen.ross@ed.ac.uk

Jean-Michel Jullien
UniDistance Suisse, Switzerland
Jean-michel.jullien@unidistance.ch

Abstract

The shift to distance education during the COVID-19 pandemic highlighted the potential and preference of online learners for remote assessment. Yet, concerns about academic integrity, especially with tools like ChatGPT, prompted a reevaluation of remote evaluation methods. Universities responded by returning to on-campus exams or relying on technological surveillance, with the limits of such approaches from a pedagogical and values perspective. This research offers a third path, re-imagining with the main stakeholders in higher education (teachers, students, institutional leaders, and pedagogical experts) what quality remote assessment could look like in the future. To address this, we took a collaborative speculative design approach. The two-day workshop comprising 34 education stakeholders identified four key characteristics of quality remote assessments: (1) ensuring authorship, (2) designing meaningful assessments, (3) fostering a feeling of autonomy, and (4) reducing stress by fostering a feeling of competence and giving space for failure. We show that the last three characteristics align with the first two psychological needs of Self-Determination Theory (SDT), autonomy and competence. Thus, by designing assessments with such characteristics, teachers will support autonomous motivation and, consequently, engagement, performance, and academic integrity. However, the third need of SDT, relatedness, was largely overlooked and should be considered in further work. The results also highlight the need for structure and a space for failure, which may thwart autonomous motivation. Teachers must carefully balance these seemingly contradictory requirements of remote assessment design. Finally, the collaborative nature of the research led to a change in the practice of some participants.

Keywords: Remote assessment, online assessment, speculative methods, academic integrity, motivation, self-determination theory

Carbonel, H., Belardi, A., Ross, R., Jullien, J-M. (2025) Integrity and motivation in **r**emote **a**ssessment. *Online Learning 29*(2), pp. 25–46. https://doi.org.10.24059/olj.v29i2.4309

The move to entirely distance education during the COVID-19 pandemic highlighted the feasibility and student preference for remote assessment (Cross et al., 2023). However, cheating is a primary concern for teachers, students, and institutions. Are remote assessments measuring the individual student's achievements? Will the value of the diploma be upheld? These worries were heightened by the release of ChatGPT in November 2022, a freely accessible AI chatbot able to answer all questions eloquently, if not always correctly. For online universities, carrying out quality remote assessments is one of the central pedagogical challenges they are currently facing. Three main reactions to these changing conditions in higher education have been a return to on-campus examinations, increased technological surveillance, and re-designing assessment. Given the specific needs of online students and the limits of what can be tested in time-constrained, pen-and-paper exams, on the one hand, and the issue of trust in a heavily proctored environment on the other, we chose to focus on the third option, taking a collaborative and speculative approach. In a two-day workshop, 34 participants (20 women, 14 men) representing the different stakeholders in higher education (teachers, students, institutional leaders, and pedagogical experts) from 10 European and North American institutions collaborated to imagine what quality remote assessments could look like, reacting to speculative scenarios and designing prototypes using speculative design.

Four overarching themes emerged from the workshop. The first theme focused on the issue of authorship and how it can be authenticated at a distance, either through oral exams or by paying attention to the learning process. The three following themes concerned designing meaningful assessments, supporting autonomy, and reducing stress through a feeling of competence while maintaining a space for failure. These findings partially align with the established values of validity and fairness in assessment, although the question of reliability is missing (Forsyth, 2022). However, the novelty is the focus on motivation, with the last three features clearly aligned with the basic psychological needs that support motivation according to self-determination theory (SDT) (Ryan & Deci, 2020). In the workshop, motivation was little explicitly discussed. Traditionally, the external motivators of rewards and punishment were considered sufficient for students to engage in the assessment tasks. However, workshop participants suggested ways of supporting autonomy and competence, which have been shown by SDT to foster autonomous motivation and positively affect student engagement, interest, and performance (Ryan & Deci, 2020), all valued behaviours in relation to assessments. However, participants also highlighted certain factors essential to distance learning, such as structure and space for failure, which may conflict with autonomous motivation.

In the next section, we discuss the question of cheating and current approaches to remote assessment. Then, we describe our collaborative and speculative method. In the third section, we share the results of the workshop. Finally, we discuss how SDT offers a framework for designing assessments and the need to balance it with other online education requirements, such as structure and space for failure.

Before we continue, a clarification of terminology. Online assessment refers to assessments taken using digital tools and technologies via the internet or intranet and may be carried out at a distance or on-campus. Remote assessments are conducted at a distance, without geographical constraints (other than an internet connection). Nowadays, they usually include the use of technologies to share the results, although the actual work may be done on- or offline. Both types may be synchronous or asynchronous.

Current Approaches to Remote Assessments and Academic Integrity

The landscape of academic integrity and assessment methods is evolving rapidly. This section offers a brief overview of academic cheating, its causes, and the three main approaches to solving these issues.

Contract cheating has become so widespread (Newton, 2018) that it has its international day, "International Action Against Contract Cheating," and the UK parliament legislated to ban essay mills (Media Officer, 2022). In the case of remote assessments with open access to Generative AI, the opportunities for cheating have increased (Jantos, 2021). However, research on the evolution of cheating over the last few years remains limited and does not always point to an increase in cheating (Baillifard & Martarelli, 2023). Moreover, a large Australian study showed that cheating was more prevalent in invigilated exams than in take-home assessments (Bretag, et al., 2019). Historically, the perception of what constitutes cheating has been fluid. Practices such as using calculators in exams, once prohibited, have now become permissible (Bulletin Officiel, 2018). Rules may also vary, depending on the level of study (e.g., the use of reference management software such as Zotero). As cognitive testing levels and learning objectives change, so do the conditions of the exams. Thus, the conditions of remote exams are not fixed but need to be adapted to a course's specific context and objectives.

Research on academic integrity focuses on three main areas and remains practical: the measurement of cheating, its causes, and potential solutions. A plethora of factors have been studied, including students' understanding of what constitutes cheating, the presence of an honour code, academic level, stress, gender, age, previous grades, dissatisfaction with the learning environment, the normalisation of cheating, language barriers, institutional approaches to cheaters, field of study, teaching medium, and the expected outcomes of cheating (Gallant, 2022; Newton, 2018). As for solutions to cheating, they include holistic approaches such as training students about ethical conduct and proper use of sources, educating teachers on detecting cheating, as well as introducing legal and institutional strategies.

Faced with the ongoing issue of contract cheating and the new challenge posed by Large Language Models (LLMs), universities and teachers have taken three main approaches: returning to on-campus exams, including pen and paper assessments, introducing online proctoring, and trying new approaches to assessment.

Returning to On-Campus Exams

Following the end of social distancing and lockdowns due to the COVID-19 pandemic, most traditional universities and some online universities (e.g., UNED, Anadolu Open University, or Universidade Aberta) returned to on-campus exams, although often maintaining elements of continuous assessment. After ChatGPT was introduced, some even called for the return to pen-and-paper exams (Cassidy, 2023). However, it seems challenging to offer valid assessments of all learning outcomes in a mode far removed from most learning and working experiences. Moreover, in the very large study by Bretag et al. (2019), students reported engaging in more contract cheating for invigilated exams (particularly in those including

Multiple Choice Questions) than take-home assignments. Thus, the return to tabletop exams is not a cure-all. Moreover, the mission of distance universities is to serve populations that cannot attend traditional universities due to work, family, health, or location constraints. Offering the possibility of completing their studies entirely remotely, including valid assessments, appears essential to student success.

Introducing Technological Surveillance

The second option is a high-tech approach to remote assessment. Educational technologies (Ed Tech) today promise a solution to all our problems, and higher education is no exception. In the face of plagiarism, collusion, or contractual cheating, Ed Tech offers digital solutions, such as plagiarism detectors or online proctoring. While online proctoring companies promise secure exams, research often contradicts their claims (Bergmans et al., 2021). Synthetic text detectors are unreliable; OpenAI retracted its own within six months due to inaccuracy (Kirchner et al., 2023).

Moreover, these technologies create a surveillance culture, forcing students to be monitored "for their own good" and the smooth running of higher education (Ross & Macleod, 2018, p. 238). In addition, these technologies are not neutral and affect the relationship between teacher and student (Lee & Fanguy, 2022). Trust is at the heart of the educational relationship, necessary to dare to ask questions, take risks, or accept feedback. However, the systematic use of fraud detection tools turns the students into a priori suspects, altering this relationship. What is more, in education, the means contribute qualitatively to the character of the results produced (Biesta, 2007; Carr, 1992). Will imposing surveillance on students during their studies mean they will be more accepting of surveillance in society and the workplace? Finally, academic integrity cannot be limited to not being caught; it is a fundamental value of the academic world and beyond and, therefore an essential pedagogical issue (Carless, 2009; Carter & Blanford, 2016; Townley & Parsell, 2004). However, there are deep concerns when considering changing assessments, even when the current format does not meet the learning needs. Trust needs to be built on all sides (Carless, 2009). Moreover, there is no single best solution.

New Approaches to Remote Assessments

We start from the fundamental question of the core purpose of assessments in a rapidly changing world. Information is ubiquitous, technologies can perform tasks at increasingly more sophisticated levels, and the problems to be solved are complex (e.g., the climate crisis). New assessment paradigms aim to engage with these changes to better prepare students for citizenship and work (Bearman et al., 2020). Assessment is a complex or wicked problem with multiple purposes (Forsyth, 2022) and ever-changing contexts. In higher education, quality assessment should promote higher cognitive learning, be sustainable, spaced, authentic, and reflective, offer students agency, encourage critical thinking, and allow the exploration of new avenues while representing knowledge in diverse ways (Bayne et al., 2020; Boud, 2000; Boud & Falchikov, 2007; Carless, 2009; Gough, 2013; Ibarra-Sáiz et al., 2021). Moreover, if the university is, among other purposes, to prepare students for working life, then it must teach them to work under similar conditions, including collaboration and the use of tools (Dawson, 2020). These new assessment forms emphasise preparation for living and acting in a changing, complex world (Morin, 2014, 2015).

Rather than focusing on surveillance, detection, or LLM avoidance, this research seeks to re-imagine what quality remote assessments might look like in a digital world. Using a speculative approach, we open the range of possibles while highlighting the questions that need to be addressed.

Theoretical Framework

SDT offers a valuable framework for discussing our results around the questions of motivation and the basic needs of autonomy, competence, and relatedness. We briefly present the theory first conceptualised by Ryan and Deci (1985, 2020) in the 1970s and backed by substantial empirical research, and will return later to discuss it in relation to our findings.

Motivation was described by Maehr and Meyer (1997, p. 373) as reflected in the actions and affects of a person, as "seen in the *direction*, *intensity*, *persistence* and *quality* of what is done or expressed." However, not all types of motivation lead to the same engagement and outcomes. For our purpose, motivation can be separated into two main types: controlled motivation and autonomous motivation.

According to Deci and Ryan (2008), controlled motivation (including external regulation and introjection) concerns behaviours linked to an external locus of causality, whether through external rewards (e.g., grades) or punishments (e.g., failing a course) or the more internalised rewards of self-esteem or avoidance of anxiety and shame. Autonomous motivation includes intrinsic motivation, when students engage in activities for their own sake (Audrin & Coppin, 2022), driven by genuine interest and enjoyment, but also autonomous external motivation, when students have internalised the locus of causality and recognise the value of an activity or find it congruent with their own values and interests.

> Autonomous extrinsic motivations share with intrinsic motivation the quality of being highly volitional, but differ primarily in that intrinsic motivation is based on *interest and enjoyment* people do these behaviours because they find them engaging or even fun, whereas identified and integrated motivations are based on a sense of *value*—people view the activities as worthwhile, even if not enjoyable. (Ryan & Deci, 2020, p. 3 italics in the original).

Research has shown that autonomous motivation leads to greater interest, engagement in activities, persistence, and enhanced performance (Deci & Ryan, 2008). Externally controlled motivation, in contrast, leads to a greater feeling of pressure and lower levels of interest and performance, especially at higher cognitive levels (Grolnick & Ryan, 1987).

Most importantly for our purpose, SDT affirms that autonomous motivation can be fostered (or thwarted) by the environment. The level of autonomous motivation is strongly related to meeting three basic psychological needs identified as a sense of autonomy, competence, and relatedness (Deci & Ryan, 1985; Ryan & Deci, 2000, 2020). Ryan and Deci describe *autonomy* as a student's sense of initiative and ownership over their learning, as opposed to being controlled through the external pressure of rewards and punishments. *Competence* is the feeling of mastery or of being able to succeed. It is supported by optimal challenges, positive feedback, and growth opportunities. *Relatedness* is linked to the feeling of belonging when teachers and peers are respectful and caring. When these fundamental psychological needs are fulfilled, research has shown that students exhibit greater autonomous motivation and are thus more engaged, interested and persistent, take a deeper approach, carry out more challenging activities, have better academic results, cope better when they fail, and generally enjoy higher levels of well-being (Ryan & Deci, 2000; Ryan & Frederick, 1997).

Motivation is not a stable, personal characteristic of learners but is complex, multifaceted and sensitive to the changing context (Hartnett et al., 2011). Numerous studies in education and across cultures have shown that when we design environments to support these needs, students reach higher levels of autonomous motivation, leading to positive assessment outcomes. However, it is also noteworthy that thwarting these needs (e.g., via performance goals, deadlines, or a controlling environment) is not neutral but reduces motivation, self-esteem, risk taking on the one hand, and increases loneliness, frustration and cheating on the other (Bartholomew et al., 2011; Bartholomew et al., 2011; Deci et al., 1999; Grolnick & Ryan, 1987; Kanat-Maymon et al., 2015).

A Collaborative and Speculative Method to Re-Imagine Remote Assessments

When researching education futures, traditional evidence-based research does not offer the possibility to imagine multiple alternative approaches. In “Why What Works Still Won’t Work: From Evidence-Based Education to Value-Based Education” (2010), Biesta shows that there are knowledge, efficacy, and practice deficits when traditional scientific methods are applied to education. The first two points are particularly relevant when looking at the future. First, the world changes as a result of our interventions, and the objects of research do not remain untouched. Scientific experiments can show what has worked in the past (which is valuable and needed knowledge) but without assurance that it will continue to work in the future. There will always be a knowledge deficit about the effect of an intervention in the future. Moreover, education systems are “open, semiotic and recursive” (Biesta, 2010, p. 500), an action in education does not have a linear, deterministic consequence, but at most probabilistic, always complex, leading to an efficacy deficit. We therefore, took an approach better adapted to the purpose of the research: a collaborative speculative design method often used when studying the future of universities (Mitrović et al., 2021; Ross, 2023; Staley, 2019).

Speculative design methods offer a means of “exploring and creating possible futures under conditions of complexity and uncertainty” (Ross, 2018, p. 197). These are not necessarily futures to strive towards but a diversity of possibilities for thinking about how things could be (Facer, 2016). While traditional design is about breaking down problems and solving them, speculative design feeds on imagination. It aims to open up new perspectives on what are sometimes called wicked problems (McCune et al., 2023) to create spaces for discussion and debate about alternative ways of being. Design speculation can act as a catalyst for collectively redefining our relationship to reality (Dunne & Raby, 2013, p. 2). We move away from the deterministic approaches of ed tech companies and forecasting reports to offer alternatives based on the values and principles of the stakeholders in higher education. Particular attention is given to ensure a diversity of voices and critical discussions around these imagined futures are constitutive of the method. For a more detailed discussion of the epistemology of future education research, see Ross (2023) or Carbonel (2021).

Speculative methods do not claim to offer universally applicable outcomes, they may offer unrealistic, ideal, or dystopian designs. Moreover, the outcomes will depend on the participants and context. However, these visions can "offer new ways at looking at issues, and they can surface issues that may not be otherwise visible" (Ross, 2023, p. 183) and thus inform the decisions of teachers, programme directors, and institutions. Moreover, the process itself affects the participants and their future practices.

The speculative research method follows the four steps outlined in Ross (2023): a speculative question, an object-to-think-with, an audience to engage with, and a means to capture and analyse the design decisions and reactions to the object. An anonymised version of the work documents and collected data is available here: https://miro.com/app/board/uXjVMhQ9F6o=/

A speculative question: What might characterise quality remote assessments in a digital world?

An object to think with: Participants engaged in various ways with the question of remote assessments. On the first day, we worked on defining cheating and academic integrity. Then we used three scenarios to imagine ideal (or dystopian) assessments for the future, considering the points of view of an online student, a teaching team, and an ed tech-rich university. On day 2, participants developed remote assessment prototypes choosing one of three approaches: a traditional instructional alignment approach, a superhero design approach, and a speculative design approach. See the Miro board for a complete presentation of all the activities and prompts.

An audience to engage with: "What and whose knowledges are being used to create these ideas of the future and where are the absences" (2021, p. 19) affect the outcome of the work. Therefore, careful attention was paid to ensure a broad representation of all the stakeholders within higher education. However, this had to be balanced with keeping a group size that allowed for meaningful collaboration. The response to the invitations was unexpectedly positive, given the significant time commitment, leading to 35 confirmed participants and just one cancellation. Thirty-four academic community members (20 women, 14 men) engaged individually and asynchronously and then met on campus for a two-day workshop in spring 2023. The participants included ten higher education teachers, ten pedagogical specialists, six university managers, five distance university students, two university staff members (faculty managers), and one high school teacher. The institutions represented were the universities of Basel, Edinburgh, Lausanne, and Lund, Gymnasium am Münsterplatz (Basel), HES-SO Valais-Wallis, IDIAP, Open University (UK), TELUQ (Canada) and UniDistance Suisse. The fields covered included artificial intelligence, economics, education (including two assessment specialists and a researcher in speculative methods), history, languages, law, philosophy, physics, and psychology. Participants spoke English (the primary language of the workshop), French and German. These were the official positions and affiliations of the participants, although most combined multiple hats. Voices from outside higher education (potential students, civil, political, and economic society members, etc.) were not represented and would probably have brought a different perspective. However, for the purposes of this work, it was necessary to focus on those with more direct and immediate experience of pedagogical assessment issues. Participants took part as researchers in the process and were offered the opportunity of being co-authors of the paper. The work was carried out in line with the Ethics Commission guidelines of UniDistance Suisse.

A means to capture and analyse the design decisions and responses to the object: the discussions and prototypes were recorded and collected on the Miro board. The analysis used Braun and Clarke’s (2012) six-phase approach: becoming familiar with the data, generating initial codes, combining the codes in overarching themes, the coherence and accuracy of the themes relative to the data, a definition of each theme, and the final report. Following an independent analysis, the authors then shared their codes and, after a few iterations, agreed on the four overarching themes. The accuracy relative to the data was rechecked by the authors and through a peer review process with five participants (four teachers and one pedagogical specialist) from the workshop.

Results

The data analysis highlighted four overarching themes concerning the characteristics of quality remote assessments: ensuring authorship, designing meaningful assessments, fostering a feeling of autonomy, and reducing stress by fostering a feeling of competence and giving a space for failure. We describe the solutions and recommendations of the workshop participants for each issue. The findings are summarised in Table 1 below.

Table 1

Highlighted Characteristics of Remote Assessments

Designing assessments to …		Examples of features	Qualifications
ensure authorship		• Oral examinations, possibly as a follow-up to a written assignment • Observe or scaffold the learning process to follow the student's work and ensure authorship	The **process** is important for learning to happen, but should this process be graded?
Foster autonomous motivation	be meaningful	• A topic relevant to the student • Develop knowledge and skills students value • Real audience • Explain the rationale for the assignment	
	foster autonomy	• Offer choice(s): format, topic, approach, tools, or even the learning objectives. • Flexibility: just-in-time assessments; easy to request extensions • Discussion of rules for assessments: rational, but also choice (e.g., use LLMs or not)	Students need to take responsibility for these choices. Attention to the marking scheme so it works for the different options. **Need for structure.**

	reduce stress by fostering a feeling of competence	• Communicate expectations clearly
		• Feedback and feedforward so that students now where they stand and can improve their work. This may include automatic, group, individual and peer-feedback.
		• Scaffolding assignments
		• Technical preparation and support.
			• **A space to fail:**
			  • Continuous assessment rather than high stakes exams
			  • Kindness, generosity, and empathy
			• Not too many assessments to avoid overload and maintain flexibility.

Designing assessments to …		Examples of features	Qualifications
ensure authorship		• Oral examinations, possibly as a follow-up to a written assignment • Observe or scaffold the learning process to follow the student's work and ensure authorship	The **process** is important for learning to happen, but should this process be graded?
Foster autonomous motivation	be meaningful	• A topic relevant to the student • Develop knowledge and skills students value • Real audience • Explain the rationale for the assignment	
	foster autonomy	• Offer choice(s): format, topic, approach, tools, or even the learning objectives. • Flexibility: just-in-time assessments; easy to request extensions • Discussion of rules for assessments: rational, but also choice (e.g., use LLMs or not)	Students need to take responsibility for these choices. Attention to the marking scheme so it works for the different options. **Need for structure.**

	reduce stress by fostering a feeling of competence	• Communicate expectations clearly
		• Feedback and feedforward so that students now where they stand and can improve their work. This may include automatic, group, individual and peer-feedback.
		• Scaffolding assignments
		• Technical preparation and support.
			• **A space to fail:**
			  • Continuous assessment rather than high stakes exams
			  • Kindness, generosity, and empathy
			• Not too many assessments to avoid overload and maintain flexibility.

Ensuring Authorship

A primary concern of all participants was to ensure the validity of assessments in relation to authorship. Does the exam or assignment measure the knowledge and skills of a given student? Two main solutions were offered: oral exams and attention to process.

Oral exams give greater assurance that it is the student themselves that is being evaluated. Several teachers in the workshop had already switched to this format despite the time constraint with large cohorts. Examinations can be exclusively oral or a viva as a follow- up to a written assignment so as to include the development of writing skills and the deepening of understanding linked to writing.

The second suggestion was to pay attention to the process. For learning to happen, students need to engage deeply and persistently with the task. This process is absent when someone or something produces the output for you. Thus, focusing on the process becomes even more important when the output, e.g. an essay, can be generated reasonably well by a Large Language Model (LLM) within seconds. In the assessment prototype P1, for example, the teacher included a reflection by the students on their learning process, expectations, difficulties, and findings. Although LLMs can also produce convincing reflective writing, discussions throughout the research and writing process between teachers and students can help ensure the student is doing the work. Others suggested scaffolding a large assignment by breaking it down into smaller tasks throughout the semester. This helps teachers better know the students' work and ensure authorship. It also encourages regular work throughout the semester, which may be more difficult in online education settings when students have competing demands on their time, and education often comes after family and work obligations. Finally, a participant suggested that students hand in their written work with a full editing history (e.g. using Etherpad or Google Docs).

The question of authorship and academic integrity was hotly debated. What should students be able to do alone? When should tools be allowed or even become part of the learning objectives? The answers depend on the course, the learning objectives, the overall context, and the values and principles of the teacher.

Designing Meaningful Assessments

The essence of creating meaningful remote assessments was a dominant theme across most prototypes and suggestions. The terms meaningful or worthwhile assessment includes several key elements:

Relevance of Topics: Assignments that engage students are grounded in relevant topics. For instance, a task requiring students to research sustainable electricity consumption in Switzerland involves applying class concepts and using creativity in finding solutions.

Skill Development: Assessment tasks can be made meaningful if students see the skills they develop as useful, in particular for their future jobs. A human resource management task involved students analysing a company's HR policy and suggesting practical solutions. In a master's course in psychology, students created online experiments and then collected and analysed the resulting data. Meanwhile, higher education instructors in a digital course were asked to select platforms, share them via QR codes, and address privacy issues—a set of tasks of immediate applicability in their roles as teachers.

Engaging Real Audiences: Genuine engagement increases the authenticity of a task. Suggestions included discussing a topic with family members, addressing real-world stakeholders, or sharing insights with peers.

Explaining the Rationale: In all cases, explaining the rationale of an assignment emerged as central. This is especially true for tasks with little intrinsic interest, such as content that requires memorisation. For instance, one teacher shared with their first-year students the feedback from the third-year students on the relevance of memorising the basic facts of psychology early on.

The arrival of AI in academic and professional realms is reshaping the landscape of what needs to be taught and learned. While some argued for more content learning due to the ever-increasing amount of knowledge available, others focused on lifelong learning or critical analysis. There is ongoing uncertainty about what might be delegated to AI versus what students should personally master. Moreover, it raised the question of whether higher education should assess foundational knowledge (as per Bloom's taxonomy) or focus on advanced skills like analysis and creation. There is no one-size-fits-all answer. Therefore, educators must articulate their rationale transparently to gain student buy-in and inspire genuine engagement.

In summary, designing meaningful assessments means aligning them with worthwhile topics and competencies, engaging real audiences, and explaining their relevance. Even when a task lacks intrinsic appeal, a clear explanation of its purpose can foster student engagement. Moreover, with AI redefining the workspace, educators must continuously reassess what is taught and evaluated to maintain relevance.

Fostering a Feeling of Autonomy

The notion of autonomy—encompassing initiative and ownership of one's studies—was a significant focal point, articulated through three interlinked themes: choice, flexibility, and discussions around academic integrity.

Choice in Assessments

Participants underlined the importance of incorporating elements of choice. This could range from the choice of format (be it an essay, video, or platform, for example) to the topic (within the confines of the module), the approach, the tools employed, and even the specific learning objectives of the module. For instance, in prototype P1, students were tasked to select their audience and platform and explain the rationale behind these choices. "Any means of communication is fine: written, filmed, recorded, oral, drawing comics, object + explanation, metaphor, art piece…" In this same group, participants also highlighted that choice had to go with responsibility, and students should be able to justify them.

Flexibility in Learning

Intertwined with choice, flexibility is especially crucial for distance learners, who often juggle multiple responsibilities. A novel proposal was the concept of "just-in-time assessments," allowing students to take exams when they feel prepared. This offers students the autonomy to manage their study schedule based on other commitments. This idea extends to a more adaptable course structure, where modules are not bound by semesters but are instead paced according to students' needs. However, participants rapidly mentioned the potential pitfalls of this approach. Synchronous class sessions risk losing their meaning, academic interactions and support may become challenging when students are at varied stages, and the sense of belonging to a cohort—with the resilience it offers—might disappear.

Autonomy in Relation to the Context of Assessment

An enhanced understanding of, and involvement in, academic rules can foster greater autonomy. Participants suggested that if students not only grasp the rationale behind specific rules but also take part in shaping them, it could engender a sense of ownership. One group defined cheating as "breaking the contract which students and teachers agreed on." This implies that teachers and students have discussed and agreed on the rules. One idea posited that students might choose whether or not to utilise Large Language Models (LLMs) for a given task, contingent on their learning outcomes. They would then declare their choice, and evaluation criteria would be adjusted accordingly.

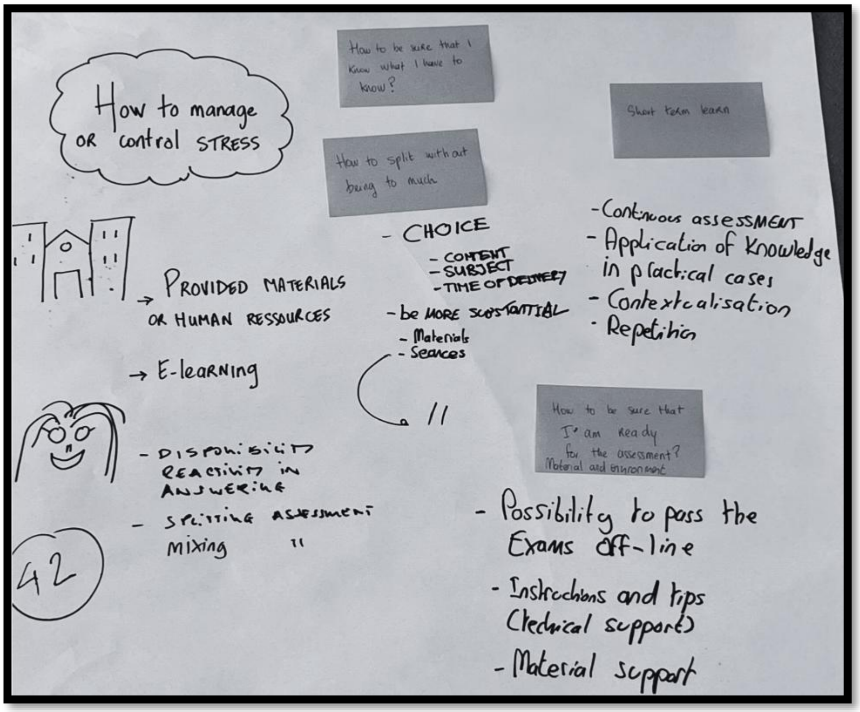
In summary, multiple approaches can be employed to grant students autonomy in assessments. While autonomy is pivotal, students must also show responsibility for their choices and be given ample support.

Reducing Stress by Fostering A Feeling of Competence and Giving a Space for Failure

During the activity on developing assessment prototypes, all five students selected the Superhero design group (they were spread across different groups for all other activities). Their conversation centred on stress during assessment, as depicted in Figure 1. The students clearly associated assessments with heightened stress and focused on ways of mitigating it. They emphasised the importance of thorough academic and technical preparedness, as well as the necessity of allowing room for mistakes. Some teachers had a more nuanced perspective on stress during exams, considering it was sometimes necessary to be able to perform under pressure. Participants noted that this should then be an explicit learning objective, with some questioning the equivalence of stress during exams and in a work environment.

Figure 1

How to Manage or Control Stress



Both students and teachers underscored the role of timely and relevant feedforward and feedback. The superhero design poster prominently featured phrases like “regular feedback.” “super-speed learning platform,” and “formative evaluations.” Through such feedback mechanisms, students can ascertain their current standing, identify areas of strength, recognise what requires further effort, and find paths to improve. Students felt that feedforward could enhance learning and alleviate stress. Participants also emphasized the importance of transparent criteria. In the discussions involving the high-tech university scenario, participants suggested using AI for personalised assessment, which could help students evaluate their progress and access tailored recommendations based on learning analytics—available “24/7.” Peer feedback was recognised as valuable, teaching students to evaluate other student’s work and better evaluate their own in the future. However, experience showed that its effectiveness depends on careful attention to the process and teacher support. The challenge of providing individualised support to large student groups emerged as a significant impediment to quality assessment. Some educators prioritised feedforward during the semester and just a grade for the final exam. Ideally, a teacher’s cohort would comprise 10 to 20 students. However, some suggested AIs could generate personalised feedback in the future.

The group using speculative design methods to develop prototypes also noted the “need to build the approaches to learning and working that are necessary (we don’t assume students are all ready and willing to work in these open-ended ways).” Scaffolding learning activities can help build a feeling of competence. “Splitting” assessments was suggested, although too many assessments could also become an issue. The previously mentioned just-in-time assessments also allow students to take the exams only when they feel ready. Being well-prepared also pertains to technology, especially in remote learning environments. Students voiced the necessity for tech support, clear guidelines, advice, and hardware provisions. One student suggested the possibility of offline examinations.

Despite students seeking a sense of "comfort and security," learning inevitably encompasses elements of "ambivalence, risk-taking, and discomfort." Opinions diverged on addressing failure—some advocated for "no learner left behind," while others believed in limited timeframes for success. Grading approaches varied, including standard or criterion-referenced grading but also norm-referenced strategies. Participants suggested continuous assessment (rather than a single time-limited table examination at the end of a module), multiple low-stakes (or no stakes) assignments or dropping the lowest grade(s). The module's atmosphere was also considered important in supporting risk-taking: "acknowledging how students feel and finding ways to reassure." Fostering competence while accommodating failure is paramount to learning, posing a challenging equilibrium for teachers.

Our results focus on four broad areas of intervention to design quality remote assessments. The first focuses on control, ensuring authorship of the work while supporting learning as teachers pay attention to the process. The three other areas, meaningful assessments, a sense of autonomy, and reducing stress through a feeling of competence, are all closely related to motivation and SDT. These are obviously not the only elements of quality assessment but part of a holistic approach. Moreover, discussions highlighted the importance of balancing these needs with other aspects, such as the need for structure, responsibility, and space for failure. In the following section, we discuss the role of motivation in assessment and the conceptual framework self-determination theory can offer when designing assessments.

Discussion and Conclusion

Traditionally, assessment design focuses on the issues of validity, reliability, and fairness (Forsyth, 2022). These characteristics were mentioned in the workshop and remain relevant. However, participants also highlighted the importance of meaning, autonomy, and competence in assessment design. These can help reinforce validity and fairness. Ensuring reliability may become more challenging, but fruitful approaches could include aiming for an expert agreement through moderation when evaluating non-similar assignments, or rethinking evaluative criteria in relation to trustworthiness, as in Lincoln and Guba's (1985) work on evaluating qualitative research. In the following discussion, we show how meaning, autonomy, and competence relate to SDT and autonomous motivation. We shed light on the lack of attention to the third psychological need, relatedness. We then qualify these needs that must be balanced with structure and space for failure in the case of higher education. Finally, we mention the effect on the actors of the current research.

In the educational sciences literature on assessment, there is little explicit attention on creating assignments that foster motivation. External loci of motivation through rewards (grades or self-esteem) or punishment (failing a course, anxiety or shame) have long been considered the main source of motivation to complete an assignment, based on behaviourism (Skinner, 1965) and social exchange theory (Emerson, 1976). Our results show a shift from focusing on controlled extrinsic motivation to fostering autonomous motivation. The participants' suggestions, such as giving choices, discussing the relevance of a task, and ensuring flexibility, increase the student's feeling of autonomy. In the same way, the actions suggested to reduce stress, such as providing clear information, giving feedback, scaffolding tasks, and ensuring technological readiness, support a feeling of competence in students. As described in the theory section, supporting autonomy and competence increases autonomous motivation. It thus can lead to greater interest, engagement, resilience and finally to higher performance, in particular for higher-level cognitive tasks. Autonomous motivation is not only related to meaningful tasks but can also be induced for uninteresting ones if students understand the importance of the activity (Deci et al., 1994). Moreover, Kanat-Maymon et al. (2015) have shown that greater autonomous motivation leads to less cheating both in experimental and real-life contexts. Park (2020) also showed that students cheated less when intrinsic goals were met. Finally, Sutherland-Smith and Dawson (2022) argue that when students are asked to do meaningful assignments and are supported by teachers through feedback and thus interested and motivated to do the work themselves, they are less likely to cheat. Therefore, the recommendations highlighted during the workshop support two of the psychological needs of SDT, leading to greater autonomous motivation and, thus, better learning performance and less cheating.

The third psychological need of SDT is relatedness and belonging. However, the focus so far has been on the individual student working alone. Learning is a social activity; knowledge is constructed in a specific socio-material context (Kuhn, 1962/2012) and social interactions with teachers and peers help support long-term engagement and resilience. Garrison et al. (1999) and the subsequent research (Garrison et al., 2010) on the community of inquiry framework highlight the importance of both social and teacher presence in distance teaching and learning. Moreover, Ryan and Deci (2000) underlined that encouraging a feeling of relatedness helps students deal better with failure. Finally, if we are preparing students to become active citizens and workers, collaboration and communication are fundamental skills. We expect professionals to discuss their work with others, use resources, get feedback, and incorporate all these into their final work. This should also be valued in higher education learning outcomes (Boud & Bearman, 2022).

Although a caring atmosphere was considered important ("kindness, generosity, and empathy") by the workshop participants, relatedness and belonging were less explicitly present in the workshop discussions. Exams were often expected to measure the knowledge and skills of an individual student working alone. Further research on the role of relatedness and belonging and how it affects motivation, engagement, and learning outcomes, in the context of remote exams would be useful. A fifth row on supporting relatedness could then be added to Table 1.

The characteristics of quality remote assessments highlighted in the workshop are thus supported empirically and theoretically by SDT and foster deeper learning and greater academic integrity. However, participants also noted important factors for remote assessments that may thwart the basic psychological needs: the need for structure and a space to fail.

A sense of autonomy must be balanced with structure, particularly in distance learning. Ryan and Deci (2020) highlight the need for structure, as distinguished from control: "Whereas controlling behaviours pressure students to behave or achieve, structure entails setting clear expectations and goals, having consistent rules and guidelines, and providing informational support for engagement and rich efficacy feedback." (p.4) These align with the workshop's recommendations. However, teachers also emphasised the role of deadlines, which have been shown to negatively affect performance and interest in the task (Amabile et al., 1976). The debate was left open during the workshop with the idea that deadlines help students stay on track with their studies within a busy schedule vs. "just-in-time exams," taken when a student felt ready, even if they did not fit within the semester timetable. The balance between autonomy and structure in remote assessment in higher education depends on the context. However, a better understanding of how guidelines and structure affect motivation in distance learning would be beneficial.

The second discussion point is the balance between the need for a sense of competence and that of a space for failure. SDT research emphasises the importance of positive feedback and suggests, for example, "[s]tructuring tasks for small but consistent wins" (Sutherland-Smith & Dawson, 2022, p. 97). However, failure, and not only minor mistakes, is integral to a deep learning process and positive feedback does not always support the learning process (Juul, 2013; Kapur & Bielaczyc, 2012; Pépin, 2018). How can teachers support both a sense of competence and leave space for failure? Some ideas included creating an atmosphere of support and trust or explaining the purpose of failure (Kapur & Bielaczyc, 2012). A related concept is psychological safety, which was extensively investigated in occupational research focusing on learning in work teams (Frazier et al., 2017; Newman et al., 2017). Newman et al. (2017) named it a "key cognitive state that allows learning processes to occur"(p. 532), and the meta-analysis by Frazier et al. (2017) found a clear association between psychological safety and learning behaviour. In a psychologically safe environment or team, people are not afraid to voice their opinions, take risks, make mistakes, ask for help, and give feedback (Edmondson, 1999; Turner & Harder, 2018). Fostering a psychologically safe environment in the (virtual) classroom, even within an assessment setting, could thus be a good path towards more space for failure.

Finally, in the methods section, we mentioned that one of the purposes of speculative approaches was that it affected the actors, leaving no one unchanged. As participants shared their prototypes at the end of the workshop, most mentioned changes they had made to their assessment forms, sometimes at the margin, sometimes more fundamentally. The day after the workshop, one participant wrote,

> I came away with ideas for my teaching practice, and the cross-fertilisation of views really helped me to step back and look at my own practice, without losing sight of my ultimate objectives. Already yesterday, I spent the whole evening working on my planning for next year using the elements that this seminar has given me. I did the same thing this evening.

In conclusion, although the speculative design approach does not offer a universal solution or measurable best practices, it opens up the field of possibilities, illustrates the complexity of remote assessment and offers avenues for reflection. Ensuring authorship and fostering autonomous motivation were seen as central to creating quality remote assessments by the participants in the speculative design workshop. By fostering autonomy, meaning and a feeling of competence, teachers can support greater engagement and help reduce the risk of cheating. These factors also help support both validity and fairness of assessments.

Much work remains to be done, including measuring the impact of autonomous motivation in assessment on engagement and skills development, defining the meaning of cheating in a digital world, the question of consistency and evaluative criteria when representing knowledge in different ways, or the relative weights of agency, competence and belonging in relation to assessment.

Acknowledgments

We wish to thank all the participants who dedicated their time and effort for this study: Alessandro Dall'Aqua, Alice Thurre, Ambroise Baillifard, Caroline Boilard, Cedric Bösch, Cindy Zen-Ruffinen, Corinna Martarelli, Cosette Josseron, Damien Carron, Joel Piffaretti, Klaus-Dieter Rossade, Lucie Rochat, Manuel Grieder, Marc-André Carle, Marco Valentino, Marta Dados-Ribeiro, Matthias Kubat, Maud Aspart, Mélanie Bonvin, Morgane Gay-Bianco, Natalie Sarrasin, Nicole Prince, Pamela Banta Lavenex, Patricia Heckendorn-Kenzelmann, Petra Köhler, Rachel Forsyth, Tanguy Darbellay, Tara Balet, and Thomas Reber. Without their engagement, this research would not have been possible.

The project was funded by the Fonds de recherche, de développement et de coopération of UniDistance Suisse and was carried out in line with the Unidistance Ethics Commission principles.

There are no conflicts of interest.

References

Amabile, T. M., DeJong, W., & Lepper, M. R. (1976). Effects of externally imposed deadlines on subsequent intrinsic motivation. *Journal of Personality and Social Psychology*, *34*(1), 92–98. https://doi.org/10.1037/0022-3514.34.1.92

Audrin, C., & Coppin, G. (2022). Interest and confusion: Contrasting theoretical approaches. *Swiss Psychology Open*, *2*(1), 5. https://doi.org/10.5334/spo.35

Baillifard, A., & Martarelli, C. S. (2023). Notes et taux de décrochage inébranlables durant la Covid-19 en enseignement universitaire à distance: *Savoirs*, *N° 60*(3), 13–30. https://doi.org/10.3917/savo.060.0013

Bartholomew, K. J., Ntoumanis, N., Ryan, R. M., Bosch, J. A., & Thøgersen-Ntoumani, C. (2011). Self-determination theory and diminished functioning: the role of interpersonal control and psychological need thwarting. *Personality and Social Psychology Bulletin*, *37*(11), 1459–1473. https://doi.org/10.1177/0146167211413125

Bartholomew, K. J., Ntoumanis, N., Ryan, R. M., & Thøgersen-Ntoumani, C. (2011). Psychological need thwarting in the sport context: Assessing the darker side of athletic experience. *Journal of Sport and Exercise Psychology*, *33*(1), 75–102. https://doi.org/10.1123/jsep.33.1.75

Bayne, S., Evans, P., Ewins, R., Knox, J., Lamb, J., Macleod, H., O'Shea, C., Ross, J., Sheail, P., & Sinclair, C. (2020). *The manifesto for teaching online*. The MIT Press.

Bearman, M., Dawson, P., & Tai, J. (2020). Digitally mediated assessment in higher education: Ethical and social impacts. In M. Bearman, P. Dawson, R. Ajjawi, J. Tai, & D. Boud (Eds.), *Re-imagining university assessment in a digital world* (pp. 23–36). Springer International Publishing. https://doi.org/10.1007/978-3-030-41956-1_3

Bergmans, L., Bouali, N., Luttikhuis, M., & Rensink, A. (2021). On the efficacy of online proctoring using Proctorio: *Proceedings of the 13th International Conference on Computer Supported Education*, 279–290. https://doi.org/10.5220/0010399602790290

Biesta, G. (2007). Why "what works" won't work: Evidence-based practice and the democratic deficit in educational research. *Educational Theory*, *57*(1), 1–22. http://dx.doi.org.ezproxy.is.ed.ac.uk/10.1111/j.1741-5446.2006.00241.x

Boud, D. (2000). Sustainable assessment: Rethinking assessment for the learning society. *Studies in Continuing Education*, *22*(2), 151–167. https://doi.org/10.1080/713695728

Boud, D., & Bearman, M. (2022). The assessment challenge of social and collaborative learning in higher education. *Educational Philosophy and Theory*, 1–10. https://doi.org/10.1080/00131857.2022.2114346

Boud, D., & Falchikov, N. (2007). *Rethinking assessment in higher education: Learning for the longer term*. Taylor & Francis Group. http://ebookcentral.proquest.com/lib/ed/detail.action?docID=292915

Bretag, T., Harper, R., Burton, M., Ellis, C., Newton, P., Rozenberg, P., Saddiqui, S., & van Haeringen, K. (2019). Contract cheating: A survey of Australian university students. *Studies in Higher Education*, *44*(11), 1837–1856. https://doi.org/10.1080/03075079.2018.1462788

Bretag, T., Harper, R., Burton, M., Ellis, C., Newton, P., van Haeringen, K., Saddiqui, S., & Rozenberg, P. (2019). Contract cheating and assessment design: Exploring the relationship. *Assessment & Evaluation in Higher Education*, *44*(5), 676–691. https://doi.org/10.1080/02602938.2018.1527892

Bulletin Officiel. (2018). *Utilisation des calculatrices électroniques aux examens et concours de l'enseignement scolaire, au diplôme de comptabilité et gestion (DCG), au diplôme supérieur de comptabilité et de gestion (DSCG), au diplôme d'expertise comptable (DEC) et au brevet de technicien supérieur (BTS), à compter de la session 2018*. https://www.education.gouv.fr/bo/15/Hebdo42/MENS1523092C.htm

Carless, D. (2009). Trust, distrust and their impact on assessment reform. *Assessment & Evaluation in Higher Education*, *34*(1), 79–89. https://doi.org/10.1080/02602930801895786

Carr, D. (1992). Practical enquiry, values and the problem of educational theory. *Oxford Review of Education*, *18*(3), 241–251.

Carter, C. B., & Blanford, C. F. (2016). Plagiarism and detection. *Journal of Materials Science*, *51*(15), 7047–7048. https://doi.org/10.1007/s10853-016-0004-7

Cassidy, C. (2023, January 10). Australian universities to return to "pen and paper" exams after students caught using AI to write essays. *The Guardian*. https://www.theguardian.com/australia-news/2023/jan/10/universities-to-return-to-pen-and-paper-exams-after-students-caught-using-ai-to-write-essays

Cross, S., Aristeidou, M., Rossade, K.-D., Wood, C., & Brasher, A. (2023). The impact of online exams on the quality of distance learners' exam and exam revision experience: Perspectives from The Open University UK. *Online Learning*, *27*(2), Article 2. https://doi.org/10.24059/olj.v27i2.3761

Dawson, P. (2020). Cognitive offloading and assessment. In M. Bearman, P. Dawson, R. Ajjawi, J. Tai, & D. Boud (Eds.), *Re-imagining university assessment in a digital world* (pp. 37–48). Springer International Publishing. https://doi.org/10.1007/978-3-030-41956-1_4

Deci, E. L., Eghrari, H., Patrick, B. C., & Leone, D. R. (1994). Facilitating internalization: The self-determination theory perspective. *Journal of Personality*, *62*(1), 119–142. https://doi.org/10.1111/j.1467-6494.1994.tb00797.x

Deci, E. L., Koestner, R., & Ryan, R. M. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological Bulletin*, *125*(6), 627–668. https://doi.org/10.1037/0033-2909.125.6.627

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. Plenum.

Deci, E. L., & Ryan, R. M. (2008). Self-determination theory: A macrotheory of human motivation, development, and health. *Canadian Psychology / Psychologie Canadienne*, *49*(3), 182–185. https://doi.org/10.1037/a0012801

Edmondson, A. (1999). Psychological Safety and Learning Behavior in Work Teams. *Administrative Science Quarterly*, *44*(2), 350–383. https://doi.org/10.2307/2666999

Emerson, R. M. (1976). Social exchange theory. *Annual Review of Sociology*, *2*(1), 335–362. https://doi.org/10.1146/annurev.so.02.080176.002003

Forsyth, R. (2022). *Confident assessment in higher education* (1st ed). Sage Publications.

Frazier, M. L., Fainshmidt, S., Klinger, R. L., Pezeshkan, A., & Vracheva, V. (2017). Psychological safety: A meta-analytic review and extension. *Personnel Psychology*, *70*(1), 113–165. https://doi.org/10.1111/peps.12183

Gallant, T. B. (2022). *The ICAI Reader (2nd ed):* 44.

Garrison, D. R., Anderson, T., & Archer, W. (1999). Critical inquiry in a text-based environment: computer conferencing in higher education. *The Internet and Higher Education*, *2*(2–3), 87–105. https://doi.org/10.1016/S1096-7516(00)00016-6

Garrison, D. R., Anderson, T., & Archer, W. (2010). The first decade of the community of inquiry framework: A retrospective. *The Internet and Higher Education*, *13*(1), 5–9. https://doi.org/10.1016/j.iheduc.2009.10.003

Gough, N. (2013). Towards deconstructive nonalignment: A complexivist view of curriculum, teaching and learning. *South African Journal of Higher Education*, *27*(5), 1213–1233.

Grolnick, W. S., & Ryan, R. M. (1987). Autonomy in children’s learning: An experimental and individual difference investigation. *Journal of Personality and Social Psychology*, *52*(5), 890–898. https://doi.org/10.1037/0022-3514.52.5.890

Hartnett, M., St. George, A., & Dron, J. (2011). Examining motivation in online distance learning environments: Complex, multifaceted and situation-dependent. *The International Review of Research in Open and Distributed Learning*, *12*(6), 20. https://doi.org/10.19173/irrodl.v12i6.1030

Ibarra-Sáiz, M. S., Rodríguez-Gómez, G., & Boud, D. (2021). The quality of assessment tasks as a determinant of learning. *Assessment & Evaluation in Higher Education*, *46*(6), 943–955. https://doi.org/10.1080/02602938.2020.1828268

Jantos, A. (2021). *Motives for Cheating in Summative E-Assessment in Higher Education—A Quantitative Analysis*. https://doi.org/10.21125/edulearn.2021.1764

Juul, J. (2013). *The art of failure: An essay on the pain of playing video games*. MIT Press.

Kanat-Maymon, Y., Benjamin, M., Stavsky, A., Shoshani, A., & Roth, G. (2015). The role of basic need fulfillment in academic dishonesty: A self-determination theory perspective. *Contemporary Educational Psychology*, *43*, 1–9. https://doi.org/10.1016/j.cedpsych.2015.08.002

Kapur, M., & Bielaczyc, K. (2012). Designing for productive failure. *Journal of the Learning Sciences*, *21*(1), 45–83. https://doi.org/10.1080/10508406.2011.591717

Kirchner, J. H., Ahmad, L., Aaronson, S., & Leike, J. (2023). *New AI classifier for indicating AI-written text*. https://openai.com/blog/new-ai-classifier-for-indicating-ai-written-text

Kuhn, T. S. (2012). *The structure of scientific revolutions* (Fourth edition). The University of Chicago Press. (Original work published 1962)

Lee, K., & Fanguy, M. (2022). Online exam proctoring technologies: Educational innovation or deterioration? *British Journal of Educational Technology*, *n/a*(n/a). https://doi.org/10.1111/bjet.13182

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Sage Publications.

Maehr, M. L., & Meyer, H. A. (1997). Understanding motivation and schooling: Where we've been, where we are, and where we need to go. *Educational Psychology Review*, *9*(4).

Media Officer. (2022). *Essay mills are now illegal—Skills Minister calls on internet service platforms to crack down on advertising—The Education Hub*. https://educationhub.blog.gov.uk/2022/04/28/essay-mills-are-now-illegal-skills-minister-calls-on-internet-service-providers-to-crack-down-on-advertising/

Morin, E. (2014). *Introduction à la pensée complexe*. Éd. Points.

Morin, E. (2015). *Les sept savoirs nécessaires à l'éducation du futur*.

Newman, A., Donohue, R., & Eva, N. (2017). Psychological safety: A systematic review of the literature. *Human Resource Management Review*, *27*(3), 521–535. https://doi.org/10.1016/j.hrmr.2017.01.001

Newton, P. M. (2018). How common is commercial contract cheating in higher education and is it increasing? A systematic review. *Frontiers in Education*, *3*. https://www.frontiersin.org/articles/10.3389/feduc.2018.00067

Park, S. (2020). Goal contents as predictors of academic cheating in college students. *Ethics & Behavior*, *30*(8), 628–639. https://doi.org/10.1080/10508422.2019.1668275

Pépin, C. (2018). *Les vertus de l'échec*. Pocket.

Ross, J. (2023). *Digital futures for learning: Speculative methods and pedagogies*. Routledge.

Ross, J., & Macleod, H. (2018). Surveillance, (dis)trust and teaching with plagiarism detection technology. *Networked Learning*, 8.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1), 68–78. https://doi.org/10.1037/0003-066X.55.1.68

Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions. *Contemporary Educational Psychology*, *61*. https://doi.org/10.1016/j.cedpsych.2020.101860

Ryan, R. M., & Frederick, C. (1997). On energy, personality, and health: Subjective vitality as a dynamic reflection of well-being. *Journal of Personality*, *65*(3), 529–565. https://doi.org/10.1111/j.1467-6494.1997.tb00326.x

Skinner, B. F. (1965). *Science and human behavior* (First Free Press Paperback edition). The Free Press.

Sutherland-Smith, W., & Dawson, P. (2022). Higher education assessment design. In S. E. Eaton, G. J. Curtis, B. M. Stoesz, J. Clare, K. Rundle, & J. Seeland (Eds.), *Contract Cheating in Higher Education: Global Perspectives on Theory, Practice, and Policy* (pp. 91–105). Springer International Publishing. https://doi.org/10.1007/978-3-031-12680-2_7

Townley, C., & Parsell, M. (2004). Technology and academic virtue: Student plagiarism through the looking glass. *Ethics and Information Technology*, *6*(4), 271–277. https://doi.org/10.1007/s10676-005-5606-8

Turner, S., & Harder, N. (2018). Psychological safe environment: A concept analysis. *Clinical Simulation in Nursing*, *18*, 47–55. https://doi.org/10.1016/j.ecns.2018.02.004

An Exploration of Dynamic Decision-Making That Supports the Design of Authentic Learning Experiences in Online Environments

Jill E. Stefaniak
University of Georgia, USA

Meimei Xu
University of Houston, USA

Fan Yang
University of Georgia, USA

Abstract
This study aims to examine the dynamic decision-making of faculty who teach instructional design courses when they design authentic learning experiences in digital learning environments, with a special focus on how they engage in environmental analysis, dynamic decision-making, promotion of knowledge acquisition, as well as the challenges they meet within their design process. Semi-structured interviews were conducted on thirteen faculty who had experience integrating authentic learning into their online course design. A constant comparative method is employed to generate a total of six themes within the research focuses of this study. The study concludes by stating that the synergy between environmental analysis and dynamic decision-making supports the design of an authentic learning environment, which, in turn, helps instructional designers to leverage contextual factors to promote authentic learning experience. Implications are discussed, and limitations as well as suggestions for future studies are also provided.

Keywords: Authentic learning, online learning environments, dynamic decision-making, instructional design

Stefaniak, J.E., Xu, M., & Yang., F. (2025). An exploration of dynamic decision-making that supports the design of authentic learning experiences in online environments. *Online Learning, 29*(2), pp. 47–80. https://doi.org/10.24059/olj.v29i2.4459

Authentic learning is an educational approach that emphasizes real-world, hands-on experiences to engage students in meaningful and relevant activities. Authentic learning seeks to bridge the gap between theory and practice by immersing students in tasks that mirror real-world experiences (Herrington & Oliver, 2000). This approach recognizes that learning is most effective when it occurs in context, allowing students to apply their knowledge and skills to solve actual problems (Herrington et al., 2014). Authentic learning experiences take various forms, such as project-based learning, simulations, internships, or collaborative team-based activities that foster a dynamic and interactive environment and support the development of critical thinking, problem-solving, and teamwork skills (Herrington et al., 2006; Reilly & Reeves, 2022).

In recent years, instructional design has increasingly emphasized the creation of authentic online learning experiences, driven by the necessity to engage learners in meaningful and relevant ways (Alioon & Delialioğlu, 2019; Britt et al., 2015; Noreen et al., 2019). One major trend is the integration of real-world applications into the curriculum, allowing learners to apply theoretical knowledge to practical scenarios (Lowell & Yang, 2023; Luo et al., 2017).

Another trend impacting the design of authentic online learning environments is the personalization of learning experiences through adaptive learning technologies (Dziuban et al., 2018; Martin et al., 2020; Xie et al., 2019). These systems leverage data analytics and artificial intelligence to tailor content and assessments to individual learners' needs, preferences, and progress. This personalized approach ensures that learners remain engaged and motivated by addressing their unique learning paths and providing immediate feedback (Liu et al., 2017; Polly et al., 2023; Van der Kleij et al., 2015). Collaborative tools and social learning platforms are increasingly incorporated to create a sense of community and encourage peer-to-peer interaction and support (Belcher et al., 2015; Peterson et al., 2019; Lai et al., 2019; Wilkinson, 2022).

In an online environment, authentic learning leverages digital tools and platforms to create engaging and relevant experiences for students. Authentic learning in online environments often involves interactive simulations, case-based learning, field experiences, and projects that mirror real-world scenarios (Abramenka-Lachheb & Ozogul, 2022; Parker et al., 2013). Integrating technology allows for the exploration of authentic problems, enabling students to apply theoretical knowledge to practical situations in an online context (Devine et al., 2020; Mattar, 2018).

The integration of authentic learning in an online environment provides flexibility and accessibility to learners (Rogers & Gronseth, 2021). Online learning provides opportunities for learners to participate in authentic experiences on a more globalized scale; they are not confined to geographical boundaries (Stefaniak & Xu, 2020). Reeves et al. (2002) argue that authentic learning activities are now considered to be a central component of curriculum, as traditional approaches to higher education could not fulfill the growing needs in learning opportunities offered by real-problem contexts.

Online learning environments provide students with dynamic, real-world experiences that foster a holistic and practical approach to education, extending beyond the traditional classroom boundaries. Asynchronous online learning environments, for example, allow for personalized, self-directed exploration, enabling students to delve into topics of interest at their own pace (Cho et al., 2010; Giesbers et al., 2014; Moallem, 2015; Shroeder et al., 2016). Synchronous learning environments foster immediate communication and social interactions, enabling instant feedback from peers and instructors (Cai et al., 2022; Majewska & Zvobgo 2023). Learners can collaborate in problem-solving with group members and apply what they have learned in various learning activities (Bower et al., 2015). Recent studies provided a wealth of ideas, practices, and strategies to inform the design and implementation of authentic learning environments in digital settings. However, there is a limited number of studies that discuss *how* faculty who teach instructional design courses leverage their dynamic decision-making and environmental analysis to promote authentic learning in online settings.

This study explored how faculty who teach instructional design courses promote authentic learning in digital environments as they relate to environmental analysis, dynamic decision-making, and promotion of knowledge acquisition. Emphasis is placed on understanding the challenges they face while designing authentic learning experiences in digital learning environments.

Literature Review

Decision-Making in Instructional Design

Dynamic decision-making in instructional design has gained significance due to various technology-related factors revolutionizing education (Heitink et al., 2016; Stefaniak et al., 2021). Integrating technology is crucial for effective instructional design (Jonassen, 1997). Instructional designers often make key decisions related to managing the learning space of a project. Hmelo-Silver (2013) describes the learning space as encompassing both the problem space and the conceptual space. Ertmer and Stepich (2005) further categorize problem space activities into problem-finding and problem-solving spaces. Problem-finding activities include identifying key stakeholders, determining the instructional designer's role, recognizing project constraints, and describing essential relationships. Conversely, problem-solving activities involve devising ways to unite stakeholders, identify viable solutions, and predict the potential consequences of these solutions (Ertmer & Stepich, 2005).

Digital environments present unique challenges for instructional designers as they must balance student needs, foster learner interactions, design authentic experiences, and provide necessary support (Lowenthal & Dennen, 2017). The geographical locations of learners make it challenging to accurately gauge learner needs without thorough surveys and analyses. Decision-making is a critical skill for learning designers in digital environments, where traditional models often fail to address the unique nuances of digital learning contexts (Boschman et al., 2014; Jonassen, 2012; Warr et al., 2018). The technological affordances of digital environments significantly impact the design and delivery of learning experiences.

Balancing internal and external conditions is crucial in instructional design (Honebein, 2019). External conditions may include institutional priorities and instructional delivery formats, while internal factors involve designers' prior knowledge and values (Boschman et al., 2014; Shafto et al., 2014; Tracey et al., 2014; Webb & Cox, 2004). Effective dynamic decision-making in learning design requires identifying a bounded rationality for the environment. Dynamic decision-making involves teachers making rapid decisions in fluctuating learning environments

(Jonassen, 2012). Unlike rational decision-making, which follows a linear, option-based process, dynamic decision-making occurs under time constraints and multiple information sources (Klein, 2008). Teachers regularly face dynamic decision-making scenarios due to varying factors like student needs, learning environment affordances, and their expertise (Ertmer, 1999; Stefaniak et al., 2021).

Every design project presents unique challenges and constraints. Instructional designers must balance internal and external factors influencing the learning environment to maintain control over the design space (Ertmer & Koehler, 2014) Stefaniak et al. (2021) introduced a conceptual framework highlighting the importance of pedagogical reasoning and dynamic decision-making in teachers. This framework encourages teachers to establish parameters for their design contexts, creating a bounded, contextualized design space influenced by internal and external factors. It adapts Webb and Cox's (2004) framework for technology integration, recognizing the contributions of both teachers and students to the learning process. This comprehensive analysis of internal and external factors supports effective instructional design decisions.

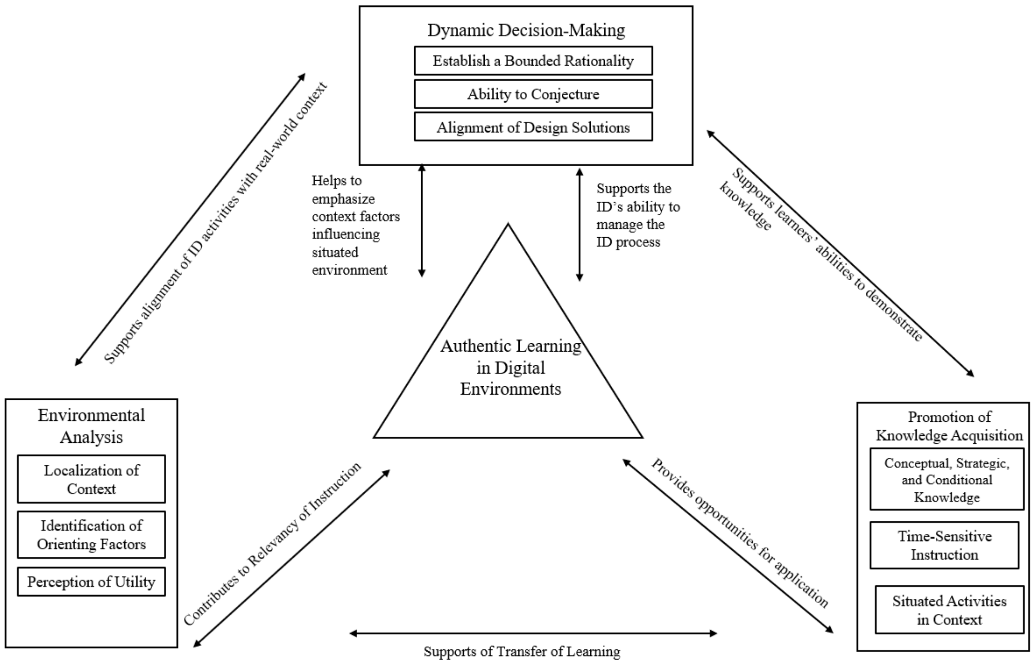
There is limited research on how instructional designers engage in decision-making and judgment during the co-evolution process, where they navigate between problem and solution spaces (Boling et al., 2017; Stefaniak & Hwang, 2021; Tomita et al., 2021). Other design scholars also highlight the need for more empirical studies to understand designers' engagement in co-evolution (Crilly & Morosanu Firth, 2019; Dorst, 2019; Wiltschnig et al., 2013). Learning designers frequently encounter complex, uncertain, and contradictory design situations, requiring them to adopt multiple roles beyond traditional instructional design (Honebein, 2019; Kenny et al., 2005). Exposure to real-world scenarios improves problem-solving skills, better preparing novice designers for the complexities of the field (Brown & Green, 2019).

Conceptual Framework

Stefaniak and Xu (2020) proposed a conceptual framework to help guide instructional designers on how they could leverage dynamic decision-making and environmental analysis to develop contextualized authentic learning experiences in digital environments (Figure 1). The framework identifies three primary constructs that contribute to the decision-making for the design of online authentic learning experiences: authentic learning, decision-making, and contextual analysis. Dynamic decision-making, as the framework indicates, can be leveraged to align environmental analysis and knowledge acquisition through the designers' bounded rationality within the design space. This framework explains how the exploration and understanding of these three constructive aspects can sustain the promotion of knowledge acquisition in online authentic learning experiences, as well as how these constructs support each other to develop effective and contextualized online authentic experiences for learners.

Figure 1

Conceptual Framework to Support Dynamic Decision-Making in Online Environments (Stefaniak & Xu, 2020)



The key components of the conceptual framework that guided this study (Stefaniak & Xu, 2020) for authentic learning in online environments include environmental analysis, dynamic decision-making, and promotion of knowledge acquisition. Environmental analysis involves understanding the contextual factors that influence the design of learning experiences, such as the extent of interaction between learners, content, and instructors, as well as the localization of context and acknowledgment of orienting factors (Tessmer, 1991; Tracey et al., 2021). Dynamic decision-making refers to instructional designers' abilities to make prompt and appropriate design decisions within a bounded rationality, engaging in design conjecture, and aligning decision solutions (Stefaniak et al., 2023).

Promotion of knowledge acquisition focuses on supporting learners' acquisition of conceptual, strategic, and conditional knowledge domains through learning activities that elicit demonstration of these knowledge domains and situating activities in a real-world context (Ertmer et al., 2011; Lai et al., 2017). These components work in concert to support the design of authentic learning experiences in online environments, aiming to optimize instructional design by leveraging contextual factors and promoting the acquisition of knowledge in real-world settings (Garcia-Cabrero et al., 2018).

Dynamic Decision-Making for Digital Learning Environments

Dynamic decision-making represents a decision-making process that emphasizes the fast-changing learning environments and designers' environmental analysis within the design space (Klein, 2008). Decision-making has been discussed with a focus on its procedure of rational analysis and option comparison (Jonassen, 2000, 2010), and comparably, its ill-structured problem-solving process where a variety of contextual factors play an essential role in the design space (Jonassen, 2012; Klein, 2008). These two categories of decision-making processes, recognized as rational decision-making and dynamic decision-making (Jonassen, 2010; Klein, 2008), are both critical in real-world decision-making.

While scholars generally view decision-making as a process rather than a state or product, research in educational technology has predominantly focused on the outcomes of decisions and their impact on student learning performance (Stefaniak & Hwang, 2021, Stefaniak et al., 2022; Consoli et al., 2023). Dynamic decision-making, with its focus on the influence of a myriad of contextual factors in digital learning environments, has been rarely discussed and examined in the field (Stefaniak & Xu, 2020). Stefaniak et al. (2021) argue that dynamic decision-making could be investigated along with practitioners' pedagogical reasoning processes to provide a better understanding of why certain instructional design decisions were made, whereas dynamic decision-making helps capture design practitioners' flexibility and ill-structured problem-solving capabilities within their instructional design processes.

Digital learning environments have played a critical role in teaching and learning in higher educational settings, especially in recent years. Existing research in digital learning environments tends to investigate the design and development of digital learning practices and technology integration (e.g., Arkoful & Abaidoo, 2015; Parkes et al., 2015; Henderson et al., 2017); however, few studies have specifically investigated teachers' or faculty's design decision-making processes that support digital learning experiences (Stefaniak & Xu, 2020; McDonald, 2023). This study, therefore, aims to examine how instructional design faculty were engaged in dynamic decision-making to design authentic learning experiences in digital learning environments.

Dynamic Decision-Making and Context

Effective instructional design necessitates a thorough consideration of contexts. To enable dynamic decision-making, designers must engage in systematic contextual analysis within the learning environment and align their design choices accordingly (Klein, 2008; Stefaniak et al., 2023). Contextual analysis involves scrutinizing factors that impact the actions and practices of both individuals and groups in a learning setting (Tessmer et al., 1990). Examples include, but are not limited to, the instructional environment, time, learners' and instructors' predispositions, and resources available to support learners in the learning environment. This process is intricately linked to the dynamic decision-making processes of practitioners and their contextualized design decisions within designers' designated space.

Tessmer and Richey's (1997) discussion of the role of contexts delineated nine dimensions that help identify different levels of contextual factors, from the perspective of learners, immediate learning environment, and organization. Specifically, contextual factors can be explored and navigated from three levels: orienting contexts, instructional contexts, and transfer contexts, where a myriad of contextual aspects are dynamic and fast-changing (Tessmer & Richey, 1997). Instructional design practitioners must have a complete awareness of the contextual factors and their influence on the dynamic decision-making processes for both instructional designers and learning environments (Richardson et al., 2017; Stefaniak & Xu, 2020).

The orienting context includes any background and prior knowledge learners bring to the educational experience. It includes their motivations, expectations, and readiness to engage with the material. For example, an online course designed for graduate students in digital marketing might consider learners’ existing knowledge of marketing principles and tools, leveraging this background to introduce advanced concepts more effectively. Contextual factors such as the learners' familiarity with technology, the learning management system, and other educational technologies significantly impact their ability to grasp new content and participate actively in the course.

The instructional context refers to the environment in which learning takes place, including the tools, resources, and strategies used to facilitate instruction. Within the instructional context, learner and instructor role perceptions are important factors that influence the learning experience. It is important that there is a shared understanding between learners and the instructor regarding the expectations of one another in the course. Oftentimes, this relates to how communication and discourse occur within the online learning environment, expectations regarding peer-to-peer interactions, the instructor providing feedback on learners’ progress, and any other expectations that will impact learner engagement and participation. Contextual factors such as the quality of the online platform, the availability of technical support, and the alignment of instructional methods with learning objectives can affect the overall effectiveness of the instruction.

The transfer context involves the application of acquired knowledge and skills to real-world situations. It focuses on how learners can take what they have learned and use it in practical, often professional, environments. For example, after completing an online course on project management, learners should be able to apply project planning and execution techniques to their work projects. Contextual factors such as the relevance of the course content to the learners’ job roles, the opportunities for practical application provided during the course, and ongoing support for learners as they implement new skills can influence the success of knowledge transfer to the workplace.

Contextual factors significantly impact dynamic decision-making by influencing the availability and interpretation of information, the perceived urgency of decisions, and the resources available at a given time (McDonald, 2024; Stefaniak et al., 2021). For example, in high-pressure situations, limited time and information can lead to quicker, heuristic-based decisions, while ample time and data might result in more deliberative, analytical choices. The context of an individual’s prior experiences and knowledge base can shape their ability to adapt and respond effectively to new and changing situations. Instructional design practitioners can leverage contextual factors to reflect upon their design decision-making processes, taking a recursive approach to weaving environmental analysis throughout the instructional design process (Stefaniak, 2024). Environmental analysis can also enhance instructional design practitioners’ abilities to develop online authentic learning experiences aimed to support learners’ transfer of their newly acquired knowledge to real-world contexts (Baaki et al., 2023; Harris et al., 1990; Stefaniak & Xu, 2020; Tessmer, 1990). However, to date, there is a paucity of empirical studies that explored instructional designers’ contextual analysis process within their instructional design practice, let alone the investigation along with dynamic decision-making for authentic learning in digital learning environments.

Instructional Design for Authentic Learning

Authentic learning is recognized as an effective approach that allows learners to solve real-world problems in simulated learning environments (Herrington & Oliver, 2000). The concepts of authenticity and situated learning in learners provides them with opportunities to transfer their knowledge and problem-solving skills into real-world authentic learning contexts (Lowell & Moore, 2020; Luo et al., 2017). Embracing authentic learning approaches not only enhances learners' theoretical understanding but also empowers them to apply their skills in practical, real-world scenarios.

Researchers in the field of education have explored strategies to support authentic learning experiences in digital environments (e.g., Kim et al., 2014; Parker et al., 2013). Rule (2006) conducted a literature review encompassing various authentic learning experiences across disciplines. The findings affirmed that these experiences could enhance learners' abilities to apply knowledge in real-world settings. Kim et al. (2014) conducted a qualitative study supporting authentic and self-directed learning in online environments. Parker et al. (2013) implemented design-based research in higher education contexts to further understand the benefits of authentic online learning experiences for practitioners.

A recent theoretical paper by Spector (2018) emphasizes that despite numerous empirical studies on authentic learning experiences, there remains a dearth of empirical evidence to substantiate the rationale behind specific design choices. This gap also extends to providing guidance for instructional design practitioners engaged in environmental analysis for the creation of authentic learning experiences in digital learning settings. The paper underscores the need for a more robust empirical foundation for the design of authentic learning experiences and to assist practitioners in their decision-making processes during the design phase (Abramenka-Lachheb & Ozogul, 2022; Warr et al., 2018).

Herrington et al. (2014) propose ten characteristics for authentic learning environments, emphasizing their real-world relevance, ill-defined nature, complexity, multi-perspective exploration, collaboration, reflection, interdisciplinary applicability, seamless integration with assessment, creation of products, and an allowance for diverse outcomes. They emphasize the need for authentic activities to be integrated seamlessly with assessment, allowing for diverse outcomes and collaboration among learners. The authors acknowledge the challenges in designing web courses to support authentic activities but stress the potential of technology to enhance learning outcomes when combined with research and theory.

Purpose of Study

While studies have focused on the types of decisions and judgments made by instructional designers (Ertmer et al., 2008; Gray et al., 2015), little has been done to theoretically ground these decision-making behaviors in an instructional design context. Researchers have suggested that IDs need to apply a flexible mindset when engaging in ill-structured problem-solving practices for real-world contexts (Yanchar & Gabbitas, 2011). Decisions that are made by IDs reflect their perception of the context (Barsalou, 2015), calling for them to be aware of contextual factors contributing to the learning space. It is inevitable that time constraints will impede an IDs' abilities to make appropriate design decisions (Tessmer & Wedman, 1990; Yanchar & Hawkley, 2014); thus, we highly advocate for them to conduct environmental analyses to inform their instructional design decisions. This helps them to be self-aware of their influence on the instructional design process (i.e. prior knowledge, design experience, and personal assumptions).

The purpose of this study was to explore how instructional design faculty promote authentic learning in digital environments as they relate to environmental analysis, dynamic decision-making, and the promotion of knowledge acquisition. Emphasis is placed on understanding the challenges instructional design faculty face while designing authentic learning experiences in digital learning environments. In a study examining dynamic decision-making to support authentic learning, Stefaniak and Xu (2020) emphasized the need for instructional designers to make contextualized design decisions to enhance learners' online learning experiences. Emphasizing the role of context in the design practice underscores the significance of considering contextual factors that may influence design decisions for authentic learning in digital environments and emphasizes the iterative and recursive nature of the instructional design process.

This study explores the extent to which instructors engage in environmental analysis and dynamic decision-making for their design decisions of authentic learning experiences in digital learning environments. An initial study was conducted using a critical interview technique to better understand how the participants designed authentic learning experiences for digital environments. The following research questions guided our study:

1. How do faculty engage in dynamic decision-making while facilitating authentic learning in online learning environments?

2. What are the implications of environmental analysis and dynamic decision-making on online course design?

Methods

Our study was designed to gain a deeper understanding of the dynamic decisions instructors may make to support authentic learning experiences in online courses. Interviews were conducted with participants using a critical incident technique (Flanagan, 1954). IRB approval was obtained prior to data collection. Participants were asked to provide examples for how they have designed authentic learning experiences in digital environments. We employed semi-structured interviews to gain an understanding of how the participants taught their courses. Interview questions were used to invite participants to reflect on their teaching practices (Kvale & Brinkmann, 2009).

Notes were taken during the interviews, and the interviews were transcribed. Data was organized by the researchers. A preliminary exploratory analysis of all data was used to attain a cursory understanding of developing themes (Creswell, 2015, p. 216). Each member of our research team reviewed the transcripts. The text was segmented by identifying direct quotes from individual transcripts, related to the research questions. These segments were labeled with codes to be recorded in a codebook. The codes were re-examined by the other members of the research team for redundancy, collapsed, and grouped. The codes were aggregated into 5-7 themes, the themes labeled and analyzed. If disagreements emerged within the group, all the researchers within the group got together to discuss it until no doubts remained.

Participants

Participants were faculty responsible for teaching online instructional design courses. Inclusion criteria required participants to integrate authentic learning experience in their online courses. For the purposes of this study, we defined authentic learning as encompassing projects that involved real-world applications that were project-based assignments. A total of thirteen instructors who have teaching experience in instructional design classes participated in this study. Table 1 provides a summary of the participants, presenting their pseudonyms, gender, years of experience as higher education instructors, and the number of years they have spent designing online instruction. There was a mix of male and female participants, with one participant identifying as female/non-binary. Our participants varied in experience, but all had taught online courses on various instructional design topics. All participants reported teaching courses that had approximately 15-25 students in their online courses. The diversity in participants' characteristics and experiences contributed to a comprehensive exploration of the design of online instructional design courses.

Table 1

Participant Information

Pseudonym	Gender	Years Experience as an Instructor	Year Experience Designing Online Instruction	Course Discussed During Interview
Jamie	Male	0-5	0-5	Introduction to instructional design
Paul	Male	6-10	11-15	Online instruction
Mary	Female	6-10	6-10	Motivation and Instructional design
Cathryn	Female	0-5	11-15	Project management
Maria	Female	0-5	16-20	Capstone

				(Applied instructional design project)
Don	Male	6-10	Over 20	Introduction to instructional design
Alan	Male	11-15	Over 20	Introduction to instructional design
Randy	Male	0-5	6-10	Gamification
Marc	Male	0-5	6-10	Human performance technology
Stacey	Female	11-15	6-10	Human performance technology
Janet	Female/Non-binary	6-10	11-15	Introduction to instructional design
Keith	Male	11-15	6-10	Simulations
Cecilia	Female	0-5	0-5	Human performance technology

Procedure

Participants were recruited through professional networks such as the Association for Educational Communications and Technology, LinkedIn, and Facebook. Individuals who were currently teaching (or had taught) instructional design courses online in higher education were invited to complete a consent form and a demographic survey. We then reached out to the participants to schedule a time for a 30-minute interview. We conducted a semi-structured interview with each participant. We used an interview protocol (see Appendix A) to guide the conversation while allowing for spontaneity and participant-driven discussions. During our interviews, we asked faculty to reflect on the types of authentic assignments and activities they incorporated into their courses, evaluative methods to gauge their learners' acquisition of knowledge, and support mechanisms put in place to assist learners in the online course. We also discussed what challenges may arise when facilitating authentic learning activities in an online course. During the interview, we asked faculty to elaborate on the rationale behind their decisions and contextual factors that influenced their decisions to better understand their dynamic decision-making processes.

Data Analysis

All interviews were recorded and transcribed prior to analysis. We employed a constant comparative method (Glaser & Strauss, 1967) to investigate how faculty design and facilitate authentic learning experiences in online environments while attending to learners' needs and contextual factors that may influence the learning environment. Our preliminary analysis followed Strauss and Corbin's (1990) principles of open, axial, and selective coding, facilitating an iterative qualitative analysis approach and the interpretation of overarching themes in the data (Creswell, 2015). The text was then divided by extracting direct quotes from individual transcripts relevant to the research questions. These segments were assigned codes and documented in a codebook.

During our analysis, *a priori* codes were assigned based on the theoretical framework guiding this study (Stefaniak & Xu, 2020). These codes were established before the analysis began and served as a structured framework for organizing and interpreting the data. Table 2 provides an overview of the a priori codes that were assigned during our initial data analysis. During our analysis, our research team discussed the application of the priori codes to relevant segments of data yielded from our semi-structured interviews (Elliot, 2018). Any deviations or emergent patterns not captured by the priori codes were also considered, allowing for flexibility in the coding process. This approach helped maintain a balance between a structured coding framework and the ability to capture novel insights or themes that might have emerged during the analysis.

Table 2

A priori Codes Used During Initial Data Analysis

Conceptual Construct	Code
Dynamic Decision-making	Establishing a bounded rationality Ability to conjecture Alignment of design solutions
Environmental Analysis	Localization of context Identification of orienting factors Perceptions of utility
Promotion of knowledge acquisition	Conceptual, strategic, and conditional knowledge Time-sensitive instruction Situated activities in context

Our research team met to collectively examine each interview. Acknowledging the inherent challenges of establishing validity in qualitative research, we followed Lincoln and Guba's (1985) recommendation of ensuring credibility through peer debriefing. This approach aimed to mitigate potential biases or subjective interpretations by individual researchers and enhance the overall validity of the study, as emphasized by Willig (2008). To achieve consensus, we adopted a collaborative process where each team member took turns presenting the particulars of an interview, highlighting the participant's key design process indicators. After the discussion, we individually assigned a category to each interview based on our understanding of the participant's responses. While most cases saw immediate agreement, three instances required further deliberation. In these situations, we revisited the interview notes for clarification, sought confirmation, and engaged in discussions until we reached a final agreement.

Results

Our interviews with participants yielded several themes that provided insights into how instructors engage in dynamic decision-making to support the design of authentic learning experiences in online courses (Table 3). We have provided quotes that are representative of the themes that emerged as our participants described their approach to designing and facilitating authentic learning experiences.

Table 3
Summary of Meta Themes and Themes

Metatheme 1: Dynamic Decision-Making
Theme 1: Establish a bounded rationality within design space
Theme 2: Use of design conjectures to align solutions
Metatheme 2: Environmental Scanning and Analysis
Theme 3: Recognition of a localized context to support authentic learning
Theme 4: Acknowledging the instructional designer's power within design
Metatheme 3: Facilitating Authentic Learning Experiences
Theme 5: Balancing Instructional Scaffolding Within Situated Experiences
Theme 6: Supporting Perceived Utility in Authentic Learning

Metatheme 1: Dynamic Decision-Making

Theme 1: Establish a Bounded Rationality Within Design Space

The importance of becoming comfortable with engaging in timely decision-making emerged as a theme during conversations with the instructors. Recognizing that learners had to balance the needs of their clients associated with their projects against a variety of constraints imposed by the semester duration, and project guidelines, instructors shared they frequently engaged in conversations with their learners about managing their design space. When discussing the need to have conversations about examining the design constraints related to their projects, Paul shared:

> Hopefully it allows them to be able to kind of express their own individual ideas without going off in all these different directions and then being so bogged down between, "What do you want me to do? And what is the question? Or what is the assignment asking me to do?" So again, trying to balance that structured nature versus the open-ended nature of an authentic learning environment.

Joanna shared:

> Real world instructional design projects are messy. I feel like providing that messiness, or the choices that you can make along the way, and how you justify those choices is a very important task for an instructional designer.

Jamie described taking on more of a coaching role to support students in their understanding of establishing boundaries. When describing how he approached coaching, Jamie shared:

> A lot of my coaching of the students was helping them understand how to work with a client, how to establish some boundaries about what you can and can't do on this project, how to handle things like switching roles and changing stakeholders, somebody falls off the project, and another person comes in that you weren't working with before, how to help them conform to your deadlines for your class to make sure they gave you the information you needed.

Theme 2: Use of Design Conjectures to Align Solutions

Several instructors shared challenges with helping students to engage in conjecturing as new contextual factors influence their projects. Cathryn discussed the iterative nature of decision-making noting that "It's a continuous feedback cycle and then by the time they have to turn in part one of the project, they've pretty much already done the outline for the next phase."

Janet shared that she often engaged in conversations preparing her students for the cyclical nature of design decision-making:

> But I said, so often though, whatever you had in that first round, you are probably going to go full circle and end up coming back to it by the time it goes through all those things. But I love that…having them get comfortable with feedback because you have to, you have to have thick skin and be able to, say, "Okay, I can listen and I can sift through what's good and what's not, and I can sift through what I just don't like, but I will still do and all of those things."

Several instructors shared the benefit of students engaging in reflection-in-action throughout their projects to think through their decisions and their thought processes informing their design. Paul noted:

> So, I would love it if students could say, "Here are the choices that I made along the way, and here are the outcomes of the choices. We're a little bit more at the hypothetical stage. What do you anticipate this looks like whenever you're able to implement it? What do you anticipate? How do you anticipate this being a benefit?" And it would be really great if we could somehow actually think through what their experiences are and then be able to kind of reflect on what those outcomes actually are.

An important part of engaging in design conjecture is to pull from prior knowledge, experience, and what is known about contextual factors influencing the environment. Marc expressed that it was important for students to take time to "understand the context and environment, quantifying performance, both current and initial, and then identifying potential causes."

Cecilia also noted the importance of taking time to discuss their needs, as instructional designers, and challenges they anticipate might occur during the project. Rather than jumping into the project, Cecilia shared that it would be beneficial to take time to reflect on where the learners are at in the earlier stages of the projects:

> The first step should be identifying what those challenges might be. Also, asking upfront after giving them the scenario or the assignment. Asking them 'what challenges do you see with being able to successfully complete this project?'

Metatheme 2: Environmental Scanning and Analysis

Theme 3: Recognition of a Localized Context to Support Authentic Learning

During the discussion, instructors emphasized the paramount importance of contextual design, underscoring the need for instructional designers to tailor their design strategies and solutions specifically to the unique demands and intricacies of the given situation. They highlighted how an understanding of the localized context fosters more effective and user-centric designs. Several instructors talked about the need for instructional designers to adapt their practices to the situated environments within which they are tasked with designing.

> Randy noted that students "need to draw on the real-life context when they try to design and figure out the authenticity behind what has guided their questions." Yeah, it takes time to teach them what aspect is authentic task, to reinforce their understanding of the authentic context.

Alan also noted that the information derived from analysis can help ensure a consistent understanding of the situation. He noted the importance of being able to communicate in terms that are understood by the client and relevant to their situated context:

> We are really careful about the terminology, and we're constantly trying to ensure the terminology we use in the course is consistent with authentic workplace practice. The main thing about the course is that it features real ID projects with real ID clients and students working in ID teams, which is how the workplace works.

Theme 4: Acknowledging the Instructional Designer's Power Within Design

A theme of power within design emerged while talking to the instructors. Instructional designers can shift the direction and messaging of instructional content as designers. Instructors emphasized the importance and challenge with helping students to see that they have a responsibility to take what they know about instructional design from a theoretical position and adapt it to provide meaningful solutions to unique situations. Paul described this as a dichotomy between theory and real-world application:

> This instructional design theory can help guide what we're doing in a particular class. Look at the theory that we're looking at in light of the experiences and then apply to these particular activities that we're doing within class. And so, I try and kind of think

> through it in that respect, just to show that there is potential dichotomy, as we translate the theory into the more real world. And as they kind of gauge through that complexity, as they select these open-ended problems that they want to do, I say, "Well, the theory can help us be able to understand and wade through all the noise and some of the messiness."

Janet discussed a need to acknowledge the inherent power instructional designers have as they engage in understanding the design context. The direction an instructional designer may take as they engage in analysis and assemble a plan can have a significant impact, good or bad, for their client, learners, and other stakeholders. When discussing the need for problem framing to manage design space, she shared:

> But when I think about what it takes to frame a problem, which I think is the hardest part because so much of our educational experiences are about solving problems…But problem framing, trying to understand what the problem is, how we know what it is, how to frame it ethically, how to frame it from the lens of justice, how do we not add more harm? How do we acknowledge the power that we have as designers? I don't know how you can possibly do that without an authentic context.

Metatheme 3: Facilitating Authentic Learning Experiences

<u>Theme 5: Balancing instructional scaffolding within situated experiences</u>

Instructors voiced the inherent struggle in finding the delicate balance between offering essential support to students and granting them the freedom to explore their projects independently. They discussed the challenge of nurturing a learning environment that encourages autonomy while ensuring students receive the guidance and resources necessary for a well-rounded educational experience. Mary shared:

> I want them to know that instructional design is messy. I want them to have authentic learning experiences because when they go into the workforce, it’s not going to be as easy as, “Here’s a task. You do this. I give you feedback. The project is done. And then you go on to do something else.” You require time management skills, again you require soft skills, requires patience. And I just want them to have those experiences to be as authentic as they would be in the real world.

Paul shared that a lot of feedback he received from students was relative to their level of comfortable with attempting something new. He shared,

> A lot of the feedback I got throughout the course was, “I’ve never done this before. I don’t know what this means. Why am I expected to do this?” It felt like it was a really high bar for the students going through that process.

Don shared how students expressed frustration over the lack of explicit instructions for completing their projects, feeling abandoned in the absence of clear, step-by-step guidance. He noted that this underscores the instructor's challenge of determining the right moment to “take the training wheels off,’ encouraging independence without leaving students feeling unsupported. When asked how the students responded to the lack of explicit guidelines, Don shared:

> It frustrates them in one sense, because sometimes they do feel like I'm just throwing them to the wolves and they're doing things they don't feel prepared for, but I'd like to think, and I hope long-term it helps them. Because at that time where I can guide them, I'm guiding them on the things that really matter to them and not just giving them this general, maybe this is important overview or stuff they already know how to do.

<u>Theme 6: Supporting perceived utility in authentic learning</u>

During the interviews, instructors underscored the important role of authentic projects in readying students for the complexities of the real world, emphasizing that these assignments should both mirror the technical and soft skill demands of professional environments in the field. Several participants stressed the need for students to gain experience going through successes and challenges that accompany the design process in a real-world project. Keith noted the real learning occurs from engaging in the experience:

> I need them to understand that it's authentic, and I need them to understand it's less about evaluating the actual quality of the product, because sometimes the product looks like crap, but it's the process they got to that is more important.

They argued for projects that not only challenge instructional students with the technicalities of instructional design but also with the unpredictability, resource constraints, and necessity for innovation that characterize real-world scenarios. The discussion converged on the idea that by simulating these conditions and emphasizing the development of soft skills like communication, leadership, and critical thinking, educators can better bridge the gap between academic learning and industry expectations, thereby preparing students to be more adaptable, effective professionals in their future careers.

Cecilia talked about the importance of providing students with authentic experiences to better prepare them for when they enter the job market. She noted that they need to be able to make connections and see the bigger picture. When discussing how instructional design students need to be prepared to approach a design project with an overarching view of the system, Cecilia shared:

> If they come to you and say, "Is this an instructional design or non-instructional intervention?" it's important not to jump to a solution and become locked in… you know you should remain solution-neutral…". So, it's really seeing what happens in the workplace.

When speaking with the instructors about supporting students' abilities to engage in design conjecture, several noted the importance of grasping the interconnectedness of different design activities and system components to ensure a cohesive and functional outcome. Understanding these relationships allows instructional design students to anticipate how changes in one area can impact others, leading to more informed design decision-making. Marc shared,

> If you can understand that you're operating within the system and there's all this stuff going on and even if you can just regurgitate to me like, "Performance doesn't happen in a vacuum." I'm usually pretty happy. And think it's good because they're not just saying

> "Everything happens and everything is a system or all these pieces are interconnected." They're able to say in art, "I saw how this piece was connected to this piece."

Discussion

Faculty Engagement in Dynamic Decision-Making for Authentic Learning

Faculty play a pivotal role in shaping online learning environments. Their expertise in subject matter, combined with instructional design knowledge, positions them as key decision-makers in developing meaningful learning experiences. Faculty are often tasked with curating and creating content that resonates with real-world scenarios, fostering student engagement and promoting deeper learning. In addition to being content experts, they act as facilitators, guiding students in applying theoretical concepts to practical problems through collaborative and authentic activities (Berry, 2019; Lowell & Moore, 2020).

The shift to online learning has necessitated that faculty take on multifaceted roles, including those of designers, facilitators, and evaluators. These roles require a nuanced understanding of technology, pedagogy, and student needs. Faculty must navigate digital tools and platforms to construct interactive and inclusive learning environments that reflect authentic contexts (Stefaniak & Xu, 2020).

Dynamic decision-making empowers faculty to adapt their instructional strategies based on evolving student needs, technological affordances, and contextual factors (Stefaniak et al., 2021). This process involves real-time assessment of student engagement and understanding, enabling faculty to adjust course materials, activities, and assessments (Abramenka-Lachheb & Ozogul, 2022). For example, faculty may identify gaps in student comprehension during a synchronous session and decide to incorporate additional resources or modify the delivery method to address these challenges.

Faculty must also navigate unforeseen challenges, such as technical issues or shifts in course dynamics, by employing adaptive strategies. This requires a balance between pre-planned instruction and the flexibility to make on-the-fly decisions. By leveraging dynamic decision-making, faculty can create a responsive and student-centered learning environment, ensuring that authentic learning remains the core focus despite external constraints.

Authentic learning necessitates a balance between granting students autonomy and providing adequate support. Faculty must design activities that encourage exploration, problem-solving, and collaboration while also offering guidance to ensure that learning objectives are met. This balance requires careful consideration of task complexity, student readiness, and available resources (Coomey & Stephenson, 2018; Stefaniak et al., 2022). Over-reliance on faculty intervention can hinder autonomy, while insufficient support may lead to student frustration.

Strategies such as scaffolding, feedback, and reflective exercises help maintain this equilibrium. Faculty can scaffold complex tasks by breaking them into manageable components, progressively reducing support as students gain confidence and competence (Doo et al., 2020;

Song & Kim, 2021). Similarly, timely and constructive feedback can guide students in refining their approaches to problem-solving and applying their knowledge to real-world contexts.

Environmental Analysis in Online Course Design

Environmental analysis in online course design involves a thorough understanding of the contextual factors that influence learning (Stefaniak & Xu, 2020). These factors include student demographics, technological infrastructure, cultural diversity, and institutional policies. A nuanced appreciation of these elements enables instructional designers to tailor courses that address the unique needs and challenges of their learners. Contextual considerations extend to the alignment of course content with real-world applications. Instructional designers must ensure that the learning environment reflects authentic contexts that resonate with students' experiences and career aspirations. This alignment not only enhances engagement but also promotes the transfer of knowledge and skills to professional settings.

Environmental analysis serves as a foundation for informed decision-making in course design. By gathering and analyzing data on learner needs, technological capabilities, and contextual constraints, instructional designers can make strategic choices that enhance the learning experience (Baaki et al., 2023). The findings from environmental analysis inform decisions about content delivery, assessment methods, and student support mechanisms, fostering a cohesive and effective course design.

Dynamic Decision-Making in Time-Sensitive Online Environments

In time-sensitive environments, bounded rationality enables instructional designers to make practical decisions with limited information and resources. This approach involves setting priorities, focusing on critical tasks, and using heuristics to streamline decision-making (Stefaniak et al., 2023; York & Ertmer, 2011). For example, when faced with tight deadlines, designers might prioritize the development of high-impact learning activities over less essential components (Caskurlu et al., 2021).

Effective communication and collaboration among team members further support bounded rationality. By fostering an open exchange of ideas, instructional designers can pool their expertise to identify innovative solutions that address constraints. Leveraging past experiences, design precedent, and evidence-based practices can guide decision-making, reducing the cognitive load associated with complex problem-solving (Boling & Gray, 2018; Demiral-Uzan & Boling, 2024).

Time-sensitive instructional design often requires balancing competing demands, such as limited budgets, tight schedules, and high expectations for quality. Designers must prioritize tasks that align with course objectives while identifying opportunities for efficiency (Stefaniak et al., 2022). Proactive planning and contingency strategies are essential for managing constraints effectively. Designers can mitigate risks by anticipating potential challenges, such as technological failures or content delivery delays, and preparing alternative solutions.

Leveraging Technological Affordances to Facilitate Authentic Learning

Technologies enable the design and implementation of authentic activities by providing various capabilities and opportunities for learners. Instructors can incorporate real-world and authentic contexts, allowing students to freely navigate resources and access diverse materials such as video clips, multimedia presentations, images, and simulations and apply them to situated activities (Herrington et al., 2003). Collaborative tools and communication mechanisms can foster a sense of community and shared experience among learners (Davis et al., 2018; Kaufmann & Vallade, 2022; Molinillo et al., 2018). Online discussion forums, video conferencing, and collaborative documents editing enable students to work together in real-time, promoting collaborative problem-solving and knowledge construction.

These technologies break down geographical barriers, creating diverse and inclusive learning environments where students can contribute their unique perspectives. This approach helps to uphold the complexity of real-life settings and provides motivation for students to complete tasks (Luo et al., 2017; Pu et al., 2016; Teras & Kartoglu, 2018). This not only enhances comprehension but also bridges the gap between theoretical knowledge and practical application. By leveraging technological affordances for authentic learning, online environments can emulate the teamwork and communication skills demanded in real-world settings (Martinez-Arguelles et al., 2023; Matthew & Butler, 2017).

However, even if technologies have supported faculty to create inclusive and accessible authentic learning experiences in a variety of ways (Herrington et al., 2003; Luo et al., 2017), the current study still captured some of the faculty's struggles and concerns while designing authentic learning activities in digital learning environments. It is critical to acknowledge that most faculty who teach instructional design courses in the current study successfully recognized the importance of grasping the interconnectedness of different design activities and system components within the learning environment to ensure a functional outcome, by leveraging their dynamic decision-making and environmental analysis skills within the digital environment. Technologies are not perfect, and instructional design faculty should integrate them wisely by keeping the balance between offering essential support to students and granting students autonomy in their authentic learning experiences.

Implications of Environmental Analysis and Dynamic Decision-Making

Environmental analysis involves understanding the context in which instructional products will be used, including physical and use factors of the instructional environment (Tessmer & Wedman, 1995). This analysis is critical for designing situated learning experiences that promote the acquisition of knowledge and transfer of learning in an online environment (Abramenka-Lachheb & Ozogul, 2022; Richardson et al., 2017). It also helps instructional designers to determine the appropriate degree of interaction required for the learning experience and informs their decision-making abilities (Stefaniak & Xu, 2020).

Dynamic decision-making prompts instructional designers to make decisions within a short time frame based on the resources available (Brehmer, 1992; Klein, 2008). It involves establishing a bounded rationality, engaging in design conjecture, and aligning decision solutions (Stefaniak et al., 2022). This process is essential for IDs to make prompt and appropriate design decisions for authentic learning in digital environments, considering environmental factors that influence design decisions.

The combination of environmental analysis and dynamic decision-making supports the design of activities grounded in an authentic context, elicits the application of conceptual, strategic, and conditional knowledge domains, and promotes the transfer of learning to real-world contexts (Stefaniak & Xu, 2020). It also helps instructional designers leverage contextual factors influencing the learning experience.

The current study reinforced that instructional design decisions can be significantly influenced by factors such as contextual analysis, environmental analysis, and time-sensitive instruction. Contextual analysis involves understanding the contextual factors that may support or inhibit learning, and it is crucial for instructional designers to consider these factors when making design decisions (Tracey & Baaki, 2022). Instructional designers must conduct environmental analyses to inform their design decisions, as the gathered information on contextual factors influences the decisions, strategies, and solutions they employ during a project.

Time-sensitive instruction greatly influences instructional design decisions requiring course designers to engage in dynamic decision-making. Time constraints greatly impact an instructional designer's ability to make appropriate decisions and implement solutions when designing instruction. It is imperative that instructional designers are equipped with strategies to support problem-solving and decision-making that occur throughout the instructional design process, particularly in real-world contexts.

Instructional designers can leverage dynamic decision-making and environmental analysis to support authentic learning experiences in online environments by considering contextual factors that influence design decisions and promoting the acquisition of knowledge in real-world settings. Instructional designers can leverage the outputs of environmental analysis to support their dynamic decision-making as they design learning experiences that are situated and promote the acquisition of knowledge and transfer of learning in an online environment (Bhat et al., 2022; Stefaniak & Xu, 2020). Instructional designers must make prompt and appropriate design decisions within a bounded rationality, engage in design conjecture, and align decision solutions. This process is essential for instructional designers to make prompt and appropriate design decisions for authentic learning in online environments, considering contextual factors that influence design decisions (Baaki & Tracey, 2019; Tracey et al., 2021).

Learners' acquisition of knowledge is supported through learning activities that elicit demonstration of their conceptual, strategic, and conditional knowledge domains, time-sensitive instruction, and situating activities in context. To cultivate a deep understanding of learning theories and their application, instructional designers might engage in an activity where they analyze case studies of real-world instructional design projects (Koehler et al., 2022). This provides instructional design students with an opportunity to explore unique nuanced needs within a particular situation and allows them to see how different theoretical frameworks translate into tangible outcomes in real-world contexts (Choi & Lee, 2008, Trespalacios, 2017; Watson et al., 2023).

Service-learning projects provide instructional designers with opportunities to collaborate with a local organization to address a design problem by engaging with stakeholders to understand their needs and then design, implement, and assess possible instructional and non-instructional solutions that may address the challenge (Maddrell, 2014). Through these types of authentic learning experiences, instructional design students not only refine their strategic skills but also learn the importance of empathy and collaboration in creating effective learning environments (Baaki & Maddrell, 2020).

Instructional simulations can be developed to replicate the decision-making process involved in designing a comprehensive learning system for an organization. Instructional design students could navigate a variety of design constraints such as budget limitations, technological and organizational infrastructures, and organizational culture to develop a strategy that aligns with the organization's goals and learner needs. During the simulation, instructional design students could engage in reflective practice exercises where they discuss the rationale behind their decisions, explore alternative approaches, and receive feedback from peers and their instructor (e.g., Chang et al., 2010). This reflective component deepens their understanding of effective instructional strategies in various contexts and improves their ability to adapt their methods in response to changing situations (Howell et al., 2021).

Limitations and Future Research

The participants in this study were all instructors teaching online instructional design courses. One limitation is that they were asked to reflect on their design processes that had previously occurred, which potentially involves the decay of memory. Another limitation of this study is the qualitative nature of the research design with a relatively small sample size of 13 participants. While this approach allows for an in-depth exploration of individual instructors' perspectives and provides rich, detailed insights into their experiences, it limits the generalizability of the findings.

Future research examining how instructional design instructors engage in environmental and contextual analyses to design online experiences in real-time would provide a more nuanced look into design decision-making. Additionally, expanding the context of this research beyond online courses offered in higher education would provide an opportunity to identify and delve into nuanced challenges facing different contexts such as business and industry, K-12 education, healthcare, and military and government. A quantitative survey approach with a larger and more diverse participant pool could complement these findings by identifying broader trends and patterns across different instructional design contexts. Such an approach might also mitigate potential biases introduced by self-selection, as those who choose to participate in qualitative research may have particularly strong opinions or unique experiences that are not representative of the larger population.

Conclusion

This study investigated dynamic decision-making of faculty as they design authentic learning experiences for online educational environments. Several metathemes were found and discussed, focusing on faculty's dynamic decision-making processes within the design space, their environmental analysis on learning contexts to support authentic learning experiences, and their self-reflective design actions aimed at promoting authentic learning activities with environmental constraints. The findings of this study suggest that faculty should leverage dynamic decision-making and contextual analysis in a balanced approach to designing authentic learning experiences. This also involves designing learning activities that encourage the demonstration of their conceptual, strategic, and conditional knowledge, incorporating time-sensitive instruction, and situating activities within contexts.

References

Abramenka-Lachheb, V., & Ozogul, G. (2022). Faculty as designers of authentic learning projects in online courses. *Online Learning*, *26*(4), 281-303. https://doi.org/10.24059/olj.v26i4.2826

Alioon, Y., & Delialioğlu, Ö. (2019). The effect of authentic m-learning activities on student engagement and motivation. *British Journal of Educational Technology*, *50*(2), 655-668. https://doi.org/10.1111/bjet.12559

Arkoful, V., & Abaidoo, N. (2015). The role of e-learning, advantages and disadvantages of its adoption in higher education. *International Journal of Instructional Technology and Distance Learning*, *12*(1), 29-42.

Baaki, J., & Tracey, M.W. (2019). Weaving a localized context of use: What it means for instructional design. *Journal of Applied Instructional Design, 8*(1), 1-13. https://doi.org/10.4324/9781003109938-7

Baaki, J., & Maddrell, J. (2020). Building empathy and developing instructional design experience and skills: A case study of using personas to design open education resources. *The Journal of Applied Instructional Design*, *9*(3). https://doi.org/10.51869/93jbjm

Baaki, J., Tracey, M. W., & Bailey, E. (2023). Exploring the two sides of a moment of use approach to design. *TechTrends, 67*(3), 572–582. https://doi.org/10.1007/s11528-022-00828-4

Bhat, Z. H., Mir, R. A., Rameez, R., & Rainayee, R. A. (2022). The influence of learner characteristics, instructional design and work environment on the transfer of training. *Industrial and Commercial Training*, *54*(4), 566-588. https://doi.org/10.1108/ict-03-2022-0014

Belcher, A. R., Hall, B. M., Kelley, K., & Pressey, K. L. (2015). An analysis of faculty promotion of critical thinking and peer interaction within threaded discussions. *Online Learning*, *19*(4). https://doi.org/10.24059/olj.v19i4.544

Berry, S. (2019). Faculty perspectives on online learning: The instructor's role in creating community. *Online Learning*, *23*(4), 181-191. https://doi.org/10.24059/olj.v23i4.2038

Boling, E., Alangari, H., Hajdu, I. M., Guo, M., Gyabak, K., Khlaif, Z., Kizilboga, R., Tomita, K., Alsaif, M., Lachheb, A., Bae, H., Ergulec, F., Zhu, M., Basdogan, M., Buggs, C., Sari, A., & Techawitthayachinda, R. I. (2017). Core judgments of instructional designers in practice. *Performance Improvement Quarterly*, *30*(3), 199-219. https://doi.org/10.1002/piq.21250

Boling, E., & Gray, C. M. (2018). Use of precedent as a narrative practice in design learning. In B. Hokanson, G. Clinton, & K. Kaminski (Eds.), *Educational technology and narrative: Story and instructional design* (pp. 259-270). Springer. https://doi.org/10.1007/978-3-319-69914-1

Boschman, F., McKenney, S., & Voogt, J. (2014). Understanding decision making in teachers' curriculum design approaches. *Educational Technology Research and Development*, *62*(4), 393-416. https://doi.org/10.1007/s11423-014-9341-x

Bower, M., Dalgarno, B., Kennedy, G. E., Lee, M. J., & Kenney, J. (2015). Design and implementation factors in blended synchronous learning environments: Outcomes from a cross-case analysis. *Computers & Education*, *86*, 1-17. https://doi.org/10.1016/j.compedu.2015.03.006

Brehmer, B. (1992). Dynamic decision making: Human control of complex systems. *Acta Psychologica, 81*(3), 211–241. https://doi.org/10.1016/0001-6918(92)90019-a

Britt, M., Goon, D., & Timmerman, M. (2015). How to better engage online students with online strategies. *College Student Journal*, *49*(3), 399-404.

Brown, A.H., & Green, T.D. (2019). *The essentials of instructional design: Connecting fundamental principles with process and practice* (3rd ed.). Routledge.

Cai, Y., Pan, Z., Han, S., Shao, P., & Liu, M. (2022). The impact of multimodal communication on learners' experience in a synchronous online environment: A mixed-methods study. *Online Learning*, *26*(4), 118-145. https://doi.org/10.24059/olj.v26i4.3448

Caskurlu, S., Richardson, J. C., Alamri, H. A., Chartier, K., Farmer, T., Janakiraman, S., ... & Yang, M. (2021). Cognitive load and online course quality: Insights from instructional designers in a higher education context. *British Journal of Educational Technology*, *52*(2), 584-605. https://doi.org/10.1111/bjet.13043

Chang, Y. C., Peng, H. Y., & Chao, H. C. (2010). Examining the effects of learning motivation and of course design in an instructional simulation game. *Interactive Learning Environments*, *18*(4), 319-339.

Cho, M. H., Demei, S., & Laffey, J. (2010). Relationships between self-regulation and social experiences in asynchronous online learning environments. *Journal of Interactive Learning Research*, *21*(3), 297-316. https://doi.org/10.1080/10494820802292386

Choi, I., & Lee, K. (2008). A case-based learning environment design for real-world classroom management problem solving. *TechTrends*, *52*(3), 26-31. https://doi.org/10.1007/s11528-008-0151-z

Coomey, M., & Stephenson, J. (2018). Online learning: It is all about dialogue, involvement, support and control—according to the research. In J. Stephenson (Ed.), *Teaching &*

learning online (pp. 37-52). Routledge.

Crilly, N., & Firth, R. M. (2019). Creativity and fixation in the real world: Three case studies of invention, design and innovation. *Design Studies*, *64*, 169-212. https://doi.org/10.1016/j.destud.2019.07.003

Davis, D., Chen, G., Hauff, C., & Houben, G. J. (2018). Activating learning at scale: A review of innovations in online learning strategies. *Computers & Education*, *125*, 327-344. https://doi.org/10.1016/j.compedu.2018.05.019

Demiral-Uzan, M., & Boling, E. (2024). Instructional design students' design judgment development. *Educational Technology Research and Development*, *72*(3), 1813-1849. https://doi.org/10.1007/s11423-024-10361-1

Devine, J. L., Bourgault, K. S., & Schwartz, R. N. (2020). Using the online capstone experience to support authentic learning. *TechTrends*, *64*(4), 606-615. https://doi.org/10.1007/s11528-020-00516-1

Doo, M. Y., Bonk, C., & Heo, H. (2020). A meta-analysis of scaffolding effects in online learning in higher education. *International Review of Research in Open and Distributed Learning*, *21*(3), 60-80. https://doi.org/10.19173/irrodl.v21i3.4638

Dorst, K. (2019). Co-evolution and emergence in design. *Design Studies*, *65*, 60-77. https://doi.org/10.1016/j.destud.2019.10.005

Dziuban, C., Moskal, P., Parker, L., Campbell, M., Howlin, C., & Johnson, C. (2018). Adaptive learning: A stabilizing influence across disciplines and universities. *Online Learning*, *22*(3), 7-39. https://doi.org/10.24059/olj.v22i3.1465

Elliott, V. (2018). Thinking about the coding process in qualitative data analysis. *Qualitative Report*, *23*(11), 2850-2861. https://doi.org/10.46743/2160-3715/2018.3560

Ertmer, P. A. (1999). Addressing first-and second-order barriers to change: Strategies for technology integration. *Educational Technology Research and Development*, *47*(4), 47-61. https://doi.org/10.1007/bf02299597

Ertmer, P. A., & Koehler, A. A. (2014). Online case-based discussions: Examining coverage of the afforded problem space. *Educational Technology Research and Development*, *62*(5), 617-636. https://doi.org/10.1007/s11423-014-9350-9

Ertmer, P. A., Sadaf, A., & Ertmer, D. J. (2011). Student-content interactions in online courses: The role of question prompts in facilitating higher-level engagement with course content. *Journal of Computing in Higher Education*, *23*(2-3), 157-186. https://doi.org/10.1007/s12528-011-9047-6

Ertmer, P. A., & Stepich, D. A. (2005). Instructional design expertise: How will we know it when we see it? *Educational Technology*, 38-43.

Flanagan, J.C. (1954). The critical incident technique. *Psychological Bulletin, 51*(4), 327-358. https://doi.org/10.1037/h0061470

García-Cabrero, B., Hoover, M. L., Lajoie, S. P., Andrade-Santoyo, N. L., Quevedo-Rodríguez, L. M., & Wong, J. (2018). Design of a learning-centered online environment: a cognitive apprenticeship approach. *Educational Technology Research and Development*, *66*(3),813-835. https://doi.org/10.1007/s11423-018-9582-1

Giesbers, B., Rienties, B., Tempelaar, D., & Gijselaers, W. (2014). A dynamic analysis of the interplay between asynchronous and synchronous communication in online learning: The impact of motivation. *Journal of Computer Assisted Learning*, *30*(1), 30-50. https://doi.org/10.1111/jcal.12020

Harris, N. D. C., & Tessmer, M. A. (1990). Environment analysis: How do you catch the learner? *Educational & Training Technology International*, *27*(4), 350-364. https://doi.org/10.1080/1355800900270402

Heitink, M., Voogt, J., Verplanken, L., van Braak, J., & Fisser, P. (2016). Teachers' professional reasoning about their pedagogical use of technology. *Computers & Education*, *101*, 70-83. https://doi.org/10.1016/j.compedu.2016.05.009

Henderson, M., Selwyn, N., & Aston, R. (2017). What works and why? Student perceptions of "useful" digital technology in university teaching and learning. *Studies in Higher Education*, *42*(8), 1567-1579. https://doi.org/10.1080/03075079.2015.1007946

Herrington, J., & Oliver, R. (2000). An instructional design framework for authentic learning environments. *Educational Technology Research and Development*, *48*(3), 23-48. https://doi.org/10.1007/bf02319856

Herrington, J., Oliver, R., & Reeves, T. C. (2003). Patterns of engagement in authentic online learning environments. *Australasian Journal of Educational Technology*, *19*(1). https://doi.org/10.14742/ajet.1701

Herrington, J., Reeves, T. C., & Oliver, R. (2006). Authentic tasks online: A synergy among learner, task, and technology. *Distance Education*, *27*(2), 233-247. https://doi.org/10.1080/01587910600789639

Herrington, J., Reeves, T. C., & Oliver, R. (2014). *Authentic learning environments*. In J.M. Spector, M.D. Merrill, J. Elen, & M.J. Bishop (Eds.), *Handbook of research on educational communications and technology* (4th ed., pp. 401-412). Springer.

Hmelo-Silver, C. E. (2013). Creating a learning space in problem-based learning. *Interdisciplinary Journal of Problem-Based Learning*, *7*(1), 5. https://doi.org/10.7771/1541-5015.1334

Honebein, P. C. (2019). Exploring the galaxy question: The influence of situation and first principles on designers' judgments about useful instructional methods. *Educational Technology Research and Development*, *67*(3), 665-689. https://doi.org/10.1007/s11423-019-09660-9

Howell, H., & Mikesha, J.N. (2021). Approximations of practice as a framework for understanding authenticity in simulations of teaching. *Journal of Research on Technology in Education, 53*(1), 8-20. https://doi.org/10.1080/15391523.2020.1809033

Jonassen, D. H. (1997). Instructional design models for well-structured and ill-structured problem-solving learning outcomes. *Educational Technology Research and Development*, *45*(1), 65-94. https://doi.org/10.1007/bf02299613

Jonassen, D. H. (2012). Designing for decision making. *Educational Technology Research and Development*, *60*(2), 341-359. https://doi.org/10.1007/s11423-011-9230-5

Kaufmann, R., & Vallade, J. I. (2022). Exploring connections in the online learning environment: student perceptions of rapport, climate, and loneliness. *Interactive Learning Environments*, *30*(10), 1794-1808. https://doi.org/10.1080/10494820.2020.1749670

Kenny, R., Zhang, Z., Schwier, R., & Campbell, K. (2005). A review of what instructional designers do: Questions answered and questions not asked. *Canadian Journal of Learning and Technology, 31*(1). https://doi.org/10.21432/t2jw2p

Klein, G. (2008). Naturalistic decision making. *Human Factors*, *50*(3), 456-460. https://doi.org/10.1518/001872008x288385

Koehler, A. A., Cheng, Z., Fiock, H., Wang, H., Janakiraman, S., & Chartier, K. (2022). Examining students' use of online case-based discussions to support problem solving: Considering individual and collaborative experiences. *Computers & Education*, *179*, 104407. https://doi.org/10.1016/j.compedu.2021.104407

Kvale, S. & Brinkmann, S. (2009). *Interviews: Learning the craft of qualitative interviewing* (2nd ed.) Sage.

Lai, C. H., Lin, H. W., Lin, R. M., & Tho, P. D. (2019). Effect of peer interaction among online learning community on learning engagement and achievement. *International Journal of Distance Education Technologies*, *17*(1), 66-77. https://doi.org/10.4018/ijdet.2019010105

Lai, P. K., Portolese, A., & Jacobson, M. J. (2017). Does sequence matter? Productive failure and designing online authentic learning for process engineering. *British Journal of Educational Technology*, *48*(6), 1217-1227. https://doi.org/10.1111/bjet.12492

Lincoln, Y.S., & Guba, E.G. (1985). *Naturalistic inquiry.* Sage.

Liu, M., McKelroy, E., Corliss, S. B., & Carrigan, J. (2017). Investigating the effect of an adaptive learning intervention on students' learning. *Educational Technology Research and Development*, *65*(6), 1605-1625. https://doi.org/10.1007/s11423-017-9542-1

Lowell, V. L., & Moore, R. L. (2020). Developing practical knowledge and skills of online instructional design students through authentic learning and real-world activities. *TechTrends*, *64*(4), 581-590. https://doi.org/10.1007/s11528-020-00518-z

Lowell, V. L., & Yang, M. (2023). Authentic learning experiences to improve online instructor's performance and self-efficacy: The design of an online mentoring program. *TechTrends*, *67*(1), 112-123. https://doi.org/10.1007/s11528-022-00770-5

Lowenthal, P. R., & Dennen, V. P. (2017). Social presence, identity, and online learning: Research development and needs. *Distance Education*, *38*(2), 137-140. https://doi.org/10.1080/01587919.2017.1335172

Luo, T., Murray, A., & Crompton, H. (2017). Designing authentic learning activities to train pre-service teachers about teaching online. *International Review of Research in Open and Distributed Learning*, *18*(7). https://doi.org/10.19173/irrodl.v18i7.3037

Maddrell, J. (2014). Service-learning instructional design considerations. *Journal of Computing in Higher Education*, *26*(3), 213-226. https://doi.org/10.1007/s12528-014-9085-y

Majewska, I., & Zvobgo, V. (2023). Students' satisfaction with quality of synchronous online learning under the COVID-19 pandemic: perceptions from liberal arts and science undergraduates. *Online Learning*, *27*(1), 313-335. https://doi.org/10.24059/olj.v27i1.3201

Martin, F., Chen, Y., Moore, R. L., & Westine, C. D. (2020). Systematic review of adaptive learning research designs, context, strategies, and technologies from 2009 to 2018. *Educational Technology Research and Development*, *68*(4), 1903-1929. https://doi.org/10.1007/s11423-020-09793-2

Martínez-Argüelles, M. J., Plana-Erta, D., & Fitó-Bertran, À. (2023). Impact of using authentic online learning environments on students' perceived employability. *Educational Technology Research and Development*, *71*(2), 605-627. https://doi.org/10.1007/s11423-022-10171-3

Mattar, J. (2018). Constructivism and connectivism in education technology: Active, situated, authentic, experiential, and anchored learning. *RIED. Revista Iberoamericana de Educación a Distancia, 21*(2). https://doi.org/10.5944/ried.21.2.20055

Matthew, A., & Butler, D. (2017). Narrative, machinima and cognitive realism: Constructing an authentic real-world learning experience for law students. *Australasian Journal of Educational Technology, 33*(1), 148–162. https://doi.org/10.14742/ajet.2846

McDonald, J. K. (2023). The everydayness of instructional design and the pursuit of quality in online courses. *Online Learning, 27*(1). https://doi.org/10.24059/olj.v27i2.3470

Moallem, M. (2015). The impact of synchronous and asynchronous communication tools on learner self-regulation, social presence, immediacy, intimacy and satisfaction in collaborative online learning. *The Online Journal of Distance Education and e-Learning*, *3*(3), 55-77.

Molinillo, S., Aguilar-Illescas, R., Anaya-Sánchez, R., & Vallespín-Arán, M. (2018). Exploring the impacts of interactions, social presence and emotional engagement on active collaborative learning in a social web-based environment. *Computers & Education*, *123*, 41-52. https://doi.org/10.1016/j.compedu.2018.04.012

Noreen, Z., Ajmal, M., & Awan, A. (2019). Impact of authentic learning on the satisfaction, knowledge and skills of distance learners in context-aware ubiquitous learning environment. *Global Regional Review*, *4*(2), 115-125. https://doi.org/10.31703/grr.2019(iv-ii).13

Parker, J., Maor, D., & Herrington, J. (2013). Authentic online learning: Aligning learner needs, pedagogy and technology. *Issues in Educational Research*, *23*(2), 227-241.

Parkes, M., Stein, S., & Reading, C. (2015). Student preparedness for university e-learning environments. *The Internet and Higher Education*, *25*, 1-10. https://doi.org/10.1016/j.iheduc.2014.10.002

Peterson, A. T., Beymer, P. N., & Putnam, R. T. (2018). Synchronous and asynchronous discussions: Effects on cooperation, belonging, and affect. *Online Learning*, *22*(4), 7-25. https://doi.org/10.24059/olj.v22i4.1517

Polly, D., Martin, F., & Byker, E. (2023). Examining pre-service and in-service teachers' perceptions of their readiness to use digital technologies for teaching and learning. *Computers in the Schools*, *40*(1), 22-55. https://doi.org/10.1080/07380569.2022.2121107

Pu, Y.-H., Wu, T.-T., Chiu, P.-S., & Huang, Y.-M. (2016). The design and implementation of authentic learning with mobile technology in vocational nursing practice course. *British Journal of Educational Technology, 47*(3), 494-509. https://doi.org/10.1111/bjet.12443

Reilly, C., & Reeves, T. C. (2022). Refining active learning design principles through design-based research. *Active Learning in Higher Education*, *25*(1), 81-100. https://doi.org/10.1177/14697874221096140

Richardson, J. C., Sadaf, A., & Ertmer, P. A. (2013). Relationship between types of question prompts and critical thinking in online discussions. In *Educational communities of inquiry: Theoretical framework, research and practice* (pp. 197-222). IGI Global.

Rogers, S. A., & Gronseth, S. L. (2021). Applying UDL to online active learning. *The Journal of Applied Instructional Design*, *10*(1). https://doi.org/10.59668/223.3748

Schroeder, S., Baker, M., Terras, K., Mahar, P., & Chiasson, K. (2016). Students' desired and experienced levels of connectivity to an asynchronous, online, distance degree program. *Online Learning*, *20*(3), 244-263. https://doi.org/10.24059/olj.v20i3.691

Shafto, P., Goodman, N. D., & Griffiths, T. L. (2014). A rational account of pedagogical reasoning: Teaching by, and learning from, examples. *Cognitive Psychology*, *71*, 55-89. https://doi.org/10.1016/j.cogpsych.2013.12.004

Song, D., & Kim, D. (2021). Effects of self-regulation scaffolding on online participation and learning outcomes. *Journal of Research on Technology in Education*, *53*(3), 249-263. https://doi.org/10.1080/15391523.2020.1767525

Stefaniak, J.E. (2024). *Advanced instructional design techniques: Theories and strategies for complex learning.* Routledge.

Stefaniak, J.E., Baaki, J., & Stapleton, L. (2022). An exploration of conjecture strategies used by instructional design students to support design decision-making. Educational Technology Research and Development, 70(2), 585-613. https://doi.org/10.1007/s11423-022-10092-1

Stefaniak, J. E., & Hwang, H. (2021). A systematic review of how expertise is cultivated in instructional design coursework. *Educational Technology Research and Development*, *69*, 3331-3366. https://doi.org/10.1007/s11423-021-10064-x

Stefaniak, J.E., Luo, T., & Xu, M. (2021). Fostering pedagogical reasoning and dynamic decision-making practices: A conceptual framework to support learning design in a digital age. *Educational Technology Research and Development*, *69*(4), 2225-2241. https://doi.org/10.1007/s11423-021-09964-9

Stefaniak, J., Tawfik, A., & Sentz, J. (2023). Supporting dynamic instructional design decisions within a bounded rationality. *TechTrends*, *67*(2), 231-244. https://doi.org/10.1007/s11528-022-00792-z

Stefaniak, J.E., & Xu, M. (2020). Leveraging dynamic decision-making and environmental analysis to support authentic learning experiences in digital environments. *Revista De Educación a Distancia (RED)*, *20*(64). https://doi.org/10.6018/red.412171

Teras, H., & Kartoglu, U. (2018). Authentic learning with technology for professional development in vaccine management. *Australasian Journal of Educational Technology, 34*(3), 15–29. https://doi.org/10.14742/ajet.2815

Tessmer, M. (1990). Environment analysis: A neglected stage of instructional design. *Educational Technology Research and Development*, *38*(1), 55-64. https://doi.org/10.1007/bf02298248

Tessmer, M. (1991). Back to the future: The environment analysis stage of front-end analysis. *Performance and Instruction*, *30*(1), 9-12. https://doi.org/10.1002/pfi.4170300104

Tessmer, M., & Wedman, J. (1995). Context-sensitive instructional design models: A response to design research, studies, and criticism. *Performance Improvement Quarterly*, *8*(3), 38-54. https://doi.org/10.1111/j.1937-8327.1995.tb00685.x

Tessmer, M., Wilson, B., & Driscoll, M. (1990). A new model of concept teaching and learning. *Educational Technology Research and Development*, *38*(1), 45-53. https://doi.org/10.1007/bf02298247

Tomita, K., Alangari, H., Zhu, M., Ergulec, F., Lachheb, A., & Boling, E. (2021). Challenges implementing qualitative research methods in a study of instructional design practice. *TechTrends*, *65*(2), 144-151. https://doi.org/10.1007/s11528-020-00569-2

Tracey, M. W., Baaki, J., Budhrani, K., & Shah, S. (2021). "Behind the curtain": Exploring how instructional design teams function to complete design and development. *International Journal of Technology and Design Education, 32*(5), 2853-2871. https://doi.org/10.1007/s10798-021-09715-0

Tracey, M. W., & Baaki, J. (2022). Empathy and empathic design for meaningful deliverables. *Educational Technology Research and Development*, *70*(6), 2091-2116. https://doi.org/10.1007/s11423-022-10146-4

Tracey, M. W., Hutchinson, A., & Grzebyk, T. Q. (2014). Instructional designers as reflective practitioners: Developing professional identity through reflection. *Educational Technology Research and Development*, *62*(3), 315-334. https://doi.org/10.1007/s11423-014-9334-9

Trespalacios, J. (2017). Exploring small group analysis of instructional design cases in online learning environments. *Online Learning, 21*(1). https://doi.org/10.24059/olj.v21i1.928

Van der Kleij, F. M., Feskens, R. C., & Eggen, T. J. (2015). Effects of feedback in a computer-based learning environment on students' learning outcomes: A meta-analysis. *Review of Educational Research*, *85*(4), 475-511. https://doi.org/10.3102/0034654314564881

Warr, M., Henriksen, D. & Mishra, P. (2018). What do we mean when we "design" e-learning solutions? An analysis of discourses on design, technology, and education. In *Proceedings of E-Learn: World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education* (pp. 717–722). Association for the Advancement of Computing in Education.

Watson, W. R., Watson, S. L., Koehler, A. A., & Oh, K. H. (2023). Student profiles and attitudes towards case-based learning in an online graduate instructional design course. *Journal of Computing in Higher Education*, *35*(3), 550-572. https://doi.org/10.1007/s12528-022-09339-w

Webb, M., & Cox, M. (2004). A review of pedagogy related to information and communications technology. *Technology, Pedagogy and Education*, *13*(3), 235-286. https://doi.org/10.1080/14759390400200183

Wilkinson, K. L. (2022). Evaluating a structured online peer evaluation system among graduate-level communication capstone students through action research. *Online Learning*, *26*(1), 93-129. https://doi.org/10.24059/olj.v26i1.3077

Willig, C. (2008). *Introducing qualitative research in psychology: Adventures in theory and method* (2nd ed.). McGraw Hill.

Wiltschnig, S., Christensen, B. T., & Ball, L. J. (2013). Collaborative problem–solution co-evolution in creative design. *Design Studies*, *34*(5), 515-542. https://doi.org/10.1016/j.destud.2013.01.002

Xie, H., Chu, H. C., Hwang, G. J., & Wang, C. C. (2019). Trends and development in technology-enhanced adaptive/personalized learning: A systematic review of journal publications from 2007 to 2017. *Computers & Education*, *140*, 103599. https://doi.org/10.1016/j.compedu.2019.103599

York, C. S., & Ertmer, P. A. (2011). Towards an understanding of instructional design heuristics: An exploratory Delphi study. *Educational Technology Research and Development*, *59*, 841-863. https://doi.org/10.1007/s11423-011-9209-2

Appendix A

Interview Protocol

1. Can you provide a brief overview of the course you teach?
2. For this study, you were asked to discuss when you developed an authentic learning experience that was facilitated in a digital environment. Please describe the activity.
    a. Level of students?
    b. Length of course?
    c. How much time was allocated to the activity or assignment?
3. Can you describe your learners?
    a. What pre-requisite skills do they have prior to your activity?
    b. What are their predispositions of the course?
        i. Do they perceive the course or activity to be useful?
    c. Do you conduct a learner analysis?
        i. How do you gauge their level of expertise?
        ii. To what extent does it impact how you teach the course?
4. How did you align the learning activities to reflect what occurs in real-world settings?
    a. Why was this important to convey in your learning experience?
    b. What challenges do individuals typically experience applying this concept in the real-world?
5. What types of contextual factors influenced how you designed this learning experience for your students?
    a. How do you manage or factor in these contextual factors into your activity?
    b. How do you plan for any challenges that may arise as a result of the contextual factors you've identified?
6. What do you typically do when you decide that you want to design an authentic activity.
    a. Can you walk me through your design process?
7. What were the desired outcomes of the learning experience?
8. What mechanisms did you put in place, if any, to support your learners' abilities to demonstrate acquisition of knowledge?
9. How did you evaluate if your students were successful with mastering this content?
10. What challenges did you encounter, if any, with facilitating this learning experience?
    a. Is there anything that you would change? Why?
11. Did you experience any challenges with facilitating this activity in an online learning environment that you wouldn't experience in a traditional face-to-face classroom setting?

Examining Faculty Perceptions of Distance Course Quality Review Feedback

Kristy Plander, PhD
Dean of Educational Development, Bryan College of Health Sciences

Renee Hathaway, PhD,
Associate Professor of Healthcare Studies, Bryan College of Health Sciences

Deb Maeder, EdD
Lead Program Development Owner, Western Governors University

Abstract
The purpose of this explanatory sequential mixed methods study was to examine faculty perceptions of distance course quality review feedback at a small healthcare-focused college in the United States. The Examining the Evaluator Feedback Survey tool was adapted and used to determine faculty perceptions (N=16) of five key aspects of reviewer feedback (usefulness, accuracy, credibility, access to resources, and responsiveness) and the importance of feedback characteristics. Follow-up interviews (N=3) were conducted for in-depth exploration of survey results. Results indicated that faculty perceived feedback to be useful and accurate and reviewers to be credible. However, faculty would like to have more involvement both to explain their teaching context and to clarify and prioritize results. While receiving feedback was initially unpleasant and the amount of feedback may be overwhelming, faculty responded by using it to make course improvements. The study adds to limited faculty perception research amongst extensive research on quality tools and institutional review processes.

Keywords: Feedback, quality assurance, course review cycle

Plander, X. (2025) Examining faculty perceptions of distance course quality review feedback. *Online Learning 29*(2), pp. 81–94. https://doi.org/10.24059/olj.v29i2.4436

Distance course quality tools are an accepted standard for evaluating and promoting course-level quality and for providing feedback (Baldwin et al., 2018; Baldwin & Ching, 2019; Nworie & Charles, 2021). Given the central role of faculty in designing and delivering courses, faculty perceptions of course quality review feedback are a vital component to meaningful institutional review processes; yet their experiences of receiving feedback from review tools has been given minimal research attention. By gaining insight into how feedback is received, institutions can refine review feedback and processes, provide greater support to faculty, and increase the likelihood that faculty will act upon the review feedback.

Literature Review

Much research has been done to determine the characteristics of a quality distance course. For example, Baldwin et al., (2018) established consensus around quality standards by comparing six online course design evaluation instruments with national and statewide influence. Reviewed instruments also have their own bodies of research that establish and validate the criteria upon which they were built (OSCQR, n.d.; QM, n.d.). Though the characteristics of distance course quality have been studied extensively, more research is needed to determine the perceived value and effectiveness of course quality instruments because the purpose of using these instruments is to provide instructors with support and guidance regarding standards of best practice. (Baldwin et al., 2018; Baldwin & Ching, 2019).

Some of the barriers to acceptance and utilization of course quality tools have been established. For example, faculty have described instruments as rigid, complex, long, and time-consuming (Gregory et al., 2020; McGahan, 2015; McNeal & Gray, 2019). Faculty may also perceive course reviews as evaluating the person who created the course rather than the course itself, despite evidence to the contrary in the criteria (Aminy et al., 2022). In an effort to create more buy-in for using course quality tools, some institutions have customized instruments or processes to fit their needs through a participatory approach (McGahan, 2015; Samuel et al., 2020). Instrument developers have also recognized the need for flexibility, which is why open-source rubrics have been created and why large college/university systems have allowed member institutions to establish their own implementation processes (Aminy et al., 2022). Due in part to faculty resistance to the idea of being evaluated, instruments have also been modified or reframed. For example, rubrics have become checklists and rating scales have moved from performance-based descriptors to measures of how much revision time is needed or to determinations of whether or not an element is present (Baldwin et al., 2018; Baldwin & Ching, 2019; McGahan, 2015). Some quality standards systems have also attended to how feedback is constructed. For example, Quality Matters emphasizes that feedback should be constructive, specific, measurable, sensitive, and balanced in order to be helpful (Ash & Oberlin, 2019).

Institutional review processes have also been studied to determine effective practices in conducting reviews. The literature supported taking a long-term, developmental view and establishing processes in order to catalyze systemic, transformational change (Altman et al., 2020; Bazluki et al., 2018; McNeal & Gray, 2019; Wargo, 2021). For institutions in which instructional designers or other staff complete quality reviews (such as at the study site) a supportive, relational approach was reinforced (Bazluki et al., 2018; Chen & Carliner, 2021). Specifically, Chen and Carliner (2021) summarized factors that facilitated (e.g., communication, trust, and flexibility) and factors that hindered (e.g., lack of clarity, workload, and ambiguity of status) faculty-designer relationships. Employing a relational approach shifted the focus from an isolated course review, which can seem like surveillance, to a long-term collaboration resulting in both enhanced course quality and faculty learning (McNeal & Gray, 2019). Course review participants were also reminded to engage through reflective practice and a philosophical orientation toward valuing feedback, remembering that students are the ultimate beneficiaries of successful quality efforts (Ouahada, 2019; Wargo, 2021).

While it is helpful to know how faculty perceive review tools and processes, there is still a lack of understanding about how faculty perceive the feedback itself. The lack of faculty feedback perception findings in higher education stands in contrast to available research about feedback perceptions of elementary and secondary (K-12) educators conducted as K-12 teacher evaluation systems have become more robust and high stakes. In K-12 settings, studies have affirmed that evaluator credibility and perceived usefulness were the most influential feedback characteristics affecting teachers' responses to feedback (Cherasaro et al., 2016). Researchers have also identified that the following teacher-reported evaluation practices are associated with teaching improvement: scoring methods reflective of teacher performance, post-observation conferences that encourage self-reflection, and access/time to engage with professional development and in-school experts (Hunter, 2024). Meanwhile, feedback specificity (particularly high amounts of critical feedback) had low associations to teacher performance (Hunter, 2024; Hunter & Springer, 2022). Researchers speculated that specific critical feedback may decrease self-efficacy and motivation and called for more investigation of this finding (Hunter, 2024). Higher education institutions and faculty may benefit from building on K-12 inquiries into faculty feedback perceptions.

The foremost reason to invest time and effort in course quality review is to continuously improve teaching and learning. However, it's not clear that consistent pathways have been established for faculty to fully realize the benefits of course review efforts in practice. One reason pathways may have been obscured is that there has been a lack of understanding of the faculty experience of receiving feedback from course quality reviews. To that end, four research questions were developed to frame the study. The first three questions examined how faculty perceive and use feedback. The last question focuses on integration data from the study's mixed methods approach.

1. What distance course quality review feedback characteristics are important to faculty?
2. What are faculty perceptions of distance course quality review feedback?
3. What efforts do faculty make to integrate distance course quality review feedback?
4. In what ways do themes identified in faculty interviews contextualize the faculty experience with distance course quality review feedback?

Methods

The population for this study was purposefully small. The researchers desired to gain an understanding of faculty perceptions at one institution: A small healthcare-focused college in the United States. The chosen site had 109 distance courses at the time of the study. The site uses a customized version of the Open SUNY (State University of New York) Course Quality Rubric (OSCQR) developed through a shared governance model. Focusing on faculty perceptions of feedback at this site allowed the researchers to understand the results situationally and limit the number of intervening variables. An explanatory sequential mixed method was chosen as a way to triangulate multiple data sources and to answer research questions that using a qualitative or quantitative method alone could not answer (Creswell & Plano Clark, 2018; Dawadi et al., 2021; Shorten & Smith, 2017). The study occurred in two phases: a quantitative survey followed by qualitative interviews.

In Phase 1, quantitative data was collected from faculty who received distance course review feedback in the past three years. Administrators teaching distance courses were excluded. The researchers adapted the Examining the Evaluator Feedback Survey, a tool developed through the Educator Effectiveness Research Alliance to gather elementary and secondary teachers' perceptions of received feedback (Cherasaro et al., 2015). This evidence-based tool was used to evaluate five key aspects of reviewer feedback: usefulness, accuracy, credibility, access to resources, and responsiveness (Cherasaro et al., 2015). Permission was not required as the tool is in the public domain (Cherasaro et al., 2015). The original tool was modified for this study so that it was more applicable to higher education, distance education, and the study site context.

After survey results were analyzed, Phase 2 qualitative interview questions were formulated to assist researchers in interpreting the survey results (Dawadi et al., 2021; Shorten & Smith, 2017). Interviews were conducted via a video conferencing platform with a convenience sample of Phase 1 participants who were willing to be interviewed. Following the iterative phases of thematic analysis as described by Creswell and Creswell (2023) and Norwell et al., (2017), all three researchers on the team read the de-identified transcripts to become familiar with the data. Then two researchers coded data in segments, using category labels to represent emerging codes and cross-checking for intercoder agreement. The full team reconvened to analyze the generated codes and explore interrelationships in the data, resulting in the emergence and definition of themes reflective of participant experiences with distance course quality review feedback. Through member checking, participants reviewed the resulting themes as a validation strategy (Creswell & Creswell, 2023; Norwell et al., 2017).

As mentioned, the researchers used an integrated approach to data collection and analysis. The quantitative findings informed the semi-structured interview questions in the qualitative phase (Creswell & Plano Clark, 2018; Dawadi et al., 2021). For example, participants were asked to elaborate on faculty ratings of survey items or to explain why some items were rated higher or lower than others. The participants also had the opportunity to bring forward aspects of course quality reviews that were not addressed on the survey tool. Additionally, the qualitative data was used to inform the quantitative findings (Creswell & Plano Clark, 2018; Dawadi et al., 2021). Interview data explained the survey results, especially results that were surprising to the research team. Interviewees also helped the researchers interpret both wide and narrow gaps between levels of importance and levels of agreement for given survey items. Finally, interviewees illuminated associations between survey findings, such as why some survey items were perceived as more or less important or present in review feedback than others.

The composition of the research team was intentional. Because two research team members deliver course quality reviews as a job requirement, a third member was added as the Research Coordinator. The coordinator was a faculty member who handled all participant correspondence, conducted interviews, and de-identified the transcripts. These team roles were selected to ensure representation of a range of perspectives and as a strategy to mitigate bias in the data collection and interpretation processes.

Results

The Phase 1 survey invitation was sent to 27 faculty who had received distance course reviews in the past three years. This included 13 full-time and 14 adjunct faculty. There were 18 respondents (response rate=66.67%), but two did not recall receiving feedback so they were directed to the end of the survey. This resulted in 16 completed surveys (completion rate=59.26%). All participants had more than five years of experience and half had 15 or more years of experience. A majority of participants (62.5%) stated that they had also taught elsewhere in the past three years.

Survey Results

The level of importance and the level of agreement with key aspects of review feedback are listed in Table 1 and depicted in Figure 1. Items are listed in order from most important to least important.

Table 1

Importance and Level of Agreement for Feedback Characteristics

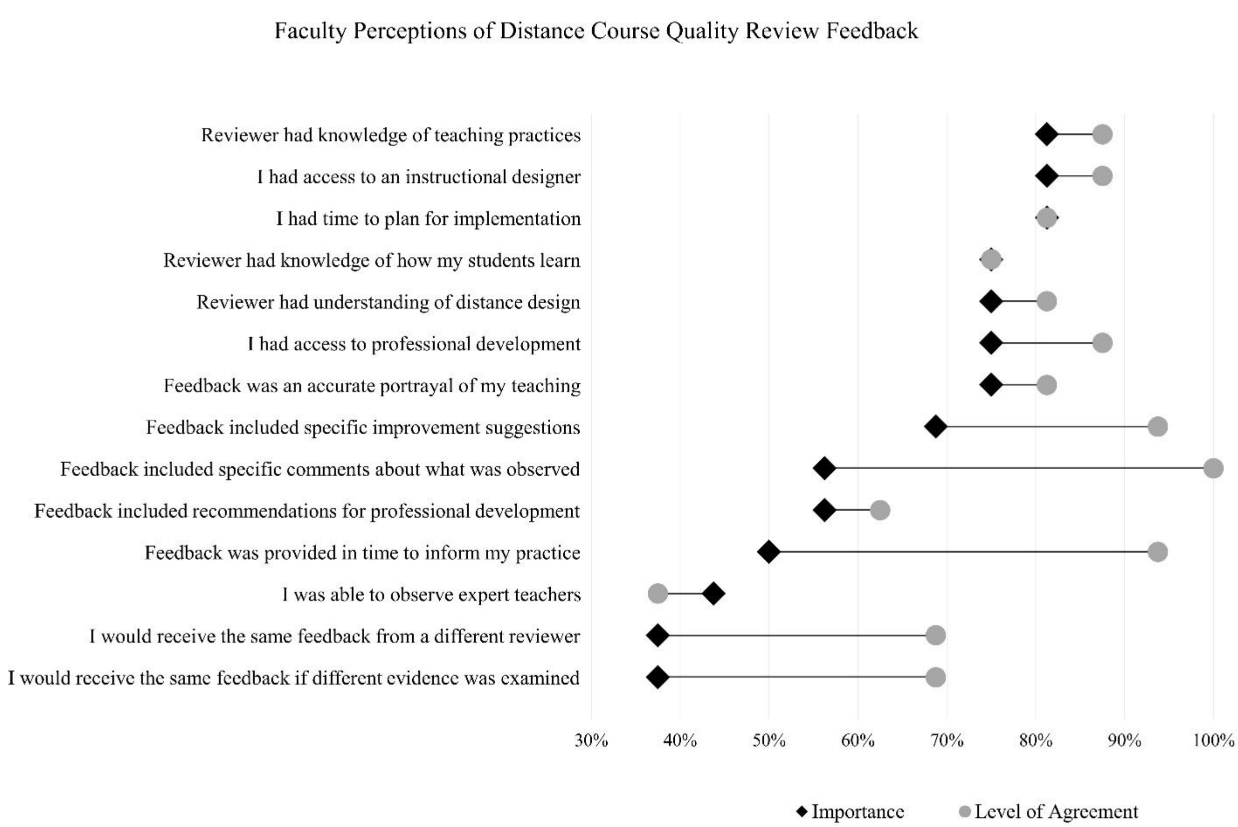
Feedback Characteristic	Importance	Level of Agreement
Reviewer had knowledge of teaching practices	81.25%	87.50%
I had access to an instructional designer	81.25%	87.50%
I had time to plan for implementation	81.25%	81.25%
Reviewer had knowledge of how my students learn	75.00%	75.00%
Reviewer had understanding of distance design	75.00%	81.25%
I had access to professional development	75.00%	87.50%
Feedback was an accurate portrayal of my teaching	75.00%	81.25%

Feedback included specific improvement suggestions	68.75%	93.75%
Feedback included specific comments about what was observed	56.25%	100.00%
Feedback included recommendations for professional development	56.25%	62.50%
Feedback was provided in time to inform my practice	50.00%	93.75%
I was able to observe expert teachers	43.75%	37.50%
I would receive the same feedback from a different reviewer	37.50%	68.75%
I would receive the same feedback if different evidence was examined	37.50%	68.75%

Note. Importance was determined by the percentage of agree/strongly agree ratings. Level of agreement was determined by the percentage of very important/critical ratings.

Figure 1

Faculty Perceptions of Distance Course Quality Review Feedback



Participant agreement was higher than the importance rating for a majority of the measured items. The largest difference between importance and agreement was for the items:

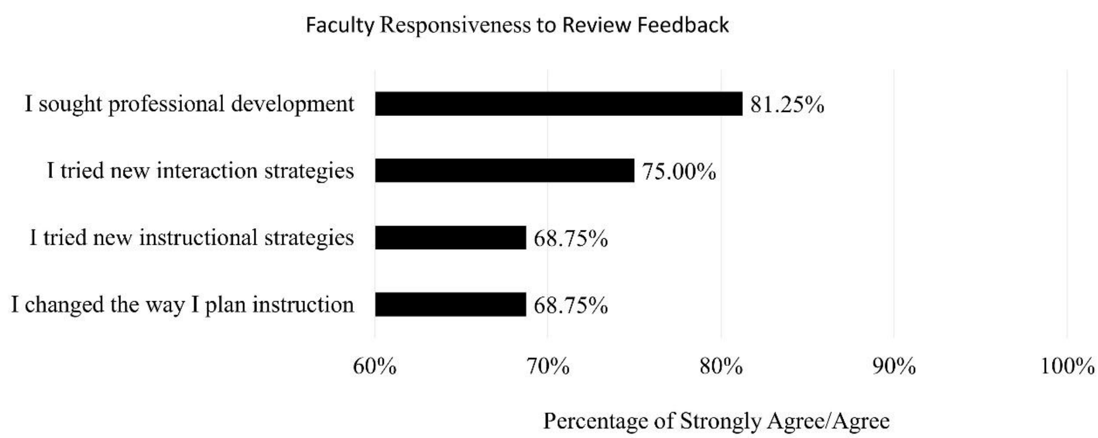
“Feedback included specific comments about what was observed” and “Feedback was provided in time to inform my teaching” with agreement exceeding importance by 43.75%. For two items: “I had time to plan for implementation” and “Reviewer had knowledge of how my students learn,” the level of agreement equaled the importance. For one item: “I was able to observe expert teachers,” the level of agreement was lower than the importance.

After the tool was adapted, there were two items for which there wasn’t a corresponding importance or agreement rating. The importance for “Receiving instructional strategies that you could use in your course” was 68.75%. The level of agreement for “The observations noted on the OSCQR Action Plan I received represented a typical lesson or activity in my course” was 93.75%. The lack of a corresponding item for these findings was a study limitation.

A final element of the survey instrument focused on faculty responsiveness to feedback, providing faculty with options for actions they have taken in response to feedback. The results are depicted in Figure 2, with the most common response being to seek professional development, followed by trying new interaction strategies, trying new instructional strategies, and changing the way instruction is planned.

Figure 2

Faculty Responsiveness to Review Feedback



Phase 2 qualitative interview questions were created after Phase 1 survey results were analyzed. Participants who were willing to be interviewed (N=3) were asked general, open-ended questions to elicit responses about how they would describe the feedback they received to another faculty member, how they reacted to the feedback, how and where they received support for implementing feedback, and specific actions they took. Then interviewees were shown a visual aid of the OSCQR action plan and asked to describe how they used the elements in the plan. Interviewees were asked to reflect on the finding that survey participants had rated reviewer knowledge items as more important than consistency items. They were also asked to elaborate on levels of confidence in the reviewer’s work and to discuss the professional development survey results. Finally, they were asked about satisfaction with their level of involvement in the process as well as the benefits and drawbacks of receiving review feedback.

Interview Results

Three explanatory themes emerged from the interviews as outlined in Table 2. All three participants had codes for all three themes in their interviews. The first theme, "'Involve me' in the process," described a desire to communicate with the reviewer before and/or after the review. Prior to the review, the participants expressed that they wanted an opportunity to provide context so that the reviewer could better understand and account for the nature of the course, the student needs, and the placement of the course within the curriculum in the review feedback. After the review, participants wanted more than a written action plan. All participants proposed an after-review conversation opportunity, indicating that the conversation should focus on clarifying the feedback, providing guidance on how to implement the feedback, and helping to prioritize course revisions. Two of the respondents reported that they self-initiated post-review outreach conversations, noting that if they would not have chosen to connect, it would have led to dissatisfaction with the review process based on the feedback initially provided.

"Feedback is valuable but overwhelming" illustrated that participants saw benefit from the reviews but also stated that sometimes there was too much feedback to implement. The interviewees affirmed receiving valuable feedback, using words like *rigor, quality, honest*, *detailed*, and *thorough* to describe their perceptions. They articulated that the purpose of course review is to assure quality student learning experiences. However, they also stated that the feedback is overwhelming, expressing this both in terms of the high quantity of feedback and in terms of the time required to make changes based upon the feedback, with time limits being the primary reason that faculty are unable to implement course changes.

Finally, the theme "Initially feedback is unpleasant, but once processed leads to action" indicated initial stress responses. However, after processing the feedback all interviewed faculty acted upon it. This theme captured the socio-emotional experience of receiving feedback. Participants used phrases such as "your feathers ruffle" (Participant 2), "I…just shut down" (Participant 3) to describe initial responses. They also perceived imbalance between positive and negative feedback, indicating that receiving several improvement suggestions with few positive comments was an unpleasant experience. After the initial reaction, participants processed the feedback, often by recalling the student-centered purpose of course review. Some also reached out to their supervisor for support and consultation or contacted the reviewer for clarification. Finally, they took actions in response to feedback with each interviewee describing specific improvements that they made to their course after processing the information.

Table 2

Qualitative Themes with Illustrative Quotations

Theme	Illustrative Quotations

1: "Involve me" in the process	Pre-review: "iI you could provide maybe some feedback before they get started on it about what the purpose of the class and those type of things are, I wonder if, I wonder if that would make a difference in how they would review the course" (Participant 2). Post review: "They just give it to you, and then you're expected to figure it out" (Participant 3).
2: Feedback is valuable but overwhelming	Valuable: "I do appreciate the quality and the rigor of the feedback that's provided" (Participant 1). Overwhelming: "There's so much feedback you're getting…that there's, there's times when it's just we're in survival mode as faculty, and it's very difficult" (Participant 2).
3: Initially feedback is unpleasant, but once processed leads to action	Initially unpleasant: "It felt like it lambasted me, like I was blindsided by it" (Participant 3). Then processing: "You're like, "Wait a minute. It is feedback. And again, the purpose of it is to ensure, again, that you have a quality course that you're presenting to the students" (Participant 2). Resulting in action: "I have re-evaluated the materials I'm providing,... And then, one other piece is I was asked to put a little bit more detail into my rubric" (Participant 1).

Discussion

The quantitative findings that agreement was higher than importance for most items was unexpected given faculty barriers to acceptance and utilization of review tools identified in the literature review (e.g., Gregory et al., 2020; McGahan, 2015; McNeal & Gray, 2019). However, the qualitative findings confirmed that feedback was perceived as useful and accurate. In the coded data associated with Themes 2 and 3, faculty acknowledged that reviews valuably benefitted students and were important for demonstrating quality to accreditors, and this was important in their processing of the feedback.

Though staff course reviewers were perceived as credible, especially in knowledge of teaching and distance education practices, survey respondents rated the importance and agreement with "Reviewer had knowledge of how my students learn" as the same. The interviewees elaborated, stating that it would be helpful for reviewers to involve faculty and gain a greater appreciation for their course contexts during the review process (Theme 1).

Regarding resources, survey respondents had low levels of agreement with their ability to observe expert teachers. This finding was expected as this was not a formally provided resource at the study site. In terms of other resources, as faculty described their desire for post-review involvement (Theme 1) they wanted feedback to be delivered via conversation. This was consistent with recommendations that review processes be relational and supportive (Bazluki et al., 2018; Chen & Carliner, 2021).

Concurrently, faculty perceived the amount of feedback to be overwhelming (Theme 2), and the interviewees reflected an underlying perception that they needed to address everything. This might mean substantially redesigning the course in order to meet the standards. Receiving more feedback than they had time to address may explain why surveyed faculty agreed with the statement "Feedback included specific comments about what was observed" at a much higher percentage than they rated its importance (43.75% difference). This may also explain the quantitative finding that there was more agreement with the statement, "Feedback was provided in time to inform practice" (93.75%) than with the statement, "I had time to plan for implementation" (81.25%). In describing resources that were or would be most helpful to them as a way to either be involved (Theme 1) or reduce the overwhelming nature of the feedback (Theme 2), interviewees mentioned that help with prioritization and clarification of feedback would be valued.

Finally, as they discussed their feedback responsiveness, interviewees described psychological components of receiving feedback in Theme 3. Two referenced an initial fight-or-flight type of response with metaphorical language such as getting one's feathers ruffled or shutting down, and the other said that "some people might take it personally" (Participant 1). This was not necessarily represented in the quantitative findings, but revealing phenomena such as this is one reason why a mixed method design was selected. Respondents' recommendations of post-review consultations and their reports of processing feedback before taking action reflect Hunter's (2024) finding that post-observation conferences that encourage self-reflection are a high-leverage practice for teaching improvement in K-12 settings. After processing the information, all interviewees took actions to improve their courses, which is consistent with the majority of survey respondents who reported taking actions (see Figure 2).

Limitations

The primary limitation of the study was the small population size. Though the population was intentionally small in order to focus on how faculty at this particular site perceived feedback, it also means the results are not generalizable. However, the study does provide an example of how larger studies could be conducted using the Examining the Evaluator Feedback Survey at the postsecondary level. A second limitation, mentioned earlier, was that two of the adapted survey items did not have a corresponding importance or agreement rating. The research team would rectify that if deploying the tool again.

Conclusions

Distance course quality reviews have been conducted at the site institution for more than 10 years, and the site has an established review process. When the institution first adopted review tools and was forming review processes, faculty support and buy-in had to be gained, especially around the idea that instructional design staff were qualified to conduct the reviews.

The study results affirmed that faculty now perceive review feedback to be useful, accurate, and valuable with benefits that extend to stakeholders such as students and accreditors. Faculty also indicated that they perceived the reviewers to be credible. These findings are congruent with conclusions from Altman et al., (2020) that adopting a long-term, institution-wide approach can result in increased faculty acceptance over time. Although the study was designed to investigate faculty perceptions of feedback rather than their perceptions of tools or processes, interviewed faculty consistently stated that a consultative feedback process would improve the experience, with one even going so far as to say that it would help close the feedback loop. Given that some faculty also consulted with their supervisor, it is important to ensure administrators are familiar with the course review feedback process so they can adequately support faculty.

Study participants clearly indicated that feedback was specific. However, they reported that too much critical feedback resulted in an unpleasant and stressful experience, which is consistent with research in other settings that feedback specificity has low associations to teacher performance (Hunter, 2024; Hunter & Springer, 2022). These findings affirm that reviewers should provide feedback that is also constructive, sensitive, and balanced (Ash & Oberlin, 2019). Faculty demonstrated that improvement actions are taken after the feedback is processed. Participants noted that reviewers can support course changes by providing clarification of how criteria can be met and indicating priority improvement areas.

This study yielded multiple insights and practical applications for continuous improvement in providing distance course quality feedback. It also established pathways for future research. For example, the Examining the Evaluator Feedback Survey instrument, though developed in elementary and secondary (K-12) settings, proved to be a useful tool for focusing on faculty perceptions of feedback in higher education. The researchers recommend that the tool be used with a larger population and sample so that the results can be generalized. This will add a new dimension to an already robust knowledge base focusing on quality assurance standards and review processes. Another potential area of research would be to implement the findings of this study and then determine the resulting impacts, particularly of a more consultative approach.

Distance course quality review processes are important for assuring quality and prompting continuous improvement. Given that the ultimate goal of reviews is to catalyze course improvements that benefit learners, departments conducting reviews should be mindful of how faculty perceive and use the feedback. As the research site discovered, investigating faculty perceptions can help institutions support faculty and refine review processes.

References

Altman, B., Shattuck, K., Simunich, B., & Burch, B. (2020). Quality assurance implementation: How it works. *Online Journal of Distance Learning Administration 23*(4). https://ojdla.com/articles/quality-assurance-implementation-how-it-works

Aminy, M., Boyd, B., Pickett, A., & West-Smith, P. (2022, April 6). *Frameworks and rubrics*. Presentation at the WCET Elements of Quality Digital Learning Virtual Summit. https://pheedloop.com/wcetsummit2022/site/sessions/?event=wcetsummit2022&section=120441&id=SESAXFIS5DT0555GU

Ash, H., & Oberlin, C. (2019). *The QM rubric says & I suggest: How to write a helpful recommendation.* Presentation at QM Connect Conference. https://www.qualitymatters.org/qa-resources/resource-center/conference-presentations/qm-rubric-says-i-suggest-how-write-helpful

Baldwin, S., & Ching, Y.-H. (2019). Online course design: A review of the Canvas Course Evaluation Checklist. *International Review of Research in Open and Distributed Learning, 20*(3), 268–282. https://doi.org/10.19173/irrodl.v20i3.4283

Baldwin, S., Ching, Y.-H., & Hsu, Y.-C. (2018). Online course design in higher education: A review of national and statewide evaluation instruments. *TechTrends: Linking Research & Practice to Improve Learning, 62*(1), 46–57. https://doi.org/10.1007/s11528-017-0215-z

Bazluki, M., Gyabak, K., Udermann, B. (2018). Instructor feedback on a formal online course quality assurance review process. *Online Journal of Distance Learning Administration 21*(2). https://ojdla.com/archive/summer212/bazluki_gyabak_udermann212.pdf

Chen, Y., & Carliner, S. (2021). A special SME: An integrative literature review of the relationship between instructional designers and faculty in the design of online courses for higher education. *Performance Improvement Quarterly, 33*(4), 471–495. https://doi.org/10.1002/piq.21339

Cherasaro, T. L., Brodersen, R. M., Reale, M. L., & Yanoski, D. C. (2016). *Teachers' responses to feedback from evaluators: What feedback characteristics matter?* (REL 2017–190). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Central. https://ies.ed.gov/ncee/rel/Products/Region/central/Publication/3790

Cherasaro, T. L., Brodersen, R. M., Yanoski, D. C., Welp, L. C., & Reale, M. L. (2015). *The examining evaluator feedback survey.* (REL 2016–100). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Central. https://ies.ed.gov/ncee/rel/Products/Region/central/Publication/3244

Creswell, J. W. & Creswell, J. D. (2023). *Research design: Qualitative, quantitative, and mixed methods designs* (6th ed.). Sage Publications.

Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). Sage Publications.

Dawadi, S., Shrestha, S., & Giri, R. A. (2021). Mixed-methods research: A discussion on its types, challenges, and criticisms. *Journal of Practical Studies in Education, 2*(2), 25-36. https://doi.org/10.46809/jpse.v2i2.20

Gregory, R. L., Rockinson-Szapkiw, A. J., & Cook, V. S. (2020). Community college faculty perceptions of the Quality Matters™ rubric. *Online Learning, 24*(2), 128-141. http://dx.doi.org/10.24059/olj.v24i2.2052

Hunter, S. B., (2024). High-leverage teacher evaluation practices for instructional improvement. *Education Management Administration & Leadership, 52*(4), 991-1013. https://doi.org/10.1177/17411432221112995

Hunter, S. B., & Springer, M. G. (2022). Critical feedback characteristics: Teacher human capital and early-career teacher performance: A mixed-methods analysis. *Educational Evaluation and Policy Analysis, 44*(3), 380-403. https://doi.org/10.3102/0162373721106291

McGahan, S.J., Jackson, C.J., & Premer, K. (2015). Online course quality assurance: Development of a quality checklist. *InSight: A Journal of Scholarly Teaching, 10,* 126–140. https://doi.org/10.46504/10201510mc

McNeal, L., & Gray, J. (2019). A new spin on quality: Broadening online course reviews through coaching and slow thinking. *Online Journal of Distance Learning Administration 22*(4). https://ojdla.com/archive/winter224/mcnealGray224.pdf

Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic analysis: Striving to meet the trustworthiness criteria. *International Journal of Qualitative Methods, 16*(1). https://doi.org/10.1177/1609406917733847

Nworie, J., & Charles, C.B. (2021). Quality standards and accreditation of distance education programs in a pandemic. *Online Journal of Distance Learning Administration, 24*(3). https://ojdla.com/articles/quality-standards-and-accreditation-of-distance-education-programs-in-a-pandemic

Open SUNY Online Course Quality Review Rubric (OSCQR) (n.d.). *Research.* https://oscqr.suny.edu/research/

Ouahada, K. (2019). Course evaluation for low pass rate improvement in engineering education. *Education Sciences, 9*, 1-27.

Quality Matters (QM) (n.d.). *Research.* https://www.qualitymatters.org/research

Samuel, A., Larsen, K., Cervero, R., & Maggio, L. (2020). A participatory approach to developing online course quality standards in health professions education. *Online Journal of Distance Learning Administration, 23*(3). https://ojdla.com/articles/a-participatory-approach-to-developing-online-course-quality-standards-in-health-professions-education

Shorten, A, & Smith, J. (2017). Mixed methods research: Expanding the evidence base. *Evidence-Based Nursing, 20,* 74-75. https://ebn.bmj.com/content/20/3/74

Wargo, K. (2021). Faculty development for online learning: Catalysts for transforming practice across modalities. *Online Journal of Distance Learning Administration 24*(3). https://ojdla.com/articles/faculty-development-for-online-learning-catalysts-for-transforming-practice-across-modalities

It’s a Situationship: How Online Contingent Faculty Talk About Their Needed Support

Yvonne Earnshaw
Kennesaw State University

Mary Ann Bodine Al-Sharif
University of Alabama at Birmingham

Abstract
This study used critical discourse analysis to examine how contingent faculty teaching in online programs talk about the support they need through the lens of organizational socialization theory. We interviewed 10 online contingent faculty across the United States from a variety of Carnegie-classified institutions using semi-structured interview questions. We used intertextuality as our method of data analysis. Our findings resulted in four overarching themes: our participants are off the radar and not included, their contingent role is a perceived gateway, their role is one of convenience for both the contingent faculty and the institution, and there is an imbalance of power between our participants and their institutions. Online contingent faculty need to feel more included in communication from the program or department and need to have more pedagogical and technical support. Additionally, they need more information to help support their students and professional development for themselves, as well as mentoring.

Keywords: Contingent faculty, online faculty, faculty development, adjunct faculty, online faculty development

Earnshaw, Y., & Bodine Al-Sharif, M. A. (2025). It’s a situationship: How online contingent faculty talk about their needed support. *Online Learning, 29*(2), pp. 95–117. https://doi.org/10.24059/olj.v29i2.4507

During the last 20 years, the reliance on contingent faculty at institutions of higher education has grown exponentially. In 2005, the American Association of University Professors (AAUP) reported that "The increasing number of faculty who are employed in contingent positions, whether full or part time, represents probably the single most significant development in higher education in the last two decades" (p. 25). Almost 20 years later, nearly three-quarters of all faculty positions are now contingent (Colby, 2023) and many of these contingent faculty are teaching in online programs.

Most research on online faculty support focuses on the pedagogical aspects of the online classroom (Martin et al., 2020) and contingent faculty who identify solely as adjuncts (Butters & Gann, 2022; Dailey-Hebert et al., 2014; Mandernach et al., 2015). However, there is a dearth in the research related specifically to the support needs of faculty who are both online *and* contingent. Online contingent faculty's motivational factors and incentive needs may be different than tenure-track or tenured faculty who also teach online (Chapman, 2011). Therefore, the purpose of our study is to examine how contingent faculty teaching in online programs talk about their support needs. Specifically, we want to know how online contingent faculty discuss needed support for their personal development and inclusion. Using critical discourse analysis (CDA), we seek to address the following research question: how do contingent faculty teaching in online programs talk about their support needs?

Literature Review

In the following section, we define what it means to be contingent faculty within higher education. We also review the benefits and challenges related to online contingent roles from both the institutional and individual perspectives.

Defining Contingent Faculty

There are a variety of definitions for the term *contingent faculty*. Depending on the institution, contingent faculty may be referred to as lecturer, instructor, visiting faculty, clinical faculty, adjunct, or another form. Contingent faculty can either be part-time or full-time employees and, according to the AAUP (n.d.), can also include postdocs and teaching assistants. For our study, we define contingent faculty as anyone who is a non-tenure-track employee working in either a full-time or part-time institutional role. We have chosen not to include postdocs or teaching assistants.

Regardless of how contingent faculty are defined, they hold most of the faculty positions in the United States. "Non-tenure-track positions of all types now account for over 70 percent of all instructional staff appointments in American higher education" (Colby, 2023, p. 2). In the last 40 years, colleges and universities have steadily moved from a majority tenured faculty workforce to majority contingent faculty workforce (Weingarten et al., 2023). In the fall of 1987, 47 percent of all faculty members in the United States were contingent, compared to 68 percent in the fall of 2021 (Colby, 2023). The increase in contingent faculty can be attributed to reduced budgets and financial support for institutions (Dailey-Hebert et al., 2014), and it has created a concern for the "growing reliance on contingent labor and its implications for institutions, the ability of all faculty members to do their jobs, and the future of academic professionalism" (Kezar & Holcombe, 2015, para. 16). However, contingent faculty, and specifically adjuncts, are seen as more marginalized because they focus on the less profitable areas of teaching and service, rather than on bringing in research dollars to the institution (Kezar & Holcombe, 2015). Furthermore, as Kimme Hea (2009) noted, “this anytime, anywhere position carries risks of exploitation, especially for part-time, nontenure-track faculty” (p. 215).

Benefits of Online Contingent Faculty

There are several benefits to having online contingent faculty, both from the institutional perspective and the individual perspective. Online contingent faculty provide a larger applicant pool for institutions to select from, as well as greater instructional options for administrators seeking discipline-specific knowledge and skills that are often from an applied perspective (Fuller et al., 2017; Lyons, 2007).

There may also be a financial benefit for institutions of higher education related to the employment of contingent faculty (Halcrow & Olson, 2008; Magda et al., 2015). Contingent faculty, particularly part-time, rarely receive benefits from their institution (Hiller, 2024; Nittle, 2022). Online contingent faculty can be hired very quickly as the need arises due to course enrollment (Gappa & Leslie, 1993; Halcrow & Olson, 2008). Institutions can also cancel contracts quickly if enrollment is low or if a tenure-track faculty member can cover the course (Mueller et al., 2013). Online contingent faculty are not required to have a physical office, phone line, or an institution-provided computer. Likewise, online classes do not need a physical classroom, therefore saving the institution money (Magda et al., 2015; Tipple, 2010).

There can also be an individual benefit. Chapman (2011) conducted a study on motivational factors for online tenure-track versus online contingent faculty. Chapman (2011) and Rich (2016) both noted that online contingent faculty often want a flexible schedule. Chapman (2011) also noted that they desired the ability to bring their expertise to the classroom, the opportunity to work with new technologies and obtain new knowledge, and the connection with adult learners.

Challenges Related to Online Contingency

There are institutional and individual challenges related to online contingent faculty. Online contingent faculty may not be as invested or engaged in the institution (Dennis et al., 2022). Onboarding and retaining the online contingent employees who may only be employed by the institution for a semester or a year can be challenging. However, investing in that employee through a “cohesive total rewards strategy” is critical (Chun & Evans, 2016).

Individually, online contingent faculty may be seen as only temporary employees and may feel underappreciated and undervalued (Benton & Li, 2015; Dolan, 2011). They may also experience negative statements from others (Dolan, 2011). Likewise, they may have expertise in the field in which they are teaching but lack the knowledge of how to teach the course material online (Butters & Gann, 2022; Rich, 2017; Slade et al., 2017). Several studies found that online faculty may not interact with the institution’s instructional designers (Jaschik & Lederman, 2019; Magda, 2019; Melonçon, 2017). There may also be a shortage of time in preparing to teach the courses (Butters & Gann, 2022), as well as questions of who owns the online course materials if the online contingent faculty is creating them.

Another challenge is that online contingent faculty may not be physically present on-campus, so there may be a lack of inclusiveness for online contingent faculty (Mandernach et al., 2021; Mueller et al., 2013), as well as challenges related to awareness of policy changes and issues affecting students (Benton & Li, 2015; Dolan, 2011). Mandernach et al. (2021) stated that online contingent faculty are "even more loosely affiliated with their academic departments or programs than their on-ground counterparts, whose presence on campus may grant them more access to participate in department meetings, curricular revisions, or other forms of academic shared governance" (p. 296).

Theoretical Framework

The theoretical framework selected for this research study is organizational socialization (Chao, 2012). Organizational socialization is built upon the premise that there is time needed for individuals to learn and adjust to a new working environment and their roles within that environment. According to Chao (2012), there are four foundational theories that support organizational socialization: (1) uncertainty reduction theory, (2) the need to belong, (3) social exchange theory, and (4) social identity theory. Uncertainty reduction theory (URT) aids in explaining the development of interpersonal relationships between individuals when entering a new working environment with strangers. URT can be used as a lens for "understanding what behaviors are appropriate, expected, or rewarded in a relationship [and] can help individuals move beyond cultural social norms or rules for etiquette, and advance to more meaningful interactions" (Chao, 2012, p. 583). The need to belong relies on two feature components—the need for frequent interactions and the perception of a bonded relationship that will last over time. In the work setting, the need to belong may materialize through social exchanges with fellow employees and a desire to be recognized and/or identified as a member of the organization. Social exchange theory looks at the ways individuals work to exchange goods and services both through direct and indirect exchanges. As individuals within an organization develop their relationships to one another and the organization, exchanges become more predictable, work identities develop, and the work becomes more meaningful for the individual. Tajfel (1978) first introduced social identity theory as the way individuals self-categorize within social groups, and then later noted with their colleague (Tajfel & Turner, 1986) that social identities are relational "to help us identify who we are and who we are not ('us versus them')" (Chao, 2012, p. 587).

Collectively, these theories build the organizational socialization process that relies on three stages: (1) anticipatory socialization, (2) accommodation, and (3) role management (Chao, 2012). Anticipatory socialization is the accumulation of knowledge and experience that individuals attain prior to entering their desired role within an organization. In this stage, individuals are looking for a role that will meet their expectations. During the accommodation stage, the newcomer has immediate needs reduced and is able to develop a sense of belonging within their working environment. According to Chao (2012), "if a newcomer is unwilling or unable to learn the lessons needed to assume a new role within an organization, it may be difficult for the organization to accept that newcomer as a permanent member" (p. 589). In the role management stage, individuals must continuously adjust related to their roles within work environment changes (technological, personnel, supervisor, etc.). These changes can be gradual over time or immediate; therefore, at times resocialization may be necessary for role management.

Methodology

We selected critical discourse analysis (CDA) for this study (Fairclough & Wodak, 1997; van Dijk, 1995). Van Dijk (1995) refers to CDA as the "study of talk and text" (p. 17) as well as an interdisciplinary or multidisciplinary approach to the study of discourse (van Dijk, 1995; 2011). CDA specifically examines the way in which power is "*reproduced* or *resisted*" through discourse and how "relations of *power*, *dominance*, and *inequality"* are navigated and produced through language by individuals (van Dijk, 1995, p. 18). CDA helps to reveal the hidden power structures in discourse (van Dijk, 1993) and asserts that "power is usually institutionalized and organized hierarchically" (Mullet, 2018, pp. 118–119). Therefore, given the hierarchical power structures within an institution, CDA was the appropriate methodological choice for this research because it provides a way to examine how online contingent faculty who hold the least amount of power in their faculty roles talk about the support they need through the lens of role socialization theory.

Positionality

Both researchers were former contingent faculty in U.S. institutions of higher education prior to becoming assistant professors. The first researcher has been a full-time lecturer at two institutions (both R1 institutions), both face-to-face and synchronously online, in which one was teaching four classes each semester and the other also included a 20% service load in addition to the four classes each semester. She has also been an adjunct faculty for four institutions (two R1 institutions, an R2 institution, and a Baccalaureate institution) all asynchronously online teaching one or two classes each semester. The second researcher has been an adjunct faculty for a community college, a Baccalaureate/Associate College, a Baccalaureate institution, and a visiting assistant professor at an R1 university teaching four courses per semester. She has taught in asynchronous, synchronous, hybrid, and face-to-face formats.

Trustworthiness

Trustworthiness or rigor within a study refers to the assurance of quality one has in the data that was collected, its interpretation, and the methods used for the study (Polit & Beck, 2014). To establish trustworthiness for this work, the researchers collected data across the United States. This allowed the researchers to triangulate the data (Creswell & Miller, 2000). Recognizing their own positionality to the research and as CDA methodologists, they chose to "reject a neutral, objective stance in [the] research" (Mullet, 2018, p. 120).

Participant Selection and Recruitment

Purposive sampling was used for this research (Robinson, 2014). Purposive sampling is the intentional and iterative process of selecting participants based on their experience with the subject matter being researched. For this research, eligible participants were between the ages of 18 and 89, contingent faculty (visiting assistant professor, instructor, lecturer, adjunct, clinical, professor of practice), and currently teaching in an online program at a public institution in the United States.

The researchers sent a recruitment email through the American College Personnel Association (ACPA) listserv and posted on social media websites within the researchers' professional networks. The email included information about the purpose of the study, inclusion criteria to qualify for the study, and a Qualtrics link so potential participants could click to read the informed consent, consent to the study, and provide basic demographic information. Participants were then contacted by the researchers to set up an interview. The semi-structured interviews (Schwandt, 2015) consisted of 18 questions that focused on support, their background, and reasons for being a contingent faculty member, developmental needs, and inclusivity. The interviews were no more than 1.5 hours, recorded and transcribed verbatim using transcription software.

In total, there were 14 respondents, four of which were not eligible. Nine of the participants were female and one was male. Five participants identified as White/European American, three participants identified as Asian/Asian American, one participant identified as Hispanic/Latino/a, and one participant identified as Middle Eastern/North African. Seven participants identified as part-time contingent faculty and three participants identified as full-time contingent faculty. Participants had experience teaching in six Carnegie regions of the United States and the majority of participants had experience teaching at R1 institutions (The Carnegie Classification of Institutions of Higher Education, n.d.). Pseudonyms were assigned to protect the participants' identities (see Table 1 and 2).

Table 1

Participant Identifiers

Participant Pseudonym	Sex at Birth	Gender Identity	Sexual Orientation	Race/ Ethnicity	Age
Angel	F	F	H/S	H/L	42
Anh	F	F	H/S	A/AA	43
Bo	F	F	H/S	A/AA	50
Dylan	F	F	H/S	W/EA	44
Emery	F	F	H/S	W/EA	47
John	M	M	H/S	W/EA	44
Nora	F	F	H/S	A/AA	51
Nour	F	F	H/S	ME/NA	39
Rowan	F	F	H/S	W/EA	56

Sage	F	F	H/S	W/EA	50

Note. H/S (heterosexual/straight), L/H (Hispanic/Latino/a), A/AA (Asian/Asian American), W/EA (White/European American), ME/NA (Middle Eastern/North African)

Table 2

Participant Institutional Identifiers

Participant Pseudonym	Years in Higher Ed	Total Years as Contingent	Years Teaching Online	Contingent Status	Region	Carnegie Classi-fication	Modalities Taught
Angel	17	2	1.5	PT PT	SE ME	R1 M1	Online only
Anh	21	4	4	FT	SW	R1	Both
Bo	1	1	1	FT	SE	R1	Online only
Dylan	20	2	2	PT PT	GL NE	R2 M1	Both
Emery	12	5	6	PT PT PT	NE NE NE	R1 M1 Bacc	Both
John	22	4	7	FT	SW	R1	Both
Nora	25	8	12	PT PT PT	GL PL GL	R1 R1 R2	Both
Nour	5	1	5	FT	SE	R1	Both
Rowan	15	14	14	PT	GL	R2	Online only
Sage	20	4	7	PT PT PT	SE SE SE	R1 R1 R3	Online only

Note. PT (part-time), FT (full-time), SE (Southeast), ME (Mid East), SW (Southwest), GL (Great Lakes), NE (New England), PL (Plains), R1 (Doctoral universities—Highest research activity), M1 (Master's colleges and universities—Larger programs), R2 (Doctoral universities—Higher research activity), Bacc (Baccalaureate Colleges), R3 (Moderate research activity), Both (Online and face-to-face)

Data Analysis

Intertextuality (Kristeva, 1980) was our method of choice for data analysis. Intertextuality examines the ways in which language intersects to create intertexts, shared speech or discourse. According to Fairclough (1992, 1995), these intersections can reveal systems of power that perpetuate social problems, as well as communicate how social meanings develop through discursive events. Fairclough (1995) defined discursive events as "instance[s] of language use, analyzed as text, discursive practice, [and] social practice" (Fairclough, 1993, p. 138). Therefore, intertextuality serves to reveal not only how texts are interrelated, but also how they are used in social practice and socially regulated in the interpretation of discourse (Fairclough 1992, 1995). Because no text can stand on its own, an intertextual analysis is dependent upon understanding the intersections or interwoven nature of language where meaning is derived from prior texts (Kristeva, 1980). This can be achieved through the examination of text on both a horizontal and vertical axis. Horizontally, researchers are connected to the research through the examination of each individual text, and vertically through the comparison of each text to one another. As researchers navigate between individual examination and collective comparisons of the texts, intertext or interwoven voices appear that are coded so that themes can arise and meaning be derived. In this study, four themes emerged in relation to the needs of contingent faculty: (1) online contingent faculty needs were often *off the radar* to their institutions, (2) they perceived that contingency would lead to other opportunities within their respective fields, (3) contingency often created a relationship of convenience for both the faculty and their institutions, and (4) online contingent faculty navigate an extreme imbalance of power.

Findings

This study sought to examine how contingent faculty teaching in online programs talk about the support they need. In the following section, we unpack the four themes derived from our analysis. Overall, our findings show that based on the experiences of our online contingent faculty participants, their needs for support are situational—depending upon both their and their institutions' needs—therefore indicating that there is not a one-size fits all approach to supporting contingent faculty. Their needs are just as unique as they and their institutions are.

Off the Radar

In some cases, our participants felt like they were off the radar to their institutions. This sometimes made them feel as though they were not included or did not belong—a lack of accommodation (Chao, 2012). Though some of our participants had prior work experience or anticipatory socialization (Chao, 2012) with their institutions as a student or employee, they did not have all the needed institutional knowledge for their instructional roles. This, at times, led to their institutions making assumptions about their knowledge of institutional policies and their ability to navigate an instructional role. CDA often exposes hierarchical power structures (Mullet, 2018) that may, at times, dismiss or exclude the voices of those with the least amount of power. This was the case for Angel, a part-time online contingent faculty who had attended the institution as a graduate student and had worked in a non-instructional role for the institution. She stated:

> I had an interesting relationship with [institution], because I was a student there for my master's and my PhD, and a full-time practitioner while I was there. And so I was able to get institutional knowledge frankly, from just my experience there in the time that I was there, so that was a little bit easier, because I was embedded into the fabric of the institution. I will say this, I taught a course for [institution] and I left [institution], and I

> can see how it would be difficult to inculcate yourself into the fabric of the institution with the information I was provided. And so, but I also don't want to make assumptions that they didn't give me what I needed because they may have thought, well, she just left recently, and so she has enough information, so I'll say that. I did get an email from the chair of the department the summer after I taught asking me to attend an orientation for faculty, so that was good. But it was after, you know, I taught, and I haven't taught there since, and so there's that piece.

Sage, a part-time online contingent faculty, also noted that she had anticipatory socialization (Chao, 2012) as a former student at the institution and assumed that she was not provided materials because of her prior experience. She stated:

> I adjuncted for [institution] and that was right after graduation. And I felt like I didn't have anything. I think I was overwhelmed too, because as a newly minted PhD, even though I had taught for the university, I co-taught [and] this was the first time I was on my own. So, in that instance, I didn't feel a connection. Like, I didn't feel like I knew really where to go or what to do, because there were some student issues. In that case, you know, so yeah, yeah, there wasn't any orientation or anything, because I think it was a kind of, you know thinking back on it, I feel like maybe they thought "Okay, well, she's been in the system for five years, she's been a student, she's been a co-instructor," you know, like, maybe, I don't know, I don't know what the thought process was…but I was on my own.

Rowan, a part-time online contingent faculty, also had anticipatory socialization (Chao, 2012) with prior experience at the institution which helped her to navigate the system. She shared, "But I'm kind of queasy about the lack of oversight. And because there's also, if I didn't have my day-role, I wouldn't know where to get support. And I know our contingent faculty are lost."

Angel and Emery, both part-time online contingent faculty, were so off the radar that they did not know who their supervisor was. Angel said:

> I honestly couldn't tell you who the department chair is. I couldn't tell you who the dean of the college is because there has been no communication from them…It's kind of like, you know, you're here, but there's no acknowledgement of you being truly here, outside of that program coordinator [who reached out midway through the semester].

Emery said:

> I think it was probably five or six years before I realized that that center director was not my boss. I didn't know that there was a coordinator for the position of the program I taught at. I didn't know that that person was my direct supervisor. I didn't know, even know that that position existed. I didn't know who the person's name was. I didn't understand how that whole thing worked. So, I always went to the center director with anything that I needed. So yeah, it was quite a long time before I even realized who my supervisor was.

In several cases, online contingent faculty spoke about being on the periphery or forgotten about entirely. Dylan, a part-time online contingent faculty, stated, “I really do feel as though I sit on the periphery of, you know, what’s happening inside.” Nora, a part-time online contingent faculty, also spoke about being forgotten. She stated:

> I’m just a non-thought once they know that the teacher spot is filled. So, it’s not, I don’t feel excluded. But I know it’s going to be up to me to create feelings of inclusion or to reach out if I have an issue. So, they don’t, yeah, I don’t feel excluded but it’s just, you’re sort of forgotten about.

CDA helps to expose the power relationships between tenure-track and tenured-faculty and online contingent faculty in the distribution of departmental and institutional information (van Dijk, 1995, 2011). Because communications did not apply to them but did not explicitly state whether it applied, this created the perception that tenure-track and tenured faculty held the dominant role. This happened to Emery, a part-time online contingent faculty. She shared:

> By not specifically calling us as a group, you know, constantly referring to faculty, but then it’s up to us to figure out, are they talking to us? Are they not talking to us? So, we generally make the assumption, okay, they’re not talking to us, because every time you do ask about something, then, “oh no, that’s for full-time faculty.” So, that’s very dismissive to just have this blanket message where it’s supposed to be [for] you, but it’s really not.

Perceived Gateway

In some instances, participants discussed how they perceived their online contingent role to be a gateway to additional opportunities. Through CDA (Mullet, 2018), this exposed a clear lack of anticipatory socialization (Chao, 2012). Participants perceived teaching to be their entry into a tenure-track position but spoke very little about other major requirements such as research. Dylan had been a finalist for a tenure-track position but after not being offered the position, she realized that maybe she could “enjoy teaching, and it could just be something from my CV, right? Like maybe if I want to be teaching down the road, being an adjunct would be helpful.”

Both Angel and John, part-time online contingent faculty, were looking for additional experience to add to their curriculum vitae to be more competitive when applying for tenure-track positions. Angel stated:

> I frankly want to look at being a full-time [tenure-track] faculty member and so [I] thought that being a contingent faculty member would allow me an opportunity to get a grasp of what the full-time work would be, but then to provide me some opportunities in my, in my resume, to demonstrate that I can do the work since I’m coming from a practitioner perspective and not from a like, full-time researcher, full-time educator.

John noted that he wanted to have some additional teaching experience because he believed that is what institutions were looking for when they were advertising tenure-track positions. He stated, “I needed to get teaching experience on my CV because I am actively applying and hoping to find a full-time faculty position somewhere soon as opposed to continuing [on with current position] day job.”

Convenience

Our participants noted that being an online contingent faculty member can be convenient for both the institution and for them individually. However, convenience sometimes created its own challenges and rewards.

Institutional

In instances where it is convenient for the institution, it may be less convenient for the individual. Often, the institution hires online contingent faculty with little notice or cancels the class with little notice. This can prevent online contingent faculty from reaching the stage of accommodation where they develop a sense of belonging (Chao, 2012), as well as lead to feelings of being expendable. John, Dylan, and Nour shared that they had one of these experiences. John, a part-time online contingent faculty, stated, “I had a week before the start of the class because they didn’t formally hire me until that short of a time before [the] semester.” He also noted:

> I’m waiting to hear back from my department right now on do I or don’t I have something for spring…well, let me rephrase that, I was asked to teach something. And then two weeks later, it was yanked away. And then I was asked if I would be willing to pick up a different one, and that is stuck in limbo.

Dylan, a part-time online contingent faculty, stated that she needed, “a little bit more transparency about the schedule of classes. I didn’t find out until recently that I wasn’t teaching in the spring and that would have been nice to know earlier.”

In terms of the hiring process, Nour, a full-time online contingent faculty, was also hired shortly before the semester began and missed the full-day orientation for faculty. She shared:

> I missed that part. So, there was like a whole day orientation, and I was in another conference. And I didn’t know that was on that day. So, I was kind of hired late, like July or something…It was directly after I signed my contract. So, I didn’t learn from the department head that it was on that day, and I didn’t figure it out on my own. So, I missed the orientation.

Individual

Being online contingent faculty can also be convenient for the individual. Online contingent faculty can make decisions about when and how to engage. When questioned about attending faculty meetings, Dylan, a part-time online contingent faculty, stated:

> Um, it doesn’t feel relevant to me at the time. But I might be a little bit more engaged, if I had students right now, or if I were a voting member of a faculty meeting, but I don’t know that even if I attended the meetings, if I would be a voting member as a contingent faculty and not a full time [faculty].

Many of the part-time online contingent faculty noted that they were working other full-time positions and that being contingent faculty was on the side. Through CDA (Mullet, 2018), we can see that in some instances online contingent faculty spoke about being empowered because there wasn't a permanent commitment and there was flexibility in when and where they would work due to the online modality. Therefore, they are not bothered by being excluded because the expectation as a contingent faculty is that they are not full-time employees. Sage, a part-time online contingent faculty, shared:

> There needs to be exclusion, like there's contractual differences between full-time and adjunct, and for me, I've got a demanding full-time job, that if my full-time job excluded me from certain things, I would be totally bothered.

Sage is also able to be selective in where she teaches. She shared, "I wouldn't adjunct for just anybody. So, …I adjunct for people I already know and want to work with [and] want to work for."

In addition, many of our participants were professional practitioners in the fields in which they were teaching and could bring that experience into the classroom. Their discourse revealed that they found teaching to be empowering (van Dijk, 1995, 2011). Sage, a part-time online contingent faculty, shared:

> I'd like to keep abreast of new things… I want my foot still to be in the field that I have received my PhD in and my master's degree in and the field that I had worked on before this current role that I have. And I like being amongst students, and I like teaching and it helps me grow and maintain my credentials and credibility, as well as helping out a rising generation in the field.

Nora, a part-time online contingent faculty, shared similar feelings due to her specialization in an area that is highly sought after.

> The reason I continue to do it [be contingent faculty] has to do with what I teach and the specialization…I keep doing contingent, despite the pay…I keep doing it, because I really want these programs to have faculty with [specific degree] who can deliver [field] education that makes sense to students and is going to help them be better practitioners on the tail end. So, it really is that I want to grow the profession, I want to grow professionals.

Imbalance of Power

In other instances, CDA revealed a clear imbalance of power between our participants and their institutions (Mullet, 2018). The power imbalance was based on the structural dynamic or systemic protocol of the program. However, in other cases the imbalance of power was revealed through acts of academic hazing by peers and administrators.

Structural Dynamics

John, a part-time online contingent faculty, shared that the students were coming to him asking for help, yet he had no authority in the decision-making. He shared:

> I've had a good number of students come to me asking me for assistance about their progress on their capstone for the master's program, because the course I'm teaching is tied in with generating some of the materials for their capstone portfolio. And I've repeatedly had to refer them back to the program head and say "I'm teaching this course as a lecturer. I don't have the authority to definitively say something or to make any promises." But that does put you in a little bit of a bind, when the students are saying, "Well, you're the one who's most responsive."

Contracts for contingent faculty may often be for the scheduled class time and do not consider the time prior to a semester starting for course preparation or even designing the online course. This reveals a power dominance or abuse of power (van Dijk, 1995, 2011), by the institution where contingent faculty may be uncompensated for their labor when they are working off-contract or before their contracted date.

Anh, a full-time online contingent faculty, shared,

> There are really particular sticking points that are not working well in my class, but to have the space to really think about it and plan it out in a way that would work across 16 weeks. Like, I don't get that and that feels exclusionary. You're expected to do it in your own time, like in a summer, and when you're not on contract. So, you want me to do something that's in a time I won't be paid for.

Nora, a part-time online contingent faculty, stated,

> I also think it acknowledges how much labor goes into creating a course before you're on payroll. So, I think that part of whether it's in a hiring letter, wherever it is, it's a sign of respect, and it's a professional norm. But I don't know that it's always thought that [the] norm is always followed for contingent faculty.

Nora went on to discuss the issue of class cancellations due to low enrollment after they are designed and receiving no compensation. She shared:

> The expectation is that I come with a course to teach…I remember I had been engaged in the work for six weeks and I could have done all that work up front and then had a student drop below 10. And then they could have canceled my class, and I had done all that labor. And it's uncompensated. So, and until the 10th day, they don't guarantee, or whatever their census day is, they're not going to guarantee the course will, they will at that point, but they, you know, they could cancel it two weeks in advance. And you've done all the work already.

When questioned about service expectations, both Nour and Bo spoke about being disempowered (van Dijk, 1995, 2011) as contingent faculty and how they were not able to say no to the service load. Nour, a full-time online contingent faculty, shared that she was sitting on multiple committees, including search committees, even though service was not part of her contract. She stated:

> I am serving at the department level, the college level, the university level, [and] in different committees. So, I am in at least six committees…you know, things kind of add up… So, at some point, they will end… I think that I am doing a lot of service to be honest. It's not required, but I don't know, sometimes, how to say no. I cannot do that, especially if I was asked by someone at a higher position. I would just say yes.

Bo, a full-time online contingent faculty, had experienced a bit more anticipatory socialization (Chao, 2012) and had a better understanding of how additional duties and/or service requirements could negatively impact his role, and therefore, worked to set some clear boundaries to protect his time. He shared:

> I've heard from other clinical positions, people with other clinical positions, saying that, be cautious, because the clinical roles…the boundary is less clear, so there could be additional responsibilities on top, and then adding more and more. So, [I] need to be cautious on that. So, I'm vigilant and trying to set a boundary if things happen.

Academic Hazing

In many cases, participants discussed the power dynamics between contingent and non-contingent faculty and how it led to a lack of accommodation (Chao, 2012) with feelings of not being included or being seen as "less than" or even "humiliated" or "bullied." When questioned what made her decide to be a contingent faculty member, Nour, a full-time online contingent faculty, noted that she wanted a tenure-track position but was not granted one and that as a contingent faculty, she received lower priority on resources. She shared:

> Because people always think that oh, contingent faculty are kind of, we are a second class or, you're always left to whatever. If there's some amount of resources or anything, probably it's going to be distributed. And then whatever is left, you can have some things…I would have never felt this towards anyone before. But I think that when I am in this position right now, I do feel how others might have felt before.

Anh, a full-time online contingent faculty, spoke about being included in faculty meetings but feeling like she was not respected initially. She shared:

> Even though I have been included all of these years, it didn't feel like there was an automatic level of respect at the beginning. I think it has come with time and gaining trust of others and proving that there is, there are things to contribute that are helpful to the program that can alleviate some work from other for other folks. And then they can spend more time on researching or whatever it is that they want to spend more time on. I think in the beginning, I felt like I was there to fulfill a certain need, like a certain teaching need, so everybody else could do their job. And in time getting, like establishing trust with everybody, more has opened up and [I] feel more included.

When questioned about whether the information in the faculty meetings was sufficient to do her job effectively, Anh went on to add:

> I think most of the time it is sufficient. There are certainly times where the conversation is veering in some direction that I don't understand…I wasn't included at all. And so, it can be sold as like well, like you have other things to do, and this is not pertinent to you, but it felt very exclusionary…so it kind of baby-stepped its way to be more inclusive… It was like [they] assumed I, that I knew. So, then you have to make a choice. Do I ask questions and maybe look ignorant? Do I sit back and observe and just try to suss this out myself? So, I have to think about the power dynamics of the group and that can be difficult.

Bo, a full-time online contingent faculty, spoke about not being included in faculty meetings for her program where she is not seen as an equal peer. She shared:

> But you know, from one perspective, that's [the] kind of thing that I feel excluded. But then on the other hand, I could understand that, that's also kind of a protection for me… It's hard for if I attend and then they talk about some sensitive things, then it might be hard for me to kind of say, like, should I tell my friend or not. So, I think it's okay, I can fully understand the decision of those faculties who decided not to have me in those meetings, and I can have less meetings. So, that's another perk. So, I don't mind.

Nour, a full-time online contingent faculty, also spoke about the imbalance of power between contingent and non-contingent faculty where she felt humiliated. She shared:

> I do feel that some people sometimes not only exclude me, but try not, it's not probably only me, but they try to kind of humiliate contingent faculty. For example, there's this service thing, or if you're doing orientations. Well, yeah, because you have more time because all you do is teach and then there are those comments that kind of hurt. So, I'm probably like, that's the way where I felt I'm excluded. But, other than that, I don't feel, it's not that I felt I was excluded. I felt more that I'm not even, they don't consider me as part of the department or anything, like you just teach or something like that.

Rowan, a part-time online contingent faculty, noted that she felt bullied during a situation where she was contacted by an upper administrator (Vice Provost) about taking on additional students in the class that was already maxed out, without receiving additional pay. Here again, we see a power dominance or abuse of power (van Dijk, 1995, 2011), because the administrator did not go through the proper channels of contacting the department chair and instead reached out to her directly. She stated:

> Because the Vice Provost actually emailed me…to ask me to do this, went around my department chair, which was unacceptable. They didn't know what they didn't know. And my department chair was furious because you don't do that. You go through the department. You don't bully an adjunct, which is really what this was, was bullying an adjunct. So, he very definitely tried to mediate that. But I couldn't say no, because I was

> also going up for senior adjunct that semester. There was no way I could say no. I had to go along with it.

Discussion

Our findings show that the best way to define the relationship between online contingent faculty and the institutions they serve is that of a *situationship*. While our online contingent faculty are not in a romantic relationship with the institution, the structure of their relationship shares situational components that are undefined and inconsistent; it is one of convenience for both parties involved (Gupta, 2023; Langlais et al., 2024). Situationships often lack follow-up, have no future commitment, and are not exclusive, and are often superficial (Gupta, 2023; Langlais et al., 2024). Likewise, there may be some differences in expectation from both parties involved (Stanley et al., 2017). Situationships can be both beneficial and problematic. It all depends on what the parties involved are willing to accept and, in some instances, tolerate as their basic guidelines for the relationship.

As our participants noted, there can be some red flags in the relationship when the benefits are one-sided, they feel undervalued, communication is lacking, or they are not included in ways that could benefit their overall ability to perform in their role. In these instances, their lack of organizational socialization (Chao, 2012) to the institution's policies, procedures, and practice can negatively impact their overall well-being and sense of support. Comparatively, when these elements are in place, and their prior knowledge or anticipatory socialization is met with appropriate accommodations to help them adjust into their roles, they are then better able to achieve role management over time and self-navigate around institutional norms and nuances (Chao, 2012).

However, situationships are not meant in general to be the norm (Gupta, 2023; Langlais et al., 2024). Research tells us that higher education did not start out several decades ago thinking that contingent faculty roles would become the norm in leading higher education classrooms (Weingarten et al., 2023). Just as a situationship can create several shades of gray within a relationship, the contingency can become quite an entanglement for individuals within these positions. For our online contingent faculty, this creates a unique need for support that varies depending on their current and prior institutional knowledge, as well as instructional experience (i.e., anticipatory socialization). There is a clear need and desire for mentorship and training but at varying levels, depending on the individual. In addition, better lines of communication at all levels (i.e., institutional, departmental, programmatically, and policy, procedural, and practice related) is needed. This will provide them with a much-needed sense of belonging (i.e., accommodations). Our participants desired to be recognized and rewarded for the contributions that they were giving to their institutions. Otherwise, the situationship that they have entered through contingent positions with their institutions can lead to a deficit mental health impact and/or them seeking other employment when expectations for more in the relationship remain underdeveloped (i.e., a lack of role management).

Limitations

Our participants taught predominantly in social science fields, which could be a limitation. We suggest that additional research be conducted with online contingent faculty from a broader background. This work is limited to the perspectives of participant experiences within the study. For more generalizable results, a quantitative approach would be needed.

Implications for Practice

Based on our findings, we provide the following six suggestions for practice related to online contingent faculty. First, we strongly suggest that each program and/or department that uses online contingent faculty create a handbook containing pertinent information related to their roles and contact information for a supervisor (program coordinator and/or department chair), technical help desk, and payroll, and information to policies (i.e., academic integrity policy, late work policy, incomplete policy, attendance policy, and communication and grading policies), pedagogical support for how to teach online (through a center for teaching and learning or similar entity), technical support for how to use the learning management system, academic calendar, and bookstore. Many online contingent faculty provide support to their students, so information regarding student counseling services, student disability services, and the library is also beneficial. Second, we strongly suggest that online contingent faculty are evaluated on an on-going basis. Student evaluations at the end of the term are not enough to support contingent faculty and have been shown to not be effective in evaluating any faculty's performance, particularly faculty who teach online (Martin & Kumar, 2021; Marzano & Allen, 2016; Miller & Digges-Elliott, 2021; Piña & Bohn, 2014, 2016). There needs to be regular monitoring of the online course for engagement and mentoring. Third, we strongly suggest that there is a multi-layered approach to mentoring online contingent faculty. This multi-layered approach should come from an individual within the program or department and an online contingent faculty mentoring support group who would help contingent faculty navigate the program, department, and university on a regular basis. Fourth, online contingent faculty must have access to professional development for teaching online. Many contingent faculty are not prepared to teach online and need to have more pedagogical support. This can be offered through a center that focuses on teaching and learning or through an instructional design support office. Fifth, communications coming from the institution/department/program should be deliberate in their inclusion of online contingent faculty. This could be in the way of separate targeted communications for contingent faculty or using inclusive language in all communications. Finally, more accountability needs to exist in preparatory programs. Doctoral programs need to better prepare students for different types of faculty roles.

Implications for Research

There are five recommendations for research that we suggest. First, we suggest that further research be conducted separately related to the differences between full-time and part-time online contingent faculty experiences and support needs. Second, we suggest that research be conducted with tenure-track and tenured faculty on their perceptions of online contingent faculty. Third, we suggest that research be conducted on administrator perceptions of online contingent faculty. Fourth, we suggest that research be conducted related to the implications of using online contingent faculty on the quality of education. Finally, we suggest that further research be conducted related to preparatory programs' faculty perceptions of online contingent faculty and how they prepare their students for these types of roles.

Conclusion

The purpose of our research was to examine how contingent faculty teaching in online programs talk about the support they need. Our research suggests the needs of online contingent faculty are not being met. Online contingent faculty need to be intentionally included in communications from the program or department and have on-going check-ins to support them. In addition, given the online modality of contingent faculty, they need to have the appropriate knowledge and skills (both technical and pedagogical) to be successful in their positions. This includes having professional development focusing on best practices for teaching online.

Declarations

The authors declare no conflicts of interest for this study. The authors declare that approval was obtain from the institution review board at Kennesaw State University and University of Alabama at Birmingham.

References

American Association of University Professors. (n.d.). *Contingent faculty positions*. https://www.aaup.org/issues/contingency

American Association of University Professors. (2005). *Inequities persist for women and non-tenured faculty*. The Annual Report on the Economic Status of the Profession 2004–2005. http://www.aaup.org/NR/rdonlyres/0A98969B-FA6C-40F5-8880-5E5DC3B7C36D/0/05z.pdf

Benton, S., & Li, D. (2015). Professional development for online adjunct faculty: The chair's role. *The Department Chair, 26*(1), 1–3. https://doi.org/10.1002/dch.30027

Butters, D., & Gann, C. (2022). Towards professionalism in higher education: An exploratory case study of struggles and needs of online adjunct professors. *Online Learning, 26*(3), 259–273. https://doi.org/10.24059/olj.v26i3.2801

Chao, G. T. (2012). Organizational socialization: Background, basics, and a blueprint for adjustment at work. In S. W. J. Kozlowski (Ed.), *The Oxford handbook of organization psychology* (Vol. 1, pp. 579–614). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199928309.013.0018

Chapman, D. D. (2011). Contingent and tenured/tenure-track faculty: Motivations and incentives to teach distance. *Online Journal of Distance Learning Administration, 14*(3). https://ojdla.com/archive/fall143/chapman143.pdf

Chun, E. B., & Evans, A. (2016, May 24). Approaches to building and sustaining a diverse adjunct workforce. *Academic Leader*. https://www.academic-leader.com/topics/faculty-recruitment-retention/approaches-to-building-and-sustaining-a-diverse-adjunct-workforce/

Colby, G. (2023, March). *Data snapshot: Tenure and contingency in US higher education*. https://www.aaup.org/sites/default/files/AAUP Data Snapshot.pdf

Creswell, J. W., & Miller, D. L. (2000). Determining validity in qualitative inquiry. *Theory Into Practice*, *39*(3), 124–130. https://www.jstor.org/stable/1477543

Dailey-Hebert, A., Mandernach, B. J., Donnelli-Sallee, E., & Norris, V. R. (2014). Expectations, motivations, and barriers to professional development: Perspectives from adjunct instructors teaching online. *The Journal of Faculty Development, 28*(1), 67–82. https://www.ingentaconnect.com/content/magna/jfd/2014/00000028/00000001/art00009

Dennis, M., Halbert, J. D., & Fornero, S. (2022). Structured development and support for online adjunct faculty. In S. Kumar & P. Arnold (Eds.), *Quality in online programs: Approaches and practices in higher education* (pp. 211–228). Brill.

Dolan, V. L. B. (2011). The isolation of online adjunct faculty and its impact on their performance. *The International Review of Research in Open and Distance Learning, 12*(2), 62–77. https://doi.org/10.19173/irrodl.v12i2.793

Fairclough, N. (1992). *Discourse and social change*. Policy Press.

Fairclough, N. (1993). Critical discourse analysis and the marketization of public discourse: The universities. *Discourse & Society, 4*(2), 133–168. https://www.jstor.org/stable/42888773

Fairclough, N. (1995). *Critical discourse analysis: The critical study of language*. Longman.

Fairclough, N., & Wodak, R. (1997). Critical discourse analysis. In T. van Dijk (Ed.), *Discourse studies: A multidisciplinary introduction* (Vol. 2, pp. 258–284). Sage.

Fuller, R., Brown, M. K., & Smith, K. (Eds.). (2017). *Adjunct faculty voices: Cultivating professional development and community at the front lines of higher education*. Taylor & Francis.

Gappa, J. M., & Leslie, D. W. (1993). *The invisible faculty: Improving the status of part-timers in higher education*. Jossey-Bass.

Gupta, S. (2023). *Situationship: How to cope when commitment is unclear*. Verywell Mind. https://www.verywellmind.com/what-is-a-situationship-5216144

Halcrow, C., & Olson, M. R. (2008). Adjunct faculty: Valued resource or cheap labor? *Focus on Colleges, Universities, and Schools*, *2*(1), 1–8. http://www.nationalforum.com/Electronic%20Journal%20Volumes/Halcrow,Cheryl, FOCUS,Vol2,Num1,2008.pdf

Hiller, J. (2024). My heart attack would have killed my livelihood if I'd still been an adjunct. *Times Higher Education*. https://www.timeshighereducation.com/blog/my-heart-attack-would-have-killed-my-livelihood-if-id-still-been-adjunct

Jaschik, S., & Lederman, D. (2019). *2019 Survey of faculty attitudes on technology*. Inside Higher Ed. https://www.insidehighered.com/sites/default/files/media/IHE_2019_Faculty_Tech_Survey_20191030.pdf

Kezar, A., & Holcombe, E. (2015). The professoriate reconsidered: What might the faculty look like in 2050? *Academe, 101*(6). https://www.aaup.org/article/professoriate-reconsidered#.W0PHp9hKii4

Kimme Hea, A. C. (2009). Perpetual contact: Rearticulating the anywhere, anytime pedagogical model of mobile and wireless composing. In A. C. Kimme Hea (Ed.), *Going wireless: A critical exploration of wireless and mobile technologies for composition teachers and researchers* (pp. 199–222). Hampton Press.

Kristeva, J. (1980). *Desire in language: A semiotic approach to literature and art*. Columbia University Press.

Langlais, M. R., Podberesky, A., Toohey, L., & Lee, C. T. (2024). Defining and describing situationships: An exploratory investigation. *Sexuality & Culture, 28*, 1831–1857. https://doi.org/10.1007/s12119-024-10210-6

Lyons, R. E. (2007). *Best practices for supporting adjunct faculty*. Anker.

Magda, A. J. (2019). *Online learning at public universities: Recruiting, orienting, and supporting online faculty*. The Learning House, Inc.

Magda, A. J., Russell, P., & Clinfelter, D. L. (2015). *Recruiting, orienting, & supporting online adjunct faculty: A survey of practices*. The Learning House, Inc.

Mandernach, B. J., Donnelli-Salle, E., & Dailey-Hebert, A. (2021). Assessing institutional support for remote adjunct faculty teaching online. In A. Dailey-Hebert, B. J. Mandernach, & E. Donnelli-Sallee (Eds.), *Handbook of research on inclusive development for remote adjunct faculty in higher education* (pp. 291–300). IGI Global. https://doi.org/10.4018/978-1-7998-6758-6.ch021

Mandernach, J, Register, L., & O'Donnell, C. (2015). Characteristics of adjunct faculty teaching online: Institutional implications. *Online Journal of Distance Learning Administration, 18*(1), 1–10.

Martin, F., & Kumar, S. (2021). Barriers to online education and strategies to overcoming them. In L. Cifuentes (Ed.), *A guide to administering distance learning* (pp. 43–60). Brill.

Martin, F., Sun, T., & Westine, C. D. (2020). A systematic review of research on online teaching and learning from 2009 to 2018. *Computers & Education, 159*. https://doi.org/10.1016/j.compedu.2020.104009

Marzano, M. P., & Allen, R. (2016). Online vs. face-to-face course evaluations: Considerations for administrators and faculty. *Online Journal of Distance Learning Administration, 19*(4). https://ojdla.com/archive/winter194/marzano_allen194.pdf

Melonçon, L. (2017). Contingent faculty, online writing instruction, and professional development in technical and professional communication. *Technical Communication Quarterly, 26*(3), 256–272. https://doi.org/10.1080/10572252.2017.1339489

Miller, C. T., & Digges-Elliott, H. (2021). Status of online learning. In L. Cifuentes (Ed.), *A guide to administering distance learning* (pp. 1–19). Brill.

Mueller, B., Mandernach, B. J., & Sanderson, K. (2013). Adjunct versus full-time faculty: Comparison of student outcomes in the online classroom. *MERLOT Journal of Online Learning and Teaching, 9*(3), 341–352. https://jolt.merlot.org/vol9no3/mueller_0913.pdf

Mullet, D. R. (2018). A general critical discourse analysis framework for educational research. *Journal of Advanced Academics, 29*(2), 116–142. https://doi.org/10.1177/1932202X18758260

Nittle, N. (2022, March 21). Adjunct professors, the "backbone" of higher education, push for better wages and benefits. *USA Today*. https://www.usatoday.com/story/news/education/2022/03/21/adjunct-professors-struggle-low-wages-no-health-benefits/7114938001/

Piña, A. A., & Bohn, L. (2014). Assessing online faculty: More than student surveys and design rubrics. *Quarterly Review of Distance Education, 15*(3), 25–34.

Piña, A. A., & Bohn, L. (2016). Assessing online faculty. In A. A. Piña & J. B. Huett (Eds.), *Beyond the online course: Leadership perspectives on e-learning* (pp. 317–330). Information Age Publishing.

Polit, D. F., & Beck, C. T. (2014). *Essentials of nursing research: Appraising evidence for nursing practice* (8th ed.). Wolters Kluwer Health/Lippincott Williams & Wilkins.

Rich, T. M. (2016). Adjuncts matter: A qualitative study of adjuncts' job satisfaction. *Online Journal of Distance Learning Administration, 19*(3). https://www.westga.edu/~distance/ojdla/fall193/rich193.html

Rich, T. M. (2017). The value of adjuncts: A study of the intrinsic factors impacting field seminar instruction. *Field Scholar, 7*(1), 1–17.

Robinson, R. S. (2014). Purposive sampling. In A. C. Michalos (Ed.), *Encyclopedia of quality of life and well-being research* (pp. 5243–5245). Springer. https://doi.org/10.1007/978-94-007-0753-5_2337

Schwandt, T. A. (2015). *The Sage dictionary of qualitative inquiry* (4th ed.). Sage.

Slade, J. D., Robb, M., Sherrod, B., & Hunker, D. (2017). Online adjunct faculty support: An innovative use of a learning management system. *Nurse Educator, 42*(3), 143–146. https://doi.org/10.1097/NNE.0000000000000337

Stanley, S. M., Rhoades, G. K., Scott, S. B., Kelmer, G., Markman, H. J., & Fincham, F. D. (2017). Asymmetrically committed relationships. *Journal of Social and Personal Relationships, 34*, 1241–1259. https://doi.org/10.1177/0265407516672013

Tajfel, H. (1978). Interindividual behavior and intergroup behavior. In H. Tajfel (Ed.), *Differentiation between social groups: Studies in the social psychology of intergroup relations* (pp. 27–45). Academic Press.

Tajfel, H., & Turner, J. C. (1986). The social identity theory of intergroup behavior. In S. Worchel & L. W. Austin (Eds.), *Psychology of intergroup relations* (pp. 7–24). Nelson-Hall.

The Carnegie Classification of Institutions of Higher Education. (n.d.). *About Carnegie Classification*. https://carnegieclassifications.acenet.edu/

Tipple, R. (2010). Effective leadership of online adjunct faculty. *Online Journal of Distance Learning Administration, 13*(1). https://www.westga.edu/~distance/ojdla/spring131/tipple131.html

van Dijk, T. A. (1993). Principles of critical discourse analysis. *Discourse & Society, 4*(2), 249–283. https://doi.org/10.1177/0957926593004002006

van Dijk, T. A. (1995). Aims of critical discourse analysis. *Japanese Discourse, 1*(1), 17–27.

van Dijk, T. A. (2011). *Discourse studies: A multidisciplinary introduction*. Sage.

Weingarten, R., Ingram, F. C., & DeJesus, E. (2023). *An army of temps: AFT contingent faculty quality of work/life report 2022*. American Federation of Teachers. https://www.aft.org/sites/default/files/media/documents/2023/Contingent_Faculty_Survey_2022_interactive.pdf

"We're All Squares on a Screen": Interpersonal and Intrapersonal Opportunities and Limitations of Online Intergroup Dialogue

Grant R. Jackson
Texas Tech University (Department of Educational Psychology, Leadership, and Counseling), Lubbock (Texas), United States

Sarah M. Schiffecker
Texas Tech University (College of Media and Communication), Lubbock (Texas), United States

Oleksandra Poquet
Technical University of Munich (Department of Educational Sciences), Munich (Bavaria), Germany

Abstract
Post-secondary institutions are seeing the need and searching for ways to prepare their students for life in an increasingly complex and often polarized society. Since its development in the late 1980s, intergroup dialogue (IGD) has become a prominent dialogic pedagogy that brings together small, diverse groups of college students to dialogue on topics related to diversity, equity, equality, and belonging. Though IGD has traditionally been an in-person experience, postsecondary institutions were required to offer IGD online during the COVID-19 pandemic, making it important to discern what opportunities and limitations may come with such online delivery. Guided by theories of intergroup contact and intergroup dialogue, we interviewed 16 college students who had participated in IGD via Zoom regarding their online IGD experience, illuminating a variety of opportunities and limitations that are interpersonal and intrapersonal in nature. Emergent themes, along with their implications for IGD theory, practice, and future research, are discussed.

Keywords: Intergroup dialogue, online learning, digital learning, belonging, college teaching

Jackson, G., Schiffecker, S. & Poquet, O. (2025) "We're all squares on a screen": Interpersonal and intrapersonal opportunities and limitations of online intergroup dialogue. *Online Learning*, *29*(2), pp. 118–139. https://doi.org/10.24059/olj.v29i2.4444

Throughout the world, postsecondary institutions are seeing the need and searching for ways to prepare their students for life in an increasingly complex and often polarized society (Abes et al., 2019; Miles & Shinew, 2022; Morphew & Hartley, 2006). Since its development at the University of Michigan in the 1980s, the "Michigan model" of intergroup dialogue (IGD) has become a prominent social justice pedagogy utilized at hundreds of colleges throughout the U.S. (Jackson, 2021), promoting intrapersonal student development and interpersonal understanding, relationships, and collaboration through multi-session dialogues on the often-polarizing topics of diversity, equity, and belonging (Gurin et al., 2013; Hurtado, 2001). The onset of the COVID-19 pandemic required the majority of IGD programs and facilitators to deliver the IGD curriculum, pedagogy, and overall experience (described in detail hereafter) online for the first time (Nagda et al., 2021; Yeakley, 2020), making it important to study the ways in which online delivery can enhance and/or hinder the purposes and intended outcomes of IGD.

Given this sudden and unprecedented transition of IGD to online delivery, the resulting possibility that IGD could become increasingly online going forward (Yeakley, 2020), and the limited research that has been conducted on online IGD thus far, the purpose of this study was to begin to discern and better understand the opportunities and limitations that come with the online delivery of IGD. In addition to this primary focus on IGD, a related purpose of this study was to provide insights that can help inform other forms of online learning, e-learning, and distance education, particularly those that are dialogic in nature, focus on matters of diversity, and/or have had to similarly and suddenly transition from in-person to online delivery in recent years (Conklin & Dikkers, 2021; Miller et al., 2023; Saltz & Heckman, 2020; Vally Essa et al., 2023). Grounded in theories of intergroup contact and IGD, the present study focuses on the perceptions and experiences of students who participated in online IGD. In the sections that follow, we provide a more detailed description of IGD, its various intrapersonal and interpersonal processes and outcomes (Gurin et al., 2013), as well as a review of the literature that guided this study and the development of our overarching research question:

> RQ: What interpersonal and intrapersonal opportunities and limitations emerged in conjunction with the online nature of students' IGD experience?

Literature Review

Intergroup Dialogue in Practice

IGD brings together small groups of college students (ca. 8-15) from diverse social identity groups to dialogue on topics related to diversity, equity, and belonging, often focusing on a particular dimension of identity (e.g., race, gender, sexuality, class, religion, ability, citizenship). Groups meet weekly throughout an academic term, and the IGD experience is guided by two facilitators whose social identities are representative of the topic and identities present in the group (Maxwell et al., 2011). The focus of IGD on personal, identity-based, lived experiences related to the topic distinguishes dialogue from discussion (a more impersonal exchange of ideas on the topic) and debate (proving or disproving claims related to the topic) (Nagda & Zúñiga, 2003). Prior to the COVID-19 pandemic, IGD was thought to be (and implemented as) an in-person experience (Gurin et al., 2013), with only a few instances of online implementation (Yeakley, 2020).

Within each IGD session, various activities (e.g., sharing written testimonials, completing social identity profiles, participating in "gallery walks" and "uncommon ground" activities) provide opportunities for reflection and dialogue between participants (Gurin et al., 2013; Zúñiga et al., 2007). As part of each activity, co-facilitators lead the group in a dialogue regarding how they felt as they participated in the activity and what they learned about intergroup conflict and societal status quos (Quaye & Johnson, 2024).

IGD's weekly sessions are collectively designed to move participants through four phases, with a few sessions dedicated to each: (1) forming and developing relationships, (2) exploring commonalities and differences, (3) discussing controversial topics, and (4) action planning and alliance building (Zúñiga et al., 2007). In the first phase, participants are given opportunities to get to know each other, learn principles of dialogue, co-create guidelines for their semester together, and engage in related activities. In the second phase, participants learn about social identities, privilege, and oppression, and they explore commonalities and differences among group members. In the third phase, students dialogue about controversial topics related to the IGD topic. The final phase focuses on participants crystallizing what they are taking away from the experience and sharing what practical steps they can take to promote equity, belonging, and justice within their own spheres of influence.

Intergroup Dialogue Research and Theory

Decades of social psychological research associated with intergroup contact (Allport, 1954; Pettigrew, 1998) and IGD (see Dessel & Rogge, 2008 and Frantell et al., 2019, for reviews) have identified a variety of pedagogical, structural, communicative, social, and psychological processes associated with productive intergroup contact and dialogue. This study was guided by and grounded in these literatures, informing the development of our research question, interview protocol, and subsequent data analysis (as described hereafter).

Intergroup Contact Theory

Based on his review of the intergroup contact research conducted in the 1930s and 1940s, Allport (1954) theorized that four conditions are necessary to promote positive and productive intergroup contact: (a) equal status among groups, (b) group cooperation, (c) a common goal, and (d) approval of authorities for groups to interact. Allport's contact theory would be supported empirically by dozens of studies over the next four decades (see Pettigrew & Tropp, 2006 for a review). In Pettigrew's (1998) reformulation of contact theory, which became known as intergroup contact theory, he added a fifth condition: The interactions are such that there is the potential for friendship.

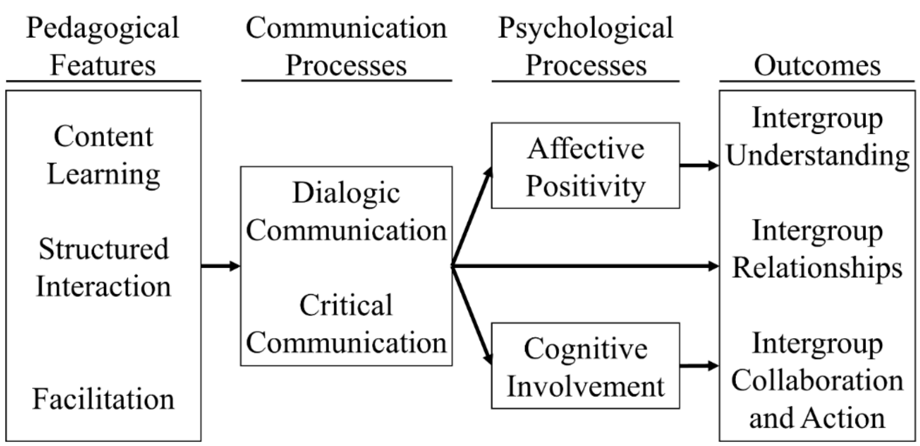
Though the traditional, in-person IGD experience is well-aligned with the literature on intergroup contact (Jackson, 2022; Joyce et al., 2024), it is possible that one or more of these five conditions are not as firmly in place when IGD is delivered online. Thus, our interview protocol included questions that would prompt participants to discuss the ways in which they felt the online platform helped create and/or constrain such conditions.

The Critical-Dialogic Theoretical Framework of Intergroup Dialogue

Building on intergroup contact theory and related social psychological research, IGD researchers would conduct multiple studies in the early 2000s (see Jackson, 2022 for a review) that would inform the development of the critical-dialogic theoretical framework of intergroup dialogue, which describes how IGD promotes a variety of interconnected intergroup processes and outcomes (Gurin et al., 2013). As illustrated in Figure 1, IGD's pedagogical features (e.g., co-facilitation, structured interactions, academic content) have been found to promote communication among participants that is both dialogic (i.e., focused on lived experience) and critical (i.e., oriented towards improving the status quo) (Nagda, 2006). In turn, these forms of dialogic and critical communication have been found to promote intrapersonal, psychological processes associated with the cognitive and emotional dimensions of the IGD experience (cognitive involvement and affective positivity, respectively) (Nagda et al., 2004). Cognitive involvement refers to the complexity of thinking required to see issues from others' perspectives and to reflect on one's assumptions about oneself, one's identities, and societal status quos. Affective positivity refers to the positive emotions that students have as they engage with difficult topics, their peers, and come to better understand others and themselves. Collectively, these communication and psychological processes promote intergroup understanding, intergroup relationships, and intergroup collaboration and action (Gurin et al., 2013; Gurin-Sands et al., 2012; Nagda et al., 2009; Sorensen et al., 2009).

Figure 1

A Critical-Dialogic Theoretical Framework of Intergroup Dialogue



Note. Adapted with permission from *Dialogue across difference: Practice, theory, and research on intergroup dialogue* (p. 76), by P. Gurin, B. R. A. Nagda, and X. Zúñiga, 2013, Russell Sage Foundation.

This framework and the research that informed its development are grounded in the traditional, in-person delivery of IGD, making it important to discern the ways in which these various intrapersonal and interpersonal processes and outcomes are fostered and/or hindered when IGD is delivered online. Thus, our interview protocol included questions that would provide participants opportunities to discuss the ways in which these various processes and outcomes may have been a part of their online IGD experience.

Current Scholarly Discourse on Online Intergroup Dialogue

Given that online IGD is a relatively new phenomenon, it has received considerably less scholarly attention when compared to the decades of research that has been conducted on in-person IGD. In our review of the literature, we found three publications that focus on online IGD, two of which center on facilitators' reflections (Bodon, 2021; Nagda et al., 2021) with the other focusing on students' perceptions (Jackson et al., 2024). Bodon (2021) describes her own experience creating and facilitating an online IGD focusing on immigration, including her perceptions of her participants' online IGD experience. Nagda et al. (2021) provide a compilation of similar essays in which they provide separate accounts of their own transition from facilitating dialogues in-person to facilitating online. Both Bodon and Nagda et al. present their online dialogic experiences primarily as examples from which readers can gain insights regarding their own work.

Jackson and colleagues' (2024) qualitative study of students' perceptions of online IGD participation focused on the ways in which the technological aspects of online IGD (e.g., cameras, displays, muting and unmuting, chat features, breakout rooms), as well as students' physical locations as they participated in online IGD (e.g., apartments, dorms) can both enhance and/or hinder IGD processes, outcomes, and the overall experience depending on how these aspects of online IGD are tended to and utilized. Similarly, their findings also illuminated ways in which the online implementation of IGD has the potential to both promote and/or hinder equal and equitable participation and experiences among participating students.

As a complement to these first steps into the scholarship of online IGD, this study focused on increasing our collective understanding of students' perceptions of the interpersonal and intrapersonal dimensions of online IGD (Gurin et al., 2013; Pettigrew, 1998; Zúñiga et al., 2007), which, in turn, can illuminate practical recommendations for enhancing online IGD and provide insight regarding future research and theory development. To gain these insights, we interviewed students who had participated in online IGD, as described in the following sections.

Methods

Research Design and Paradigm

Given the nature of our research question, we conducted semi-structured interviews as part of this qualitative, phenomenological study. Phenomenology focuses on individuals' lived experiences of a phenomenon (in this case, the online IGD experience), which is explored "with a group of individuals who have all experienced the phenomenon" (Creswell & Poth, 2018, p. 76). In providing participants opportunities to relate their own experiences of online IGD through the interview process, our research efforts were grounded in social constructivism, a paradigm that centers on the development of meaning and knowledge through the complexity and diversity of individuals' lived experiences (Creswell & Poth, 2018; Moring, 2001).

Sample

The sample for this study was purposeful, given our need to interview students who had participated in online IGD. Participants were interviewed after having completed an IGD course at one of three U.S. postsecondary institutions. Though these courses were led by different facilitators at different institutions, each of the IGD courses represented in this study aligns with the "Michigan Model" of IGD (described previously), meaning that the participants in this study experienced the same dialogic approach and pedagogy.

Participants were recruited via a survey that they completed as part of a separate study of intergroup dialogue (i.e., they were asked at the end of that survey if they would be willing to be interviewed as part of the present study). This recruitment resulted in interviews with 16 students, all of whom were undergraduates who participated in synchronous IGDs that were either fully online (via Zoom) or blended (i.e., some weekly sessions via Zoom, some sessions in person). Table 1 provides additional demographic information for the sample.

Table 1

Select Sample Demographics

Pseudonym	Gender	Race(s)/ Ethnicity(ies)	Institution	IGD Semester	IGD Format
Amber	Woman	African, African American	C	2021 Fall	Blended
Angela	Woman	White, Latinx	C	2021 Fall	Blended
Avery	Woman	Asian American	C	2021 Spring	Fully Online
Bailey	Genderqueer/ nonconforming	White, Middle Eastern	A	2021 Spring	Fully Online
Crystal	Woman	Black	B	2021 Fall	Blended
Daniel	Man	Asian, Asian American	B	2021 Fall	Blended
Jessica	Woman	White	B	2022 Spring	Fully Online
Justin	Man	African, African American	C	2021 Spring	Fully Online
Kayla	Woman	White	C	2021 Spring	Fully Online
Molly	Woman	White	B	2022 Spring	Blended
Nicole	Woman	White	C	2021 Spring	Fully Online
Robert	Man	White	C	2022 Spring	Blended
Talia	Woman	White	C	2021 Fall	Blended
Tara	Woman	Asian	C	2021 Spring	Fully Online
Tyler	Woman	White	B	2022 Spring	Fully Online
Whitney	Woman	White	C	2021 Spring	Fully Online

Note. n = 16.

Data Collection

The lead researcher conducted 45-60-minute, semi-structured interviews via Zoom with each student who had consented to participate in the study, utilizing an interview protocol that was designed to illuminate participants' overall perceptions of their IGD experience, as well as the opportunities and limitations they felt came with its online delivery. At the beginning of each interview, the lead researcher introduced himself, summarized the purpose of the study, confirmed that the participant had indeed participated in (and completed) an online IGD, and asked the participant if they would like to ask any questions before moving on with the interview. The development of the interview questions was guided by our review of the IGD and intergroup contact literatures (discussed previously), inviting participants to share their perceptions of the ways in which the online nature of their IGD experience promoted and/or hindered Allport's (1954) and Pettigrew's (1998) conditions of intergroup contact and the various pedagogical, communicative, psychological, and intergroup processes and outcomes that comprise the critical-dialogic theoretical framework of intergroup dialogue (Gurin et al., 2013; see Figure 1). For example, participants were asked to describe their perceptions of the ways in which the online nature of their IGD experience helped promote and/or hinder their desire and ability to develop relationships with their group members (i.e., friendship potential; Pettigrew, 1998) and to work through conflicts that emerged in their IGD experience (i.e., communication processes, cognitive involvement; Gurin et al., 2013; see Figure 1). In addition to asking questions that were more explicitly grounded in these theoretical considerations, the interview protocol also included more practical questions related to the features of Zoom (e.g., breakout rooms, chat, cameras, microphones) as a complementary way of discerning the opportunities and limitations associated with the various conditions (Pettigrew, 1998), processes, and outcomes (Gurin et al., 2013) associated with intergroup contact and dialogue. At the end of the interview, participants were asked if there was anything else they would like to share about their online IGD experience.

Data Analysis

To analyze participants' responses, we used an open, axial, and selective coding approach (Strauss & Corbin, 1998) to enable "a cyclical and evolving data loop in which the researcher interacts, is constantly comparing data and applying data reduction, and consolidation techniques" (Williams & Moser, 2019, p. 47). Through this dynamic process, themes were identified and interpreted, as guided by the study's theoretical grounding and research questions. The research team coded the responses individually in the open coding phase. Thereafter, we met and discussed the themes that emerged in the data until saturation was reached as part of the axial coding phase. We then coded all data using a selective coding approach. Following the coding, we met to discuss the selected themes and coded excerpts as additional steps to ensure intercoder consistency (O'Connor & Joffe, 2020). Our resulting coding scheme consisted of codes that were guided by terms and constructs in the IGD literature (e.g., "friendship potential") along with original codes developed by the researchers individually and collectively (e.g., "feel safe behind a screen").

To further establish trustworthiness and reliability in our data collection and analysis efforts, we triangulated our analyses by having each member of the research team involved in coding and the cross-checking of codes (Patton, 2015), and we provide thick, rich description and interview excerpts in our finding sections below (Creswell & Miller, 2000). Member checking was also used to establish trustworthiness and reinforce the narrative co-construction of meaning (Creswell & Creswell, 2018).

Findings

Our analyses of the data illuminated a range of perceptions of online IGD, including ways in which online delivery can help foster and strain the kinds of conditions (Allport, 1954; Pettigrew, 1998), pedagogy, and intrapersonal and interpersonal processes (Gurin et al., 2013) associated with productive intergroup contact and dialogue. Specifically, students discussed ways in which participating in online IGD "behind a screen" influenced how they engaged with (or disengaged from) both their peers and their own identity-related reflection. Students also described how participating in IGD online influenced their ability to develop relationships with their IGD group members. These themes are described in greater detail in the following sections.

Students' Experiencing Safety (or Comfort) "Behind a Screen"

One of the most prominent themes that emerged from our interviews was the practical and emotional buffer that students' screens provided. Students discussed behaviors that they were enabled to do (or not to do) because there was a screen between them and their IGD peers, which represents an important set of opportunities and limitations associated with online IGD. That is, it became clear that what they were describing (summarized hereafter) could be seen as an opportunity or limitation depending on whether students were using this "buffer" as a way to pursue safety or comfort.

In IGD, and in inclusive teaching, generally, the distinction between students feeling safe and students feeling comfortable is important (Gurin et al., 2013; Weaver et al., 2021). On the one hand, students should feel and be safe from all forms of harm. On the other hand, learning, unlearning, and development can be uncomfortable as students learn about and make sense of difficult realities. For example, students in this study described how one can always just turn off their camera if things get heated or emotional (Angela, Avery, Crystal, Daniel, Justin, Tara, Tyler), with Daniel suggesting that "online, I could easily turn off my camera and like, I don't know, punch [a] pillow or something if I was angry . . . but, obviously in person, I would have to kind of keep that to myself." Along these lines, Tyler (a woman in a gender IGD) felt that it was easier to express emotions online because she could "kind of retreat after" by muting and, "as far as I know, nobody was still looking at my screen after I shared." She also highlighted how having a screen between herself and her peers influenced how she talked about gender and her past experiences with her peers:

> We've been socialized as women to be quieter and kind of defer to other people. And I find it easier to shed that when I'm online because I'm the same size as everybody else. I'm taking up the same space on the screen, but in person, that's not the case . . . . there are certain things that I felt more comfortable sharing about, like sexual assault and harassment that I probably wouldn't have felt as comfortable sharing in person . . . I also felt it helped me not sugarcoat certain opinions as much because I didn't see any men right in my space or in the room. So, I felt more comfortable, kind of like calling out certain behaviors that probably some of these guys engage in.

In these students' observations, we can see how if such steps are taken in the name of safety (as was the case with Tyler), they represent an opportunity that is difficult to replicate in person. We can also see how such behaviors (e.g., avoiding heated or emotional moments) can also highlight a potential limitation of online IGD if students do them as a way of avoiding the kinds of discomfort that promote learning and development.

The online platform influenced other emotional dynamics as well. Robert shared that experiencing IGD online "made it have a little less emotional gravity" and that, if there was an emotionally charged moment where no one knew what to say, "I could kind of just stare off into space for a second or, like, stare at the document up on my screen." Similarly, Kayla felt:

> Having the screen lets a lot of . . . the uncomfortableness of the conversations we were having . . . it kind of buffered that conversation and made it so we could just sit in silence for five minutes and then we were like: "Okay, no one is going to talk."

Conversely, when those moments happened in person, Robert felt that he "could kind of feel the people around me feeling what I'm feeling, feel that kind of like silence in the room." This connection to (and the relevance of) the feelings of nearby peers is also discernible in Justin's thoughts on crying:

> If I share something personal, it would be a lot easier for me to, if I'm feeling I want to cry, hold back the waterworks or whatever if I'm online. Whereas, if I'm in person, I can't explain why, but I feel like it would be a lot harder to hold back that emotion.

Here again, the ability of an online platform to help students "hold back the waterworks" can be seen as a benefit or limitation depending on whether it is promoting student safety or comfort, and the ways in which it is promoting or hindering dialogue between students.

Having a screen between students and their peers also influenced how students navigated controversy. On the one hand, the screen was seen as a way to say more controversial things, as summarized by Molly:

> In person, if you say something controversial, I don't even know what it is necessarily, but you kind of have to own it. Whereas, on Zoom, you could say something, you say something offensive or controversial, and then when the two hours is up, you just close your computer, and then next week you open it again and you never have to, like, be face-to-face with your peers. Whereas, in person . . . people would feel more, like I said, vulnerable in person.

On the receiving end of controversial statements, students discussed how they would respond differently to things they disagree with. Regarding online IGD, Kayla said that hearing things she disagreed with would "make [her] want to be more distracted." Elaborating, she said

> I don't really like to directly oppose people, or I don't really know how to do that yet, I guess. So, I'd either withdraw from the dialogue, or I'd get more engaged and just be in my own thoughts more instead of participating verbally.

When asked how she would respond in an in-person IGD, she said, "I think, eventually, I would go to a leader and be like, 'Hey, I really want to learn how to constructively dialogue about a point that I want to oppose.'" When asked why she wouldn't reach out to a facilitator in an online IGD, she felt that

> It was just another email I had to send in another Zoom that I had to be on. And, at that point, it was just a lot of the same, just repetitive being on the screen. So, I think that was a big reason that stopped me from reaching out, which is unfortunate, but I think if it were in person, and I could just go up to my leaders after class and be like, "Hey, I need some more help with this," then I would have just done it.

In Kayla's comments, we see how having a screen between students and their peers can offer them distractions in moments of disagreements, and how having to go through a screen to connect to facilitators can motivate students to avoid or pass on opportunities for learning and development. Again, if students finding distractions during disagreement offers students a sense of safety, it can represent a benefit afforded by online IGD; if students take such steps to avoid effort or discomfort, it can be seen as a limitation.

Having a screen between students and their peers also influenced other interpersonal aspects of the IGD experience. For example, Amber indicated that her group had their cameras off throughout much of their IGD experience, highlighting how "when you're online and your camera isn't on, you can do whatever you want" (i.e., even to the point where people might have been so physically removed from the dialogue that they weren't in a position to speak into their microphone). Even when cameras were on, which was the norm among those we interviewed, Robert felt that there was less opportunity for affirmation:

> I didn't feel affirmed at all by the people around me, even if they were in agreement. I feel like my passion for the moment didn't get affirmed at all on Zoom. You'd have another person jump in right away, and then people would be visually engaged in whatever that was.

Students also highlighted how they can have more control over what they see and what others see of them. Tara shared how being able to see herself made her feel more comfortable reading her testimonial:

> If we were in class, and I was standing up and reading it in front of the class or something, I think I would have been even more scared or more stressed than I was over Zoom. So, I kind of felt like sometimes having that barrier where like, you see what everyone's looking at, and you can kind of control that, was kind of nice for me, personally, because it made me feel more comfortable in being in the space.

Whitney pointed out that, when reading her testimonial, she could only look at one screen at a time, which allowed her to look at her testimonial document (only), to the point where "it was like I wasn't talking to anyone." She also highlighted that, on Zoom, "we kind of didn't look each other in the eyes or anything," noting that "being online definitely has that added layer of kind of being able to say all of it without really having to face everyone, which I don't know if that's good or bad." Here, Whitney highlights how, when students look into the eyes of their peers on Zoom, the others are unable to detect it (i.e., it will appear that they are looking elsewhere). However, if a student were to stare into their own camera as a way of helping their peers feel that they were being looked at directly, that student would actually only be able to see their peers peripherally (because they are staring at their own camera). In this sense, Whitney's comments remind us that Zoom does not enable students to look each other in the eyes, while also reinforcing one of the primary themes that emerged in this study (i.e., "I don't know if that's good or bad").

However, there were ways in which having a screen between students and their peers hindered intrapersonal dimensions of the online IGD experience, such as students' identity engagement (see Gurin et al., 2013). Robert, a white man who participated in a blended IGD, explained that

> being online meant I had to face far less emotional topics, or topics that actually made me process my privilege. Then, in person, it wasn't forced, but I think the in-person nature of it created a direct confrontation with those identities more than online.

He later explained that being online "allow[s] you to avoid a lot of other things that compounds into processing identity as well." Molly (a white woman in a blended IGD) suggested this as well, while also highlighting how this kind of intrapersonal processing can influence not only long-term development within students, but how they engage with their peers in their IGD over the short-term:

> When we moved to in-person, I became a lot more quiet . . . . I just felt so much more vulnerable in person, and I felt like I shouldn't speak up . . . I should let my classmates speak up just because [our IGD was] about race. And I think that I gave a lot of room for my Black classmates, my Hispanic classmates, to speak when we were in person, whereas online I felt like, 'Oh, like I'm just behind a screen, I'll just speak up. Like, it doesn't matter.' But when I was in person, I was like, 'Oh my gosh, I'm one of the only white, blonde, blue-eyed girls. I should shut up and just let everyone else talk.'"

Here, Molly highlights how physical proximity influences how she engages with her own identities (an intrapersonal process) and, consequently, the ways in which she interacts with her peers (an interpersonal process).

A Lack of "Friendship Potential"

Students also discussed how a lack of physical proximity influenced their ability to form deeper relationships with their IGD peers. Research has found the potential for friendship to be an integral condition of positive intergroup contact (Ball & Skrzypek, 2022; Pettigrew, 1998). This does not mean that everyone involved in intergroup contact must become friends, but it does highlight the importance of people having a quantity and quality of interactions that can promote relationship development (Miles et al., 2015). Aside from the more formal, course-related interactions that students had as part of their IGD, one of the most prominent themes that emerged from our interviews was an absence of the personal connections and relationships that students felt can be developed outside of class. Almost every student mentioned their longing for "small talk" and "little interactions" (Robert) that were seemingly not possible in Zoom. It was outside of class where they needed to "get to know each other as . . . potential friends . . . instead of just students in the same class" (Avery). Being on campus and "hanging out with everyone at once" (Whitney) was seen as instrumental for connection.

Furthermore, students discussed how their interactions with their classmates were confined to their time on Zoom: "[There was] no way to go off and talk to someone personally at the end of class" (Jessica). When the class was over, that was the "time to log off and not think of those people anymore" (Tyler). The demarcation between life and school gave rise to a narrow group identity: "We had a collective identity in class, but . . . when the Zoom call ended, our group identity ended, and when the Zoom call started, that's when it started" (Tara). Some students (who lived near each other) were able to interact outside of class, others were not. Avery discussed how it was difficult to hear that one of her IGD classmates

> worked at a coffee shop nearby, on campus, and [other classmates] were able to go and hang out for a couple hours and get to know each other more. But I was [living out of state] doing things. I don't know, I just feel like when you meet together, your peers can be a part of your life more easily, but over Zoom, you don't really know where they're going after, or where everyone comes from before class.

In addition, some students expressed that they were not willing to take the "extra steps" they felt were necessary to have the kind of informal "small talk" that can cultivate relationships: "Because things were online, like, I'm not going to private message anyone. I'm not going to unmute myself to talk to people, so there's no way really of making that connection" (Amber).

Not everyone was pessimistic about the friendship potential, noting that online experience simply made it more difficult, requiring more work. Angela remarked, for instance, that "making personal connections on Zoom may just take longer and is dependent on the participants in the room."

Discussion

The purpose of this study was to discern dialogic opportunities and limitations of online IGD. Our interviews and subsequent analyses of students' responses were grounded in and guided by scholarship associated with intergroup contact (Allport, 1954; Pettigrew, 1998) and IGD (Gurin et al., 2013; see Figure 1). In analyzing students' responses to our interview questions, and in line with previous online IGD research (Jackson et al., 2024), we found that dichotomizing the various features of the online IGD experience in terms of opportunities or limitations, while a useful starting point for this study, ultimately, over-simplifies the assessment of online IGD. Thus, in our description of the findings, we highlighted the ways in which a particular aspect of online IGD can represent and provide both opportunities and limitations. These collections of opportunities and limitations have a variety of implications for IGD theory, practice, and research, as discussed in the following sections.

Theoretical Implications for (Online) Intergroup Contact and Dialogue

Intergroup contact theory (Allport, 1954; Pettigrew, 1998) posits that, for positive intergroup contact to take place, there must be (a) equal status among groups, (b) group cooperation, (c) a common goal, (d) approval of authorities for groups to interact, and (e) friendship potential. In this study, students' descriptions of their online IGD experience raise questions as to the extent to which each of these conditions were met, as well as a recognition of how the online delivery IGD helped promote these conditions.

While students did not provide any reason to believe that there was a lack of authority approval for them to interact, students did identify ways in which the online delivery hindered friendship potential and led to varying levels of investment and group cooperation among IGD participants. As for sharing and working towards a common goal, there were ways in which students' goals and motivations for enrolling in IGD surpassed their capacity to work toward those goals equally in an online context, both individually and collectively with their classmates. At the same time, the online delivery of IGD provided more equal access to students who would have otherwise not been able to participate (e.g., Avery, who lived out of state), and there were ways in which online delivery helped students more equally engage in the dialogic experience and overall purposes of IGD, given that they were not in the same physical space as their classmates (making them feel safer and more willing to be vulnerable).

Looking beyond the conditions necessary for positive intergroup contact, the critical-dialogic theoretical framework of intergroup dialogue (Gurin et al., 2013) (see Figure 1), provides a useful lens for analyzing the online IGD experiences students described in this study. For example, we see ways in which the online delivery of IGD both enhanced and hindered the structured interactions and activities that students experience. We also see ways in which students were more and less willing and able to engage in dialogic communication. In addition, students described how not being physically near someone can make it easier to not engage and work through one's own identities and corresponding privilege (i.e., identity engagement, a form of cognitive involvement). As for the affective and emotional dimensions of IGD, emotional disengagement was a prominent theme in our interviews, as was the limited ability to form substantive relationships or friendships.

Pedagogical Implications for Intergroup Dialogue

It was evident in participants' interview responses that many aspects of online IGD could represent opportunities or limitations, depending on a variety of factors. Thus, in the sections that follow, we offer recommendations as to how IGD facilitators and participants might, on the one hand, take full advantage of the opportunities afforded by the online delivery of IGD while, on the other hand, avoid its limitations.

Cultivating "Friendship Potential"

Online learning scholars have long emphasized the need for online instructors and students to be thoughtful and proactive in mitigating the "transactional distance" that can be accentuated in online learning (Moore, 1973; Moore & Kearsley, 1996; Orcutt et al., 2024; Stein et al., 2005; Ustati & Hassan, 2013; Weidlich & Bastiaens, 2018; Xiao, 2024). Moore (1991) describes transactional distance as "a distance of understandings and perceptions, caused in part by the geographic distance, that has to be overcome by instructors, learners and educational organizations if effective, deliberate, planned learning is to occur" (p. 2). Though participants in this study shared a variety of ways in which online IGD helped facilitate the kinds of authentic and personal interactions that have been found in previous studies of IGD (Jackson et al., 2024; Gurin et al., 2013) and online learning (Mehall, 2020), one of the most prominent themes of this study was students' desire (and struggle) to engage in the kinds of informal "small talk" that can often happen before in-person classes, during breaks, and after class. Such interactions help decrease transactional distance and have the potential to lead to other kinds of gatherings (e.g., at nearby cafés, restaurants) that help students and facilitators get to know, trust, and become more comfortable with each other (Hansen-Brown et al., 2022).

Though facilitators are rather limited in what students do outside of class, they can invite (not require) their students to consider establishing inclusive way(s) that students can connect with each other outside of class, perhaps one that allows for whole-group conversations as well as private messaging (for instances when students want to follow up with just one person) (Borowiec et al., 2021; Borup et al., 2020; McClannon et al., 2018). Facilitators should also be thoughtful as to when this invitation might be extended. For example, making such a suggestion on the first day of class may be too significant for a group of people who do not really know each other. In this study, many students expressed that the sharing of their testimonials was a turning point for the group, the point at which they began to trust each other. Perhaps after a session when the group seems to be becoming closer as a group, facilitators can suggest that they identify an inclusive way to connect outside of class, which can help them continue to foster the positive feelings and relationships they are developing.

Optimizing Cameras and Displays

As in Jackson and colleagues' (2024) study of online IGD, students in this study illuminated how the more technical aspects of the online experience (in this case, Zoom features) can influence the more interpersonal and intrapersonal processes and outcomes associated with IGD. In describing their struggles to form deep relationships with their IGD peers, students in this study shared how being able to see everyone in their group was helpful along these lines, both in terms of having a screen large enough to see everyone's Zoom "tile" and in terms of their classmates having their cameras turned on. The benefits of cameras and a sufficiently large display become all the more important as we consider how students struggled to read body language and the influence that this had on their IGD experience.

In the course descriptions for online sections of IGD, students can briefly be told (a) that they will need a camera and sufficiently large screen for the course (e.g., not a phone) and (b) where they can access or obtain such technology if they do not already have it. On the first day of class, facilitators can talk with students about web camera behaviors and best practices (Dennen et al., 2022), including the importance of keeping cameras turned on throughout the IGD experience, along with instances when it may be appropriate to turn one's camera off (e.g., distractions in their backgrounds, the differences between safety and comfort in difficult conversations). Facilitators can also teach students how to adjust their Zoom displays so that they can see everyone and invite them to let the group know throughout the IGD experience if they are struggling to see the group in some way. In addition, facilitators can encourage students to position their cameras in such a way that helps maximize eye contact (as opposed to students looking off to the side), which can help give students the feeling that their peers are focusing on the shared IGD experience, as opposed to multitasking. Facilitators can also be thoughtful as to when and why screens are "shared" in the platform, given that screen-sharing prevents students from seeing the rest of their group.

Facilitators can also encourage students to be mindful of their own facial expressions, given that (a) their faces are more visible in an online setting than in the in-person contexts they are used to and (b) that other forms of body language are inaccessible to their classmates (Cai et al., 2022). Facilitators should also be mindful of their own facial expressions, body language, and related behaviors, which can influence how students perceive them, students' comfort in contacting them, and the overall course experience (Orcutt et al., 2024), given the prominent roles that facilitators play in IGD pedagogy. And, at the same time, facilitators can remind students of the importance of looking at their classmates (i.e., not just their own Zoom "tile") throughout the IGD experience.

Directions for Future Intergroup Dialogue Research

Similar to other practical and scholarly efforts to better understand how to effectively implement IGD online (Jackson et al., 2024; Bodon, 2021; McCarron et al., 2020; Nagda et al., 2021; Yeakley, 2020), this study was exploratory with broad theoretical foci: Pettigrew's (1998) intergroup contact theory and Gurin and colleagues' (2013) critical-dialogic theoretical framework of intergroup dialogue (see Figure 1). While this study's illumination of opportunities and limitations associated with online IGD can be useful in practice, the findings of this study also illuminate promising directions for future research that can further enhance scholars' and professionals' understanding of how IGD (and other IGD-like endeavors) can be optimally implemented online.

First, given the diversity of ways in which instructors can respond to the (potentially sudden or unexpected) need to teach online (Wingo et al., 2017), future studies can focus on the experiences and perceptions of facilitators who have facilitated IGD online. Specifically, researchers could interview facilitators who have facilitated both in person and online, and/or they could interview facilitators who have only facilitated online. The perspectives and experiences of facilitators who have only facilitated online would represent an important complement to the students in this study who, with the exception of one student who participated in a form of IGD as a high school student, had never been an IGD participant before. However, interviewing facilitators who have facilitated both in-person and online would allow for more direct comparisons between in-person and online IGD, which can be helpful in illuminating the various opportunities and limitations associated with online IGD.

Second, as a complement to students' self-reported experiences in and perceptions of online IGD, observational research would help IGD researchers (a) more fully understand the particular phenomena that students discussed in this study and (b) identify opportunities and limitations of online IGD that may not be discernible through students' retrospective accounts. Indeed, observational studies of IGD have been conducted previously (Gurin et al., 2013), which have provided IGD researchers and professionals with rare and unique insight into how IGD participants listen and speak to each other. Whereas those researchers videotaped IGDs in order to analyze them later, Zoom allows for simple and convenient recording. Further, if researchers wanted to observe online IGDs in real time, they could attend the online IGD with their camera turned off, which allows the host to remove the researchers' tile from participants' view. Though participants would be aware of and consent to the presence of the observer(s), their invisible presence would help prevent the possibility that students would act differently because they know they are being observed.

Third, as a complement to such qualitative studies, quantitative studies could help IGD scholars and professionals assess the extent to which students are experiencing and obtaining IGD's intended outcomes. Such research would build on past quantitative studies of IGD that have analyzed the extent to which students engage in a wide range of intrapersonal and interpersonal processes and outcomes associated with interpersonal communication, emotion, cognition, and intergroup understanding, relationships, collaboration, and action (Gurin et al., 2013; Gurin-Sands et al., 2012; Nagda et al., 2004; Nagda 2006; Nagda et al., 2009; Sorensen et al., 2009). Such research would be useful in discerning the extent to which such processes and outcomes are likewise occurring in online IGD. Of course, the purpose of such research would not be to simply make comparisons between in-person and online IGD in order to determine "which one is better" (see Bernard et al., 2004). Indeed, scholars of online learning have long understood that the underlying questions of such research should not center on determining whether in-person or online instruction is "better" (Joksimović et al., 2015); rather, based on the understanding that both in-person and online implementation can be effective, the underlying research questions and purposes should center on how pedagogies (such as IGD) can be optimally implemented in person and online (Salomon, 2002) . In this sense, quantitative studies of online IGD could help identify if there are processes or outcomes that are not carrying over in the transition from in-person to online IGD, how this might vary across students with different identities (Miles & Kivlighan, 2012) or levels of developmental readiness (Jackson, 2021), and, therefore, provide insight into adaptations that can be made as part of such a transition.

Fourth, while the findings of this study did not give reason to believe that previously identified conditions for positive intergroup contact (Allport, 1954; Pettigrew, 1998) do not apply to online IGD, this study does prompt us to consider what additional conditions may be necessary for positive intergroup contact in online contexts, given that Allport's (1954) and Pettigrew's (1998) conditions for intergroup contact were derived from decades of research on in-person group interactions (see Pettigrew & Tropp, 2006, for a review). Future research in this area can help discern such conditions, which will be critical to IGD programs, facilitators, and students striving to optimize IGD interactions online.

Finally, as a complement to this study, which was grounded primarily in IGD research and theories, the pursuit to better understand the opportunities and limitations of online IGD can be enhanced as IGD scholars further draw upon the scholarship of online learning. As just one example, the community of inquiry (COI) framework (Cleveland-Innes et al., 2024; Garrison et al., 1999; Shea et al., 2022) describes a set of components related to cognition, social presence, instructor pedagogy, and student learning that have been found to be integral to the online learning experience. These four components both align with and complement the psychological, communicative, and pedagogical components of IGD (see Figure 1), speaking more directly to phenomena that are unique to online teaching and learning. The online focus of such frameworks can help shift how IGD facilitators and researchers implement and study online IGD, how they interpret and make sense of the online IGD literature that is emerging post-pandemic, as well as the kinds of topics and questions that will receive scholarly and practical attention going forward.

Limitations

Though this exploratory study is useful in discerning next steps in IGD theory development, practice, and research, there are limitations to this study that should be acknowledged. First, the sample consisted primarily of women (12 out of 16) who attended 3 institutions. These students also self-selected into this study, and it is possible that the experiences and perceptions of students who decide to accept the invitation to participate in such a study may not represent the experiences and perceptions of other students who were invited—but did not choose—to participate. In addition, interviewees had slightly different IGD experiences: The sample included students who participated in IGD exclusively online, as well as those who participated in a blended format (i.e., some weekly sessions online, some in-person), and the quantity of IGD sessions varied across participants as well.

In addition, the questionnaire was designed to ask a range of questions that were grounded in IGD theories and digital learning perspectives. As an exploratory study, the interviews conducted offered a breadth of responses designed to illuminate implications for practice and future research related to online IGD, rather than in-depth explorations of select aspects. Future qualitative studies that focus more in-depth on particular aspects of the findings presented in this study would be helpful in addressing such limitations, along with quantitative studies that can identify and further substantiate relationships through the use of larger datasets.

Conclusion

For decades, in-person IGD has been a prominent social justice pedagogy, bringing students together to dialogue on matters that are central to the intergroup conflicts taking place in the U.S. and throughout the world. In an increasingly digital world, it is important to understand how such pedagogical approaches and conversations can be optimized in online contexts.

The purpose of this study was to discern and better understand opportunities and limitations associated with the online delivery of IGD. The findings of this study highlight the importance of facilitators being able to, on the one hand, take advantage of the opportunities afforded by the online delivery of IGD, while, on the other hand, avoiding or mitigating its limitations. In this study, we have put forth a variety of such recommendations, and we have highlighted future directions for IGD research and related theory development that can help us better understand how IGD programs, facilitators, and students can navigate limitations of online IGD. Beyond IGD alone, such empirical, theoretical, and practical efforts stand to increase our understanding of how to prepare students (through online means) for life in a world that is not only increasingly diverse and complex, but increasingly online as well.

Declarations

This study was approved by the [institution name temporarily withheld for peer review purposes] Institutional Review Board.

The authors have no conflicts of interest to declare.

References

Abes, E. S., Jones, S. R., & Stewart, D. L. (Eds.). (2019). *Rethinking college student development theory using critical frameworks*. Stylus.

Allport, G. W. (1954). *The nature of prejudice*. Addison-Wesley.

Ball, A. & Skrzypek, C. (2022). Enhancing transformative social-emotional learning through intergroup dialogue: An exploratory study. *Currents: Journal of Diversity Scholarship for Social Change*, *2*(1), 6-11. https://doi.org/10.3998/ncidcurrents.1772

Bernard, R. M., Abrami, P. C., Lou, Y., Borokhovski, E., Wade, A., Wozney, L., . . . & Huang, B. (2004). How does distance education compare with classroom instruction? A meta-analysis of the empirical literature. *Review of Educational Research*, *74*(3), 379-439. https://doi.org/10.3102/00346543074003379

Bodon, T. C. (2021). Global migrant crisis: Teaching and learning on Zoom while facilitating intergroup dialogue. *Journal of Universality of Global Education Issues*, *8*(1), 1-32.

Borup, J., Walters, S., & Call-Cummings, M. (2020). Student perceptions of their interactions with peers at a cyber charter high school. *Online Learning*, *24*(2), 207-224. https://doi.org/10.24059/olj.v24i2.2015

Borowiec, K., Kim, D., Wang, L., Kim, J., & Wortham, S. (2021). Supporting holistic student development through online community building. *Online Learning*, *25*(4), 145-155. https://doi.org/10.24059/olj.v25i4.2882

Cai, Y., Pan, Z., Han, S., Shao, P., Liu., M. (2022). The impact of multimodal communication on learners' experience in a synchronous online environment: A mixed-methods study. *Online Learning*, *26*(4), 118-145. https://doi.org/10.24059/olj.v26i4.3448

Cleveland-Innes, M. F., Stenbom, S., & Garrison, D. R. (Eds.). (2024). *The design of digital learning environments: Online and blended applications of the community of inquiry*. Taylor & Francis.

Conklin, S. & Garrett Dikkers, A. (2021). Instructor social presence and connectedness in a quick shift from face-to-face to online instruction. *Online Learning*, *25*(1), 135-150. https://doi.org/10.24059/olj.v25i1.2482

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications, Inc.

Creswell, J.W., & Miller, D. L. (2000). Determining validity in qualitative inquiry. *Theory Into Practice*, *39*(3), 124-130. https://doi.org/10.1207/s15430421tip3903_2

Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry & research design: Choosing among five approaches.* Sage.

Dennen, V. P., Yalcin, Y., & Hur, J. (2022). Student webcam behaviors and beliefs: Emergent norms, student performance, and cultural difference. *Online Learning*, *26*(4), 168-192. https://doi.org/10.24059/olj.v26i4.3472

Dessel, A., & Rogge, M. E. (2008). Evaluation of intergroup dialogue: A review of the empirical literature. *Conflict Resolution Quarterly*, *26*(2), 199-238. https://doi.org/10.1002/crq.230

Ford, K. A. (Ed.). (2017). *Facilitating change through intergroup dialogue: Social justice advocacy in practice*. Taylor & Francis.

Frantell, K. A., Miles, J. R., & Ruwe, A. M. (2019). Intergroup dialogue: A review of recent empirical research and its implications for research and practice. *Small Group Research, 50*(5) 654–695. https://doi.org/10.1177/1046496419835923

Garrison, D. R., Anderson, T., & Archer, W. (1999). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education*, 2(2-3), 87-105. https://doi.org/10.1016/s1096-7516(00)00016-6

Gurin, P., Nagda, B. R. A., & Zúñiga, X. (2013). *Dialogue across difference: Practice, theory, and research on intergroup dialogue*. Russell Sage Foundation.

Gurin-Sands, C., Gurin, P., Nagda, B. A., & Osuna, S. (2012). Fostering a commitment to social action: How talking, thinking, and feeling make a difference in intergroup dialogue. *Equity & Excellence in Education*, *45*(1), 60-79. https://doi.org/10.1080/10665684.2012.643699

Hansen-Brown, A. A., Sullivan, S., Jacobson, B., Holt, B., & Donovan, S. (2022). College students' belonging and loneliness in the context of remote online classes during the COVID-19 pandemic. *Online Learning*, *26*(4), 323-346. https://doi.org/10.24059/olj.v26i4.3123

Hurtado, S. (2001). Research and evaluation on intergroup dialogues. In D. Schoem & S. Hurtado (Eds.), *Intergroup dialogue: Deliberative democracy in school, college, community and workplace* (pp. 22-36). The University of Michigan Press.

Jackson, G. R. (2021). Intergroup dialogue pedagogy, processes, and outcomes: The moderating role of students' openness to multiple perspectives. *Teachers College Record*, *123*(6), 1-36. https://doi.org/10.1177/0161468121123006

Jackson, G. R. (2022). Using student development theory to inform intergroup dialogue research, theory, and practice. *Journal of Diversity in Higher Education, 15(2), 194-206.* http://dx.doi.org/10.1037/dhe0000241

Jackson, G. R., Schiffecker, S. M., Poquet, O. (2024). "An intense level of self-regulation": Technological opportunities and limitations of online intergroup dialogue. *Journal of the Scholarship of Teaching and Learning*, *24*(4), 138-161. https://doi.org/10.14434/josotl.v24i4.36086

Joksimović, S., Kovanović, V., Skrypnyk, O., Gašević, D., Dawson, S., & Siemens, G. (2015). The history and state of online learning. In *Preparing for the digital university: a review of the history and current state of distance, blended, and online learning* (pp. 93-122). http://linkresearchlab.org/PreparingDigitalUniversity.pdf

Joyce, N., Sandras, D., & Soliz, J. (2024). Intergroup contact and intergroup dialogue: communicative pathways to addressing prejudice and intergroup bias. In *Research Handbook on Communication and Prejudice* (pp. 91-103). Edward Elgar Publishing.

Maxwell, K. E., Nagda, B. R. A., & Thompson, M. C. (2011). *Facilitating intergroup dialogues: Bridging differences, catalyzing change*. Stylus.

McCarron, G., Jackson, G. R., McNaughtan, J., Olesova, L., Schmidt, G., & Taylor-Adams, T. (2020). Twenty-first century pedagogy for leadership development: Centering dialogic and digital approaches in leadership education. *Journal of Leadership Studies*, *14*(3), 72-77. https://doi.org/10.1002/jls.21716

McClannon, T. W., Cheney, A. W., Bolt, L. L., & Terry, K. P. (2018). Predicting sense of presence and sense of community in immersive online learning environments. *Online Learning*, *22*(4), 141-159. https://doi.org/10.24059/olj.v22i4.1510

Mehall, S. (2020). Purposeful interpersonal interaction in online learning: What is it and how is it measured? *Online Learning*, *24*(1), 182-204. https://doi.org/10.24059/olj.v24i1.2002

Miles, J. R., & Kivlighan, D. M., Jr. (2012). Perceptions of group climate by social identity group in intergroup dialogue. *Group Dynamics: Theory, Research, and Practice*, *16*(3), 189–205. https://doi.org/10.1037/a0028634

Miles, J. R., Muller, J. T., Arnett, J. E. III, Bourn, J. R., Johnson, M. C., & Recabarren, D. (2015). Group member affect and session evaluations in intergroup dialogue. *Group Dynamics: Theory, Research, and Practice*, *19*(4), 225–242. https://doi.org/10.1037/gdn0000032

Miles, J. R., & Shinew, H. J. (2022). A breakdown (and rebuilding) of intergroup dialogue. *Group Dynamics: Theory, Research, and Practice*, *26*(3), 274–287. https://doi.org/10.1037/gdn0000190

Miller, R. A., Howell, C.D., Oyarzun, B., Martin, F., Knight, S., & Frankovich, J. (2023). Faculty perspectives on inclusion, diversity, equity, and access in online teaching. *Online Learning*, *27*(3), 387-406. https://doi.org/10.24059/olj.v27i3.3691

Moring, I. (2001). Detecting the fictional problem solvers in time and space: Metaphors guiding qualitative analysis and interpretation. *Qualitative Inquiry*, *7*(3), 346–369. https://doi.org/10.1177/107780040100700306

Morphew, C. C., & Hartley, M. (2006). Mission statements: A thematic analysis of rhetoric across institutional type. *The Journal of Higher Education*, *77*, 456–471. http://dx.doi.org/10.1353/jhe.2006.0025

Nagda, B. A. (2006). Breaking barriers, crossing borders, building bridges: Communication processes in intergroup dialogues. *Journal of Social Issues*, *62*(3), 553-576. https://doi.org/10.1111/j.1540-4560.2006.00473.x

Nagda, B. A., Gurin, P., Sorensen, N., Gurin-Sands, C., & Osuna, S. M. (2009). From separate corners to dialogue and action. *Race and Social Problems*, *1*(1), 45-55. https://doi.org/10.1007/s12552-009-9002-6

Nagda, B. R. A., Rappeport, A., King, R. U., Barrios, H. R., Nuñez, C., & Aisenberg, E. (2021). Dialogic learning in the time of a global pandemic and beyond. In *Global perspectives on dialogue in the classroom* (pp. 133-149). Palgrave Macmillan.

Nagda, B. A., & Zúñiga, X. (2003). Fostering meaningful racial engagement through intergroup dialogues. *Group Processes & Intergroup Relations*, *6*(1), 111-128. https://doi.org/10.1177/1368430203006001015

O'Connor, C., & Joffe, H. (2020). Intercoder reliability in qualitative research: Debates and practical guidelines. *International Journal of Qualitative Methods*, *19*. https://doi.org/10.1177/1609406919899220

Orcutt, M., Jackson, G. R., & Jones, S. J. (2024). "It helped push me through the class": Community college student perceptions of the role of instructor immediacy behaviors in completing an online course. *Online Learning*, *28*(3), 348-371. https://doi.org/10.24059/olj.v28i3.4080

Patton, M. Q. (2015). *Qualitative research & evaluation methods: Integrating theory and practice* (4th ed.). SAGE Publications, Inc.

Pettigrew, T. F. (1998). Intergroup contact theory. *Annual Review of Psychology, 49*, 65-85. https://doi.org/10.1146/annurev.psych.49.1.65

Pettigrew, T. F., & Tropp, L. R. (2006). A meta-analytic test of intergroup contact theory. *Journal of Personality and Social Psychology, 90*(5), 751-783. https://doi.org/10.1037/0022-3514.90.5.751

Salomon, G. (2002). Technology and pedagogy: Why don't we see the promised revolution? *Educational Technology*, *42*(2), 71-75.

Saltz, J., & Heckman, R. (2020). Using structured pair activities in a distributed online breakout room. *Online Learning*, *24*(1), 227-244. https://doi.org/10.24059/olj.v24i1.1632

Shea, P., Richardson, J., & Swan, K. (2022). Building bridges to advance the community of inquiry framework for online learning. *Educational Psychologist*, *57*(3), 148-161. https://doi.org/10.1080/00461520.2022.2089989

Sorensen, N., Nagda, B. A., Gurin, P., & Maxwell, K. E. (2009). Taking a "hands on" approach to diversity in higher education: A critical-dialogic model for effective intergroup interaction. *Analyses of Social Issues and Public Policy*, *9*(1), 3-35. https://doi.org/10.1111/j.1530-2415.2009.01193.x

Strauss, A. & Corbin, J. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory*. Sage.

Vally Essa, F., Andrews, G., Mendelowitz, B., Reed, Y., Fouche, I. (2023). Humanising online pedagogy through asynchronous discussion forums: An analysis of student dialogic interactions at a South African university. *Online Learning*, *27*(4), 508-529. https://doi.org/10.24059/olj.v27i4.3652

Williams, M. & Moser, T. (2019). The art of coding and thematic exploration in qualitative research. *International Management Review 15*(1): 45-55.

Wingo, N. P., Ivankova, N. V., & Moss, J. A. (2017) Faculty perceptions about teaching online: Exploring the literature using the technology acceptance model as an organizing framework. *Online Learning*, *21*(1), 15-35. https://doi.org/10.24059/olj.v21i1.761

Xiao, J. (2024). Revisiting the theory of transactional distance: Implications for open, distance, and digital education in the 21st century. *American Journal of Distance Education*, 1-14.

Yeakley, A. (2020). *Creating community and supporting dialogues to moving online*. https://www.difficultdialogues.org/blog/creating-community-and-supporting-dialogues-to-moving-online

Zúñiga, X., Nagda, B. A., Chesler, M., & Cytron-Walker, A. (2007). Intergroup dialogue in higher education: Meaningful learning about social justice. *ASHE Higher Education Report*, *32*(4), 1-128.

Design of Interactive Spaces for Promoting Parental Involvement: Strategies Used by EFL Teachers

Dongni Guo, Yingru Zhao, and Qi Sun
School of Education, University at Albany, State University of New York

Roberto L. M. Ramos
School of Education, University at Albany, State University of New York
Federal Institute of Education, Science and Technology of Brasília (IFB)—
Riacho Fundo Campus, Brazil

Abstract
Using a qualitative multiple-case study design, this study explored the strategies employed by five Chinese teachers of English as a Foreign Language (EFL) to design activities that incorporate digital tools and visuals, aiming to enhance parent-involved interactions in online language learning settings. Grounded theory analysis of teachers' iterative and semi-structured interviews, recorded videos, student artworks, and teacher-parent-student discourses on digital learning platforms and social media, revealed six emergent themes regarding digital-screen-mediated designs and interactive activities. These themes point to pedagogical strategies of using digital visuals, such as recorded videos, learning management systems, and social media. These digital visuals mediated authentic parent-involved communications and interactions in both interpersonal and community-based phases. The findings also demonstrate that the screen mediation process extended beyond merely illustrating, sharing, or anchoring targeted visual content with parents and students; it also involved co-creation of visuals on the screens. The findings of this study contribute to a deeper and more innovative view of digital-screen-mediated teaching approach for fostering multiple parent-involved interactions in online EFL learning settings. They can also assist EFL teachers to develop more effective instructional strategies in these learning environments.

Keywords: Parental involvement, online language teaching, digital screen mediation model, English teacher development, lesson design, English as a Foreign Language, social interactions

Guo, D., Ramos, R. L. M., Zhao, Y., & Sun, Q. (2025). Design of interactive spaces for promoting parental involvement: Strategies used by EFL teachers. *Online Learning, 29(*2), pp. 140–167. https://doi.org/10.24059/olj.v29i2.4683

Online language course enrollment has increased significantly over the past several decades (Borup et al., 2019), especially since the advent of the COVID-19 pandemic. Such technologically facilitated online learning, however, requires greater parental involvement, particularly for young English as a Foreign Language (EFL) students. These learners need high levels of support from adults due to their limited capacity for self-regulated learning and developing digital literacy skills (Tao & Xu, 2022). Increasing research recognizes the vital role of parental involvement in children's language education (e.g., Al-Mahrooqi et al., 2016; Kalaycı & Öz, 2018; Mahmoud, 2018). Involving parents in language learning not only improves language learning outcomes but also promotes their children's social, emotional, psychological, and interactional development (Al-Mahrooqi et al., 2016; Kalaycı & Ergül, 2020; Kalaycı & Öz, 2018; Niehaus & Adelson, 2014). This positive impact transcends cultures and nationalities (Tong et al., 2021).

In Asian countries, Wati (2015) found that parents support English-language learners by assisting with vocabulary acquisition and assignment completion; providing learning materials, including not only standard texts but also cartoons, puzzles, and videos; and seeking clarification from teachers on topics with which their children have difficulty. Chinese parents in particular harbor high expectations for their children's academic success and invest substantial efforts in their learning (Cheung & Pomerantz, 2011). This emphasis is rooted in the belief that education serves as the paramount avenue for social mobility (Gao, 2012; Tam & Chan, 2010; Tong et al., 2021). When Tao and Xu (2022) explored parental supportive practices for young EFL online learners in Chinese primary schools during the COVID-19 pandemic, they found that monitoring children's learning was parents' top priority among all their children's activities, followed by providing psychological, academic, and technological support.

However, online language teachers often find achieving productive parental involvement challenging. Gokturk and Dinckal (2018) found that significant misunderstandings and related tensions often arise between parents and teachers regarding their respective roles, which may hinder productive partnerships. At the same time, they found school administrators often fail to fully support teachers in fostering parental involvement. Helping teachers respond to this scenario in online language education of primary-school children requires an understanding of the mechanisms underlying their parental involvement strategies. This study addresses this research gap by investigating the practices of EFL teachers in designing constructive parent-involved interactive spaces for supporting children's online language-learning experiences. The results contribute to a deeper insight into instructional techniques integrating digital strategies and interactive learning designs for parental involvement. Furthermore, this study presents a more nuanced conceptualization of parent-involved interactive configurations, fostering authentic communication and both interpersonal and community-based interactions for EFL online learners.

Conceptual Frameworks

Parental Involvement as Social Interaction

Wagner (1994) defines *interactions* as reciprocal events involving at least two objects and actions that mutually influence each other. Palloff and Pratt (2001) describe *interactivity* as the creation of an environment where students feel comfortable asking questions, sharing ideas, and engaging in collaborative activities. Building on Rafaeli's (1988) examination of interactivity as a process-related variable and focusing on person-to-person rather than person-tomachine interaction, Hyland (2008) emphasizes that social interactions between *individuals* are a means by which knowledge is constructed. Numerous studies have explored the significance of social relationships and group cohesion in facilitating meaningful online collaboration, particularly highlighting how dialogue triggers cognitive processes essential for deep learning and information retention (Johnson & Johnson, 1987; Kreijns et al., 2005). Such dialogue helps foster a sense of connectedness and belonging while serving as a resource for knowledge construction and growth (Händel et al., 2020; Mullen et al., 2021).

Interactivity frames parental involvement as interactions through which parents communicate directly with teachers and/or learners or mediate interactions between their children and others. Interaction has always been a defining and crucial concept in the educational process and context; it is challenging yet imperative to establish a clear definition and format for interaction in online language education. Studies revealed that novel interaction types, such as procedural and administrative interactions, emerged in online learning to assist learners struggling with digital course interfaces and learning tools in seeking assistance from others (Borup et al., 2013; Howkin et al., 2011; Offir et al., 2001). Tao and Xu (2022) proposed a tripartite support system for young learners' online language learning, expanding two-person interactions (i.e., teacher-parent and student-parent) to include parent participation in student-teacher interactions. This system involves diverse types of interactions among parents, teachers, and students, such as providing academic, affective, and technical support; consulting teachers; and assisting with schoolwork.

Upholding interactivity as a lens, our current study has investigated, coded, and analyzed the practices of the teachers in designing and promoting parent-involved interactions. As a result, it has conceptualized more interactive configurations among actors involved in parental involvement.

Digital Screen Mediation Model

Online language learning is based on the premise that students acquire language through interacting, interpreting, and negotiating meaning with others (Meskill, 2024). In the process of joint meaning making, digital visuals play a crucial role in simplifying complex ideas and making them more accessible (Kolyvas, 2020). Online language teachers are required to foster student social interactions with teachers, peers, parents, and other learning facilitators. The traditional monologic approach, where teachers simply convey information and test recall, is unsuitable for digital mediation; instead, the learning process should be highly dialogic (Meskill, 2024).

The *digital screen mediation model* posits that "academic content and the medium which expresses it and gives it shape" is "mediated collaboratively by instructors and students through authentic conversations about what they co-view" (Meskill, 2024). This model highlights the vital role of digital visuals and tools in fostering collaboration among teachers, parents, and students, describing the digital screen as a facilitator of authentic conversations that develop learners' language competencies. For example, Meskill et al. (2020) found that teaching using Digital Fairytales in an online program for learning Russian as a second language provided more opportunities for language-focused mediational practices than traditional approaches. Through this program, young learners develop language and digital skills by observing the way others use them and by interacting with adults (Meskill et al., 2020).

However, little is known about the potential of applying the digital screen mediation model to involve parents, who play a vital role in their children's authentic conversations and language learning practices. To address this gap, this study used the digital screen mediation model to examine parental involvement as social interaction, exploring how EFL teachers use digital screens to create extended opportunities for parental involvement.

Literature Review

For our literature review, we searched Google Scholar and the ERIC databases for papers focusing on parental involvement in online English as Foreign Language (EFL) instruction in elementary and middle school contexts. We also reference conceptual frameworks employed in the field. Based on our exploratory approach, we present this review in a narrative form by discussing parental involvement in online language education broadly, before focusing on studies specific to teacher strategies in the online environment.

Parental Involvement in Online Language Education

Promoting *parental involvement—actions parents take to support their child's learning achievement—*requires forming partnerships: parent–child, parent–teacher, and parent–parent partnerships (Kalaycı & Öz, 2018; McNeal Jr, 2014). Compared to learning other subjects online, learning languages requires greater communication and interaction with others (Meskill, 2024). Interactions with parents in the home promote a form of cognitive socialization that contributes to children's fundamental intellectual development (Ryan, 1995; Wati, 2015). They also promote language learning. For example, Bang & Mackey (2024) investigated 63 Chinese parents' involvement in 5- to 6-year-old children's use of game-based language learning app. Their mixed methods analysis found that parents' initiation of app use correlated positively with learners' overall English skills, but negatively with student engagement. Qualitative results further showed that parents sought to foster their children's interest in English, helped their children connect the app content to real life, and employed various helping behaviors, mediating their children's learning, with potentially better result for those parents that foster their children's autonomy.

In studying the correlation between parental involvement and children's English proficiency, Halommi and Stevens (2023) collected self-reported survey data from 500 EFL learners and their parents and found that the parental factors of direct learning assistance at home and communication of curricula and child progress between school and parents were the factors that most positively correlated with children's achievement. Parents' socioeconomic status (SES) has also been found to affect their parental involvement. Ghajarieh et al. (2024) conducted a quantitative longitudinal study in Iran to investigate the correlation between 28 four- to six-year-old EFL children's achievement, their parents' SES, beliefs and parental involvement. The study found a strong correlation between parents' high SES and positive beliefs and parental involvement regarding their children's English learning, including parental factors such as parental expectations and reading of books at home. In response to challenges to parental involvement, Al Murshidi et al. (2023) interviewed 28 parents of EFL learners in elementary school in the UAE. Their analysis showed that parents mostly used audio-visual resources and increased use of English at home and led them to suggest that schools supply parents with training, improve communication/coordination of learning targets, and foster children's independent learning.

Several parental involvement typologies have been employed within the fields of online and language education. Epstein's framework (1992; Epstein & Sanders, 2002) proposes six types of family involvement: parenting, communicating, volunteering, learning at home, decision-making, and collaborating with the community. The Hoover-Dempsey and Sandler (1995) model encompasses the mechanisms of parental encouragement, modeling, reinforcement, and instruction, which have unique roles in virtual education. In an examination of online elementary and middle schools, Hasler-Waters (2014) identified four parental roles that boost students' academic performance. First, parents act as *organizers* to plan their children's daily learning schedule and gather learning materials. Second, parents act as *instructors* by providing one-on-one instruction. Third, parents act as *motivators* to encourage students to persist in completing their work. Finally, parents act as *managers* of their children's learning progress.

These parental involvement models place significant emphasis on the roles and responsibilities of parents while often overlooking the contributions and actions of teachers (Lei & Vilbulphol, 2024). This imbalance may place high pressure on parents, causing anxiety. Rectifying this imbalance requires understanding both the mechanisms underlying parental involvement and developing strategies for EFL teachers to engage parents in online settings.

Teacher Practices and Parental Involvement

A growing body of research recognizes teachers' important roles in promoting effective parental involvement (e.g., Boivin et al., 2014; Borup, 2016; Sari et al., 2020). As educational experts, teachers design, encourage, guide, and facilitate parental involvement activities (Kalaycı & Ergül, 2020). Teachers can provide parents with the training, expertise, and opportunities that help them assist their children to succeed academically (Stevens & Borup, 2015).

To gain understanding of teachers' perceptions of practices regarding parental involvement, Borup et al. (2019) interviewed 12 online teachers and 12 on-site facilitators. They found that both groups valued parental involvement when parents advised students on course enrollment, nurtured relationships, and monitored student progress. They identified challenges that teachers and facilitators faced in the online learning process (e.g., no parent portal with a student progress dashboard and difficulty interpreting students' progress and grades). In an investigation of teachers' perspectives on parental involvement in Turkey, Hakyemez (2015) found that although teachers placed a high value on parental involvement, parents were often unwilling to become involved. In another study, Kalaycı and Ergül (2020) found that teachers value parental involvement but lack specific strategies to promote it. Furthermore, teachers view themselves as the main presence in the language-learning process and parents as only one of the moderating factors.

Willis and Exley (2018) explored Australian teachers' strategies in using digital screens to promote parental involvement, examining the use of social media as part of an inquiry curriculum to promote parental engagement. The teachers selected Seesaw as their social media platform for its rapid, secure, user-friendly, and age-appropriate approach to promoting home-school partnerships. They found that the use of Seesaw promoted parents' enthusiasm for participation and enabled idea-sharing that expanded and enriched teachers' classroom practices. They also identified several impediments to parental involvement, including teachers' negative experiences with using digital technologies and the lack of lesson plans for using social media, which affected their ability to strategize for parental involvement.

Chichón (2022) investigated the degree and type of parental involvement of 165 parents of preschool children (aged 0–6) to outline a catalogue of practical proposals for supporting parental involvement by student teachers (n = 10) in a bachelor's degree training course in Cádiz, Spain. Eight strategies for providing materials, guidance and coordination of parents' support of their children's learning were proposed to address the identification of low levels of parental participation, a lack of a regular teacher-parent relationship, and parents' tendency to teach vocabulary in a decontextualized way and replicate their own previous EFL instruction as learners.

To manage home learning during the pandemic in China, many teachers established a class-communication platform using multiple digital channels, including both official and unofficial class/school groups on QQ and WeChat, instant messaging applications (Zhou & Li, 2020). For example, Jiangsu Zhenjiang Experimental School built a home-school coeducation network platform to promote online learning during the pandemic (Zhang & Li, 2020). These technologies helped teachers communicate effectively, maximizing support and collaboration with parents.

Also, in the context of the pandemic, Lei and Vilbulphol (2024) conducted a case study of how an English teacher in Thailand helped parents support their first- to sixth- grade children's learning during remote teaching. Identified across the themes were strategies of equipping parents to be teachers at home, irrespective of the varied levels of parents' proficiency and confidence in speaking and teaching the target language, by supplying examples and video clips of teaching and parental support as well as cultivating a relationship of trust and respect, capitalized on from Thai culture. The teacher reported continuing some form of these strategies even after the end of the pandemic's emergency remote learning period.

In the wake of the pandemic, Dao et al. (2023) investigated 124 Vietnamese teachers' perceived benefits, challenges and responses when conducting synchronous online teaching to 6 through 11-year-olds. Teachers' varied strategies in response to challenges were categorized as either approach-coping strategies (i.e., proactively seeking solutions) or avoidant-coping strategies (i.e., not addressing the problem).

The reviewed literature shows that parental involvement can help promote student success in online language education, specifically in EFL instruction for elementary and middle school students. Studies highlight the contribution of partnerships between parents, teachers, and children in fostering language learning. However, they also cite pedagogical challenges with technology use, parent engagement, and their varying levels of competency in the target language and its instruction. They also emphasize the teacher's crucial role as an expert and catalyst of pedagogy, leveraging the pedagogy-mediating spaces that are digital platforms and media in the online environment to effectively shape training, resources, communication and collaboration for parents and children. Thus, strategizing to better support parental involvement can be an effective teaching tactic in online EFL education.

Current Study

While the reviewed literature highlights the importance of parental involvement in online language learning and the crucial role of EFL teachers in facilitating such involvement, there is a gap in understanding the specific mechanisms guiding teachers in designing interactive spaces that involve parents. This study examines how teachers engage parents by integrating various digital visuals and tools, as well as the learning structures they collaboratively construct with students and their parents. Specifically, this study investigates the practices used by Chinese EFL teachers of Grades 1–8 for involving parents during the COVID-19 lockdown period in China (March 2020–December 2022). During this period, EFL teachers developed a variety of strategies employing digital tools to encourage students and their parents to fully use learning management systems (LMSs) and take responsibility for constructing interactive and collaborative learning spaces. The aim was to contribute to the development of a new digital screen mediation model for facilitating and sustaining teacher-student-parent interactive spaces in online settings.

To fulfill this aim, this study was guided by the following research questions:

1. What strategies do Chinese EFL teachers employ in using digital screens for promoting parental involvement in online learning?

2. What interactive structures involving parents are constructed to support children's online language learning?

Methods

This study used a qualitative multiple-case study design (Yin, 2018) to explore how Chinese EFL teachers' use digital screens to promote parent-involved interactions in online learning contexts. The case study approach was chosen for its suitability in examining complex phenomena across multiple similar and contrasting cases, adding confidence to findings (Miles et al., 2020). This enables an in-depth understanding of teacher strategies in specific contexts. Using purposive sampling strategy (Miles et al., 2020), five teachers were selected as "critical cases" from an initial survey of 78 respondents based on their potential to provide strategic insights (Flyvbjerg, 2011). Rich qualitative data, including interviews, class recordings, designing materials, were collected and analyzed using a grounded theory approach. This design aligns with the study's goal of capturing nuanced practices in using digital screens and shaping parent-involved interactions. This study was approved by the university's Institutional Review Board (IRB) (protocol/study number 22X253).

Participants and Contexts

The selected teachers met the eligibility criteria of (1) teaching Grade 1–7 EFL, (2) working in public schools in China, (3) having taught EFL online during the pandemic, and (4) valuing and encouraging parental involvement when teaching online. Table 1 presents the participants' pseudonyms, background, and demographic data.

Table 1

Interviewee Demographics

Name	Gender	Age	Educational degree	Grade	Years of teaching
Yu	Female	25	Bachelor's degree	Grade 3	4
Li	Female	34	Bachelor's degree	Grade 5	10
Liu	Female	36	Bachelor's degree	Grade 7	10
Yang	Female	42	Bachelor's degree	Grade 5	16
Zhang	Female	44	Bachelor's degree	Grade 4/6	20

The five teachers, who worked at elementary or middle public schools in China, transitioned from in-class to online teaching during the pandemic. To support such a swift transition, China's Education Department developed an elementary school network cloud comprising online courses recorded by expert teachers (Ministry of Education of the People's Republic of China, 2020). The participating teachers assigned their students to watch these 20-minute videos at scheduled times. Subsequently, the teachers either conducted synchronous lessons or recorded their own videos to help students better understand and expand upon the content. One participating middle-school teacher designed the entire online course herself without using the expert-recorded videos. All the participating teachers were responsible for designing after-class assignments.

Data Collection

This study drew upon a variety of data sources, including teacher interviews, class video recordings, micro-lesson videos, student artworks, interaction records on digital learning platforms, such as English Bao; and social media (e.g., WeChat). To gain an in-depth understanding of the teachers' design practices, semi-structured internet-based interviews were conducted iteratively in multiple formats with each participant (Ravitch & Carl, 2016) in both synchronous and near-asynchronous format (Salmons, 2014).

This iterative interview method, chosen for its ability to track teachers' dynamic development in constructing interactive environments for parental involvement (Josselson, 2013), facilitates reflection and adaptation. It enables researchers and participants to refine questions and responses over time (Guo et al., 2024), capturing evolving insights as teachers adjust their strategies (Salmons, 2014). The teachers under study moved to online teaching according to the severity of the pandemic and educational policies. Most online teaching occurred during two distinct periods, from March 2020 to June 2020 and from September 2022 to December 2022, between which most EFL teachers conducted in-class instruction.

Before the formal synchronous interviews, a shared document was made available to each participant teacher via a OneDrive link. This allowed the teachers to preview all the interview questions and provide written responses if desired. Interview questions focused on (a) teachers' pedagogical strategies/practices in using various digital tools to promote parent-involved interactions, (b) teachers' responsibilities and roles, and (c) teachers' perceptions of parent-involved interactions.

The synchronous interviews were conducted via one-on-one audio chat using WeChat and lasted approximately 45 minutes. The interviews focused on the teachers' reflections on their design of strategies for using digital screens to create interactive environments for parental involvement. Near-synchronous written interviews were also conducted via WeChat to address any follow-up questions. All notes and interview transcripts were uploaded to the shared document site, allowing the teachers to review, verify, and add new information as needed.

Data Analysis

Figure 1 outlines the data analysis process. The data were analyzed using a grounded theory approach (Strauss & Corbin, 1998) to code the specific forms of digital screen mediation that teacher employed for parent-involved interactions. This approach was chosen to enable theoretical insights to emerge inductively from the rich qualitative data, making it well-suited for uncovering the complex dynamics of teaching practices. Using an open coding system (Merriam, 2009), all the interview transcripts were reviewed to generate low-inference codes for identifying the digital visuals teachers used, how they used them, and the resulting parent-involved interaction structures. Throughout the process, memos were written to further refine coding schemes and track themes across the data (Merriam, 2009).

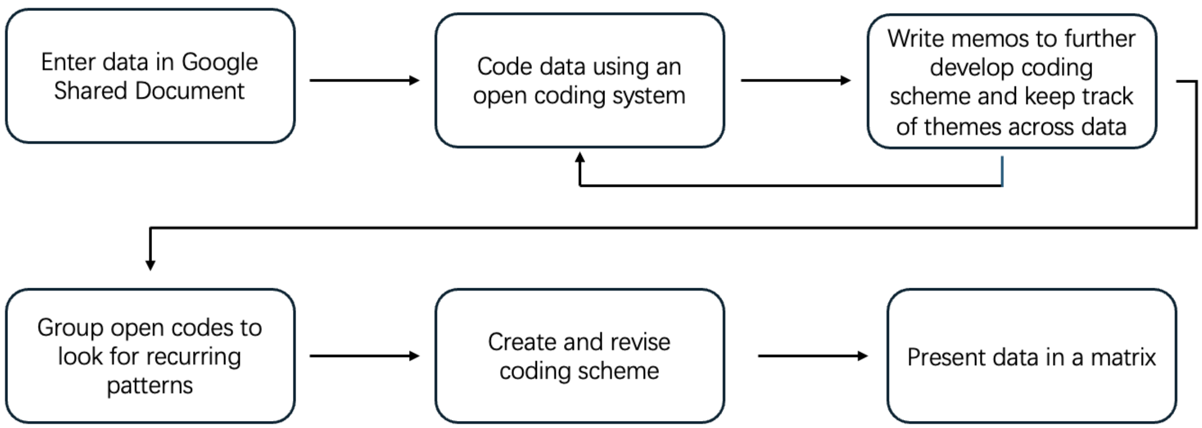
The open codes were organized into themes. Comparing units of information to identify recurring concepts (Patish, 2016) led to the emergence of several concepts, including parent community building and extension of learning activities beyond the classroom. After a preliminary coding scheme was created, data units were grouped into an Excel file to facilitate exploration of the data and provide a holistic view of teachers' strategies and practices. This process aided in moving from the coding to interpretation of data and in generating a new model to explain the parental involvement practices of EFL teachers with digital screens in online learning settings. Supportive data shared by teachers such as their class video recordings, students' artworks and videos, not only validated key themes but also enriched the interpretation of teachers' evolving strategies. To ensure methodological rigor and consistency, the first and third authors co-code and co-developed the codebook. During this process, disagreements regarding codes or interpretations were resolved through consensus- building discussions until intercoder agreement exceeded 85% (Miles et al., 2020). However, some limitations arose. Open coding process resulted in a large number of fragmented codes. To address this, the coding refinement was iteratively conducted through multiple rounds of axial and selective coding (Strauss & Corbin, 1998).

A matrix visual display with detailed descriptions and supporting examples was developed to address the two research questions and aid in data interpretation. Finally, based on deep reflection and interpretation of each theme, a novel digital-screen-mediated design model emerged, explaining how digital-screen-mediated design supported parent-involved interactions and how interactive structures were co-constructed by teachers, students, and parents.

Before concluding the research, member checking was conducted to confirm the accuracy and validity of the findings (Creswell, 2002). All participants were asked to review the shared documents, identify missing information, correct incorrect information, and confirm that the records and related analysis were consistent with their views and experiences.

Figure 1

Data Analysis Process Flowchart



Findings

The following section describes in detail the digital tools, resources, and platforms that the teachers used; how they used them to provide instructional guidance; and which parent-involved interaction structures they enabled to support student online language learning (Table 2).

Table 2

Five Teacher Strategies for Promoting Parental Involvement

Theme	Teachers' actions	Frequency	Parent-involved interaction structures as outcomes	Frequency
Use learning management systems to exchange information and materials with parents (Teacher Li, Teacher Liu, Teacher Yang, Teacher Yu, Teacher Zhang)	Share visualized data on student performance	12	Agentively seek help from teachers and other parents on how to improve their children's learning performance	11
	Provide multiple means of access for parents to upload their children's work	6	Select the online platform with which they are most familiar	4

Use recorded videos to extend instruction and teacher–student–parent interaction (Teacher Li, Teacher Liu, Teacher Yu, Teacher Zhang)	Record short videos modeling parent–student interactions	1	Interact with their children by emulating teacher modeling of interactions Record the interactions to share them with other parents on social media and message platforms	1
	Design micro-lessons to address difficult topics	7	Watch and discuss lessons with their children	7
Use social media to advance students' and parents' collective knowledge (Teacher Li, Teacher Liu, Teacher Yang, Teacher Zhang)	Establish online parent groups and communities	5	Form collective knowledge and expertise in tutoring their child Provide valuable feedback to teachers and parent communities Exchange views and learning resources with parent communities	5
	Invite parents to manage students' study groups on social media	2	Encourage all group members to complete all tasks on time Encourage students to review, comment on, and discuss each other's assignments in the chat box	3
	Encourage parents to share students' work on social platforms	3	Share and discuss their children's work with parent groups and communicates Provide feedback to and express appreciation of the work of other children and discuss it with their own children Encourage their children to improve their work based on peer and parental feedback Ensure that their children participate in daily learning activities	3
Invite parents to attend classes in real time using live conferencing platforms (Teacher Li, Teacher Liu, Teacher Yang, Teacher Yu, Teacher Zhang)	Encourage parents to attend classes with their children in real time	8	Act as supervisors, facilitators, and partners with and for their children Address technical issues for students	10
	Encourage students to practice dialogues with their parents	4	Reinforce their children's communication skills and ESL knowledge in an authentic context with their support	1
	Provide course links to parents to allow them to briefly enter the online classroom	2	Confirm their children's attendance at any time	1

Promote authentic conversations by simulating digital games (Teacher Li)	Structure opportunities for students to simulate digital games to play at home with their parents	2	Situate dialogue with children on authentic problems and ideas in target language Record interactions to share with other parents and wider community	2
Use assignment instructions to co-create meaning-making environments for students and their parents (Teacher Li, Teacher Liu, Teacher Yang, Teacher Yu, Teacher Zhang)	Structure opportunities for students to complete homework with their parents	4	Provide personalized instruction to their children	2
	Assign reading tasks to students and encourage them to retell the reading materials to parents	2	Record story-retelling activities as audio /video recordings to share with parent groups and communities Provide immediate feedback to their children.	3
	Assign challenging homework to students	2	Provide support to their children and seek help together online	3
	Send digital materials to parents and ask them to explain to their children how to view and use these materials	3	Assist their children fully comprehend teacher requirements, review essential materials, and complete their assignments	5
	Assign daily tasks to students and encourage parents to help their children complete it	6	Share children's work on parent instant messaging, online community, and social media groups Provide feedback to and express appreciation of the work of other children and share it their own children	2

Using LMSs to Exchange Information and Materials with Parents

LMSs offer virtual educational platforms whereby teachers, students, and parents can exchange information, distribute content, design evaluations, and prepare lessons. Li, Yu, and Yang emphasized the importance of granting parents access to LMSs so that they could monitor their children's academic performance, real-time learning progress, and assessment results. For example, when Yu assigned reading tasks and quizzes to her students on an LMS called English Bao, she granted parents access so that they could track their children's progress in terms of quiz item completion and scores (Figure 2). Leveraging the convenience of LMSs and the information provided by teachers, parents proactively sought help from teachers and other parents to address their children's learning weaknesses.

Figure 2

Learning Task Progress Report

Note. The first column shows student names (removed), the second the average scores, the third the amount of time elapsed for task completion, and the last the percentage of correct responses.

The teachers typically conducted various learning activities with their students on multiple LMSs, including English Bao, Banjixiaoguanjia, and Yiqizuoye. Yu found that some parents helped their children download and upload the required materials while others struggled with unfamiliar or complex digital platforms. To address this, Yu provided separate access points for parents and students to upload homework, allowing them to choose the platform with which they were most comfortable. This approach allowed parents struggling with complex digital platforms to choose the easiest option, ensuring all students could review essential materials and submit their assignments on time with parental support.

Using Videos to Extend Instructions and Teacher-Student-Parent Interactions

Recorded videos provide the opportunity to extend the instructional and communicative space beyond the classroom. The teachers emphasized that recorded videos allowed students to preview and review lessons at their convenience. The teachers recorded different types of videos for diverse learning purposes. For example, Li developed micro-lessons to address difficult or critical concepts and knowledge for each lesson and posted them on WeChat and the SeeWo LMS. Li explained that as every formal synchronous lesson was only 20 minutes long, they were inadequate for providing children with understanding of complex knowledge points and for practicing learning content. Li also encouraged parents and students to watch these lessons together, thereby enabling parents to tutor their children more effectively.

In a different vein, Yu trained parents on how to facilitate their children's learning by recording videos modeling parent–student interaction for parents to emulate. She described her approach as follows:

> I made a series of micro-courses of around 20 minutes each in which I invite a little girl to be my teaching assistant. I ask her to pretend to be my daughter. We learn English together by dancing, singing, playing games, etc. By doing so, I show parents how to interact with their children. Parents could model the process after class at home.

Yu observed that the children showed keen interest in these videos, acquiring new vocabulary and expressions that they applied in real-life interactions with their parents. Parents recorded the interactive processes and shared them through social media and messaging platforms, thereby gaining insights into effective ways to engage with their children, assist them in practicing English, and integrate English conversation into authentic situations at home.

Using Social Media to Advance Collective Knowledge

Establishing Online Parent Groups and Communities

The teachers integrated social media into their online teaching and learning activities to promote student and parent collective knowledge building and community building. All the participating teachers noted that they had established online parent chat groups on social media, enabling parents to discuss English-learning strategies, share resources, and seek advice. Liu observed that parents frequently turned to the community when their children had English-language-related questions they could not answer. By tapping into the collective knowledge and expertise of other parents with stronger English skills, they could offer more effective support to their children. Liu explained that parents commonly discussed topics such as the English books that their children were reading at home, the effective learning approaches, the best online courses and English learning platforms, sharing and commenting their children's daily English practice videos.

Moreover, the online parent community generated valuable feedback that Liu and Zhang were able to leverage to improve their teaching practices. Zhang postulated that collecting feedback from an online parent group helps teachers enhance their pedagogical strategies and lesson designs. She described how her approach evolved.

> In the beginning, I used to send videos provided by an educational company to parents. However, some parents informed me that merely watching videos didn't result in a thorough comprehension of the subject matter, and it lacked genuine opportunities for practice and interaction. As a result, based on this feedback, I incorporated live class sessions for students during which we could delve into challenging topics and engage in English dialogues to enhance their learning experience.

Parents in the group shared motivations, interests and needs related to their children's English learning. Drawing from these discussions, they not only collaboratively developed new insights into how to better support their children's English learning within this community but also helped teachers improve their pedagogical designs.

Inviting Parents to Manage Student Study Groups

To promote peer collaboration and mutual support, Li organized students into small learning groups of four to six students, each with a designated group leader. Leaders were selected based on their higher English proficiency and sense of responsibility, as well as the parents' willingness to assist with group management. Li encouraged the parents to create an online chat group for ongoing communication. To facilitate this collaborative learning process, Li assigned daily reading tasks to students and required them to submit their completed work to their group leaders. The leader's parents helped manage the study group by communicating with the other parents and encouraging timely task completion.

All parents shared their children's work in a chat group, enabling students to review, comment, and discuss each other's assignments. Sharing these discourses and student artifacts made their learning trajectories more visible, demonstrating that sharing on digital screens and collaborating on digital platforms can facilitate the cumulative progress of student learning and parent–student discussions within and across lessons. Yang similarly established a parent-facilitated study group but she opted to include more students in each group. The discussions among parents in Yang's groups encompassed not only the learning tasks themselves but also their children's plans for learning.

Encouraging Parents to Share Student Work on Social Platforms

Both Yu and Yang assigned daily tasks to their students including a range of activities, such as read-aloud sessions, home quizzes, and dialogue practice. Yu encouraged parents to share their children's work on the Parent Community or Moments platforms, enabling other parents to provide feedback, express appreciation, and showcase their own children's production. This approach increased the number of learners completing the daily assignments, leading to improved participation rates and active refinement of their work based on peer and parental feedback.

Inviting Parents to Participate in Real-Time Classroom though Live Conferencing Platform

A synchronous learning mode involves real-time online teaching, such as through online conferencing platforms like Zoom (Dailey-Hebert, 2018). Live conferencing was a key mode of online language teaching for all the participant teachers. The teachers used live conferencing platforms such as Voov and Ding Talk, which support screen sharing, chatting, recording, and whiteboarding. Despite these powerful features, teachers encountered challenges in consistently engaging students in synchronous classes and in supervising their students' status and thoughts due to camera constraints. For example, Yu recognized that young learners often struggled to maintain focus and engaged when learning English online at home, as they lacked the social interaction and guidance provided by a supervisor.

To mitigate these issues, Yu, Li, Yang, and Zhang advocated for parental involvement in synchronous classes, in which parents and students can co-view and engage in the learning content on the screen and discuss learning-content-focused topics. Parents were also able to help build stronger teacher-student connections, such as by helping students better understand teacher guidelines. Yang selectively invited parents whose children required more support to attend online classes. Likewise, Zhang shared the online class link with parents, allowing them to briefly join the virtual classroom and monitor their children's learning progress. By attending classes, parents acted as guides, facilitators, and learning partners, providing guidance and support.

In synchronous classes, Yu asked every student to practice English dialogues with their parents. To facilitate this, Yu would first invite two or more students to model the dialogue for the entire class, allowing others to observe her expectations. She then assigned the students to practice the dialogue with their parents, thereby reinforcing students' language skills in an authentic context with parental support. For example:

> in the unit called "What Is This?" I instructed my students to display their school bags to their parents, who would ask them to identify several school items by inquiring "What is this?" The students would respond to the questions in English using the phrase "It is a(n)…." This activity helped to reinforce their English language skills while also familiarizing them with school-related vocabulary.

Eliciting Authentic Conversations by Simulating Digital Games

With students increasingly engaged in digital games, teachers are seeking to capitalize on such interest for the learning of curricular concepts (Heafner, & Handler, 2018). The teachers emphasized that integrating games is invaluable for engaging students and fostering parent-student interactions. Yu encouraged parents to play games with their children to increase their understanding of the learning content and to provide opportunities for authentic language use.

In her synchronous classes, Yu seamlessly integrated engaging digital games aligned with lesson topics as effective tools for teaching students vocabulary and sentence structure. To foster authentic and contextualized conversations and promote genuine English language practice, Yu also encouraged her students to physically reenact the digital games at home with their parents. As an example, Yu assigned a game in which students had to explain the color-blending process in English using the phrase "If you mix . . . yellow with . . . blue, you will get . . . green" or simply stating "This is . . . yellow" (Figure 5). She encouraged them to ask questions, provide feedback, and record the entire process on video. This approach enabled students to consolidate their language skills in a collaborative and supportive learning environment while also providing parents with an opportunity to participate actively in their children's education.

Figure 5

Screenshot of Video of Parent and Child Playing Color Blending Game

Note. The child was blending the blue, red and yellow colors.

Using Assignment Instructions to Create Collaborative Meaning-Making Environments

In the context of developing effective homework strategies, Yu and Zhang asserted that parents are best positioned to provide personalized, one-on-one instruction to their children in the home environment.

After a formal synchronous lesson ended, Yu encouraged students to collaborate with their parents in completing their homework assignments. She explained that this approach afforded parents the opportunity to co-create learning content with their children as active partners and/or facilitators while also documenting the learning process.

> I assigned English conversation tasks to my students, requesting them to complete them with their parents at home and record the process as either video or audio. They then shared and submitted their digital products to social networks, such as WeChat Group, or LMSs, such as Yiqizuoye. For instance, in the Describing Clothes learning unit, I instructed students to choose one of their parents' items of clothing at home and describe and discuss it with their parents in English. The entire process was recorded by video by the parents. I was pleasantly surprised by the quality of the work that they produced. I even presented them in my online classes!

To enhance students' reading skills, Zhang assigned daily reading tasks on digital platforms and encouraged students to re-tell stories with their parents. This approach aimed to provide students with regular opportunities to practice reading and comprehension skills while fostering stronger family interactions and joint meaning making activities around screens.

Yang believes that children are more likely to actively seek parental help when assigned challenging tasks they cannot complete alone. For instance, to celebrate Lunar New Year, Yang tasked students with designing a handmade poster or newspaper in English featuring Spring Festival-related drawings, short stories, and poems, and cultural descriptions and expressions of customs. While I did not require parents to assist with the English handwritten poster, many parents still chose to participate and help their children select a topic that they were interested in and collaborate on the design of the poster. As a result, I received numerous high-quality products that were submitted by the parents and their children showcasing their creativity and English writing skills.

Figure 6

A Student's Poster for Spring Festival

Discussion

This study investigated how parent-involved interactions in EFL student learning activities can be organized and supported through digital-screen-mediated instructional design in online language learning environments. Analysis of the collected data identified six themes related to teachers' design strategies. Each theme comprised two key issues underlying the design of digital-screen-mediated interactive structures and pedagogy.

Digital-Screen-Mediated Design Fosters Parent-Involved Interactions

Consistent with previous perspectives and studies (Mercer et al., 2019; Meskill, 2020), the findings of this study suggest that EFL teachers' digital-screen-mediated design can anchor authentic conversations and interactions among teachers, students, and parents. Teachers capitalized on digital screen features and affordances of learning platforms and applications to create many opportunities for students and their parents to conduct English-related conversations with, though, and around digital screens.

Video-based supporting material proved effective in engaging parent involvement—in line with previous literature (e.g., Al Murshidi et al. 2023; Lei & Vilbulphol, 2024). Furthermore, facilitating parents' access to children's formative assessment and academic achievement data, as well as providing them multiple ways to upload assignments and log into synchronous classes helped teachers to create conditions conducive to dealing with common issues in the online parental involvement literature, such as parents' engagement with their children's tasks (e.g., Mckenna & Millen, 2013, Chicón, 2022) and differences in parents' language and technological competency (e.g., Al Murshidi et al. 2023; Lei & Vilbulphol, 2024). Participant teachers' use of game-based activities for homework confirmed their positive effect in promoting parent-student interaction with the target language (Bang & Mackey, 2024). Such strategies also improved communication with parents, a key factor in effective parental involvement (Al Murshidi et al. 2023; Epstein & Sanders, 2002; Halommi & Stevens, 2023; Zhang & Li, 2020), as teachers used instant messaging applications to guide parents on tutoring areas of focus.

Leveraging the sharing and communicating features of online modalities also contributed to the training of parents to perform their role in parent involvement tasks and structures, a strategy supported by prior research (e.g., Al Murshidi et al. 2023; Chicón, 2022; Lei & Vilbulphol, 2024; Stevens & Borup, 2015), especially through the modeling of parent-student interaction in the target language.

Community building, a generally overlooked dimension in previous research, was a prominent finding in this study. Teachers' strategies enabled parents to seek support not only from the teacher but also from other parents in the organized communities, further enhancing their ability to fulfill supportive roles.

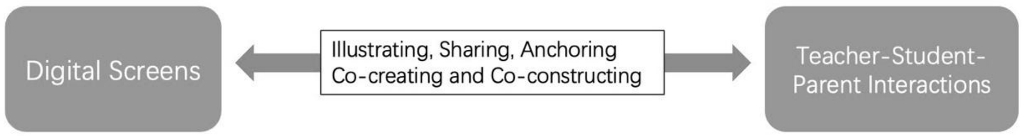
Our data showed that teachers' use of social media and online parent groups enabled parents to post and blog about their children's work to receive feedback and encouragement for both their children and themselves—contrary to Willis and Exley's (2018) findings on the challenges in using social media. This highlighted the potential of parent-to-parent interaction, an underexplored aspect in the online parental involvement literature. Strategies to promote the sharing of student work on social media also contributed positively to classroom management issues, ensuring student participation and timely completion of assignments. Moreover, the forums for parent participation provided teachers with feedback on students' and parents' difficulties, helping them plan subsequent strategies, as advocated in Chicón (2022).

Overall, teachers' strategies emerged as responses to their perceived challenges in online teaching, echoing other studies (e.g., Chicón, 2022; Dao et al. 2023; Lei & Vilbulphol, 2024). Our findings align with Katherine et al. (2016), who found that use of technology can enhance communication and feedback among students, teachers, and parents. These results demonstrate that digital screens are tools for not only teaching English but also mediating teacher–student–parent interactions (Twiner et al., 2010) and socially mediating the English-learning process.

Previous research has shown that digital screen communication supports constructive interactions through illustrating, sharing, and anchoring targeted visual content (Meskill, 2024). Building on this research, the current study found that the interactive process is also mediated by co-creation of visuals on the screen (Figure 7). For example, with parental assistance students created many artifacts, including dubbed and subtitled videos and posters, and constructed many discourses. Digital screens also allowed these artifacts and discourses to be downloaded and revised (Mercer, 2019) enabling students and parents to access, work with, and build upon them anytime, making their language learning sustainable.

Figure 7

Digital-Screen-Mediated Model



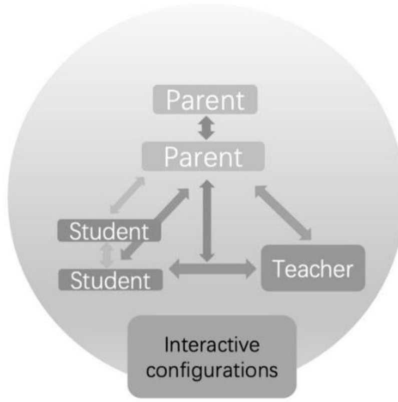
Teacher, Student, and Parent Co-Construction of Interactive Structures

Supported by teachers' designed actions, teachers, students, and parents co-constructed a variety of interactive structures as outcomes aligned with five parent-involved interactive, interpersonal, and community-based configurations: student–parent, teacher–parent, parent–parent, parent participation in student–student interaction, and parent participation in teacher–student interaction. The novel configurations—parent-parent and parent participation in student-student interaction—enhanced Tao and Xu (2022)'s tripartite model of parental support (see Figure 8).

These interactive configurations, which build on Hawkins et al. (2011) and Meskill et al. (2021), were primarily designed and initiated by teachers and sustained and expanded by parents and students. As such, they indicate how teachers, students, and parents agentively and actively collaborate to co-construct evolving structures across virtual, classroom, and home interactive spaces.

Figure 8

Interactive Configurations Among Teachers, Students, and Parents



Assuming a variety of roles, the teachers actively involved parents in students' EFL online learning and directed teacher–student–parent interactions through multiple modalities pivotal in supporting online language learning. One role was modeling an interactive ethos, demonstrating interactive practices, and encouraging parent and student agency. The teachers explored and continually developed new visions and possibilities for parent-involved interactions with digital screens. These findings enriched prior research on the pedagogical development of online EFL teachers (Meskill et al., 2023; Meskill et al., 2024).

Parents and students also positively engaged in learning activities. Parents proactively sought help from teachers and other parents when facing challenges, recorded their interactive activities (e.g., dialogues and games), and shared these on social media. In the process, parents advanced collective knowledge, expertise, and skills in tutoring their children in English. As the primary producers of learning artifacts, students attempted to connect class discussion topic and assignments to their own interests. For instance, guided by teachers and parents, students identified favorite clothes and described them in English. To complete their assignments, they actively sought help and collaboration from parents and teachers and selected and organized relevant materials. With teachers and parent support, they engaged in their own learning process and gained control over it, in line with other studies that advocate the development of student autonomy (e.g., Bang & Mackey, 2024; Al Murshidi et al., 2023) All these positive outcomes resulted from the teachers' design of parent-involved interactive spaces where teachers, students, and parents could co-construct structures for engaging young EFL learners.

Conclusions, Contributions, and Limitations

This study investigated the strategies employed by EFL teachers to facilitate parent-involved English-language-learning interactions in online settings. Interview data, parent-recorded videos and student work collected from five elementary and middle school teachers enabled the mapping of a collection of teacher strategies around digital screen and the reconceptualization of interactive dynamics and configuration among the three main actors of parental involvement: teachers, students, and their parents. Data analysis revealed six design strategies through which teachers, students, and parents not only illustrate, share, and anchor visuals but also collaboratively create and construct digital visuals, resulting in five types of parent-involved interactions. The findings illustrate that while the teachers established interactive spaces and opportunities for learning activities, parents and students actively engaged in learning processes and co-constructed interactive learning structures.

Although previous research has considered strategies for parental involvement—proposed by parents (e.g., Murshidi et al., 2023), teachers (e.g., Chichón, 2022), or implemented by teachers (e.g., Dao et al., 2023; Lei & Vilbulphol, 2024)—it has often focused on other key aspects such as parental engagement (Lei & Vilbulphol, 2024) and teacher capital (Dao et al., 2023). Our study focuses on instructional strategies involving digital modalities and their pedagogical outcomes, as reported by teachers. Our analysis of these strategies offers a more nuanced conceptualization of the interactive configurations among the main actors of parental involvement, building on previous research. The implication for teachers is that fostering interactivity for better language learning extends beyond the two-way avenue of parent-teacher and teacher-student interaction (possibly mediated by parents), and the one way of parents-student interactions (as in Tao & Xu, 2022) to include community-based interactions among students and among parents through the digital medium.

Our study also contributes to the digital screen-mediation framework by showing that teachers not only capitalized on visual screens to promote conversations and learning (Meskill, 2024), but they also created spaces for parents and students to collaborate and produce visual materials that fostered further dialogue and learning. This, in turn, was conducive to the collective construction of knowledge and reinforced trust in parents and their role as pedagogical facilitators.

However, these insights are based primarily on teacher-reported data, with parents' perspectives being filtered through teachers' accounts. Furthermore, the study was limited to a small cohort of five teachers in the Chinese educational context. Another potential limitation is that the relationships between themes of using different digital approaches to promote parental involvement may not have been fully explored. Teachers may use multiple approaches simultaneously to involve parents. The effect of such trans-media strategies should be further explored in future research.

Given the challenges in engaging parents in their children's EFL learning reported in previous studies (e.g., Chicón, 2022; Hakyemez, 2015), the positive reception of teachers' strategies among parents may reflect Chinese cultural factors—similar to the intentional use of culture to promote parental involvement noted in Lei and Vilbulphol's (2024) study in Thailand. While cultural comparison lies beyond the scope of this study, this is an important consideration, and we hope that our findings serve as a foundation for future cross-cultural research on pedagogical and technical innovations that foster parental involvement.

Declarations

Roberto L. M. Ramos would like to acknowledge that for this work he received the partial support of Fulbright/Coordenação de Aperfeiçoamento de Pessoal de Nível Superior—Brasil (CAPES), Finance Code 001.

References

Al-Mahrooqi, R., Denman, C., & Al-Maamari, F. (2016). Omani parents' involvement in their children's English education. *SAGE Open*, *6*(1), 1–12. https://doi.org/10.1177/2158244016629190

Bang, H. J., & Mackey, A. (2024). Chinese parents' involvement in their young children's app-based language learning. *Language Teaching for Young Learners*. https://doi.org/10.1075/ltyl.00052.ban

Boivin N., Albakri, R. Yunus, Z. B. M., Mohammed, H., & Muniandy, N. (2014). Assessing emergent social and multiliteracy practices in urban Malaysian homes. *Malaysian Journal of ELT Research 10*(2), 34–54. https://meltajournals.com/index.php/majer/article/view/604

Borup, J. (2016). Teacher perceptions of learner-learner engagement at a cyber high school. *International Review of Research in Open and Distributed Learning, 17*(3), 231–250. https://doi.org/10.19173/irrodl.v17i3.2361

Borup, J., Chambers, C., & Srimson, R. (2019). Online teacher and on-site facilitator perceptions of parental engagement at a supplemental virtual high school. *International Review of Research in Open and Distributed Learning, 20*(2), 79–95. https://doi.org/10.19173/irrodl.v20i2.4237

Borup, J., Graham, C. R., & Davies, R. S. (2013). The nature of parental interactions in an online charter school. *American Journal of Distance Education*, *27*, 40–55. https://doi.org/10.1080/08923647.2013.754271

Cheung, C. S., & Pomerantz, E. M. (2011). Parents' involvement in children's learning in the United States and China: implications for children's academic and emotional adjustment. *Child Development*, *82*(3), 932–950. https://doi.org/10.1111/j.1467-8624.2011.01582.x

Chichón, J. L. E. (2022). Parental involvement in children's (0–6-year-olds) EFL learning: Outlining practical proposals for improvement as part of student teachers' training. *Porta Linguarum: Revista Internacional de Didáctica de las Lenguas Extranjeras*, (5). https://doi.org/10.30827/portalin.vi.26179

Creswell, J. W. (2002). *Research design: Qualitative, quantitative and mixed methods approaches* (2nd ed.). Sage.

Dailey-Hebert, A. (2018). Maximizing interactivity in online learning: Moving beyond discussion boards. *The Journal of Educators Online*, 15(3). https://www.thejeo.com/archive/2018_15_3/hebert_interactivity

Dao, P., Bui, T. L. D., Nguyen, D. T. T., & Nguyen, M. X. N. C. (2023). Synchronous online English language teaching for young learners: insights from public primary school teachers in an EFL context. *Computer Assisted Language Learning*, *37*(8), 2359–2388. https://doi.org/10.1080/09588221.2023.2260429

Flyvbjerg, B. (2011). Case study. In N. K. Denzin & Y. S. Lincoln (Eds.), *The SAGE handbook of qualitative research* (4th ed., pp. 301–316). Sage.

Gao, X. (2012). Parental strategies in supporting Chinese children’s learning of English vocabulary. *Research Papers in Education*, *27*(5), 581–595. https://doi.org/10.1080/02671522.2011.602102

Ghajarieh, A., Mozaheb, M. A., Mohd Don, Z., & Mirkazemi, F. (2024). The socioeconomic status of parents and parental involvement in post-pandemic era: A longitudinal TEFL study in Iran. *Applications of Language Studies, 2*(1), 1–23. https://doi.org/10.22034/jals.2024.713323

Gokturk, S., & Dinckal, S. (2018). Effective parental involvement in education: experiences and perceptions of Turkish teachers from private schools. *Teachers and Teaching*, *24*(2), 183–201. https://doi.org/10.1080/13540602.2017.1388777

Guo, D., Ramos, L. M. R., & Wang, F. (2014). Qualitative online interviews: Voices of applied linguistics researchers. *Research Methods in Applied Linguistics, 3*(3), 1–14. https://doi.org/10.1016/j.rmal.2024.100130

Hakyemez, S. (2015). Turkish early childhood educators on parental involvement. *European Educational Research Journal*, *14*(1), 100–112. https://doi.org/10.1177/1474904114565152

Halommi, L., & Stevens, J. (2023). Quantifying the relationship between parental involvement and English language proficiency among EFL learners. *Research Studies in English Language Teaching and Learning*, *1*(4), 192–203. https://doi.org/10.62583/rseltl.v1i4.21

Händel, M., Stephan, M., Gläser-Zikuda, M., Kopp, B., Bedenlier, S., & Ziegler, A. (2020). Digital readiness and its effects on higher education students’ socio-emotional perceptions in the context of the COVID-19 pandemic. *Journal of Research on Technology in Education*, *54*(2), 267–280. https://doi.org/10.1080/15391523.2020.1846147

Hasler-Waters, L., Menchaca, M. P., & Borup, J. (2014). Parental involvement in K–12 online and blended learning. In R. Ferdig & K. Kennedy (Eds.), *Handbook of research on K–12 online and blended learning* (pp. 303–323). ETC Press.

Hawkins, A., Barbour, M. K., & Graham, C. R. (2011). Strictly business: Teacher perceptions of interaction in virtual schooling. *The Journal of Distance Education*, *25*(2). https://www.ijede.ca/index.php/jde/article/view/726/1241

Heafner, T., & Handler, L. K. (2018). Online, hybrid, blended, and technology-mediated learning in social studies. In K. Kennedy & R. E. Ferdig (Eds.), *Handbook of research on K–12 online and blended learning* (2nd ed., pp. 335–355). Carnegie Mellon University—ETC Press.

Hoover-Dempsey, K. V., & Sandler, H. M. (1995). Parental involvement in children's education: Why does it make a difference? *Teachers College Record*, *97*(2), 310–331. https://doi.org/10.1177/016146819509700202

Hoover-Dempsey, K. V., & Sandler, H. M. (2005). *The social context of parental involvement: A path to enhanced achievement. Final performance report for the Office of Educational Research and Improvement* (Grant No. R305T010673). http://www.vanderbilt.edu/peabody/family-school/Reports.html

Hyland, K. (2008). Persuasion, interaction and the construction of knowledge: Representing self and others in research writing. *International Journal of English Studies*, *8*(2), 1–23. https://wrap.warwick.ac.uk/48543/

Johnson, D. W., & Johnson, R. T. (1989). *Cooperation and competition: Theory and research*. Interaction Book Company.

Josselson, R. (2013). *Interviewing for qualitative inquiry: A relational approach*. Guilford Press.

Kalaycı, G., & Öz, H. (2018). Parental involvement in English language education: Understanding the parents' perception. *International Online Journal of Education and Teaching (IOJET)*, 5(4), 832–847. https://iojet.org/index.php/IOJET/article/view/447

Kalaycı, G., & Ergül, E. (2020). Teachers' perceptions of the role of parental involvement in teaching English to young learners. *Journal of Language and Linguistic Studies*, *16*(3), 1167–1176. https://doi.org/10.17263/jlls.803608

Kirschner, P. A., & Kreijns, K. (2005). Enhancing sociability of computer-supported collaborative learning environments. In R. Bromme, F. W. Hesse, & H. Spada (Eds.), *Barriers and biases in computer-mediated knowledge communication: And how they may be overcome* (pp. 169–191). Springer. https://doi.org/10.1007/0-387-24319-4_8

Kolyvas, S. (2020). Innovative and collaborative learning in visual arts with the use of modern educational software. *Education Quarterly Reviews*, *3*(2). https://doi.org/10.ssrn.com/abstract=3612835

Lei, J., & Vibulphol, J. (2024). Teacher-parent collaboration for young EFL learners: A Thai teacher's experiences. *English Language Teaching, 17*(8), 39–51. https://doi.org/10.5539/elt.v17n8p39

Mahmoud, S. S. (2018). Saudi parents' perceptions of the kind of help they offer to their primary school kids. *English Language Teaching*, *11*(3), 102–112. https://doi.org/10.5539/elt.v11n3p102

McKnight, K., O'Malley, K., Ruzic, R., Horsley, M. K., Franey, J. J., & Bassett, K. (2016). Teaching in a digital age: How educators use technology to improve student learning. *Journal of Research on Technology in Education*, *48*(3), 194–211. https://doi.org/10.1080/15391523.2016.1175856

McNeal Jr., R. B. (2014). Parent involvement, academic achievement and the role of student attitudes and behaviors as mediators. *Universal Journal of Educational Research*, *2*(8), 564–576. https://eric.ed.gov/?id=EJ1053945

Mercer, N., Hennessy, S., & Warwick, P. (2019). Dialogue, thinking together and digital technology in the classroom: Some educational implications of a continuing line of inquiry. *International Journal of Educational Research*, *97*, 187–199. https://doi.org/10.1016/j.ijer.2017.08.007

Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation*. Jossey-Bass.

Meskill, C. (2024). *Digital screen mediation in education: Authentic and agentive technology practices for teaching and learning*. Routledge.

Meskill, C., Sadykova, G., & Kayumova, A. (2020). Mediating digital screens with very young emerging bilinguals. *Bilingual Research Journal*, *43*(2), 137–156. https://doi.org/10.1080/15235882.2020.1743383

Meskill, C., Guo, D., Wang, F., & Kusumastuti, W. (2024). How emergency remote online language teaching informed post-lockdown language teaching practices: The case of two Chinese EFL elementary teachers. In L. Oliveira and Y. Xu (Eds.), *Pedagogies for equitable access: Reimagining multilingual education for an uncertain world.* Information Age Publishers. https://www.infoagepub.com/products/Pedagogies-for-Equitable-Access

Meskill, C., Kusumastuti, W., Guo, D., Wang, F., & Ramos, R. L. M. (2023). Emergency remote EFL instruction in Brazil, China, and Indonesia: What teachers learned and how. In D. Tafazoli & M. Picard (Eds.), *Handbook of CALL teacher education and professional development*. (pp. 137–155). Springer. https://doi.org/10.1007/978-981-99-0514-0_9

Miles, M., Huberman, M., & Saldaňa, J. (2020). *Qualitative data analysis: A methods sourcebook* (4th ed). Sage.

Ministry of Education of the People's Republic of China. (2020, April 6*). Notice on work arrangements for primary and secondary schools' "School is Out, but Class is On" (关于深入做好 中小学"停课不停学"工作的通知).* http://www.moe.gov.cn/jyb_xwfb/gzdt_gzdt/s5987/202003/t20200306_428342.html

Mullen, C., Pettigrew, J., Cronin, A., Rylands, L., & Shearman, D. (2021). The rapid move to online mathematics support: Changes in pedagogy and social interaction. *International Journal of Mathematical Education in Science and Technology*, *53*(1), 64–91. https://doi.org/10.1080/0020739X.2021.1962555

Murshidi, G. A., Daoud, S., Derei, R. A., Alhamidi, H., Jabir, W., & Sayed, N. (2023). Parental involvement in English as foreign language learners' education: Challenges and solutions in a post-pandemic era. *International Journal of Educational Research Open*, *5.* https://doi.org/10.1016/j.ijedro.2023.100297

Niehaus, K., & Adelson, J. L. (2014). School support, parental involvement, and academic and social-emotional outcomes for English language learners. *American Educational Research Journal*, *51*(4), 810–844. https://www.jstor.org/stable/24546700

Offir, B., Lev, Y., Lev, Y., and Barth, I. (2001). Using interaction content analysis instruments to assess distance learning. *Computers in the Schools*, *18*(2), 27–41. https://doi.org/10.1300/j025v18n02_03

Palloff, R., & Pratt, K (2001). *Lessons from the cyberspace classroom: The reality of online teaching*. Jossey-Bass.

Patish, Y. (2016). *The development of novice teachers' culturally responsive classroom management practice* [Doctoral dissertation, University of Washington]. https://www.proquest.com/dissertations-theses/development-novice-teachers-culturally-responsive/docview/1804413962/se-2?accountid=14166

Rafaeli, S. (1988). Interactivity: From new media to communication. In R. P. Hawkins, J. M. Wiemann, and S. Pingree (Eds.), *Advancing communication science: Merging mass and interpersonal process* (pp. 110–134). Sage.

Ravitch, S. M., & Carl, N. M. (2016). *Qualitative research: Bridging the conceptual, theoretical, and methodological*. Sage.

Ryan, A. B. (1995). *The family-school connection: Theory, research, and practice.* Sage.

Salmons, J. (2014). *Qualitative online interviews: Strategies, design, and skills*. Sage.

Sari, D. K., & Maningtyas, R. T. (2020, November). Parents' involvement in distance learning during the COVID-19 pandemic. In *Proceedings of 2nd Early Childhood and Primary Childhood Education* (ECPE 2020) (pp. 94–97). Atlantis Press. 10.2991/assehr.k.201112.018

Stevens, M., & Borup, J. (2015). Parental engagement in online learning environments: A review of the literature. In M. F. Rice (Ed.), *Exploring pedagogies for diverse learners* *online* (Vol. 25, pp. 99–119). Emerald Group Publishing Limited. https://doi.org/10.1108/S1479-368720150000027005

Strauss, A., & Corbin, J. (1998). *Basics of qualitative research*. Sage.

Tam, V. C., & Chan, R. M. (2010). Hong Kong parents' perceptions and experiences of involvement in homework: A family capital and resource management perspective. *Journal of Family and Economic Issues*, *31*(3), 361–370. https://ideas.repec.org/a/kap/jfamec/v31y2010i3p361-370.html

Tao, J., & Xu, Y. (2022). Parental support for young learners' online learning of English in a Chinese primary school. *System*, 105. https://doi.org/10.1016/j.system.2021.102718

Tong, F., Zhang, H., Zhen, F., Irby, B. J., & Lara-Alecio, R. (2021). Supporting home literacy practices in promoting Chinese parents' engagement in their children's English education in low-SES families: an experimental study. *International Journal of Educational Research*, 109. https://doi.org/10.1016/j.ijer.2021.101816

Twiner, A., Coffin, C., Littleton, K., & Whitelock, D. (2010). Multimodality, orchestration and participation in the context of classroom use of the interactive whiteboard: a discussion. *Technology, Pedagogy and Education*, *19*(2), 211–223. https://doi.org/10.1080/1475939X.2010.491232

Wagner, E. D. (1994). In support of a functional definition of interaction. *American Journal of Distance Education*, *8*(2), 6–29.

Wati, S. (2015). Parental involvement and English language teaching to young learners: Parents' experience in Aceh. In D. D. Rochsantiningsih (Ed.), *Trends and issue in teacher training and education in the 21st century*. *Proceedings of the International Conference on Teacher Training and Education (ICTTE)*, FKIP UNS 2015 (pp. 527–533). Universitas Sebelas Maret, Surakarta, Indonesia.

Willis, L., & Exley, B. (2018). Using an online social media space to engage parents in student learning in the early years: Enablers and impediments. *Digital Education Review*, *33*, 87–104. https://doi.org/10.1344/der.2018.33.87-104

Yin, R. (2018). *Case study research and applications: Design and methods* (6th edition). Sage.

Zhou, L., & Li, F. (2020). A review of the largest online teaching in China for elementary and middle school students during the COVID-19 pandemic. *Best Evidence of Chinese Education*, *5*(1), 549–567. http://doi.org/10.15354/bece.20.re040.

Enhancing Online Mathematics Learning: The Cohesive Work of an Instructional Platform and an Instructional Team

Sarah Hoffman, Madeyo Darnell, and Patricia Moreira
University of Arizona

Abstract
Studies in online STEM education have shown that instructional platforms enhance communication and students' engagement. Despite the relevance of these platforms as communicative tools to support online learning, we cannot neglect the impact of the human connection if we want to ensure an equitable learning environment for online asynchronous students. Mathematics online education has lacked research on how an instructional team can use an instructional platform to promote participation and enhance students' performance. In our study, we used a descriptive-correlational research design to explore this connection in the context of an online asynchronous math course across eight semesters. Our findings showed that the combination of these technological and human resources (Microsoft Teams and an instructional team) improved student participation and performance in our online asynchronous course. While each group of students (online campus and main campus) saw improvements in participation and performance, online campus students saw greater improvement. We hope our findings inform online math teaching to improve students' learning experience and provide new research opportunities to study the reasons behind them.

Keywords: Mathematics education, learning assistants, online learning, undergraduate

Hoffman, S., Darnell, M., & Moreira, P. (2025). Enhancing online mathematics learning: The cohesive work of an instructional platform and an instructional team. *Online Learning, 29*(2), pp. 168–187. https://doi.org/10.24059/olj.v29i2.4464

For decades, numerous studies have explored the challenges of online and in-person teaching and learning environments in mathematics education. A literature review focused on online undergraduate education, considering studies published between 2000 and 2024, showed that mathematics learners had lower performance in comparison with students enrolled in other online courses as well as in-person (Trenholm et al., 2019). Meanwhile, other researchers found that learners in online environments may have more opportunities for reflection than in face-to-face environments (Smith et al., 2003).

A successful online teaching and learning experience requires the proper use of technological tools for students to communicate with instructors, enable communication between students, and facilitate interaction with materials and assignments. In the field of online learning, Liang and collaborators found that students with less mathematical knowledge used an instructional platform with higher frequency than their knowledgeable peers (Liang et al., 2018). In addition, in the same study, all students used videos and quizzes as complements during their learning process, finding a positive association between learning and the studied platform. Indeed, other studies have found that digital collaboration and engagement tools play an important role in the building of community in online students (Shaw et al., 2023), and how interactive tools can enhance learning experiences (MacKenzie & Ballard, 2015).

Instructional platforms have numerous benefits for online learning; however, they are not the only aspect instructors can use to support distance learning. The use of human resources in this particular context may also play a relevant role. The Teaching and Learning Lab at Massachusetts Institute of Technology highlighted the relevance of a sense of belonging for learning at the academic level where students can feel socially related and part of a university community (Teaching + Learning Lab, n.d.). Using instructional teams (a group of undergraduate students—learning assistants—working with the instructor to enhance learning experiences) has been shown to improve students' impression of learning, engagement, and sense of belonging in online and in-person STEM classes (Clements et al., 2022).

Even though there is a significant amount of research around mathematics online learning, a closer look at the influence of the combined use of technology (online platforms) and human resources (instructional teams) to support mathematics online learning is a field to explore. Therefore, in our research, we seek to study the combined influence of an instructional team and the use of an online platform in the performance and participation of students in an online asynchronous mathematics class at the college level.

Literature Review

Online learning has had numerous definitions over time. For the purposes of this study, we will use the guidelines laid out by Singh and Thurman (2019)—learning in an online setting refers to teaching and learning that takes place in a distance environment mediated by the internet, without in-person interaction. In addition, considering the sociocultural approach (Vygotsky, 1978), the communication required to co-construct knowledge in this environment is mediated by technological resources to facilitate participants' interaction. Online learning can take place in two modalities: (1) synchronous, where students and instructor are connected at the same time using a video chat platform and (2) asynchronous, where students can access a platform that holds learning materials, assignments, and communication with the instructor, not requiring real-time interaction between participants.

Our study was conducted in an online asynchronous mathematics classroom of an entry-level quantitative reasoning course. These non-STEM students enter this terminal math class to complete a liberal arts requirement and often lack comfort with mathematics and have various levels of preparation. For years, students in our institution accessed the material using the platform provided by the university. However, after semesters of experience using the platform, the instructor found limitations regarding communication with the students and decided to use a new tool, Microsoft Teams.

Instructional Platforms to Support Online Learning

Research has reported the benefits of using the internet and learning platforms to engage students in their learning process, enhancing their performance and increasing the chance of deep thinking and reflection (Chen, 2010). Rojabi (2020) found that students struggle to interact with their online instructors and classmates and find there are often more miscommunications. This evidence shows that instructional technology alone is not enough to ensure an equitable learning environment for online asynchronous students. It is necessary to consider different factors, such as course structure and organization, learner interaction, student engagement, and instructor presence (Gray & DiLoreto, 2016).

Any successful instructional platform should facilitate learner/instructor interaction and engagement. Park et al. (2020) reported that regarding a student's satisfaction in their online classroom, it was the perceived notion of instructor presence bolstered by the interactive communication tool, rather than the tool itself that was the most important. Eom (2006) and Watson et al. (2023) showed a similar finding, reporting that instructor presence, individual attention, and responsiveness in the form of instructor feedback including responses to emails, notes on written assignments, and responses to discussion posts were one of the main factors that improved perceived learning outcomes. Numerous other papers discuss the importance of instructor presence and bringing forth various methods to achieve it (Anderson et al., 2001; Baker, 2010; Lowenthal & Parscal, 2008; Miller et al., 2014).

A wide variety of instructional platforms are available for instructors—Blackboard, Desire to Learn, Google Classroom, Microsoft Teams, Moodle, Padlet, and Canvas, just to name a few. These are all designed to increase points of contact between the students and the instructional team (Dixson, 2010). In our context, the instructor chose Microsoft Teams (MT) as the online mediator to interact with the students after experiencing limitations with previous platforms and the new opportunities MT presents to enhance communication. Microsoft Teams is a collaboration and communication hub built as a part of the Microsoft 365 suite. Within MT, people can work together in real-time, interacting in chat and live web-conferencing, sharing perspectives in discussion boards, watching content in Stream, or collaborating on Word, PowerPoint, and Excel files (Cankaya, 2020). MT for education additionally allows instructors to assign tasks and assignments, attach rubrics and learning objectives, and provide feedback (Microsoft Education, n.d.). Sharip et al. (2023) found that when given access to Google Classroom, Padlet, and Microsoft Teams, most students (46%) preferred Microsoft Teams.

Research has shown that Microsoft Teams can enhance online instruction. Alameri et al. (2020) found that students have a good perception of Microsoft Teams, with more than 80% of students surveyed believing that the Microsoft Teams platform improved learning by increasing contact between teachers and students. Additionally, in the same study, 84.2% of students felt working with Teams was a valuable use of their time, with 81.1% additionally feeling the platform improved the speed of their learning. Purba (2021) found similar results with 94% of respondents agreeing or strongly agreeing to the statement, "Online learning using Microsoft Teams encourages me to be active in learning." They also found 79% of students agreed or strongly agreed to "Microsoft Teams makes it easier to understand the learning material." Alzubi (2022) found that students taught math using Microsoft Teams outperformed students taught in the traditional whiteboard format. Park et al. (2020) also found Microsoft Teams useful in promoting the instructor presence necessary for student engagement and satisfaction.

Instructional Team in Online Learning Environments

Other studies focused on exploring the online learning environment have found the benefits of working collaboratively with instructional teams (human teaching and learning resource) to promote a sense of belonging, enhance engagement, and improve instructional and learning experiences, among other benefits. Clements et al. (2022), from the lenses of inclusive learning environments, found that working with learning assistants in in-person and online courses promoted a sense of belonging and supported students' engagement.

Hester et al. (2022) studied the influence of an instructional team working with a large group of students in a chemistry course. They found that the integration of an instructional team in the online course increased students' social and cognitive engagement, as well as instructor presence, showing a positive influence in students' online learning experience. In another study, Kim et al. (2021) found that specialized roles in their instructional teams allowed the STEM instructors to adjust teaching resources based on the team's feedback and achieve a higher connection with students in the online environment.

Although studies have shown the benefits of working with an instructional team in online courses from the teaching and learning perspectives, the research in this area is scarce, and more studies are needed to build knowledge in this specific field.

Because of the challenges of online Math learning and the benefits that the individual use of instructional platforms and instructional teams offer to online students, in our study, we seek to explore the influence of combined use of Microsoft Teams and an instructional team with specialized roles on students' performance and interaction in an online asynchronous mathematics college course by answering the following research question:

> How do an instructional team and the use of an instructional platform influence students' performance and participation in an asynchronous math class across semesters?

Context and Participants

This study took place in a math course called "Exploring and Understanding Data" at a large public university in the southwestern United States. This seven-week course seeks to develop the ability of students in social and behavioral sciences to engage in quantitative reasoning and assess the validity of the information received from different sources. The course was taught in an online asynchronous environment and data were collected each semester from fall 2018 to spring 2022. Students in this class included a mixture of traditional students taking other in-person courses on campus (Main Campus students), students completing all courses online (Online students), and international students affiliated with a global university program (Global students). Due to the small number of Global students in the course (under 5% of the total population), only data from Main Campus and Online students were considered in this study.

The course was led by the same instructor each semester; however, in the fall of 2020, the instructor adopted an Instructional Team Model (ITM) incorporating a group of undergraduate students with specialized roles to support the teaching and learning experience (Kim et al., 2021). At the same time, the formal use of Microsoft Teams was included to support the work of the instructional team. This instructional team was comprised of six to eight undergraduate learning assistants selected from past sessions of the course, and thus they were representative of the students in the course (non-STEM main campus, online, and global majors). Backed by research by Eom (2006), Watson et al. (2023), and Park et al., (2020), we knew that translating the idea of instructor presence to the online asynchronous world would involve using Microsoft Teams extensively and structuring the instructional team in a way that prioritized individual attention and individualized responses to their course work and participation—both negative and positive. Each learning assistant fulfilled a specific role in supporting the class as defined in the ITM. These roles included:

- Instructional Manager (IM): Key communicator between the students and the instructional team. The IM monitored student interactions within Microsoft Teams, using the Insights app. This allowed us to see the dates and times students logged in, the materials they interacted with, and the amount of time they spent on the course (Figures 1a and 1b). They also kept tabs on who missed assignments and any trends we were seeing in a student's participation. The IM then personally reached out to encourage students to get back on track and offered to meet with them to answer any questions they may have. The instructor was copied on each of these communications, allowing them to follow up with the students who needed it most. The IM would also notice student dedication and offer congratulations on their continued diligence to the course.

- Learning Researcher (LR): Informally engaged with students to gauge students' perception of progress in the course and their math anxiety levels. Regular surveys were sent out, asking students to reflect on their comfort with the material, the class, and their overall math ability. Students were presented with an emoji scale (Figure 1c) and an opportunity to leave feedback. These informal methods allowed us to get a sense of our students' states of mind. If a student started to struggle, our LR would reach out. These interactions allowed us to catch difficulties while they were small and opened a line of dialogue between the student, the LR, and the instructor.

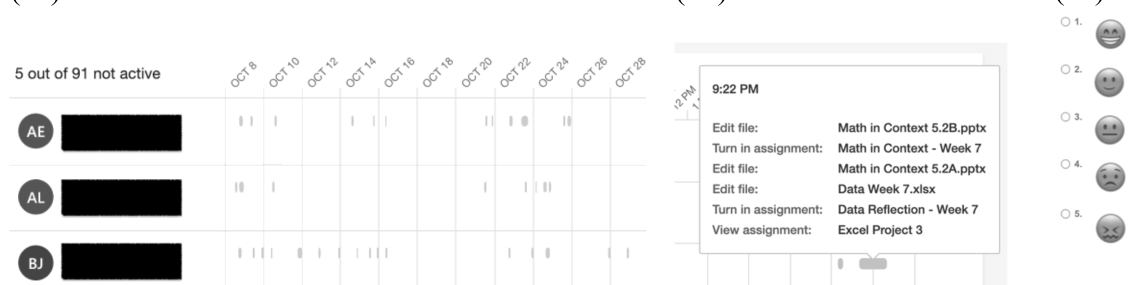
- Learning Assistants (LA): Held weekly help sessions in Zoom and assisted in increasing instructor presence through quick question turn around on discussion boards and leaving detailed feedback on formative assessments. Our LAs would document the students who attended help sessions and left summaries of common questions that were brought up during their sessions. These learning assistant reports allowed the instructor to create "Just in Time" videos that were tailored to the needs of the particular class.

All members of the IT received basic training to perform their assigned roles.

Figure 1

Insights App View of Teams Interactions for Class (1a) and Individual (1b); LR Emoji Scale (1c)

(1a) (1b) (1c)



The total number of main campus and online students enrolled in the course each semester of the study is listed in Table 1.

Table 1

Number of Students Across Semesters

Semester	Student Population Group	Number of Students
	Pre-ITM	
Fall 2018	Online	16
	Main Campus	16
Spring 2019	Online	16
	Main Campus	0
Fall 2019	Online	13
	Main Campus	14
Total		75
	Post-ITM	
Fall 2020	Online	16

	Main Campus	90
Spring 2021	Online	36
	Main Campus	49
Fall 2021	Online	28
	Main Campus	53
Spring 2022	Online	18
	Main Campus	34
Total		324

Note. The Spring 2019 course offering was open to our Online Campus students only.

Starting in the fall 2020, the main instructor and the instructional team delivered course content and activities and interacted with students through a Microsoft Teams interface. There, students had access to the same lecture videos and formative and summative assessments but could now interact synchronously and asynchronously with instructional team members. Questions were regularly asked and answered using this platform, encouraging students to interact with the material and practice their mathematical skills daily.

Methods

Study Design

We used a descriptive-correlational research design to answer our research question (Creswell, 2013). Math courses are often seen as impediments toward degree progression. This needs to be improved without lowering the quality of the education delivered. The instructor implemented a variety of changes to the course structure. Clements et al. (2022) and others found that the instructional team improved engagement, not just performance, so it became important that our study measure not just final course grades. Instead, we dove deeper, examining engagement through both homework participation and regular use of the Teams learning environment, where we will attempt to verify Liang et al.’s (2018) assertion that the instructional platform has a positive association to learning. First, we studied the differences in our sample populations by completing a descriptive quantitative study on student performance and participation. Then, we focused on our post-ITM population in a correlation study of the effects of interacting with Microsoft Teams and the instructional team.

Data Collection

Data were collected between fall 2018 and spring 2022 as shown in Table 1. Data from the spring of 2020 were excluded from the analysis due to the COVID-19 pandemic, when all students were given the opportunity to freely withdraw or switch to Pass-Fail up until the last day of classes. This opportunity, along with the turmoil at the start of the pandemic, greatly altered students’ motivation, and strongly affected course dynamics in the seven-week session staring mid-March 2020. (In fact, 23 out of 68 students took advantage of these policy changes during spring 2020.) Data were collected in two main categories, student performance and student participation, as detailed in Table 2. All data collection was approved by the Institutional Review Board at the institution and all participants (instructor, instructional team members, students) consented to participate in the study.

Table 2

Description of Data Sources

Data Collected	Description
Student's Performance	
Excel Project Scores	Over the course of a 7-week semester, students work on six Excel projects, each focusing on a key skill. These included basic visual representations of data, filtering, histograms and data statistics, normal probability functions, and linear regression. Each project included a large spreadsheet of data to analyze and a list of questions to focus the data analysis. Besides submitting their completed Excel files and answers to questions, students created video demonstrations of key Excel skills. Showcasing their mastery of the key skills in the course, this is an important area to measure success.
Final Course Grades	Multiple formative and summative assessments were implemented each week. Grades from 40 to 50 homework assignments and 4 to 6 exams per semester were combined to generate final course grades. This data is maintained as both a percentage score, as well as a letter grade awarded.
DFW rate	Percentage of students who withdrew from the course or received a final grade of D or F.
Student's Participation	
Number of homework assignments missed	On average students completed 2-3 low-stakes assessments every week. Upon completion of these assignments, students worked on 2 to 3 summative assignments in the online homework environment and completed an Excel project. When the instructional team model was implemented, it was decided that online students needed more flexibility to complete course assignments. Due dates were altered so that an initial due date was set to earlier in the week with a 48-hour grace period in which students could still complete the assignment with little to no penalty.
Interactions Microsoft Teams Virtual Classroom 2021-22 school year	Number of days students logged in to Microsoft Teams Virtual Classroom and interacted with team members or the instructor, using the communication channels provided by the instructional team.

Data Analysis

Students' performance in the course, considering their final grades and average scores on the Excel Projects, was analyzed for each class from 2018 to 2022 and divided into two main categories: pre-ITM (fall 2018 to fall 2019) and post-ITM (fall 2020 to spring 2022) to characterize changes in students’ performance before and after the incorporation of the instructional team (see Table 3). Boxplots were created to visualize the center and spread of student performance and one-sided hypothesis testing on the two population means was used to determine the significance of any changes.

To add perspective to any observed changes in student success, we compared our results to values available from department grade distributions from the in-person, on-campus sections during the same time periods. This large group of students (801 pre-ITM and 1,140 post-ITM) had access to the same materials and the same software as the online asynchronous students, but they did not have access to the Instruction Team Model. As this dataset only records the grade awarded to students, we will focus our analysis on period GPAs for the course. With these values, we can then run our hypothesis testing to evaluate significance.

A similar approach was used to characterize students’ participation in the course. The number of assignments missed during the pre-ITM (fall 2018 to fall 2019) and post-ITM (fall 2020 to spring 2022) were used to identify changes in students’ participation before and after the implementation of the instructional team model.

Interaction data on Microsoft Teams is only maintained by Teams for one year. Because of this limitation, we analyzed data regarding students’ interaction with the platform for the fall of 2021 and spring of 2022 (see Table 3). We used boxplots to show the center and spread of students’ participation results, along with one-sided hypothesis testing on the difference to determine the significance of any changes in their participation. Linear regression was then used to explore the relationship between days spent interacting with Microsoft Teams and final course grades (only for the 2021–22 school year).

Additionally, for both sets of data (student performance and participation), differences across the two groups of students in the course, main campus and online students, were identified.

Table 3

Distribution of Sources of Data Across Semesters

Pre-ITM			**Post-ITM**			
Fall 2018	**Spring 2019**	**Fall 2019**	**Fall 2020**	**Spring 2021**	**Fall 2021**	**Spring 2022**
Students’ Performance						
● Excel Project Average Grades ● Final Grades ● DFW Rate						
Students’ Participation						
● Assignments Missed			● Assignments Missed ● Interactions Microsoft Teams			

Main Findings

Our analysis allowed us to identify distinct trends in the performance and participation of main campus and online students in the asynchronous math class. Major findings are presented below, organized into two main sections. In the first one, we present our results from the analysis of student performance across semesters, and in the second section, we focus on changes in student participation. In both cases, we highlight differences observed between the two main groups of students enrolled in the course.

Student Performance

We analyzed student performance by looking at average grades on Excel projects and final course grades. We also examined the period DFW rates.

As shown in Figure 2, the performance of all students in the course Excel projects improved in those semesters where the ITM was implemented. In general, online students received higher grades than main campus students on these projects in all semesters. The average Excel project grade for online students increased significantly ($p = 0.034$) from 85.2 pre-ITM to 90.9 post-ITM, while this average grade for main campus students increased ($p = 0.30$) from 78.8 pre-ITM to 81.0 post-ITM. As these numbers indicate, the average grade change was larger and only significant for the online student population.

Figure 2

Average Excel Project Scores per Student for Online (2a) and the Main Campus (2b) Students

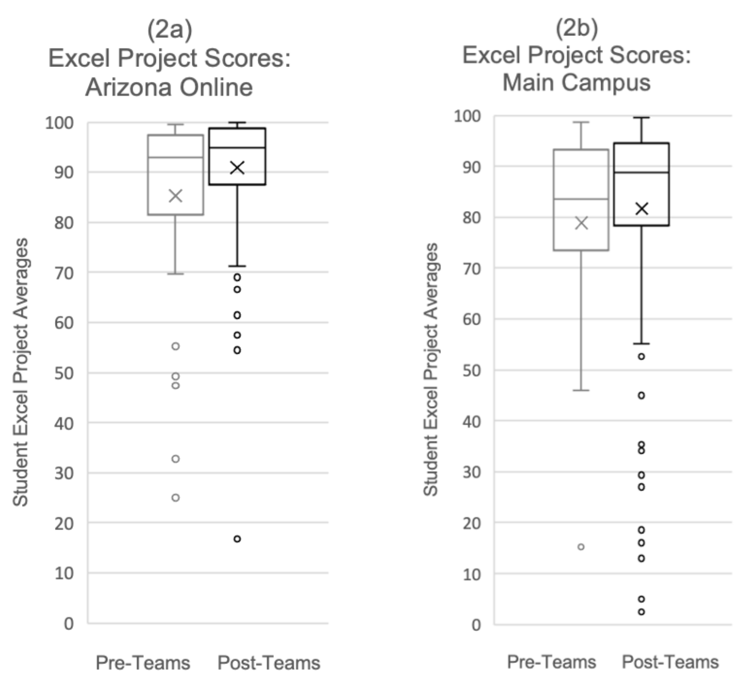
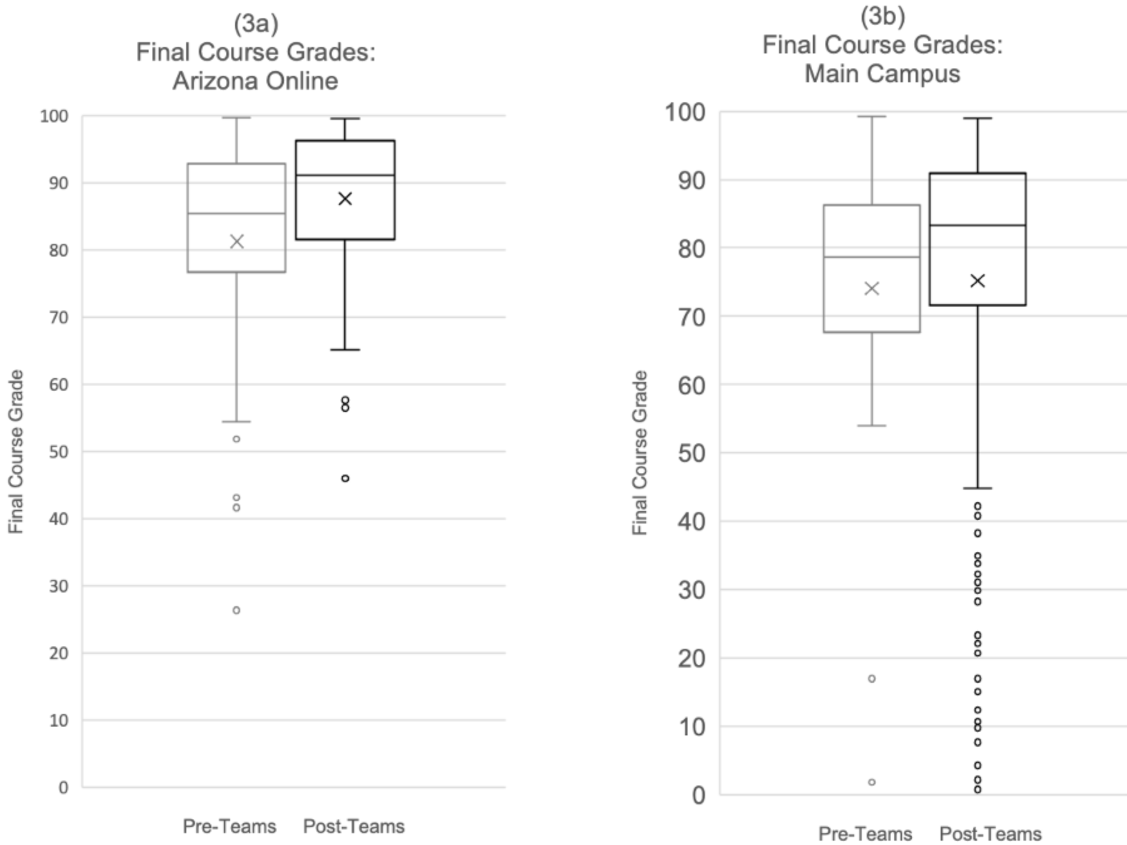


Figure 3 shows changes in student performance as measured by final course grades. Again, online students outperformed main campus students in all semesters in this area. Average final grades for the online population increased (p = 0.0091) from 81.2 pre-ITM to 87.6 post-ITM, while it changed (p = 0.04032) from 74.1 pre-ITM to 75.1 post-ITM. Both increments were significant in this case. More than 50% of the online students enrolled post-ITM earned an "A" letter grade compared to nearly 30% pre-ITM. On the other hand, although the percentage of main campus students earning an A also increased from the pre- to the post-ITM semesters, it remained below 25%. Notice the larger number of outlier main campus students earning grades below 45% during post-ITM semesters.

Figure 3

Average Final Grades per Student for Online (3a) and Main Campus (3b) Students



Considering these differences in two populations, we compared them to the comparison group of in-person, on-campus students taking the course. As they use the same materials and software, it allows us to dial in on the impact of the ITM. Table 4 summarizes the GPA changes pre- and post-ITM for these disparate student populations. Both main campus and online student populations finishing the course saw significant improvements in overall course GPAs—0.54 for main campus students (p = 0.0160) and 0.43 for online students (p = 0.0227). Main campus, in-person students saw no significant increase over the same time periods.

Table 4

Course GPA for Each Population

Student population	GPA (pre-ITM)	GPA (post-ITM)	Changes GPA
Online	2.91	3.34	+0.43 (p = 0.0227)
Main Campus (Async)	2.30	2.84	+0.54 (p = 0.0160)
Main Campus, In-Person	2.57	2.60	+0.03 (p = 0.2923)

As a final measure of changes in student performance, we analyzed DFW rates in the class across different semesters. While this is related to class GPA, the DFW rate also incorporates the students who withdrew early from the course. The results are summarized in Table 5, where we can see that DFW rates for online students decreased from 23.40% pre-ITM to 12.26% post-ITM. There was, however, an increase in the DFW rate for main campus students from 23.53% to 31.27% for the same set of compared semesters. For comparison purposes, it is noteworthy that main campus students who took the course in-person with other instructors also experienced an increase in their respective DFW rates over the same time periods from 19.35% (n = 801) to 25.79% (n = 1140).

Table 5

DFW Rates for Each Population

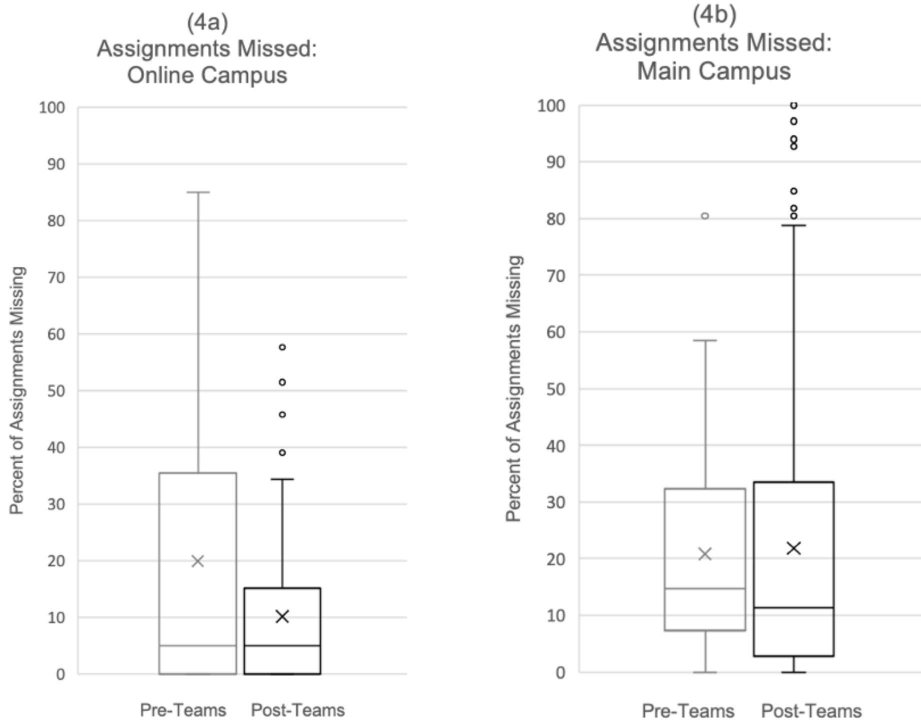
Student population	DFW (pre-ITM)	DFW (post-ITM)	Changes DFW
Online	23.40%	12.26%	-11.14% (p = 0.054)
Main Campus (Async)	23. 53%	31.27%	+7.74% (p = 0.16)
Main Campus, In-Person	19.35%	25.79%	+6.44% (p = 0.00036)

Students' Participation Across Semesters

To develop a sense of changes in student participation in the class before and after the implementation of the ITM, we analyzed the number of assignments not completed by students in any given semester. This decision was made because the previous platform did not allow us to measure students' participation (number of interactions in the platform). As shown in Figure 4, the percentage of missed assignments dropped (p = 0.0079) by nearly half, from 19.85% pre-ITM to 10.09% post-ITM, for online students, while it remained practically unchanged for main campus students. This figure reveals a marked contrast in assignment completion between online and main campus students from pre-ITM to post-ITM semesters, with a much larger variation in behavior in this area for main campus versus online students.

Figure 4

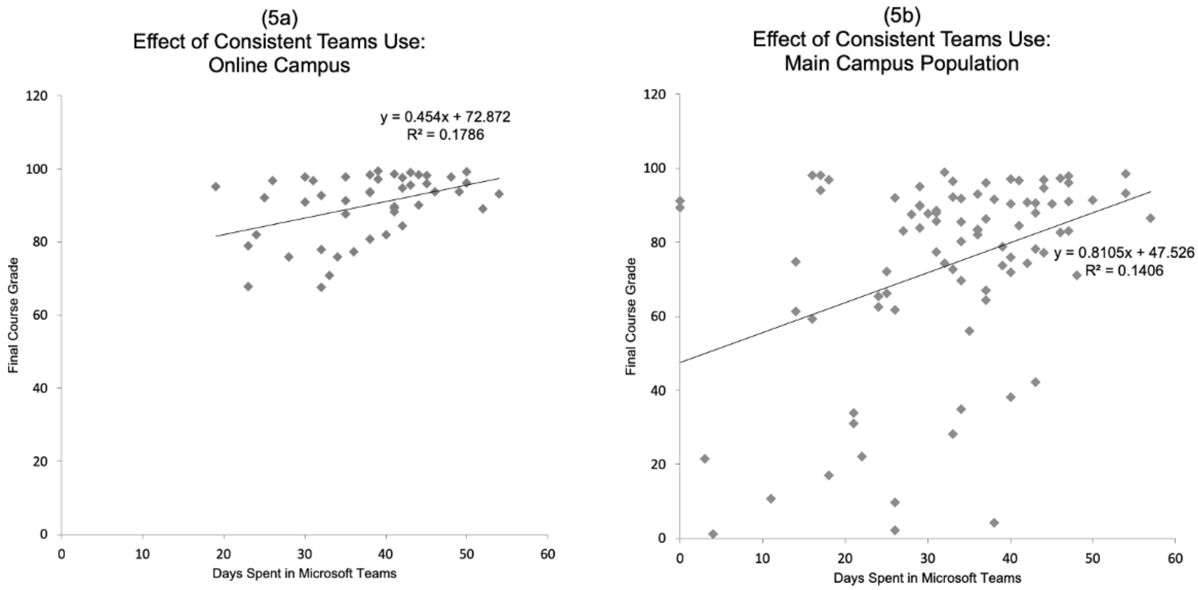
Assignments Missed per Student for Online (4a) and Main Campus (4b) Students



Student participation starting in fall 2021 was also measured in terms of student engagement within the Microsoft Teams platform. On average, during the seven-week course, online students spent more time engaged with the platform (37.74 days) than main campus students (32.69 days). Statistical analysis of this data revealed a moderate positive correlation ($r = 0.42$ for online students and $r = 0.37$ for main campus students) between days spent interacting with the platform and final course grades as shown in Figure 5.

Figure 5

Effect of Consistent Microsoft Teams Use for Online (5a) and Main Campus (5b) Students



Discussion and Implications

Our findings showed that the combined use of the ITM and Microsoft Teams favored online students over the main campus in terms of participation and performance. Online students logged an average of 37.74 days over the seven-week course, compared with only 32.69 days for main campus students when both resources were used. Regarding their performance, online students showed higher performance in all measurements, in addition to lowering the DFW from 23.4% to 12.26% compared to the main campus group which increased from 23.53% to 31.27%. The reasons for these variations in how the use of these instructional tools influenced students' participation and performance in the asynchronous course may be due to different factors, such as the fact that main campus students are involved in other courses on campus. They interact with their classmates, participate in activities, and have a full university experience that may provide them the opportunity for educational discourse, not needing to explore that in an asynchronous course. Research has posited that students on-campus have a sense of "*macro* (institution-level) community," but that exclusively online students instead have a need to seek out "*micro* (class-level) forms of community" (Long et al., 2023).

Studies have previously suggested that online students value different forms of communication and course interaction than on-campus students (Turk et al., 2024). The results of our study support the claim that other researchers have mentioned in terms of the benefits of instructional platforms for engagement and communication in online environments (Alameri et al., 2020; Chen, 2010). In our study, the addition of MT allowed us to open more channels of communication between the instructor and students, as well as the mediation of the instructional team. In addition, the fluent communication may foster a sense of community among the members of the class, including instructional team members, students, and the instructor

(Clements, 2022; Hoffman, Darnell, & Moreira, 2021). As one spring 2021 online student mentioned in the end of the semester student course evaluations, “Your method and style of teaching has made this class what it is. Even as a student you feel like you are a part of the team already and everyone is on the same level and mission for success. Which I admire so much.”

Indeed, Long et al. (2023) found that their online student population viewed connection to other students to be a key aspect to their success in a course. On the Likert scale survey question used in Long and collaborators’ study, “I learn best when I feel connected to other students,” online student groups had a higher average agreement of 6.46 and 5.30 on a scale of 1 to 10, compared to only a 4.00 for on-campus students. Previous research about the use of an instructional team in online environments highlights the relevance of its role in promoting a sense of cohesiveness, community, and engagement and making mutual benefits for instructors and students visible (Clements, 2022; Kim et al., 2021). Kim et al. (2021) found that the intentional use of learning assistants focused on specific roles had a positive impact in online asynchronous learning environments. The study used online learning managers and online learning researchers to enhance communication with students and facilitate formative assessment. Their findings are evidence of the relevance of an instructor familiarizing themself with the learning assistants that are part of the instructional team, so instructors can properly assign them roles that are coherent with their characteristics and motivations to participate in the group (Kim et al., 2021).

The characteristics of the instructional team in our study may be one of the factors that influenced the growth of a sense of community within the class. The instructor in our study selected former students, allowing for students to be recruited based off of their strengths for the appropriate roles. The Instructional Team was also selected to reflect the student population it served. This meant that our team had members from the main campus, online campus, and global campus. Different time zones and life stages were represented, so every student could see themselves in some way reflected on the instructional team. Additionally, using students who had been in their position a semester before may make the course more approachable, allowing students to visualize their own success.

Beyond the benefits to our current student population, we should not neglect to reflect on the benefits for the learning assistants themselves. On-campus students have a plethora of opportunities to gain leadership experience, form a closer connection with faculty, and receive mentorship. To truly bring our online students an equivalent experience, we should be providing similar opportunities for our online students. Learning assistants in our study were given the opportunity to earn elective credit or work for pay, but the chance to solidify their mathematical knowledge, increase their confidence, and grow as leaders is so much more valuable.

Conclusion

The purpose of communicating our findings was to share the experience of humanizing an asynchronous mathematics learning environment. As mentioned in our literature review, instructional online platforms are a valuable resource to provide learning opportunities to distance students (Liang et al., 2018; Shaw et al., 2023). However, their use alone is not enough to provide meaningful learning opportunities to our students, who should be supported by an environment where they feel listened to, engaged, and part of the group.

Our findings provide evidence of the influence of the combined use of an instructional platform, such as Microsoft Teams, with the instructional support of a group of learning assistants with specialized roles in students' performance and participation in an online asynchronous class. Students with the additional support missed fewer assignments and scored higher on key summative assessments. This resulted in a lower DFW rate and increased session GPAs. Additionally, there was a correlation between interactions with the support and final course grades.

We found differences in the two main student populations in the asynchronous course (online and main campus). While some research may suggest that online students have different needs for community and connection than their main campus counterparts, further research is needed to provide insights regarding the reasons behind these findings and how we can capitalize on it for our online courses. In addition, it is relevant to mention that due to the overhaul of the course at the start of the pandemic, we are unable to fully ascertain which benefits are due to the use of a communication hub like Microsoft Teams versus the interaction with the instructional team itself.

Due to the nature of our study (descriptive-correlational research design), our findings are limited to describing the relationship between the use of an instructional team in combination with an online platform, with students' outcomes and participation. For this reason and as part of the limitations of our study, we didn't take into account students' cultural and prior education backgrounds when comparing our different populations. Many life factors differ greatly in our online student population. Demographic information from the online instruction section of our institution mentioned in a welcome email that 51% of online students are married or in domestic partnerships, 42% tend to have children at home, 37% work more than 40 hours a week, and only 15% don't work. Further research considering these factors is necessary to provide a deeper characterization of the online environments and factors that influence students' performance and participation.

Lastly, investigating ways to make the strategy of combining technological and human resources sustainable on a large scale is necessary to improve online learning opportunities in classes with over 100 students. How can we ensure all students have access to peer assistance while keeping university costs down? We have begun to investigate increasing our team sizes to include multiple learning researchers and instructional managers who can focus in on a student subsection. With a larger team, we can facilitate more opportunities for live assistance and quicker turn-around times for posted questions. To reduce our operational costs, we are using an independent study course, allowing team members to earn elective course credit for their work. We are continuing to work with our university to find a way to allow our learning assistants the opportunity to participate in that mentorship relationship without burdening online students with additional tuition fees. For this to happen, we need to crystallize the message. A robust instructional team benefits everyone—students, instructional team members, and instructor alike.

Acknowledgements

We would like to give special thanks to all the instructional team members who supported the learning experience of all students enrolled in the course, as well as the Instructional Team Project who provided training for our team members and research support. This work is part of a large project supported by the National Science Foundation (DUE-XX).

Declarations

The authors declare no potential conflicts of interest. Since analysis of the data, one author's spouse became employed at Microsoft. No other conflicts exist in authorship and/or publication of this article. All data were collected in accordance with protocols approved by the Institutional Review Board (IRB) at Affiliation.

References

Alameri, J., Masadeh, R., Hamadallah, E., Ismail, H. B., & Fakhouri, H. N. (2020). Students' perceptions of e-learning platforms (Moodle, Microsoft Teams and Zoom platforms) in The University of Jordan education and its relation to self-study and academic achievement during COVID-19 pandemic. *Advanced Research & Studies Journal*, *2692*, 2800.

Alzubi, K. A. A. (2022). The effect of teaching mathematic supported by Microsoft teams on the students' mathematical skills in a college course in Jordan. *Journal of Positive School Psychology, 6*(2), 4286–4292. https://doi.org/10.17522/balikesirnef.827595

Anderson, T., Rourke L., Garrison, D. R., & Archer, W. (2001). Assessing teaching presence in a computer conferencing context. *Journal of Asynchronous Learning Networks, 5*(2), 1–17 (2001).

Baker, C. (2010). The impact of instructor immediacy and presence for online student affective learning, cognition, and motivation. *Journal of Educators Online, 7*(1), n1.

Çankaya, S., & Durak, G. (2020). Integrated systems in emergency distance education: The Microsoft Teams. *Necatibey Faculty of Education Electronic Journal of Science and Mathematics Education, 14*(2), 889–920. https://doi.org/10.17522/balikesirnef.827595

Chen, P. S. D., Lambert, A. D., & Guidry, K. R. (2010). Engaging online learners: The impact of web-based learning technology on college student engagement. *Computers & Education*, *54*(4), 1222–1232.

Clements, T. P., Friedman, K. L., Johnson, H. J., Meier, C. J., Watkins, J., Brockman, A. J., & Brame, C. J. (2022). "It made me feel like a bigger part of the STEM community": Incorporation of learning assistants enhances students' sense of belonging in a large introductory biology course. *CBE—Life Sciences Education*, *21*(2), ar26.

Creswell, J. W. (2013). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). SAGE Publications.

Dixson, M. D. (2010). Creating effective student engagement in online courses: What do students find engaging? *Journal of the Scholarship of Teaching and Learning, 10*(2), 1–13.

Eom, S. (2006). The role of the instructors as a determinant of students' satisfaction in university online education. In *Sixth IEEE International Conference on Advanced Learning Technologies* (ICALT 20 2006) (pp. 985–988). IEEE.

Gray, J. A., & DiLoreto, M. (2016). The effects of student engagement, student satisfaction, and perceived learning in online learning environments. *International Journal of Educational Leadership Preparation*, *11*(1), n1.

Hester, S. D., Elliott, J. M., Navis, L. K., Hidalgo, L. T., Kim, Y. A., Blowers, P., Elfrin, L., & Talanquer, V. (2022). Using an instructional team during pandemic remote teaching enhanced student outcomes in a large STEM course. *Journal of College Science Teaching*, *51*(3), 12–21.

Hubbard, M., & Bailey, M. J. (2018). *Mastering Microsoft Teams: End user guide to practical usage, collaboration, and governance*. Apress Berkley.

Kim, Y. A., Rezende, L., Eadie, E., Maximillian, J., Southard, K., Elfring, L., Blowers, P., & Talanquer, V. (2021). Responsive teaching in online learning environments: Using an instructional team to promote formative assessment and sense of community. *Journal of College Science Teaching*, *50*(4), 17–24.

Liang, L., Yeung, K., Lui, R. K. W., Cheung, W. M. Y., & Lam, K. F. (2018). Lessons learned from a calculus e-learning system for first-year university students with diverse mathematics backgrounds. In J. Silverman & V. Hoyos (Eds.), *Distance learning, e-learning and blended learning in mathematics education: International trends in research and development* (pp. 69–92). Springer Cham.

Long, M. G., Gebhardt, K., & McKenna, K. (2023). Success rate disparities between online and face-to-face economics courses: Understanding the impacts of student affiliation and course modality. *Online Learning*, *27*(4), 461–485.

Lowenthal, P. R., & Parscal, T. (2008). Teaching presence. *The Learning Curve, 3*(4), 1–2.

MacKenzie, J., & Ballard, H. (2015). Interactive tools as a catalyst for learning in online education. *The Journal of Effective Teaching*, *15*(4), 5–20.

Microsoft Education (n.d). *Empower students and educators with Microsoft Teams for schools*. https://www.microsoft.com/en-us/education/products/teams

Miller, M. G., Hahs-Vaughn, D. L., and Zygouris-Coe, V. (2014). A confirmatory factor analysis of teaching presence within online professional development. *Journal of Asynchronous Learning Networks, 18*(1). https://doi.org/10.24059/olj.v18i1.333

Park, C., & Kim, D. G. (2020). Perception of instructor presence and its effects on learning experience in online classes. *Journal of Information Technology Education: Research*, *19*, 475–488.

Purba, L. S. L. (2021). Microsoft teams 365 and online learning: The student's perception. *Jurnal Pendidikan Kimia*, *13*(2), 130–136.

Rojabi, A. R. (2020). Exploring EFL students' perception of online learning via Microsoft Teams: University level in Indonesia. *English Language Teaching Educational Journal*, *3*(2), 163–173.

Singh, V., & Thurman, A. (2019). How many ways can we define online learning? A systematic literature review of definitions of online learning (1988–2018). *American Journal of Distance Education, 33*(4), 289–306.

Smith, G., Ferguson, D., & Caris, M. (2003). The web versus the classroom: Instructor experiences in discussion-based and mathematics-based disciplines. *Journal of Educational Computing Research*, 29(1), 29–59.

Sharip, A. A., Zain, S. M. M., Rahid, N. N. A., & Saidi, R. M. (2023). Usability evaluation of learning management systems: Google Classroom, Microsoft Teams and Padlet. *International Journal of Academic Research in Progressive Education and Development*, *12*(2).

Shaw, C., Bhardwaj, R., Condon, K., NeJame, L., Martin, S., Rich, J., Janson, N., Bryant, G., and Fox, K. (2023, September). *Listening to learners 2023*. Tyton Partners.

Teaching + Learning Lab. (n.d.). Sense of belonging. https://tll.mit.edu/teaching-materials/cultivating-sense-belonging

Trenholm, S., Peschke, J., & Chinnappan, M. (2019). A review of fully online undergraduate mathematics instruction through the lens of large-scale research (2000–2015). *Primus*, *29*(10), 1080–1100.

Turk, M., Toraman Turk, S, Muftuoglu, A.C., Karakaya, O., & Karakaya, K. (2024). Students' expectations and experiences about engagement strategies in online courses: A mixed methods study. *Online Learning*, *28*(2), 1–29.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes.* Harvard University Press.

Watson, S., Sullivan, D. P., & Watson, K. (2023). Teaching presence in asynchronous online classes: It's not just a façade. *Online Learning*, *27*(2), 288–303.

A Qualitative Study of Kindergarten Through Grade 6 Tutors' Experiences Implementing Synchronous, One-On-One Online Tutoring as Literacy Intervention

Valarie Algee
American College of Education

Abstract
This qualitative study explored the perceptions of 20 online literacy tutors within the United States on the benefits and challenges of implementing synchronous, one-on-one online tutoring for literacy intervention to kindergarten through Grade 6 students and what they feel are elements contributing to success as they engage in this instructional format. Three research questions guided this study. Data were collected via an open-ended, online, confidential Qualtrics questionnaire and analyzed using manual qualitative coding. Findings revealed five themes related to benefits, challenges, and contributors to success, including pedagogy, technology, physical distance, accessibility, and intimacy and familiarity.

Keywords: Intervention, literacy, online, qualitative, synchronous, tutoring

Algee, V. (2025). A qualitative study of kindergarten through grade 6 tutors' experiences implementing synchronous, one-on-one tutoring as literacy intervention. *Online Learning, 29*(2), pp. 188–212. https://doi.org/10.24059/olj.v29i2.4469

Instruction has increasingly moved online in the United States and worldwide. According to the National Center for Education Statistics (NCES, 2021), in 2020, 67% of students under 18 enrolled in public or private schools were required to shift to distance learning due to the COVID-19 pandemic. In addition, the most recent National Assessment of Educational Progress (NAEP) report indicates that 37% of Grade 4 students in the United States scored below basic in reading in 2022, demonstrating the most significant decline in reading scores since 1990 (NCES, 2022). The negative academic impact resulting from the COVID-19 pandemic was more significant for Black, Hispanic, and low-income students, further widening an already-existing achievement gap (NCES, 2022).

Research surrounding one-on-one or small group literacy intervention in the form of tutoring has overwhelmingly suggested positive outcomes (Gersten et al., 2020; Pace Miles et al., 2019). Research examining online instruction has also shown benefits (e.g., increased access, improved engagement, and learning gains), as well as some challenges (Gregg & Shin, 2021; Guillen-Gamez et al., 2022; U. S. Department of Education, 2010; Weiss et al., 2022). Elements contributing to success have been outlined (Guillen-Gamez et al., 2022; Weiss et al., 2022). Studies devoted to synchronous, one-on-one online tutoring for literacy intervention in grades kindergarten through Grade 6, however, remain rare, with most of the relevant research taking place outside of the United States and focusing primarily on upper grades and higher education, and subjects other than ELA/literacy. As of the completion of this paper in November 2024, little research on this specific facet of online instruction has been peer-reviewed and published. The minimal research that does exist, though, indicates positive effects, specifically for traditionally marginalized students, thereby suggesting the power of online tutoring and its ability to contribute to the closing of existing achievement gaps (Carlana & La Ferrara, 2021; Gortazar et al., 2022).

Since the onset of the COVID-19 pandemic, online instruction has sharply increased (Okoro et al., 2021; Pratama et al., 2020). Further, students have experienced a considerable learning loss, thereby escalating the urgency for academic intervention (Engzell et al., 2021; Maldonado & De Witte, 2021). Expansion in the use of online formats for instruction, coupled with the need for academic intervention, increases the necessity to understand online instruction for intervention through research. This basic qualitative study explored tutors' perspectives on implementing synchronous, one-on-one online tutoring as literacy intervention for kindergarten through Grade 6 students across the United States, exploring the benefits, challenges, and elements contributing to success. Further research is necessary to guide and assist tutors conducting synchronous, one-on-one online literacy intervention. Researching this complex phenomenon from the tutors' perspectives may help conceptualize the meaning of the experience, thereby adding to the currently limited understanding (McAleese & Kilty, 2019; Merriam, 2009).

What are the tutors' perspectives on the benefits of synchronous, one-on-one online tutoring for literacy intervention for K–6 learners? What are the tutors' perspectives on the challenges of synchronous, one-on-one online tutoring for literacy intervention with this age cohort? What are the tutors' perspectives on the elements that lead to successful synchronous, one-on-one online tutoring for literacy intervention?

Literature Review

The literature review for this study revealed that there are successful outcomes of in-person, face-to-face tutoring for literacy intervention (Gersten et al., 2020; Pace Miles et al., 2019) and benefits to and generally positive effects of broad online instruction and distance learning (Gregg & Shin, 2021; U. S. Department of Education, 2010; Wisniewski et al., 2020); however, there is little current research exploring the specific area of synchronous one-on-one online literacy tutoring as an intervention for striving readers (de Rosa & Johnson, 2019) in elementary school. The scarce research that does exist is centered primarily on grades beyond elementary, frequently outside the United States, and in subject areas other than ELA. Synchronous one-on-one online literacy intervention furnishes access to valuable and necessary support for students who may otherwise not have the means to secure a qualified and knowledgeable tutor due to factors including, but not limited to, location, scheduling, or transportation (Liu & Li, 2020; Wisniewski et al., 2020).

The research literature review outlines literacy instruction, including a description of evidence-based literacy practice and an encapsulation of the science of reading, a term used to describe the body of research surrounding such practice. Following that is an explication of tutoring consisting of a brief history, an outline of shadow education (i.e., private, for-fee tutoring), and an overview of literacy tutoring. The review concludes with a summary of the research surrounding synchronous, one-on-one online literacy tutoring.

Literacy Instruction

In 1997, Congress assembled the NRP (2000) to gather and judge the effectiveness of various approaches to reading instruction. This comprehensive government review summarized research and outlined five areas of essential literacy instruction: phonemic awareness, phonics, fluency, vocabulary, and comprehension (McKenna et al., 2021; Torgesen, 2005). The report specifically outlined the importance of direct and explicit instruction in phonemic awareness to facilitate improvements in reading and spelling and the benefits of systematic phonics instruction (NRP, 2000). The NRP (2000) determinations still stand as necessary and relevant, with current research in cognitive science and neuroscience conducted internationally only adding to and expanding its initial findings. The robust scientific consensus is that explicit, systematic, code-based literacy instruction benefits diverse learners and the general population (Puzio et al., 2020).

The science of reading is a term to describe the accumulation of research from various fields, from many countries, and over numerous years regarding reading development and reading instruction informed by replicated, peer-reviewed studies using the scientific method (Petscher et al., 2020). The science of reading is not a single approach to reading instruction but encompasses a wide range of research contributing to understanding literacy and informing instructional practices (Semingson & Kerns, 2021). It is essential to view the science of reading as dynamic and constantly developing due to continuing research and understanding (Fien et al., 2021).

As both a result of and a contributing factor leading to the examination of reading via the scientific process, the science of reading continues to strengthen as a social movement. Consequently, the call for evidence-based practice to meet the needs of all students, particularly those who are struggling, is becoming increasingly widespread (Hindman et al., 2020; Solari et al., 2020). Furnishing access to supplemental instruction, or tutoring, to provide scientifically informed intervention to students in need is a natural result of the intense public and national focus on reading and ELA, coupled with the continuing and recently increasing academic struggle students are experiencing.

Tutoring

Tutoring, historically defined as one-on-one or small group interaction between an instructor and student(s) to increase learning of content or a skill (Nickow et al., 2020), originated during the 11th century in medieval Europe and was the primary way to pass on learning and culture outside of apprenticeship (Alesksandrovna et al., 2015; Kudinov et al., 2019). Within the 12th and 14th centuries, European Universities (e.g., Oxford, Cambridge), whose original primary purpose was to educate clergy, employed tutors as mentors (Alesksandrovna et al., 2015; Moore, 1968). Compulsory education, introduced in the 1800s, became widespread by the end of the century (Alesksandrovna et al., 2015; Gardner et al., 2007). This change resulted in tutoring evolving from the primary method of educating pupils to support learning in schools; tutoring became inexorably tied to mainstream education because it began to mimic or shadow mainstream schooling to facilitate students' success within it (Gupta, 2022; Baker, 2020).

Stevenson and Baker (1992) coined the term shadow education to describe a phenomenon emerging in Asia: individual, supplementary education outside of formal schooling purchased by Tokyo parents to support the upward mobility of their high-achieving teens. Shadow education, currently defined as private, supplementary, for-profit tutoring outside of, yet mimicking, the formal education system, has since become a widespread global phenomenon (Gupta, 2022), moving even into the United States, where it is more commonly termed private tutoring. Shadow education contains three common aspects that help define it, including a focus on academic subjects, being provided in addition to and outside of mainstream schooling, and the intention of financial gain for the instructor (Subedi, 2018). Shadow education is ubiquitous, inescapable, and likely to increase in frequency (Baker, 2020). Private tutoring for literacy intervention is one area of shadow education that is important to explore due in part to the United States government's focus on reading and ELA instruction, coupled with the exacerbating academic consequences of the COVID-19 pandemic, as evidenced in the most recent NAEP scores (NCES, 2022), resulting in a focused interest in literacy tutoring for purposes of academic intervention.

Literacy tutoring significantly improves the learning outcomes of participating students across populations (Gersten et al., 2020; Nickow et al., 2020). One-on-one or small group literacy intervention in the form of explicit, evidence-based instruction consistent with the findings of the NRP (2000) is particularly impactful, even when provided by paraprofessionals, volunteers, or parents (Markovitz et al., 2022). Specifically, interventions are most effective when addressing foundational skills, such as decoding and phonemic awareness, using evidence-based practices (Chan et al., 2022) and when conducted with less than five students at a time for short, intense sessions (Ludwig et al., 2019). Students who received evidence-based reading intervention showed significant gains in foundational reading skills (Bøg et al., 2021; Pace Miles et al., 2019).

Synchronous, One-On-One Online Tutoring

Although the number of current research studies examining synchronous online tutoring is sparse (de Rosa & Johnson, 2019), those that do exist have shown promising evidence regarding its benefits (Dean et al., 2021; Donovan et al., 2022; Weiss et al., 2022). Students engaged in synchronous online instruction demonstrate increased reading rates (Dean et al., 2021; Weiss et al., 2022) and improved focus and attention, generally comparable to the outcomes of face-to-face instruction (Gregg & Shin, 2021; Martin et al., 2021). Positive effects have even been found for students with Down syndrome (Grindle et al., 2019), suggesting the value of synchronous online literacy intervention for students with diverse needs.

Synchronous online tutoring has numerous advantages that do not exist within the traditional, in-person tutoring format, including, but not limited to, access, opportunity, and adaptability (Liu & Li, 2020; Gregg & Shin, 2021; Wisniewski et al., 2020). The online format may facilitate students receiving vital differentiated and 1:1 support they may otherwise find neither available nor attainable (Aslan et al., 2022). Further, caregivers report the online format as feasible and effective, allowing them to observe the tutoring session and learn concrete ways to support their students' learning (Beach et al., 2021).

Obstacles to successful and effective synchronous online tutoring also exist. While some studies report increased engagement, others suggest that students participating in synchronous online tutoring struggle to pay attention, regulate their behaviors and actions, and maintain interest (Lasnumanda & Tarigan, 2020; Okoro et al., 2021). Distance learning minimizes access to attractive and innovative materials and negates students' ability to physically interact with manipulatives, which is often crucial for younger students (Aslan et al., 2022; Liu & Li, 2020; Washburn et al., 2021). The online format tends to lessen visible and audible cues, restricting the tutor/tutee interaction and the ability for the tutor to assess students' emotional states (Aslan et al., 2022; Lambie & Law, 2020).

Additional barriers, unique to an online format, include unreliable internet access, technical troubles (e.g., losing internet, applications not working correctly), and variable sound quality (e.g., difficulty hearing one another, microphone malfunctions) (Bacon & Liu, 2021; Okoro et al., 2021). Access to technology, including hardware and internet service, may be a challenge for some students, particularly those of low income, leading to questions of equity (Johns & Mills, 2021). However, smartphones, public libraries, and schools are all means to internet and online access that may address this issue (Carlana & La Ferrara, 2021; Roschelle et al., 2020).

Finally, the learning curve for teachers engaging in online instruction is steep. Teachers leading synchronous online instruction lack guidance and support, both technological and pedagogical, and are currently left to struggle to figure things out independently, thereby increasing their workload (Aslan et al., 2022; Okoro et al., 2021). Tutors may benefit from increased awareness of the potential challenges and pitfalls of online instruction that may come from collaboration and communication with fellow online instructors (Curwen, 2020).

Research that has found benefits to and generally positive outcomes of synchronous online tutoring has many commonalities in approaches to instruction. Bacon and Liu (2021) described the dynamic nature of teaching as being made even more pronounced when moving online; therefore, the components that make up strong and effective face-to-face instruction are equally or even more important online. Aslan et al. (2022) concur, referring in their study to the importance of instructors' pedagogical skills. A thread woven throughout studies on synchronous online tutoring, contributing to positive outcomes, is well-designed, evidence-based instruction that is systematic, explicit, structured, and diagnostic, aligned with the science of reading and provided by a trained instructor (Curwen, 2020; Weiss et al., 2022).

It is essential to actively engage students through interaction and resources while maintaining a clearly outlined protocol (Bacon & Liu, 2021; Lambie & Law, 2020). For example, using shared whiteboards as a tool fosters interaction and helps hold students' interest (Johns & Mills, 2021; Lambie & Law, 2020). Responsive pedagogy, including engaging conversations and dialogue, further increases student connection (Lawrence, 2020).

Creating a positive, caring learning environment that nurtures feelings of safety and trust and provides motivation and empathy, further facilitates student success during online learning (Donovan et al., 2022; Washburn et al., 2021), as well as honoring students' humanness and individuality (Lawrence, 2020).

Found benefits also result from actively connecting and engaging with students' caregivers, inviting them into the learning process, and recruiting their support (Aslan et al., 2022; Curwen, 2020; Washburn et al., 2021). The physical presence of the caregiver may support the student's focus and interaction with the instructor and the lesson, and the caregiver's ability to witness the instruction provides them with the means to continue supporting the student's learning beyond that session. The online format facilitates family interaction as the tutor is essentially at home with the student.

Finally, instructors having opportunities for collaboration, support, and training in both subject-area pedagogy, as well as technology navigation and appropriate communication techniques for the online format, in the form of professional development training, workshops, co-teaching groups, or mentorships, is indicated as a vital component of success (Johns & Mills, 2021; Washburn et al., 2021). Tutors must be aware of and attentive to the benefits and challenges of online tutoring for students and instructors and be able to adjust their pedagogy appropriately (Wisniewski et al., 2020). This, coupled with reflective practice on the instructor's part, is pivotal, as it facilitates understanding, meaning-making, and growth, thereby improving practice (Donovan et al., 2022; Liu & Li, 2020).

Method

This research employed a questionnaire approach to create and present a descriptive narrative interpreting tutors' understanding of the phenomenon of synchronous, one-on-one online tutoring for literacy intervention. This basic qualitative study used an open-ended online questionnaire to examine tutors' perceptions regarding the benefits and challenges of synchronous, one-on-one online tutoring and elements contributing to success. According to

Eckerdal and Hagström (2017), qualitative questionnaires provide rich, informative, useful information illuminating aspects of everyday life.

Research Questions (RQs)

The research questions underlying this research were:

RQ1: What are the tutors' perspectives on the benefits of synchronous, one-on-one online tutoring for literacy intervention?

RQ2: What are the tutors' perspectives on the challenges of synchronous, one-on-one online tutoring for literacy intervention?

RQ3: What are the tutors' perspectives on the elements that lead to successful synchronous, one-on-one online tutoring for literacy intervention?

Questionnaire Construction

The data instrument for this basic qualitative study was an open-ended online questionnaire. Asynchronous, online qualitative data collection has recently become more common, allowing for a widened available participant population and time- and cost-efficient (Jones et al., 2021). The 15 questions specifically addressed the research questions, reflecting the literature review findings by centering the benefits, challenges, and elements contributing to successful synchronous, one-on-one online tutoring.

To mitigate poor data quality, subject matter experts (SMEs) were used to make an interim assessment of the questions included in the questionnaire, ensuring it is a viable research instrument. All feedback was considered and incorporated into questionnaire revisions. Study participants accessed the questionnaire via Qualtrics, a web-based survey tool, through an emailed link.

Participants

The target population was 20 literacy tutors conducting synchronous, one-on-one online tutoring with kindergarten through Grade 6 students within the United States for literacy intervention. This number was consistent with the effective basic qualitative method recommendation of 15 (Merriam & Tisdell, 2015) and sufficient to provide rich information appropriate to the topic and research questions (Vasileiou et al., 2018). Purposeful sampling was used, in which the researcher chose a sample from which they may learn the most based on a set of selection criteria (Creswell, 2014). Inclusion criteria required that participants were currently tutoring kindergarten through Grade 6 students online synchronously, one-on-one for literacy intervention; were located within the United States; and were willing to complete an online questionnaire elaborately. Participants were recruited through online social media communities of literacy educators and tutors via social media posts calling for participants.

A demographic profile of participants was developed during data analysis. Most participants held master's degrees and completed various literacy-related trainings and workshops. Teaching backgrounds ranged from homeschooling to over 30 years as a professional educator. Most participants indicated that they used Zoom as a tutoring platform, while others used Koala Go, Microsoft Teams, or Google Meet. Individual tutoring sessions lasted 30–55 minutes; no standard protocol or procedure was employed. Participants reported using various resources, including texts, websites, and digital applications. Some participants used and followed a specific program, while others used none.

Data Analysis

Data collected from participants were investigated and interpreted following Braun and Clarke's (2006) six steps of thematic analysis. Coding entailed multiple rounds, including initial review, open coding, revision, and refinement. Manual qualitative coding was employed, which comprised manipulating data on paper and writing codes by hand. Saldana (2021) recommends manual coding for small-scale studies because it gives the researchers more control.

The first step in the thematic analysis process included reviewing the 30-page Qualtrics report and developing preliminary ideas regarding possible code themes (Braun & Clarke, 2006). Data were read closely for familiarization, highlighting and making notes by hand next to keywords and phrases that stood out as potentially relevant for answering the research questions.

The second step comprised open coding during which all identified keywords and phrases were transferred into a Word document and loose categories were generated leading to initial codes using theoretical analysis based on the research questions. The document was printed and the individual keywords and phrases cut apart, creating 394 individual pieces of data to review and sort by hand, grouping them into categories to form 29 initial codes.

During the third step, links between codes were determined. New codes were established, refined, and placed in a hierarchy where patterns and themes were generated, extending and deepening the data analysis, focusing on meaning, interpretation, and the relationships between categories and subcategories in the search for themes (Braun & Clarke, 2006; Saldana, 2021). Table 1 outlines emerging themes and lists the initial codes combined and incorporated to create those themes. Some initial codes persisted to become emerging themes.

Table 1

Emerging Themes and Incorporated Codes

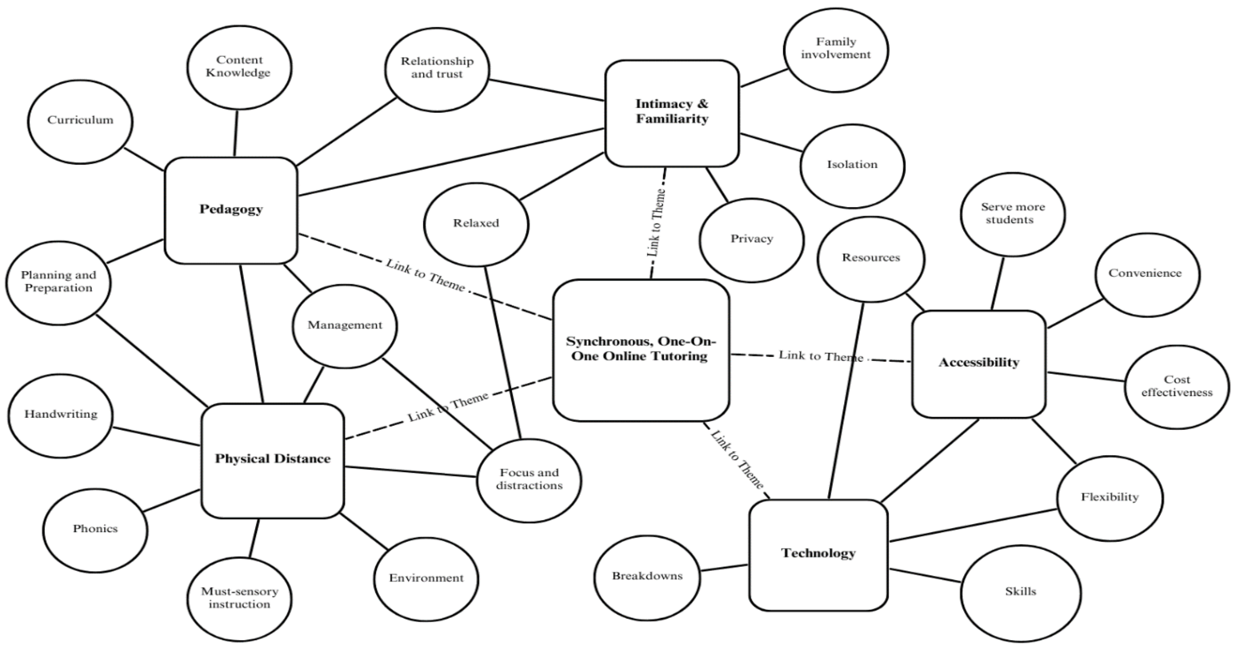
Emerging theme	Incorporated codes
Benefits for students	• Convenience • Privacy • Relaxed and intimate • Family involvement • Continuity
Benefits for tutor	• Number of students served • Convenience • Cost-effectiveness • Access to resources

Emerging theme	Incorporated codes
Flexibility & efficiency	
Accessibility	
Accomplishments & results	
Technology	
Personal	• Preparation time • Isolation • Sedentary lifestyle • Outside perceptions
Attention and distractions	• Focus • Distractions • Particular students
Physical limitations	• Teaching phonemes • Handwriting instruction • Multi-sensory instruction • Particular students
Contextual	• Environment • Reliable technology • Preparedness
Strong instruction	• Preparedness • Content knowledge • Management skills
Relationship and trust	

The fourth step further collapsed the initial categories and emerging themes into five coherent, overarching themes: Pedagogy, Technology, Physical Distance, Accessibility, and Intimacy and Familiarity. This process entailed blending and renaming themes and checking them against the extracted codes. A thematic map, indicating themes, sub-themes, and relationships among them, outlines the analysis (see Figure 1).

Figure 1

Thematic Map



The fifth step finalized the analysis process. The specifics of each theme were clarified and refined, including generating distinct names, definitions, and descriptions (see Table 2). This step also considered how the themes relate to each other and the research questions, and involved reporting and discussing the data analysis.

Table 2

Definitions and Descriptions of Overarching Themes and Research Questions Addressed

Theme Name	Definition	Description	RQs Addressed
1. Pedagogy	Participants' perceptions of their agency and effectiveness resulted from their knowledge of the content area, instructional methods, and materials utilized.	Participants referred to content knowledge, instructional techniques, curriculum, planning and preparation, management, and tutor and tutee relationship and trust.	RQ2 RQ3
2. Technology	Participants perceived technology as both an advantage and a detriment to online tutoring.	Participants described technology issues, including bad connections, lag time, glitches, poor sound quality, and the often-steep learning curve involved. Participants also described the ready access to resources, novel learning experiences, and efficiency provided by technology tools.	RQ1 RQ2 RQ3

Theme Name	Definition	Description	RQs Addressed
3. Physical Distance	Participants perceived the physical distance inherent in online tutoring as limiting their control and effectiveness.	Participants reported struggles with hearing and teaching phonemes, guiding handwriting, providing hands-on learning experiences, and managing student behavior. Participants indicated increased challenges in this area when working with younger students, those with learning disabilities, and those who struggle with attention.	RQ2 RQ3
4. Accessibility	Participants perceived online tutoring to increase accessibility in general — to students, tutors, content, and materials.	Participants detailed the tutor's accessibility to more students, materials, and resources and the student's accessibility to instructors, appropriate content, and intervention. Participants described barriers due to location, time constraints, expense, and transportation as being reduced or removed.	RQ1 RQ3
5. Intimacy and Familiarity	Participants perceived online tutoring as promoting familiarity, trust, and comfort.	Participants referred to the intimacy and privacy of online tutoring in which the tutor and tutee are in the comfort of their homes. The ease and trust created may facilitate learning, while the informality may lead to distractions.	RQ1 RQ2 RQ3

Results

The thematic analysis results from the data gathered were used to explore tutors' perspectives on implementing synchronous, one-on-one online tutoring for literacy intervention in the United States for students in kindergarten through Grade 6. Five overarching themes were determined: Pedagogy, Technology, Physical Distance, Accessibility, and Intimacy and Familiarity. Reliability and validity were ensured by including a clear audit trail, a thick narrative description of data, data triangulation, and personal reflexivity.

Theme 1: Pedagogy

Pedagogy is defined here as everything an instructor does, including planning, teaching, managing, and assessing based on their content knowledge, instructional skills, and management techniques. Pedagogy most often concerns RQ3, focusing on elements contributing to success. According to Participant 8, "My training and confidence in my ability make the leap to virtual less stressful and has worked so well." Participants noted that effective pedagogy leads to solid academic outcomes, solves problems, mitigates challenges, and creates strong tutor/tutee relationships and feelings of trust. As declared by Participant 2, "No amount of razzle-dazzle can make up for ineffective instruction."

Alternatively, some struggles with online tutoring stem from instructors' varying abilities to effectively engage students, often due to the physical distance, which was relevant to RQ2. Participant 9 reported, "It's harder to get those students' attention through a screen," while Participant 12 shared, "It can be monotonous for them to just sit and look at my face." However, according to Participant 6, "[You] just have to be open to using a different set of methods." Participant 13 described, "My lessons are packed tight, and I keep them busy." Pedagogy matters when it comes to managing challenges such as distraction and maintaining focus.

Theme 2: Technology

Participants frequently referred to technology. Technology offers unique challenges due to the learning curve involved, struggles with hardware and software, and instances of internet interruptions and slowdown pertinent to RQ2. According to Participant 13, "The only challenge to synchronous online tutoring has been technology with sound, video, or internet quality."

However, technology also facilitates flexibility and accessibility, enabling quick access to instructors and students, materials, and resources, addressing RQ1, which deals with the perceived benefits of synchronous, one-on-one online tutoring. Some participants noted the value of using technology to incorporate games and digital manipulatives, mitigating the challenge of incorporating multi-sensory instruction resulting from being physically removed from their students when tutoring online, touching on RQ3, concerned with elements contributing to success.

Theme 3: Physical Distance

The physical distance innate in online tutoring was referenced by participants primarily when discussing challenges, addressing RQ2. The physical distance between the tutor and the tutee makes it challenging to manage distractions and maintain the student's focus on the lesson. One participant noted that they did not feel as connected to their students when teaching online as they did in person. Participant 14 noted, "It is difficult not having control over the student's learning environment." Further, physical distance affects pedagogy, creating a barrier to teaching phonemic awareness and handwriting. Multi-sensory and hands-on learning is more challenging from a distance than in-person.

Some participants, however, shared how they adjust for the physical distance by making pedagogical decisions to control distractions and create multi-sensory experiences. Participants described having their students use whiteboards, allowing students to annotate on the screen, and even mailing materials to their students to use during lessons. A few participants reported that physical distance presents less of a challenge than a problem to solve through creativity and effective pedagogy, addressing RQ3, elements contributing to success.

Theme 4: Accessibility

Participants often referenced accessibility as a benefit of synchronous, one-on-one online tutoring relevant to RQ1. For students, online tutoring provides access to teachers and specialized instruction, regardless of locale, distance from one another, and time of day. The use of technology innate in online instruction facilitates convenience and flexibility. Participant 8 shared, "Children and families find it much easier to work appointments into busy schedules, and it takes out the stress of traffic and providing childcare for younger siblings during tutoring."

Additionally, according to participants, online tutoring facilitates tutors' access to resources, material, and students and provides a location for teaching that may otherwise not exist. Using technology for online instruction increases and streamlines instructors' ability to retrieve various materials and resources. According to Participant 6, "One of the biggest benefits is the accessibility of resources… Online, I can get to every resource I use. All the time [sic]." The easy access to resources and materials facilitates and broadens pedagogical decision-making, contributing to success, thereby addressing RQ3.

Further, participants commented on the cost-effectiveness of online tutoring, thereby expanding the number of tutors able to engage in the work and decreasing the cost of tutoring sessions for families, increasing students' access to instruction. Participant 15 reported, "It is a more cost-effective option for families since the overhead of online is much cheaper as a tutor." As stated by Participant 19, due to increased accessibility provided by online tutoring, "There are fewer excuses as to why a student is not being helped."

Theme 5: Intimacy and Familiarity

Participants reported positive effects stemming from the intimacy and familiarity cultivated through online tutoring, addressing RQ1, focusing on the benefits of synchronous, one-on-one online tutoring. According to participants, the tutor and tutee are in the comforts of their homes and are privy to each other's surroundings, creating ease and closeness. The student's family has an opportunity to engage as well. According to Participant 3, "I get to know their families, pets, likes, dislikes in a very intimate way." However, two participants did report that it is more challenging for them to connect, or they feel less connected to their students when tutoring online versus in person. Privacy, a factor related to intimacy, was explicitly addressed by several participants. Participant 1 shared, "This is a very private way to learn to read. Some of my students suffer from anxiety, and it has benefitted them to learn online." This intimacy and familiarity further facilitate trust, an essential pedagogical factor contributing to success, thereby addressing RQ3.

On the other hand, a few participants reported challenges created when students get too comfortable in their own homes, forgetting that they are in a lesson, addressing RQ2. According to Participant 2, "Sometimes students are too relaxed at home—picking their noses, teeth, etc. [sic] when they wouldn't do that in public. Many need to be reminded to put their toys where they are not distracting." Additionally, although working in their home environments facilitates closeness and intimacy for the tutor and tutee, some participants reported loneliness and isolation. Participant 13 wrote, "It is a lonely job, and I miss having coworkers."

Discussion

This study explored the perspectives of kindergarten through Grade 6 online literacy tutors within the United States on the benefits and challenges of implementing synchronous, one-on-one online literacy intervention and what they view as elements contributing to success. Table 3 outlines the results as they answer the research questions. More detailed descriptions follow.

Table 3

Answers to the Research Questions

RQ1: What are the tutors' perspectives on the benefits of synchronous, one-on-one online tutoring for literacy intervention?	RQ2: What are the tutors' perspectives on the challenges of synchronous, one-on-one online tutoring for literacy intervention?	RQ3: What are the tutors' perspectives on the elements that lead to successful synchronous, one-on-one online tutoring for literacy intervention?
Student motivation & engagement	Managing distractions	Explicit, systematic, evidence-based instruction
Flexibility & adaptability	Technological problems and steep learning curve	Active student participation & interaction
Efficiency	Maintaining student attention and focus	Positive/trusting relationship between tutor & tutee
Expanded access to services & students	Teacher loneliness/isolation	Reliable technology and comfort with technological tools
Intimacy &familiarity	Students too at ease	Pedagogical creativity
Privacy	Managing instruction requiring detailed hearing and up-close viewing (e.g., phonics, handwriting) or manipulatives	
Cost effectiveness		

Benefits

This study found technology to provide easy access to endless resources and materials through digital tools and storage of text and materials. Twelve participants from this study shared how digital tools and applications provide novel and appealing learning experiences and activities that facilitate student motivation, focus, and engagement, expanding pedagogical and resource options. This discovery ranged beyond the findings of the literature review.

Flexibility and efficiency are other benefits this study found offered by technology, which agreed with previous studies' findings. Thirteen participants described being able to modify lessons and move from one student to the next swiftly and seamlessly. The reviewed literature similarly outlined the flexibility and convenience provided by technology and the ability to quickly adapt lessons to individuals (Gregg & Shin, 2021; Lasnumanda & Tarigan, 2020).

Participants viewed technology as expanding access to their services, allowing tutors and tutees to come together regardless of time or location. Eighteen participants described tutors being able to reach more students than when working face-to-face and students being able to connect with instructors with the skills and qualifications to provide appropriate support. This finding aligned with the reviewed literature reporting increased access and opportunities provided by online tutoring, mitigating unequal learning opportunities for students (Liu & Li, 2020; Wisniewski et al., 2020).

This study illustrated tutors' perspectives concerning increased accessibility provided by online tutoring. Eighteen respondents detailed their ability to connect with more students in less time. Sixteen participants reported easy retrieval of resources and materials via digital means. Eighteen participants described students' increased ability to access appropriate instruction provided by a skilled practitioner regardless of location. Ten participants highlighted the cost-effectiveness of online tutoring, resulting from neither transportation nor a designated physical location being required, further increasing accessibility. These findings were consistent with the reviewed literature that outlined the increased accessibility facilitated by online tutoring, provided to tutors and tutees, to students, to instructors, and to materials and resources (Gregg & Shin, 2021; Wisniewski et al., 2020).

Seven participants in this study reported on the intimacy and familiarity between the tutor and tutee being facilitated by the online format. Further, privacy was explicitly addressed by some as a benefit, particularly for older students and those struggling with anxiety. These factors were less salient in the literature. In fact, some research reported online instructors feeling disconnected from their students (Liu & Li, 2020; Okoro et al., 2021). Only two of this study's participants reported feeling detached from their students.

Challenges

Eleven study participants described the time and effort it takes to acquaint oneself with and employ the necessary technology and adjust instructional techniques and management styles. This finding was consistent with the research by Aslan et al. (2022) and Curwen (2020), who referenced the steep learning curve involved in online instruction and the struggles of those who are less tech-savvy. Five respondents additionally outlined the extra energy and time needed for the physical preparation that online tutoring requires over face-to-face tutoring. This finding did not appear in the reviewed literature.

Thirteen participants described difficulties keeping and maintaining students' focus and attention and managing distractions when working online due to the lack of hands-on engagement and physical interaction, thereby necessitating additional pedagogical adjustments. This was particularly true with younger students and those with preexisting challenges. This finding was consistent with the literature reviewed (Aslan et al., 2022; Liu & Li, 2020; Okoro et al., 2021).

Seventeen participants described technological challenges, including those related to hardware, software, and internet connection. This finding aligned with those of previous studies that highlighted struggles with internet connection, technology equipment, and sound quality as offering problems and complications for the tutor and tutee and negatively impacting student learning (Bacon & Liu, 2021; Carlana & La Ferrara, 2021). Four participants additionally noted the loss of academic time due to a lack of technological skills on the part of tutors and tutees, mainly when working with younger students, a finding consistent with the literature (Curwen, 2020).

The reviewed literature additionally addressed individuals' variable access to technology as a challenge, creating equity issues (Johns & Mills, 2021). No participants in this study put forth this factor. This omission does not mean the participants did not consider the digital divide and resulting equity issues; however, they neither discussed nor brought up students' ability to secure devices to access instruction.

Twelve participants revealed student behavioral challenges stemming from the physical distance inherent in online tutoring. Tutors could not gain and maintain students' attention and focus on the lesson through physical touch or control the environment by removing a toy, clearing the workspace, or even preventing a student from leaving. These findings echoed previous studies that detailed physical distance reducing visual and auditory cues that provide information concerning students' emotional states, and restricting interactions (Aslan et al., 2022; Lasnumanda & Tarigan, 2020; Okoro et al., 2021).

Twelve participants additionally outlined challenges in hearing and teaching phonemes and handwriting, consistent with previous research (Aslan et al., 2022; Washburn et al., 2021). Multi-sensory instruction, incorporating manipulatives and physical interaction, is also challenging, particularly noteworthy with younger students, further congruent with the literature (Aslan et al., 2022; Liu & Li, 2020; Washburn et al., 2021).

Three participants reported students getting too comfortable and relaxed at home, leading to distraction, lack of focus, and not taking the tutoring session seriously. Along these lines, the literature addressed student distraction and variable focus when tutoring online (Lasnumanda & Tarigan, 2020; Okoro et al., 2021); however, it did not explicitly link those challenges to the students being comfortable in their environment, but rather to the general nature of online instruction. Challenges stemming specifically from students being too at ease were a finding unique to this study.

Four participants disclosed their feelings of loneliness and isolation resulting from teaching online and not having coworkers nearby. According to participants, limiting one's work environment to the home and computer screen can create a sense of aloneness and have a siloing effect. The reviewed literature did not address this specific challenge; however, it did reference collaboration, support, and relevant training among and for online instructors as contributors to success (Johns & Mills, 2021; Washburn et al., 2021).

Elements Contributing to Success

Eleven participants outlined the value of being prepared, with more than enough engaging and appropriate lessons, material, and resources, digitally organized and easily accessible. This is consistent with the literature, which noted that the elements that make up strong face-to-face teaching, including preparation, result in successful online instruction (Bacon & Liu, 2021; Washburn et al., 2021).

Fourteen participants outlined their chosen program or instructional approach as a factor contributing to success, provided it is explicit, systematic, and evidence-based. This finding is aligned with the previous research that found positive outcomes from online literacy interventions that included explicit, systematic, and diagnostic instruction aligned with evidence-based practice following the science of reading (Petscher et al., 2020; Puzio et al., 2020; Weiss et al., 2022).

Thirteen participants described the management of the tutoring session as an element essential for success. Tutors must incorporate materials and strategies that keep students motivated and engaged, including games, whiteboards, goal setting, and screen sharing, particularly when working with younger students and those struggling with attention. This finding was consistent with the literature highlighting the importance of interactive instructional techniques and students' active participation (Gregg & Shin, 2021; Johns & Mills, 2021).

Ten participants outlined the benefits of a positive relationship and trust between the tutor and student, describing making emotional connections with their students, taking an interest in their lives, and maintaining a patient and positive attitude. This finding was consistent with the literature that detailed the importance of creating a positive learning environment to increase student motivation (Lawrence, 2020; Washburn et al., 2021). Previous research described empathy on the tutor's part as facilitating a caring, trusting, and safe relationship that supports instruction (Donovan et al., 2022; Lawrence, 2020; Liu & Li, 2020).

Seventeen respondents expressed the importance of reliable technology and adequate knowledge of and comfort with technological tools for successful online tutoring. The tutor must be able to manage basic troubleshooting, and the students or caregivers should feel generally at ease with technology. A strong Wi-Fi signal should be available at both locations and an appropriate device should be accessible to the tutor and tutee. These elements for success were consistent with the literature (Carlana & La Ferrara, 2021; Okoro et al., 2021), which additionally suggested the effective use of smartphones when needed (Carlana & La Ferrara, 2021) and technology training for tutors (Johns & Mills, 2021; Washburn et al., 2021).

Methods that work when tutoring face-to-face may not be effective when tutoring online due to the physical distance; however, according to 12 participants, this challenge leads to problem-solving, creative pedagogical techniques, and the use of novel resources, which may be ultimately beneficial. This forward-looking perspective adds to the findings of previous research. However, Wisniewski et al. (2020) did speak to the importance of tutors being aware of and attending to challenges and making appropriate adjustments.

Ten participants reported easy access to resources and materials as an element contributing to successful online tutoring. Fourteen participants highlighted their ability to smoothly pivot instruction and adjust when needed due to the ease of pulling up unlimited digital resources, thereby keeping the tutoring session interesting, motivating, and appropriate to the individual student. Although previous research addressed accessing digital tools to increase the interactivity of online instruction (Johns & Mills, 2021; Martin et al., 2021), it did not highlight the value of accessing novel tools and materials quickly and efficiently to promote success.

Seven participants described creating, developing, and maintaining feelings of comfort and trust as vital for success, increasing student engagement, willingness to participate, and learning ability. Ten participants shared how they take time to learn about their students and have fun with them. The literature surrounding online tutoring supported this finding, outlining a positive learning environment, including praise and positive corrective feedback, as facilitating student motivation (Washburn et al., 2021) and the value of creating tutor/tutee relationships rooted in care, safety, and trust (Donovan et al., 2022; Liu & Li, 2020).

Research Limitations and Future Research Recommendations

The research methodology of this study was qualitative, thereby limiting transferability. Findings were not statistical and did not predict outcomes, but described the phenomenon's nature and, thereby, may be considered less robust. Including a thick, rich narrative description of data that reached saturation helped mitigate this limitation, supporting qualitative research's generalizability (Merriam, 2009). Future studies may employ a mixed-method research design to increase validity and provide a complete picture of the phenomenon.

This study employed a singular method for data collection, an open-ended online questionnaire, which may have caused the results to lack diversity of data and reduce credibility, as well as lead to inconsistencies in the depth and breadth of responses thereby impacting data comparability. Data triangulation was applied, in that 20 participants were recruited from seven social media pages, making up a variety of data sources, future studies should additionally employ method triangulation by including interviews, observations, and focus groups, and implement member checks, further ensuring that the results are an accurate representation of the phenomenon under study.

This study's relatively small sample size of 20 may have also limited the diversity of data, in that the results represent the experiences of the 20 tutors involved and are not grounded within a larger scale data set. Purposeful sampling may have introduced selection bias, potentially skewing results towards those with positive experiences with online tutoring. This study, however, does provide a foundation for future research that may be more expansive.

Further, at the time of the study, the researcher was engaged in synchronous, one-on-one online tutoring for literacy intervention, the phenomenon under study. In order to mitigate the impact of bias, the researcher incorporated reflexive practices, including creating a reflexive journal in the form of a narrative autobiography and a self-interview, and used SMEs to ensure alignment between the questionnaire and the research questions. Future studies should use additional researchers to help code data and review preliminary findings and conclusions to ensure they are appropriate and sound.

Conclusion

Key points from this study on synchronous, one-on-one online tutoring for literacy intervention indicated that participants perceived benefits for tutors and tutees to include factors related to access, flexibility, and the tutor/tutee relationship; challenges included increased effort required, distractions, lack of physical control, and teacher isolation; and elements contributing to success to include advanced preparation, reliable technology, evidence-based practice, and a trusting tutor/tutee relationship. This study's results were confirmed by and expanded on the reviewed literature. Five recurrent themes emerged through data analysis: pedagogy, technology, physical distance, accessibility, and intimacy and familiarity.

In reflection on the knowledge gained through this study, there are many perceived benefits of synchronous, one-on-one online tutoring for literacy intervention. The tutor's advanced awareness, preparation, and available appropriate tools and resources may mitigate most perceived challenges. Factors contributing to success include effective face-to-face teaching, such as evidence-based instruction, establishing a solid and trusting relationship, and student interactivity, suggesting that online teaching may amplify and compound the effects of one's existing instruction and management.

Practical Applications

The results of this study suggest that explicit, systematic, diagnostic teaching should be employed for online literacy instruction and intervention. Tutors must be mindful of students' cognitive load, seeing that technology does not overload working memory and hamper learning. Instructors interested in online tutoring should be aware of and attend to the potential benefits and challenges, preparing for and adjusting accordingly (Wisniewski et al., 2020).

Educational leaders can use the results of this study to expand access to literacy intervention for students who require additional support. Online tutoring can provide Response to Intervention (RtI) Tier 3 literacy intervention to students, particularly older students who seem less negatively affected by the physical distance and may value the privacy it affords. Students can use school devices and WiFi, negating concerns over access to technology. Leaders can take action to organize online intervention providers towards the goal of more easily matching them with students in need.

Declarations

The author declares no conflicts of interest. Permission to collect data from human subjects was granted from the IRB of the (*author's educational institution*).

Acknowledgements

I would like to thank Dr. Colt Turner for his guidance and encouragement throughout this study.

References

Alesksandrovna, C. E., Farman, A. N., Nikolaevna, K. S., Vladimirovna, Y. O., Valerievna, B. V., & Ivanova, S. M. (2015). History of origin of tutoring in global educational practice. *Mediterranean Journal of Social Sciences, 6*(6), 492–497. https://doi.org/10.5901/mjss.2015.v6n6p492

Armbruster, B. B., Lehr, F., Osborn, J., & Adler, C. R. (2009). Put reading first: The research building blocks of reading instruction: Kindergarten through Grade 3 (3rd ed.). *National Institute for Literacy.* https://lincs.ed.gov/publications/pdf/PRFbooklet.pdf

Aslan, S., Li, Q., Bonk, C. J., & Nachman, L. (2022). An overnight transformation: How did the pandemic turn early childhood education upside down? *Online Learning, 26*(2), 52–77. https://doi.org/10.24059/olj.v26i2.2748

Bacon, S., & Liu, L. (2021). Participation rate of fifth graders during COVID-19 emergency: Synchronous versus asynchronous learning activities. *International Journal of Technology in Teaching and Learning, 17*(1), 47–61. https://files.eric.ed.gov/fulltext/EJ1330704.pdf

Baker, D. P. (2020). An inevitable phenomenon: Reflections on the origins and future of worldwide shadow education. *European Journal of Education, 55*(3), 311–315. https://doi.org/10.1111/ejed.12410

Beach, K. D., Washburn, E. K., Gesel, S. A., & Williams, P. (2021). Pivoting an elementary summer reading intervention to a virtual context in response to COVID-19: An examination of program transformation and outcomes. *Journal of Education for Students Places at Risk (JESPAR), 26*, 112–134. https://doi.org/10.1080/10824669.2021.1906250

Bøg, M., Dietrichson, J., & Isaksson, A. A. (2021). A multi-sensory tutoring program for students at risk of reading difficulties: Evidence from a randomized field experiment. *Journal of Educational Research, 114*(3), 233–251. http://doi.org/10.1080/00220671.2021.1902254

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Carlana, M., & La Ferrara, E. (2021, February 1). Apart but connected: Online tutoring and student outcomes during the COVID-19 pandemic. HKS Working Paper No. RWP21-001. https://ssrn.com/abstract=3777556 or http://dx.doi.org/10.2139/ssrn.3777556

Chan, E. S. M., Shero, J. A., Hand, E. D., Cole, A. M., Gaye, F., Spiegel, J. A., & Kofler, M. J. (2022). Are reading interventions effective for at-risk readers with ADHD? A meta-Analysis. *Journal of Attention Disorders, 00*(0), 1–19. https://doi.org/10.1177/10870547221130111

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). SAGE Publications.

Curwen, M. S. (2020). Vexations and breakthroughs: Taking an in-person tutoring program online. *Issues in Teacher Education, 29*(1–2), 75–84. https://www.itejournal.org/index.html

Czahajda, R., & Cernko, M. (2021). Perceived session quality sale: What contributes to the quality of synchronous online education? *International Journal of Training and Development, 25*, 217–243. https://doi.org/10.1111/ijtd.12216

Dean, J., Pascoe, M., & le Roux, J. (2021). Pilot evaluation of a partner-supported online reading intervention for Grade 3–6 children. *Child Language Teaching & Therapy, 37*(3), 337–354. https://doi.org/10.1177/0265659021989400

de Rosa, C., & Johnson, J. (2019). Webinar-based approaches to maximize learning and transfer good practices: Case studies from the humanitarian sector. *International Journal of Training and Development, 23*(4), 339–348. https://doi.org/10.1111/ijtd.12166

Donovan, S. J., Dakessian, A. K., & Samano, S. M. (2022). Redefining community and teacher preparation: Online tutoring partnerships for greater equity in literacy instruction. *Illinois Reading Council Journal, 50*(2), 31–41. http://doi.org/10.33600/IRCJ.50.2.2022.31

Eckerdal, R. J., & Hagström, C. (2017). Qualitative questionnaires as a method for information studies research. *Information Research, 22*(1). http://InformationR.net/ir/22-1/colis/colis1639.html

Engzell, P., Frey, A., & Verhagen, M. D. (2021). Learning loss due to school closures during the COVID-19 pandemic. *Proceedings of the National Academy of Sciences, 118*(17). https://doi.org/10.1073/mnas.2022376118

Fien, H., Chard, D. J., & Baker, S. K. (2021). Can the evidence revolution and multi-tiered systems of support improve education equity and reading achievement? *Reading Research Quarterly, 56*(1), S105–S118. https://doi.org/10.1002/rrq.391

Fuchs, D., & Fuchs, L. S. (2006). Introduction to response to intervention: What, why, and how valid is it? *Reading Research Quarterly, 41*(1), 93–99. https://doi.org/10.1598/RRQ.41.1.4

Gardner, R., Nobel, M. M., Hessler, T., Yawn, C. D., & Heron, T. E. (2007). Tutoring system innovations: Past practice to future prototypes. *Intervention in School and Clinic, 43*(2), 71–81. https://doi.org/10.1177%2F10534512070430020701

Gersten, R., Haymond, K., Newman-Gonchar, R., Dimino, J., & Jayanthi, M. (2020). Meta-analysis of the impact of reading interventions for students in the primary grades. *Journal of Research on Educational Effectiveness, 13*(2), 401–427. https://doi.org/10.1080/19345747.2019.1689591

The Glossary of Education Reform. (2013, August 29). *Synchronous learning.* https://www.edglossary.org/synchronous-learning/

Gortazar, L., Hupkau, C., & Roldan, A. (2022). *Online tutoring works: Experimental evidence from a program with vulnerable children* (ESADE working paper #2). https://www.esade.edu/ecpol/en/publications/online-tutoring-works-experimental-evidence-from-a-program-with-vulnerable-children/

Gregg, D., & Shin, S. J. (2021). Why we will not return to exclusively face-to-face tutoring post-COVID: Improving student engagement through technology. *The Learning Assistance Review, 26*(2), 53–79. https://files.eric.ed.gov/fulltext/EJ1317248.pdf

Grindle, C., Tyler, E., Murray, C., Hastings, R. P., & Lovell, M. (2019). Parent-mediated online reading intervention for children with Down syndrome. *Support for Learning, 34*(4), 211–320. http://doi.org/10.1111/1467-9604.1249

Guillen-Gamez, F. D., Linde-Valenzuela, T., Ramos, M., & Mayorga-Fernandez, M. J. (2022). Identifying predictors of digital competence of educators and their impact on online guidance. *Research and Practice in Technology Enhanced Learning, 17*(20), 1–19. https://doi.org/10.1186/s41039-022-00197-9

Gupta, A. (2022). A #shadow education" time scape: An empirical investigation of the temporal arrangements of private tutoring vis-a-vis formal schooling in India. *British Journal of Educational Studies, 70*(6), 771–787. https://doi.org/10.1080/00071005.2021.2024137

Hindman, A. H., Morrison, F. J., Connor, C. M., & Connor, J. A. (2020). Bringing the science of reading to preservice elementary teachers: Tools that bridge research and practice. *Reading Research Quarterly, 55*(Suppl 1), S197–S206. https://doi.org/10.1002/rrq.345

Johns, C., & Mills, M. (2021). Online mathematics tutoring during the COVID-19 pandemic: Recommendations for best practices. *Problems, Resources, and Issues in Mathematics Undergraduate Studies, 31*(1), 99–117. https://doi.org/10.1080/10511970.2020.1818336

Jones, A., Caes, L., Rugg, T., Noes, M., Bateman, S., & Jordan, A. (2021). Challenging issues of integrity and identify of participants in non-synchronous online qualitative methods. *Methods in Psychology, 5*(2021), 1–5. https://doi.org/10.1016/j.metip.2021.100072

Kudinov, D. V., Degtyarev, S. I., Polyakova, L. G., & Gut, J. (2019). Educational process in ancient Rome schools. *European journal of contemporary education, 8*(2), 425–436. https://eric.ed.gov/?id=EJ1220301

Lambie, I., & Law, B. (2020). Teaching online during a pandemic: Pedagogical skills transfer from face to face support to online synchronous support provision. *Academic Conferences International Limited*. https://doi.org/10.34190/EEL.20.063

Lasnumanda, E. S., & Tarigan, F. N. (2020). Online English shadow education: EFL learners' perspective. *Journal of Linguistics and Applied Linguistics, 2*(1), 70–77. https://doi.org/10.32493/ljlal.v2i2.8104

Lawrence, A. (2020). Teaching as dialogue: Toward culturally responsive online pedagogy. *Journal of Online Learning Research, 6*(1), 5–33. https://www.learntechlib.org/primary/p/210657/

Li, Y. C. (2020). Action research to enrich learning in e-tutoring for remote schools. *Systemic Practice & Action Research, 33*(1), 95–110. https://doi.org/10.1007/s11213-019-09517-5

Liu, R. L., & Li, Y. C. (2020). Action research to enrich learning in e-tutoring for remote schools. *Systemic Practice & Action Research, 33*(1), 95–110. https://doi.org/10.1007/s11213-019-09517-5

Ludwig, C., Guo, K., & Georgiou, G. K. (2019). Are reading interventions for English language learners effective? A Meta-analysis. *Journal of Learning Disabilities, 52*(3), 220–231. https://doi.org/10.1177/0022219419825855

Maldonado, J. E., & De Witte, J. E. (2021). The effect of school closures on standardized student test outcomes. *British Educational Research Journal, 48*(1), 49–94. https://doi.org/10.1002/berj.3754

Markovitz, C. E., Hernandez, M. W., Hedberg, E. C., & Whitmore, H. W. (2022). Evaluating the effectiveness of a volunteer one-on-one tutoring model for early elementary reading intervention: A randomized controlled trial replication study. *American Educational Research Journal, 59*(4), 788–819. https://doi.org/10.3102/00028312211066848

Martin, F., Ting, S., Turk, M., & Ritzhaupt, A. D. (2021). A meta-analysis on the effects of synchronous online learning on cognitive and affective educational outcomes. *International Review of Research in Open & Distance Learning, 22*(3), 205–242. https://doi.org/10.19173/irrodl.v22i3.5263 https://doi.org/10.1177/002221941982585r

McAleese, S., & Kilty, J. M. (2019). Stories matter: Reaffirming the value of qualitative research. *The Qualitative Report, 24*(4), 822–845. https://doi.org/10.46743/2160-3715/2019.3713

McKenna, J. W., Garwood, J., & Solis, M. (2021). Reading instruction for students with and at risk of emotional and behavioral disorders: A synthesis of observation research. *Journal of Behavioral Education, 31*(1), 1–27. https://doi.org/10.1007/s10864-020-09425-y

Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation.* Jossey-Bass.

Merriam, S. B., & Tisdell, E. J. (2015). *Qualitative research: A guide to design and implementation* (4th ed.). John Wiley & Sons.

Moore, W. G. (1968). *The tutorial system and its future.* Pergamon Press.

National Center for Education Statistics. (2021, May). *Impact of the coronavirus pandemic on the elementary and secondary education system*. https://nces.ed.gov/programs/coe/indicator/tcb/covid-impact-elementary-secondary

National Center for Educational Statistics (NCES). (2022, October 12). *National Assessment of Educational Progress (NAEP)*. https://nces.ed.gov/nationsreportcard/

National Reading Panel (NRP) (U.S.) & National Institute of Child Health and Human Development (U.S.). (2000). *Report of the National Reading Panel: Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction.* https://www.nichd.nih.gov/sites/default/files/publications/pubs/nrp/Documents/report.pdf

Nelson-Royes, A. M. (2018). Tutors can improve students' reading skills. *Reading Improvement, 50*(2), 48–53. https://eric.ed.gov/?id=EJ1023409

Nickow, A., Oreopoulos, P., & Quan, V. (2020, January 1). *The impressive effects of tutoring on prek-12 Learning: A systematic review and meta-analysis of the experimental evidence* (NBER Working Paper No. 27476). https://doi.org/10.3386/w27476

Okoro, C. S., Takawira, O., & Baur, P. (2021). An assessment of tutoring performance, challenges and support during COVID-19: A qualitative study in a South African university. *Journal of University Teaching & Learning Practice, 18*(8). https://doi.org/10.53761/1.18.8.4

Pace Miles, K., Lauterbach, M. D., Murano, D. M., & Dembek, G. A. (2019). Reading rescue: A follow-up on effectiveness of an intervention for struggling readers. *Journal of Educational Research, 112*(2), 255–269. https://doi.org/10.1080/00220671.2018.1514358

Petscher, Y., Cabell, S. Q., Catts, H. W., Compton, D. L., Foorman, B. R., Hart, S. A., Lonigan, C. J., Phillips, B. M., Schatschneider, C., Steacy, L. M., Terry, N. P., & Wagner, R. K. (2020). How the science of reading informs 21st-century education. *Reading Research Quarterly, 55*, S267–S282. https://doi.org/10.1002/rrq.352

Pratama, H., Azhari Azman, M. N., Kassymova, G. K., & Duisenbayeva, S. S. (2020). The trend in using online meeting applications for learning during the period of pandemic COVID-19: A literature review. *Journal of Innovation in Educational and Cultural Research, 1*(2), 58–68. https://doi.org/10.46843/jiecr.v1i2.15

Puzio, K., Colby, G. T., & Algeo-Nichols, D. (2020). Differentiated literacy instruction: Boondoggle or best practice? *Review of Educational Research, 90*(4), 459–498. https://doi.org/10.3102/0034654320933536

Roschelle, J., Cheng, B. H., Hodkowski, N., Neisler, J., & Holder, L. (2020). Evaluation of an online tutoring program in elementary mathematics [Project Report]. *Digital Promise*. http://hdl.handle.net/20.500.12265/95

Saldana, J. (2021). *The coding manual for qualitative researchers*. SAGE Publications.

Semingson, P., & Kerns, W. (2021). Where is the evidence? Looking back to Jeanne Chall and enduring debates about the science of reading. *Reading Research Quarterly, 56*(S1), S157–S169. https://doi.org/10.1002/rrq.405

Solari, E., Terry, N. P., Gaab, N., Hogan, T. P., Nelson, N., Pentimonti, J., Petscher, Y., & Sayko, S. (2020). Translational science: A roadmap for the science of reading. *Reading Research Quarterly*, 55(1), 347–360. https://doi.org/10.1002/rrq.357

Stevenson, D. L., & Baker, D. P. (1992). Shadow education and allocation in formal schooling: Transition to university in Japan. *American Journal of Sociology, 97*(6), 1639–1657. https://doi.org/10.1086/229942

Subedi, K. R. (2018). Shadow education: A role of private tutoring in learning. *International Journal of Humanities and Social Sciences, 1*(2), 29–42. https://files.eric.ed.gov/fulltext/ED591992.pdf

Torgesen, J. (2005). Recent discoveries on remedial interventions for children with dyslexia. In M. J. Snowling & C. Hulme (Eds.), *The science of reading: A handbook* (pp. 521–549). Blackwell. http://doi.org/10.1002/9780470757642.ch27

U. S. Department of Education, Office of Planning, Evaluation, and Policy Development. (2010). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies*. https://www.ed.gov/sites/ed/files/rschstat/eval/tech/evidence-based-practices/finalreport.pdf

Vasileiou, K., Barnett, J., Thorpe, S., & Young, T. (2018). Characterizing and justifying sample size sufficiency in interview-based studies: Systematic analysis of qualitative health research over a 15-year period. *BMC Medical Research Methodology, 18*(148), 1–18. https://doi.org/10.1186/s12874-018-0594-7

Washburn, E. K., Beach, K. D., Gesel, S. A., Billingsley, M., Howard, C., King, B., & Vintinner, J. P. (2021). Zooming into summer: Key takeaways from a virtual summer reading intervention. *Reading Teacher, 74*(6), 812–818. https://doi.org/10.1002/trtr.2000

Weiss, Y., Yeatman, J. D., Ender, S., Gijbels, L., Loop, H., Mizrahi, J. C., Woo, B. Y., & Kuhl, P. K. (2022). Can an online reading camp teach 5-year-old children to read? *Frontiers in Human Neuroscience, 16,* 1–13. https://doi.org/10.3389/fnhum2022.793213

Wisniewski, C., Regidor, M. C., Chason, L., Groundwater, E., Kranek, A., Mayne, D., & Middleton, L. (2020). Questioning assumptions about online tutoring: A mixed-method study of face-to-face and synchronous online writing center tutorials. *The Writing Center Journal*, *38*(1/2), 261–296. https://www.jstor.org/stable/27031270

New Normal in Higher Education for the Post-COVID-19 World: Reimagining and Re-examining Factors for Student Success in Online Learning

Hungwei Tseng
Chris Inman
Jacksonville State University, USA

Abstract
As the novel coronavirus began to rapidly spread worldwide in March 2020, emergency transitions to the remote education processes were adopted in all institutions so as not to interrupt students' learning. In this study, we intended to investigate the extent to which factors of online course design and student learning impact students' success after online student characteristics are controlled. Online survey data were collected from 182 undergraduate and graduate students enrolled in at least one fully online course(s). The results revealed that a student's online learning experience was a critical factor in determining the students' attitudes when facing future online courses that were diverse and required autonomy, as well as the student's ability to adapt to challenges from online courses that might use multiple information and communication technology (ICT) tools. Moreover, time management, course design/structure and quality facilitation, and emotional presence were consistently found to be significant determinants of student's online learning success.

Keywords: New normal, online student success, course design and facilitation, emotional presence

Tseng, H., & Inman, C. (2024). New normal in higher education for the post-COVID-19 world: Reimagining and re-examining factors for student success in online learning. *Online Learning,* 29(2), pp. 213–240. https://doi.org/10.24059/olj.v29i2.4629

The COVID-19 outbreak disrupted the education system globally, causing many school and university closures, and forced educational systems to facilitate the large-scale adoption of online learning (Tang et al., 2021). Moreover, the rapid rise of online learning during the pandemic formed a new normal for education, though it will be in a perpetual state of flux (Cacayan et al., 2020). According to Cacayan et al. (2020), the new normal "is a state of which economy, society, school, and other concerns settle following a crisis like the COVID-19 pandemic" (p. 234). Even prior to the outbreak of COVID-19, the number of college students who enrolled and studied in online learning contexts was experiencing modest yet steady growth. According to the National Center for Education Statistics, 37.3 percent of college students were enrolled in at least one online course in 2019. Over the past few decades, online learning gradually became an alternative instructional modality of delivery to face-to-face learning (Paul & Jefferson, 2019) because of its accessibility, affordability, and flexibility (Dhawan, 2020). To ensure the quality of online education, many experimental studies have explored the impacts of effective practices and a variety of factors related to the quality of instructor (Martin et al., 2018), course design (Czerkawski & Lyman, 2016; Dunlap et al., 2016), and pedagogical practices (Chai et al., 2019; Gurley, 2018).

As the novel coronavirus began to rapidly spread worldwide in March 2020, emergency transitions to remote education processes were implemented in all institutions so as not to interrupt students' learning. These changes brought more challenges to instructors who teach online students, especially for those with limited online teaching experience. In addition, though the massive shift to online learning contexts allows students to continue learning, it also exposed some students to diverse and "just in time" rapid learning experiences they had never previously faced that could potentially diminish their productivity and hinder their success. Thus, students' online learning readiness and self-regulated learning skills have also been challenged (Hong et al., 2021; Rafique et al., 2021). For instance, Naji et al.'s study (2020) stated that students reported that they had less control over their learning and had difficulty managing time well during the pandemic.

In the online learning literature, a variety of learner characteristics and skill sets have been considered essential learning competencies, such as internet self-efficacy (Hung et al., 2010; Kuo et al., 2013), time management (Galindo-Domínguez & Bezanilla, 2021; Hensley et al., 2018; Zampetakis et al., 2010), and self-regulation (Kuo et al., 2020). According to Eastin and LaRose (2000), internet self-efficacy is referred as "the belief in one's capabilities to organize and execute courses of Internet actions required to produce given attainments" (p. 1). In terms of time management, Claessens et al. (2007) defined it as "behaviours that aim at achieving an effective use of time while performing certain goal-directed activities" (p. 262).

While evidence-based research appears to strongly support online learning quality, little attention has been paid to the investigations of the relationship of these practices with students' outcomes and student success. Moreover, researchers argue that there are significant needs to examine how well learning interaction or student learning experience, a throughput or process, can primarily indicate the quality of online courses and pedagogy (Joosten & Cusatis, 2019). System approach was referred to as "a term that means to do something systematically. In educational industry, to teach systematically teachers must consider input, process and output and decide objectives, contents, methods and assessment" (Salam, 2015, p. 1). At the broadest level, the quality of education is described as the nature of the components in the input, process, and output of the education system that deliver services that fully meet the expectations, both explicit and implicit, of internal and external strategic stakeholders (Cheng and Tam, 1997). From the aspects of instructional design and student learning, the systems approach to evaluating student learning in online education stresses a comprehensive and integrated assessment framework that investigates interrelated parts of the educational process in order to improve student learning outcomes (Dick et al., 2015; González & Quiroz, 2019). This approach views online learning as a complex system with multiple components, including instructional design principles, technical tools, student participation and behaviors, and evaluation methods, all of which contribute to the learning process. With high-quality inputs in an online context (e.g., innovative learning technologies and well-designed course materials), it enables more effective throughput processes (e.g., personalized instruction and interactive learning experiences), which in turn, contribute to positive outputs, such as higher retention rates and improved learner outcomes. Moreover, this approach aligns instructional design components with a systematic perspective, emphasizing how each phase contributes to online student success (Eom & Ashill, 2016). By examining these components as a whole, the systems approach provides insights into how well an online learning environment promotes student achievement and a road map for specific improvements. Thus, this study adapted a system approach (see Figure 1) and integrated instructional design components to essentially reimagine and reexamine a variety of online learning characteristics and online learning factors that can influence online student success in this new normal era.

Purpose of the Study and Research Hypotheses

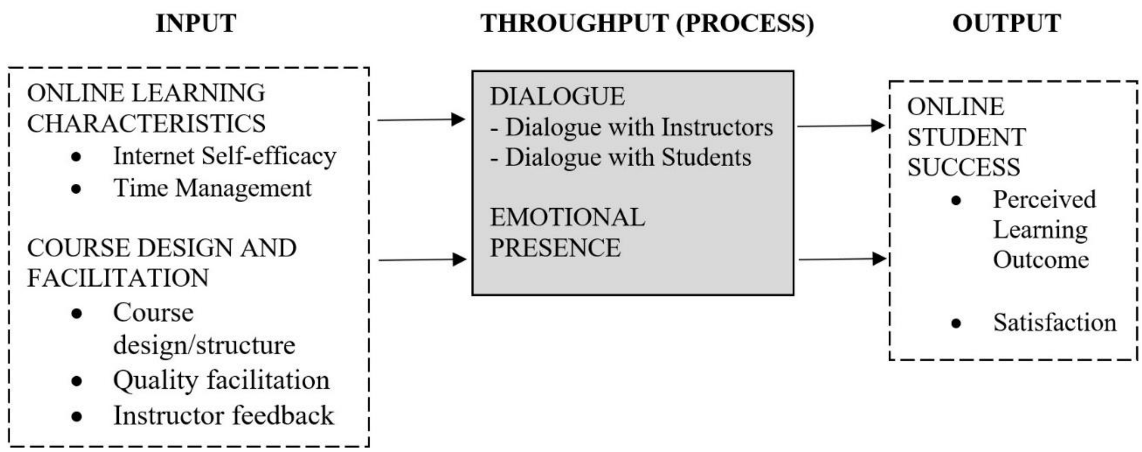
The purposes of this study were twofold. First, we attempted to investigate how students' online learning experience during COVID-19 would differ on the levels of online success according to their online learning characteristics, perceived online course design and facilitation, dialogue with instructors and students, and emotional presence. Second, we intended to investigate to the extent to which factors of online course design and facilitation, and dialogue with instructors and students, impact students' success in the online learning contexts after online student characteristics were controlled. The research hypotheses for this study were:

> **H1.** Online students who had completed more online courses were more likely to have a higher level of online success compared to those who had less online learning experience.
>
> **H2.** Online students who had higher motivation to visit their online courses frequently were more likely to have a higher level of online success compared to those who had not.
>
> **H3.** After controlling for individual characteristics, variables associated with online learning characteristics (internet self-efficacy and time management), course design and facilitation (course design/structure, quality facilitation, and instructor feedback), and dialogue with instructors/students and emotional presence would have a positive effect on online students' perceived learning outcome.
>
> **H4.** After controlling for individual characteristics, variables associated with online learning characteristics (internet self-efficacy and time management), course design and

facilitation (course design/structure, quality facilitation, and instructor feedback), and dialogue with instructors/students and emotional presence would have a positive effect on online students' learning satisfaction.

Figure 1

A System Approach to Online Student Success



Literature Review

In this study, online student success was measured by two key constructs: perceived learning outcome and satisfaction, which encompass both cognitive and affective dimensions of a student's educational experience. Students' perceived learning outcome refers to the extent to which a student believes they have achieved desired learning objectives and gained skills through learning materials. This represents the cognitive dimension of success. In Zhuofan et al.'s (2024) study, their findings indicated that positive correlations existed between students' perceived learning outcome and learning engagement. This suggested that students who perceive they are learning effectively are more likely to remain engaged, which can enhance their academic performance and contribute to future educational success (Honicke et al., 2023). Satisfaction reflects the affective dimension of success, and it refers to "the fulfillment of a student's need and perceptions of contentment with learner, instructor, course, program, and organizational related factors in the online learning environment" (Martin & Bolliger, 2022, p. 2). Further, "satisfaction is a multivariate condition with a variety of measures" such as program and course design, instructor behavior, social conditions, and learner characteristics (Wickersham & McGee, 2008, p. 75). Satisfied learners are more likely to succeed academically but correlation must exist between a student's expectation (perceived learning outcome) and the actual, lived experience in the online course (Noel-Levitz, 2004). Previous studies have demonstrated a correlation between student satisfaction and perceived learning outcome (Lin et al., 2023; Swan, 2001) and perceived online learning experience (Lin & Wang, 2024). Marks et al. (2005) found that perceived student learning outcome is a good predictor of student satisfaction in online learning.

Factors in Predicting Online Student Success

Previous Online Learning Experience

Previous studies that have taken students' experience of course completion into account discovered that it was a significant determinant of a student's online success (Hachey et al., 2012), perceived learning outcome (Asarta & Schmidt, 2020; Hachey et al., 2015), and perceived course quality (Hixon et al., 2016). For example, studying 1,566 online STEM students at an urban community college, Hachey et al. (2015) investigated how well prior online course experiences predicted future online STEM course outcomes. They coded students' prior online experience based on transcript data into four groups: (a) no prior online experience—no online course taken previously; (b) successful—successful completion of all prior online courses taken; (c) mixed success—completed some but not all prior online courses successfully; or (d) unsuccessful—failed to complete any prior online courses successfully. Their results revealed that students who successfully completed all prior online courses taken would also have significantly higher rates of successful online STEM course completion with a higher G.P.A.

Internet Self-Efficacy and Time Management

Ally (2008) defined online learning as "the use of the Internet to access learning material; to interact with the content, instructor, and other learners; and to obtain support during the learning process, in order to acquire knowledge, to construct personal meaning, and to grow from the learning experience" (p. 17). With the rapid advance of instructional technologies applied in active online learning, digital natives are being forced to adapt quickly to be familiar with information and communication technology (ICT) used in their online courses. In online learning research, internet self-efficacy is the most recognized learning characteristic an online student must carry to successfully participate in the online learning environment (Kuo et al., 2020; Hamdan et al., 2021; Kuo et al., 2013; Martin et al., 2020). In Kuo et al.'s (2020) study, a positive and significant correlation was found between online students' internet self-efficacy and learning performance, which implies that students who had strong self-belief in their capabilities in executing internet-related actions to accomplish learning tasks were more likely to achieve success in the online learning environment. Kuo and Belland (2016) conducted a quantitative study where 167 African-American working adults enrolled in six undergraduate-level online courses participated and completed the questionnaire. The results supported the potential impact of Internet self-efficacy on successful learning experience where a positive and significant relationship was revealed between Internet self-efficacy and satisfaction ($r = .573$, $p < .01$).

Broadly speaking, time management refers to "activities that imply an effective use of time that is deemed to facilitate productivity and alleviate stress" (Zampetakis et al., 2010, p. 24). Learning in an online delivery modality highly involves self-paced learning and often takes place within a given short period of time for students to achieve carefully planned and diverse objectives. Thus, time management plays a significant role for learning organization and efficiency and is a critical factor in successful academic endeavors (Pinxten et al., 2019; Neroni et al., 2019). Substantial empirical research has been conducted and revealed that online students' ability in time management is a vital factor of their learning success and satisfaction, including the current works of Gordanier et al. (2019). In their study, at-risk students were referred to the university's Student Success Center for additional academic support. The findings indicated that the early academic intervention had a strong effect on students' final performance as services were provided for them to explore and improve time management strategies and study skills. Moreover, Hong et al. (2021) investigated the relationships between components of self-regulated online learning and students' procrastination disposition during the COVID-19 lockdown. The results revealed that students' procrastination disposition was significantly and negatively related to time management; in other words, students with higher time management skills would self-motivate to work on online tasks as scheduled and take actions to pursue learning goals to achieve consistently high performance.

Course Design/Structure, Quality Facilitation, and Instructor Feedback

Given the fact that a paradigm shift of learner-centered approaches, students are the center of learning and are required to hold more responsibilities for their own learning and to be more active and collaborative during the learning process. In addition to a teaching role, research identified several essential roles instructors should also take that promote effective and engaged learning including as a course designer and organizer, discussion and technology facilitator, and feedback provider (Hung & Chou, 2015; Martin et al., 2019; Martin et al., 2021), especially in online settings. A well-designed online course must be clearly structured and outlined for students to achieve desired learning outcomes. In terms of structure, Moore (1993) refers it as "the rigidity or flexibility of the programme's educational objectives, teaching strategies, and evaluation methods" (p. 26). To be able to focus more on facilitating and engaging students learning, it is necessary for online instructors to carefully prepare and plan their courses in advance including, but not limited to, logically sequencing content segments, meaningfully aligning content and activities with learning unit and learning objectives, and purposefully providing students with authentic and deep learning opportunities. Quality of course design and instructor facilitations are critical influences on online student success (Chu et al., 2021; Eom & Ashill, 2016; Martin et al., 2019). Eom and Ashill (2016) collected survey data from 372 participants who have completed at least one online course at a university, and the study intended to investigate to what extent does five independent variables (motivation, student self-regulation, dialogue, instructor, and course design) predict students' perceived learning outcomes and satisfaction. Their results indicated that course design had a positive and significant relationship with user satisfaction ($\beta = .34$) and perceived learning outcomes ($\beta = .25$).

In terms of quality facilitations, research has recognized it as one of the critical factors to the success of online courses and student learning (Caskurlu et al., 2021; Chu et al., 2021; Martin et al., 2020). According to Martin et al. (2019), online course facilitation broadly refers to "how, what, when, and why an online faculty member makes decisions and takes actions to help students meet the learning outcomes" (p. 36) and quality facilitations can promote students' critical thinking skills (Richardson et al., 2015; Seibert, 2021), sense of community (Conklin & Dikkers, 2021), and learning motivation (Chu et al., 2016; Waheed et al., 2016). When online instructors effectively use multiple strategies to humanize and engage in student learning, students can benefit by getting a head start on navigating the course content, developing a clear understanding of the course structure and learning goals, and even establishing an early connection with the instructor to know how to seek help. Instructors were encouraged to provide clear instructions and guidelines, regular and open communication (Gurley, 2018; Nielsen, 2015), and timely response and prompt feedback (Gopal et al., 2021; Martin et al., 2018; Martin et al., 2020) to assist in establishing teaching presence and instructor connectedness that led to higher learning motivation and achievement. These foundational elements of quality course facilitation come before active learning and are categorized as input within the process. They assist instructors in designing clear guidelines, establishing course expectations, and fostering active learning to prepare students for participation and guarantee interaction in the initial phase of learning. Moreover, studies that examined the impact of instructors' feedback on online learning, particularly Abbasi et al. (2020), aimed to evaluate 1,255 health sciences students' perceptions and satisfaction towards e-learning during the COVID-19 lockdown. Their results revealed that more than 45% of the participants reported they highly appreciated e-learning for timely feedback from instructors. Waheed et al. (2016) noted that timely feedback can motivate students intrinsically in active learning, can help students save time, improving performance in future assessments. Instructor feedback can occur early in the course when students engage with preliminary tasks, such as an introductory assignment, diagnostic assessment, or formative evaluation. Feedback in this input phase sets expectations, identifies learning gaps, and provides students with a clear direction for improvement and engagement. When instructor feedback occurs as part of course setup, it contributes to the scaffolding and creates a supportive environment for learning (Tang et al., 2025).

Dialogue with Instructors/Students and Emotional Presence

Moore (1993) originally differentiated dialogue and interaction by defining dialogue as "an interaction or series of interaction having positive qualities that other interactions might not have" (p. 24). Moreover, Eom and Ashill (2016) referred to dialogue as "purposeful, constructive, meaningful interaction that is valued by each party" (p. 193). Online instructions are purposefully designed to engage students constructively and consistently, and to integrate team-based learning (Ku et al., 2013; Tseng et al., 2013) and problem-based learning approaches that provide rich opportunities for a deeply meaningful dialogue among students. Dialogue involves two-way communication between students and instructors taking place in students' learning process (throughput) that fosters trust, collaboration, and deeper understanding. This relational aspect of instruction supports emotional presence and cognitive engagement, distinguishing it from one-directional feedback. In addition, dialogue is an active engagement and interaction between students and instructors that can foster cognitive engagement in ways of open-mindedness and reflective thinking for reducing the students' transactional distance (Huang et al., 2016; Moore & Kearsley, 2012), which, in turn, improve their online learning achievement.

Emotions are considered an essential factor when building student-student and student-instructor relationships (Jiang & Koo, 2020; Telli et al., 2022), facilitating safe and engaging online learning atmospheres (Cleveland-Innes & Garrison, 2010; Parker, 2021), as well as having significant impacts on online learning success (Majeski et al., 2018). As part of throughput, emotional presence reflects the ongoing interaction and engagement dynamics among students, instructors, and course content that sustain motivation and engagement. In addition, it promotes a learning community that directly impacts student persistence and performance. Garrison et al. (2000, 2001) developed the Community of Inquiry (CoI) framework and identified three interdependent dimensions of presences: social presence, teaching presence, and cognitive presence that help educators and scholars understand the fundamental and critical components of successful online learning experiences (Akyol & Garrison, 2008; Arbaugh, 2008). To demonstrate the importance of emotion elements in interactive online learning environments, Cleveland-Innes and Campbell (2012) added emotional presence as an additional unique dimension of presence to CoI and defined it as the “outward expression of emotion, affect, and feeling by individuals and among individuals in a community of inquiry, as they relate to and interact with the learning technology, course content, students, and the instructor” (p. 283). Jiang and Koo’s (2020) study used a multiple regression analysis to explore non-traditional graduate students’ perceived emotional presence and they found that emotional presence was able to significantly predict students’ satisfaction with online learning.

Methods

Participants

A total of 182 undergraduate and graduate students (with a response rate of 10.3%) participated, all of whom were enrolled in at least one fully online course during the fall semester of the 2021–2022 academic year. There were 134 female participants (73.6%) and 41 male participants (22.6%). See Table 1. The majority of the students (*n* = 61, 33.4%) reported being in the age range of 20 to 24, and 69 of them (38.5%) reported that they had completed one to five fully online courses in the past. Moreover, in terms of the frequency of visiting their online courses, 61 students (33.3%) indicated that they accessed Canvas six to ten times per week to work on course work.

Table 1

Demographic Information of Participants

Demographic variables	*n*	f(%)
Gender		
Female	134	(73.6%)
Male	41	(22.6%)
Prefer Not to Say	7	(3.8%)
Age		
Under 20	38	(21.3%)
20–24	61	(33.3%)
25–29	13	(7.1%)
30–39	32	(17.5%)
Over 40–49	38	(20.8%)
Class Level		
Freshman	37	(20.4%)
Sophomore	22	(12.2%)
Junior	36	(19.9%)
Senior	33	(19.2%)
Graduate Student	53	(29.3%)

Number of Online Courses Completed		
None	32	(17.9%)
1–5	69	(38.5%)
6–10	46	(25.7%)
More than 10	32	(17.9%)
Frequency of visiting Course on Canvas per Week		
1–5 times	57	(31.5%)
6–10 times	61	(33.3%)
11–15 times	31	(17.2%)
More than 16 times	32	(17.7%)

Instruments

Input Variables—Online Learning Characteristics

Internet self-efficacy. To measure students' confidence in using internet-based technology, an eight-item, 5-point Likert scale questionnaire developed by Eastin and LaRose (2000) was adapted for this study. Example questions include "I feel confident using the Internet to gather data" and "I feel confident turning to an online discussion group when help is needed." In this study, Cronbach's Alpha of 0.928 indicated a strong internal consistency.

Time management. In this study, online students' time management skills were measured using three survey questions that are one of the six subscales in Barnard, Paton, and Lan's (2008) *Online Self-regulated Learning Questionnaire* (*OSLQ*). All items were measured on a 5-point Likert-type scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The questions in the survey included, for example, "I allocate extra studying time for my online courses because I know it is time-demanding" and "I try to schedule the same time every day or every week to study for my online courses, and I observe the schedule." In this study, Cronbach's Alpha of 0.830 indicated an acceptable internal consistency.

Input Variables—Online Course Design and Facilitation

Course design/structure. Five questions (5-point Likert scale) related to course design and structure were adapted from Eom and Ashill's (2016) study that they based on four categories (Category 1: logical structure of the modules; Category 2: learning objectives; Category 3: assessment and measurement; Category 4: instructional materials) in the Quality Matters (QM) rubric standard. Example questions include "The course objectives and procedures of online classes were clearly communicated" and "The structure of the modules of online classes was well organized into logical and understandable components." The scale displayed strong internal consistency ($\alpha = 0.912$) in this study.

Quality facilitation. Questions on quality facilitation (QF) were adapted from Chu et al.'s (2021) study that was developed to measure online students' perspectives on how well their instructors facilitate different course strategies in online teaching. All five survey items were measured using the 5-point Likert scale (1 = strongly disagree; 5 = strongly agree; $\alpha = 0.940$).

Example questions include "In general, the instructors in online classes provided timely and helpful feedback on assignments, exams, or projects" and "In general, the instructors in online classes were responsive to student concerns."

Instructor feedback. Four questions were used to ask for students' perceptions on the feedback they received from the instructors in their online learning experience. All four survey items were measured using the 5-point Likert scale ($\alpha = 0.944$). Example questions include "The instructor provided timely feedback on assignments, exams, or projects," "The instructor was responsive to student concerns," and "I felt as if the instructor cared about my individual learning in this course."

Throughput (Process) Variables

Dialogue with instructors/students. We modified eight 5-point Likert scale questions developed by Eom and Ashill (2016) to measure dialogue with instructors and students. Example questions include "I had positive and constructive interactions with the instructor frequently in online classes," "The level of positive and constructive interactions between the instructor and students was high in online classes," and "In online classes, I learned more from my fellow students than in other classes at this university." The scale displayed a strong level of internal consistency ($\alpha = .940$) in this study.

Emotional presence. Online students' emotional presence was measured by a six-item survey (Cleveland-Innes & Campbell, 2012) using the 5-point Likert scale (1 = strongly disagree to 5 = strongly agree; $\alpha = 0.898$). Example questions include "I felt comfortable expressing emotion through the online medium" and "I found myself responding emotionally about ideas or learning activities in this course."

Output Variables—Online Student Success

Perceived learning outcome. Students' perceived learning outcome was measured by a five-item survey using the 5-point Likert scale (1 = strongly disagree to 5 = strongly agree; $\alpha = 0.637$). Example questions include "In online courses, I am pleased with what I learned" and "The learning activities promoted the achievement of student learning outcomes."

Learning satisfaction. To measure how satisfied students were after studying in the online learning environment, we adapted a five-item, 5-point Likert scale (1 = strongly disagree to 5 = strongly agree; $\alpha = 0.783$) questionnaire developed and validated by Kuo et al. (2013). Example questions include "The online courses contributed to my professional development," "I am satisfied with the level of interaction that happened in online courses," and "In the future, I would be willing to take a fully online course again." The reliability and content validity of the satisfaction scale were previously established, and Cronbach's alpha values were $\alpha = 0.93$ (Kuo et al., 2013).

Data Collection and Analysis

Prior to the data collection process, this study was approved by the Institutional Review Board (IRB) at the university. In terms of the data collection procedures, all questionnaires were distributed in an online survey format and a survey invitation letter with consent was sent to students enrolled in at least one fully online course after midterms week. All questionnaires were expected to take about 20 to 25 minutes for participants to complete.

To test Hypotheses 1 and 2, the multivariate analysis of variance (MANOVA) was conducted to determine whether there were significant differences in terms of online student success among students who had different online learning experiences and behaviors. For the MANOVA that yielded significant main effects at $p < 0.05$, F value was used to determine the variables contributing to the significance of the overall analysis.

To test the remaining hypotheses, two hierarchical multiple regression (HMR) analyses were conducted. First, students' individual characteristics were considered as a potential control variable in the regression and were entered into Block 1 of the research model. Next, two variables in online learning characteristics (internet self-efficacy and time management) and three variables in course design and facilitation (course design/structure, quality facilitation, and instructor feedback) were entered into Block 2. Latest, variables in students' learning process (throughput), dialogue (dialogue with instructors and dialogue with students), and emotional presence were added into Block 3. IBM SPSS AMOS 27.0 was used to conduct both MANOVA and HMR analyses.

Results

Results of MANOVA for Differences Among Students Learning Experience and Behavior in Online Student Success

There was a statistically significant difference in online student success based on number of online courses students had completed when participating in the study, $F(6, 348) = 2.756$, $p < .05$; Wilk's $\Lambda = .911$, partial $\eta^2 = .045$.

We can see in Table 2 that the number of online courses students had completed has a statistically significant effect on their *perceived learning outcome* ($F(3, 177) = 4.875$; $p < .003$; partial $\eta^2 = .077$) and *learning satisfaction* ($F(3, 177) = 4.991$; $p < .002$; partial $\eta^2 = .079$). Participants who had completed more than 10 online courses also had higher *perceived learning outcome* ($M = 4.00$, $SD = .64$) and *learning satisfaction* ($M = 3.79$, $SD = .61$).

Table 2

Multivariate Analysis of Variance (MANOVA) for Differences Among Number of Online Courses Taken in Online Student Success

Variable	Number of online courses had completed	Mean	SD	F	Partial η^2
Perceived Learning Outcome	None	3.47	.61	7.878**	.074
	1–5	3.43	.88		
	6–10	3.67	.62		
	More than 10	4.00	.64		
Learning Satisfaction	None	3.23	.81	9.458**	.079
	1–5	3.15	.90		

	6–10	3.37	.73
	More than 10	3.79	.61

Note. ** $p < .01$

Moreover, there was a statistically significant difference in online student success based on how frequently students visited their online courses on Canvas, $F(6, 352) = 3.524$, $p < .002$; Wilk's $\Lambda = .890$, partial $\eta^2 = .057$.

We can see in Table 3 that how frequently online students visited their online course has a statistically significant effect on their *perceived learning outcome* ($F(3, 177) = 5.074$; $p < .002$; partial $\eta^2 = .074$) and *learning satisfaction* ($F(3, 177) = 6.125$; $p < .001$; partial $\eta^2 = .094$). The findings indicated that online students who were visiting their courses on Canvas more than 16 times reported the highest mean scores on both *perceived learning outcome* and *learning satisfaction* ($M = 3.95$, $SD = .49$; $M = 3.81$, $SD = .46$, respectively)

Table 3

Multivariate Analysis of Variance (MANOVA) for Differences among Frequency of Visiting Course on Canvas in Online Student Success

Variable	Frequency of visiting course (per week)	Mean	SD	F	Partial η²
Perceived Learning Outcome	1–5 times	3.33	.88	5.074**	.074
	6–10 times	3.64	.64		
	11–15 times	3.58	.81		
	More than 16 times	3.95	.49		
Learning Satisfaction	1–5 times	3.06	.96	6.125**	.094
	6–10 times	3.30	.73		
	11–15 times	3.37	.85		
	More than 16 times	3.81	.46		

Note. ** $p < .01$

Hierarchical Multiple Regression Analysis of Perceived Learning Outcome

Two HMR analyses were conducted to assess how students' online learning characteristics, factors in course design and facilitation, and variables in students' learning process (throughput) predict their online learning success while controlling for students' individual characteristics. The model in Block 1 of the first HMR (see Table 4), which consisted of five control variables (i.e., gender, age, number of online courses taken, etc.), significantly explained 13.9% of the variance in students' perceived learning outcome, $F(5,168) = 5.439$, $p < .001$, $R^2 = .139$. Two of the control variables, Canvas visits ($\beta = .230$, $p < .01$) and number of online courses ($\beta = .167$, $p < .05$), significantly contributed to perceived learning outcome.

Next, the results revealed that the second model predicted 66.0% of the variance in students' perceived learning outcome, $F(10,163) = 31.688$, $p < .001$, $R^2 = .660$. Moreover, the change of R^2 between the models in Block 1 and Block 2 ($\Delta R^2 = .521$, $p < .001$) was also statistically significant with the *time management* (β = .116*, p* < .05), *course design/structure* (β = .361*, p* < .01), and *quality facilitation* (β = *.330, p* < .01) as three significant predictors.

Finally, when variables in dialogue with instructors/students and emotional presence were added in Block 3, the overall model explained 69.7% of the variance of the perceived learning outcome, $F(13,160) = 28.285$, $p < .001$, $R^2 = .697$. *Course design/structure* (β = .366*, p* < .01) was found to be a consistent predictor of perceived learning outcome. The change in variance ($\Delta R^2 = .036$, $p < .001$) indicated a small increase of 3.6% in variability of perceived learning outcome that is accounted on emotional presence (β = .209*, p* < .05).

Table 4

Results of Hierarchical Multiple Regression Analyses of Perceived Learning Outcome

Variable	*Block 1 β*	*Block 2 β*	*Block 3 β*
Block 1			
Individual characteristics			
Gender (0 = Female)	-.042	-.048	.049
Age	.146	**.122***	**.119***
Class	.001	-.070	-.080
Canvas visit	**.230****	.027	.013
Number of online courses	**.167***	.044	.017
Block 2			
Online learning characteristics		-.023	-.039
Internet self-efficacy		**.116***	.083
Time management			
Online course design and facilitation		**.361****	**.366****
Course design/structure		**.330****	.158
Quality facilitation		.068	.069
Instructor feedback			
Block 3			
Dialogue with instructors/students			.169
Dialogue with instructors			.110
Dialogue with students			
			.209*
Emotional presence			
R^2	.139	.660	.697
F	5.439***		28.285***

p-value	.001***		.001***
ΔF	5.439***	31.688***	6.415***
ΔR^2	.139		.036
		.001***	
		50.004***	
		.521	

Note. $N = 173$, * $p < .05$, ** $p < .01$, *** $p < .001$

Hierarchical Multiple Regression Analysis of Online Learning Satisfaction

The second HMR analysis was undertaken to examine whether the set of independent online learning variables (online learning characteristics, course design and facilitation, and dialogue with instructors/students and emotional presence) could be used to predict students' satisfaction while controlling for individual characteristics. The first model significantly explained 16.2% of the variance, $F(5,168) = 6.603$, $p < .001$, $R^2 = .162$ (see Table 5). *Age*, *Canvas visit*, and *Number of online courses* were significant positive predictors of students' learning satisfaction ($\beta = .212$, $p < .05$; $\beta = .257$, $p < .01$; $\beta = .190$, $p < .05$, respectively). Next, the addition of *Internet self-efficacy*, *time management*, *course design/structure* ($\beta = .231$, $p < .05$), and *quality facilitation* ($\beta = .499$, $p < .01$) in Block 2 explained an additional 45.0% of variance to the overall model effect of $R^2 = .612$ ($F(10,163) = 25.707$, $p < .001$) in students' learning satisfaction.

Finally, when variables in dialogue with instructors/students and emotional presence were added in Block 3, the overall model explained 65.2% of the variance of the students' learning satisfaction, $F(13,160) = 23.110$, p < .001, $R^2 = .652$. *Course design/structure* ($\beta = .234$, $p < .01$) and quality facilitation ($\beta = .347$, $p < .01$) were found to be consistent and significant predictors of students' learning satisfaction. The change in variance ($\Delta R^2 = .040$, $p < .001$) indicated a small increase of 4.0% in variability of students' learning satisfaction that is accounted on emotional presence ($\beta = .283$, $p < .05$).

Table 5

Results of Hierarchical Multiple Regression Analyses of Online Learning Satisfaction

Variable	*Block 1 β*	*Block 2 β*	*Block 3 β*
Block 1			
Individual characteristics			
Gender (0 = Female)	-.038	.033	.034
Age	**.212***	**.181***	**.178****
Class	-.070	-.129	**-.138***
Canvas visit	**.257****	.073	.061
Number of online courses	**.190***	.057	.033

Block 2

Online student characteristics		.013	.000
Internet self-efficacy		.085	.057
Time management			
Online course design and facilitation		**.231***	**.234***
Course design/structure		**.499****	**.347***
Quality facilitation		-.039	-.039
Instructor feedback			
Block 3			
Dialogue with instructors/students			.153
Dialogue with instructors			.093
Dialogue with students			
			.283**
Emotional presence			
R^2	.162	.612	.652
F	6.603***	25.707***	23.110***
p-value	.001***	.001***	.001***
ΔF	6.603***	37.615***	6.220***
ΔR^2	.164	.448	.041

Note. $N = 173$, * $p < .05$, ** $p < .01$, *** $p < .001$

Discussion and Implications

With the aim to reimagine and reexamine influences of a variety of online learning characteristics and factors upon online student success in this new normal era, the results from two MANOVAs revealed that students who had more experience taking online classes, as well as students who frequently visited courses on Canvas, were more likely to have higher perceived learning outcomes and satisfaction. The hierarchical multiple regression analyses further supported Hypotheses 1 and 2 by confirming that *Canvas visit* and *number of online courses* were two significant predictors of online student success when five students' individual characteristics were entered into Block 1 of the research model. Those findings echoed Hachey et al.'s (2015) study as they explained that a student's first online learning experience was a critical factor in determining the students' attitudes when facing future online courses that were diverse and required autonomy, as well as the student's ability to adapt to challenges from online courses that might use multiple ICT tools.

Second, our study underscores the value of considering both online learning characteristics and course design and facilitation as two core input factors for the purpose of examining how students optimally achieve competencies in online learning. The results from two hierarchical multiple regression analyses partially supported Hypotheses 3 and 4. Our results revealed that *time management* could significantly predict online students' perceived learning outcome in Block 2 (Table 5), which corresponded to Paul et al.'s (2012) study that students who had good time management skills did not have difficulty sustaining attention, which in turn led to their improved academic performance.

Course design/structure and *quality facilitation* were consistently found to be significant determinants of both factors of a student's online success (perceived learning outcome and learning satisfaction), which is consistent with previous findings (Chu et al., 2021; Eom & Ashill, 2016; Martin et al., 2020). It can be suggested that a well-structured course can provide students with a clear path for them to progress and maintain attention to the lesson. A solid alignment among learning objectives, instructional strategies, and instruction provided, and assessment frameworks in an online course is fundamental to students taking ownership of their learning (Lahdenperä et al., 2019). More importantly, it can help students achieve desired learning goals effectively and empower them to think critically (Reynders et al., 2020).

Quality facilitation was also found to be a significant predictor of online student success. That is, when instructors design and implement supportive pedagogies (i.e., warm welcome messages, clear instructions and guidance on navigating course content, well-managed discussions, structured and supportive feedback, etc.) in their courses, online students would have less anxiety in interactions with instructors and peers, and they would feel more comfortable conversing in course discussions (Caskurlu et al., 2021; Chu et al., 2021).

Finally, for the last regression model, *emotional presence* accounted for a small increased variance in student perceived learning outcome and learning satisfaction ($\Delta R^2 = .037$; $\Delta R^2 = .040$, respectively). With modern technology such as synchronous video conferencing, instant messaging, telecommunication, and online interactive documents, emotions play an important role in online learning especially when students are interacting with their instructors and peers for the first time (Tseng et al., 2020; Trigwell et al., 2012). Given the inherent importance of emotions in online learning, it is essential for educators to understand students' emotional needs and perceived emotional presence in course interactions, thus, we can plan in advance, facilitate a safe learning environment, and set the foundation for student success (Ben-Eliyahu, 2019; Majeski et al., 2018).

Practical Implications

To reimagine and reexamine how online students' success is associated with a variety of online learning factors, this study adopted a system approach and integrated it with instructional design components to gain insights into students' actual learning experience in this new normal era. The findings in this study provide significant implications for instructors and instructional designers when designing high-quality courses and implementing effective pedagogical strategies. First, there are strong needs for institutional administrators and instructors to put efforts and place emphasis on improving students' time management skills according to Paul et al.'s (2012) suggestions. As an online environment extends interactions with instructors, peers, and instructions virtually and informally with more depth and constructive meaning on learning, it is vital to prepare students with effective time management skills beforehand. For instance, the Instructional Design Professionals (Online@JSU) at Jacksonville State University has dedicated itself to proactively designing online orientation modules and workshops that assist students with the development of multiple academic skills for being successful online learners. From the instructional design standpoints, we also encourage students to use tools such as online calendar reminders and the TO-DO list function on the learning management system for managing their learning tasks across multiple courses.

Moreover, our findings prompt decision-makers in course and curriculum development, and designers to provide multiple opportunities of professional development to enrich online course instructors' knowledge and capabilities in applying fundamental instructional design principles to build learner-centered and engaged online courses where students can enjoy learning and achieve their aligned learning outcomes. The Instructional Design Professionals (Online@JSU) at the authors' institution has developed multiple professional development pathways for faculty to learn in practical ways to design and implement supportive pedagogies (i.e., multiple ways of checking learning progress, problem-based learning activities, authentic assessments, etc.) in their teaching. For example, the authors' institution has developed a "Certified Online Instructor" course with leads to an online teaching certification at the institution. The course is offered on a consistent rotation throughout the academic year through different modalities, such as 100% online or hybrid. The certification signifies that an instructor who completes the course and earns the certification has basic working knowledge and practical skills in the basics of operating the institution's learning management system, in teaching online courses effectively, and in designing and building online courses using best practices. Additionally, the author's institution offers 100% online workshops, tutorials, and presentations throughout the academic year, and emails faculty each Monday with tips, recommendations, information, and brief (under three minutes) how-to videos.

When discussing the integrations in course designs, facilitations, and teaching strategies, the three principles that compose the Universal Design in Learning (UDL) framework must also be mentioned: (a) multiple means of representation, (b) multiple means of action and expression, and (c) multiple means of engagement (CAST, 2011). The UDL has been used as a proactive framework by instructors, trainers, designers to develop equitable and engaged instructions that support students for greater degrees of accessibility and diversity in learning (Celestini et al., 2021; Garrad & Nolan, 2022; Schreffler et al., 2019). By infusing UDL principles into online course design and facilitation, we can provide all students with equal opportunities to learn from well-designed, persistent, and inclusive online courses (Wright et al., 2023). We would suggest several equitable practices including, but not limited to, providing clear and consistent instruction to minimize threats and distractions, offering alternatives and multi-media approaches to deliver materials and for communication, and fostering learning connectedness by encouraging participation and collaborations.

Furthermore, with support from transparent educational technologies, online instructions offer students with more depth and constructive meaning of interactions and knowledge exchange. For instance, using Microsoft Teams to facilitate synchronous video-based communication might provide new ways for learning interaction and reflection and provide multiple ways for knowledge exchange. Research also reported that using video-based communication can improve social presence and online students were more willing to express their feelings (Lowenthal et al., 2017). Social annotation tools also have the potential to offer students opportunities for deeper construction of meaningful interactions and knowledge exchange. For example, with hypothes.is (https://web.hypothes.is/), a social annotation tool, instructors and students read and annotate text together digitally by adding images, video clips, textual comments, and by asking questions and discussing the text together asynchronously. Another social annotation tool, Perusall (https://www.perusall.com/), performs similarly to hypothes.is. Research has shown that social annotation tools can help students perform better on in-class activities, improve academic performance due to meaningful engagement in online discussions, and encourage co-construction of knowledge between students and scaffolding of learning during reading and annotation activities (Miller et al., 2016; Tian, 2019).

Finally, it is vital for an online instructor to not only be an effective facilitator by adapting transformational learning strategies, but also to express emotional presence by developing a sense of attachment and trust (Tseng & Yeh, 2013; Tseng et al., 2019), showing online caring and excitement for student's success. Melrose et al. (2013) noted that teachers must "provide content and experiences that have the potential to trigger new insights and invite critical reflection" (p. 124). Students' learning attitudes can be influenced by the instructor's ability to offer supportive and personalized feedback, communication and organization skills, and openness to accept different perspectives, etc. Under no circumstance should a student feel isolation and psychological distance in an online learning context. In order to provide students with a transformative learning environment and to enrich emotional presence, instructors could (a) provide alternative processes of learning and encourage students to discover alternative solutions; (b) develop assessments for tracing and exploring changes to their original perspectives, such as learning journal and reflection papers; and (c) design engaging activities for students to express feelings and present interests in learning, including case studies, role plays, and simulations.

Conclusion

This study aims to contribute to the existing literature on online teaching and learning by investigating how students' online learning experience during COVID-19 would be on the levels of online success. From the number of online courses completed to the frequency of course visits on Canvas, and from course design/facilitation to emotional presence, several instructional design principles play crucial roles in shaping students' perceptions of their learning outcomes and satisfaction levels in online settings. Moving forward, institutional decision-makers, educators and instructional designers should consider these findings to enhance the design and facilitation of online courses, ultimately promoting better student engagement, motivation, and learning outcomes in online learning environments.

Limitations and Direction for the Future Studies

Although this study provides some contributions and implications to the literature on online learning, there are several potential limitations. First, a small sample size of 182 voluntary online undergraduate and graduate students from a single university with a low response rate could limit generalizability of our findings. Moreover, participants' perceptions on learning experience were collected from several retrospective self-report questionnaires when they had almost completed their online courses; thus, recall bias could also distort the results of this online study. Second, participants in this study were mostly female (73.6%) and undergraduate students (70.7%), which may have skewed the distribution of the results. Therefore, future studies should recruit more balanced participants in terms of gender and class level and extend the research scope by collecting data across multiple institutions or nations.

In terms of our suggestions for future research, other factors on learning characteristics that might also affect online students' success, such as online learning readiness, emotional intelligence, and academic procrastination should be brought into account. Moreover, Berge (1995) categorizes instructor facilitation strategies into four functions: managerial, social, pedagogical, and technical. Therefore, future studies might also consider exploring to what extent do these four facilitation strategies impact students' success in online learning contexts. In addition, it is suggested to integrate objective measures such as exam scores, GPA, or standardized assessment to provide a more comprehensive evaluation of students' online learning competencies and learning outcomes.

Declaration

There is no conflict of interest known to the authors.

References

Abbasi, M. S., Ahmed, N., Sajjad, B., Alshahrani, A., Saeed, S., Sarfaraz, S., Alhamdan, R. S., Vohra, F. & Abduljabbar, T. (2020). E-learning perception and satisfaction among health sciences students amid the COVID-19 pandemic. *Work*, *67*(3), 549–556. http://doi.org/10.3233/WOR-203308

Akyol, Z. & Garrison, R. D. (2008). The development of a community of inquiry over time in an online course: Understanding the progression and integration of social, cognitive and teaching presence. *Journal of Asynchronous Learning Networks, 12*(3), 3–22.

Ally, M. (2008). Foundation of educational theory for online learning. In T. Anderson (Ed.), *Foundations of educational theory for online learning* (2nd ed., pp. 15–44). AU Press.

Arbaugh, J. B. (2008). Does the community of inquiry framework predict outcomes in online MBA courses? *International Review of Research in Open and Distance Learning*, *9*(2), 1–21. https://doi.org/10.19173/irrodl.v9i2.490

Asarta, C. J., & Schmidt, J. R. (2020). The effects of online and blended experience on outcomes in a blended learning environment. *The Internet and Higher Education*, *44*, 100708. https://doi.org/10.1016/j.iheduc.2019.100708

Barnard, L., Paton, V., & Lan, W. (2008). Online self-regulatory learning behaviors as a mediator in the relationship between online course perceptions with achievement. *The International Review of Research in Open and Distributed Learning, 9*(2), 1–11.

Ben-Eliyahu, A. (2019). Academic emotional learning: A critical component of self-regulated learning in the emotional learning cycle. *Educational Psychologist*, *54*(2), 84–105. https://doi.org/10.1080/00461520.2019.1582345

Berge, Z. L. (1995). Facilitating computer conferencing: Recommendations from the field. *Educational Technology, 35*(1), 22–30. https://www.jstor.org/stable/44428247

Cacayan, E. B., Baua, M. E. C., & Alvarado, A. E. (2020). Challenges in nursing education in the new normal: Basis for faculty enhancement program. *Health Notions, 4*(8), 234–247. https://doi.org/10.33846/hn40801

Caskurlu, S., Richardson, J. C., Maeda, Y., & Kozan, K. (2021). The qualitative evidence behind the factors impacting online learning experiences as informed by the community of inquiry framework: A thematic synthesis. *Computers & Education*, *165*, 104111. https://doi.org/10.1016/j.compedu.2020.104111

Celestini, A. M., Thibeault, C. A., Masood, B., & Perera, B. (2021). A universal design for success: A mixed-methods case study of a first-year BScN course. *Quality Advancement in Nursing Education-Avancées en formation infirmière*, *7*(2), 3. https://doi.org/10.17483/2368-6669.1296

Center for Applied Special Technology (CAST). (2011). Universal Design for Learning guidelines version 2.0. https://wvde.state.wv.us/osp/UDL/4.%20Guidelines%202.0.pdf

Chai, C. S., Hwee Ling Koh, J., & Teo, Y. H. (2019). Enhancing and modeling teachers' design beliefs and efficacy of technological pedagogical content knowledge for 21st century quality learning. *Journal of Educational Computing Research*, *57*(2), 360–384. https://doi.org/10.1177/0735633117752

Cheng, Y. C., & Tam, M. (1997). Multi-models of quality in education. *Quality Assurance in Education, 5*(1), 22–31. https://doi.org/10.1108/09684889710156558

Chu, A. M. Y., Liu, C. K. W., So, M. K. P., & Lam, B. S. Y. (2021). Factors for sustainable online learning in higher education during the COVID-19 pandemic. *Sustainability, 13*(9), 5038. https://doi.org/10.3390/su13095038

Claessens, B. J. C., Van Eerde, W., Rutte, C. G., & Roe, R. A. (2007). A review of the time management literature. *Personnel Review*, *36*(2), 255–276. https://doi.org/10.1108/00483480710726136

Cleveland-Innes, M., & Campbell, P. (2012). Emotional presence, learning, and the online learning environment. *The International Review of Research in Open and Distributed Learning, 13*(4), 269–292. https://doi.org/10.19173/irrodl.v13i4.123

Cleveland-Innes, M., & Garrison, D. (2010). *An introduction to distance education: Understanding teaching and learning in a new era*. Routledge.

Conklin, S., & Dikkers, A. G. (2021). Instructor social presence and connectedness in a quick shift from face-to-face to online instruction. *Online Learning*, *25*(1), 135–150. https://doi.org/10.24059/olj.v25i1.2482

Czerkawski, B. C., & Lyman, E. W. (2016). An instructional design framework for fostering student engagement in online learning environments. *TechTrends, 60*(6), 532–539.

Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. *Journal of Educational Technology Systems*, *49*(1), 5–22. https://doi.org/10.1177/0047239520934018

Dick, W., Carey, L., & Carey, J. O. (2015). *The systematic design of instruction* (8th ed.). Pearson.

Dunlap, J. C., Verma, G., & Johnson, H. L. (2016). Presence+ Experience: A framework for the purposeful design of presence in online courses. *TechTrends, 60*(2), 145–151.

Eastin, M. S., & LaRose, R. (2000). Internet self-efficacy and the psychology of the digital divide, *Journal of Computer-Mediated Communication*, *6*(1). https://doi.org/10.1111/j.1083-6101.2000.tb00110.x

Eom, S. B., & Ashill, N. (2016). The determinants of students' perceived learning outcomes and satisfaction in university online education: An update. *Decision Sciences Journal of Innovative Education*, *14*(2), 185–215. https://doi.org/10.1111/dsji.12097

Galindo-Domínguez, H., & Bezanilla, M. J. (2021). Promoting time management and self-efficacy through digital competence in university students: A mediational model. *Contemporary Educational Technology*, *13*(2), ep294. https://doi.org/10.30935/cedtech/9607

Garrad, T.-A., & Nolan, H. (2022). Rethinking higher education unit design: Embedding universal design for learning in online studies. *Student Success, 14*(1), 1–8. https://doi.org/10.5204/ssj.2300

Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *Internet and Higher Education*, *2*(2–3), 87–105.

Garrison, D. R., Anderson, T., & Archer, W. (2001). Critical thinking, cognitive presence, and computer conferencing in distance education. *American Journal of Distance Education*, *15*(1), 7–23.

Gopal, R., Singh, V. & Aggarwal, A. (2021). Impact of online classes on the satisfaction and performance of students during the pandemic period of COVID 19. *Education and Information Technologies, 26*, 6923–6947. https://doi.org/10.1007/s10639-021-10523-1

González, L. F. M., & Quiroz, V. G. (2019). Instructional design in online education: A systemic approach. *European Journal of Education*, *2*(3), 43–52. https://doi.org/10.26417/ejed.v2i3.p64-73

Gordanier, J., Hauk, W., & Sankaran, C. (2019). Early intervention in college classes and improved student outcomes. *Economics of Education Review, 72,* 23–29. https://doi.org/10.1016/j.econedurev.2019.05.003

Gurley, L. E. (2018). Educators' preparation to teach, perceived teaching presence, and perceived teaching presence behaviors in blended and online learning environments. *Online Learning*, *22*(2), 197–220. http://dx.doi.org/10.24059/olj.v22i2.1255

Hachey, A. C., Wladis, C. W., & Conway, K. M. (2012). Is the second time the charm? Investigating trends in online re-enrollment, retention and success. *Journal of Educators Online*, *9*(1), n1.

Hachey, A. C., Wladis, C., & Conway, K. (2015). Prior online course experience and GPA as predictors of subsequent online STEM course outcomes. *The Internet and Higher Education*, *25*, 11–17. https://doi.org/10.1016/j.iheduc.2014.10.003

Hamdan, K. M., Al-Bashaireh, A. M., Zahran, Z., Al-Daghestani, A., Samira, A. H., & Shaheen, A. M. (2021). University students' interaction, Internet self-efficacy, self-regulation and satisfaction with online education during pandemic crises of COVID-19 (SARS-CoV-2). *International Journal of Educational Management, 35*(3), 713–725. https://doi.org/10.1108/IJEM-11-2020-0513

Hensley, L. C., Wolters, C. A., Won, S., & Brady, A. C. (2018). Academic probation, time management, and time use in a college success course. *Journal of College Reading and Learning*, *48*(2), 105–123. https://doi.org/10.1080/10790195.2017.1411214

Hixon, E., Barczyk, C., Ralston-Berg, P., & Buckenmeyer, J. (2016). The impact of previous online course experience on student's perceptions of quality. *Online Learning, 20*(1), 1–16. https://doi.org/10.24059/olj.v20i1.565

Hong, J. C., Lee, Y. F., & Ye, J. H. (2021). Procrastination predicts online self-regulated learning and online learning ineffectiveness during the coronavirus lockdown. *Personality and Individual Differences*, *174*, 110673. https://doi.org/10.1016/j.paid.2021.110673

Honicke, T., Broadbent, J., & Fuller-Tyszkiewicz, M. (2023). The self-efficacy and academic performance reciprocal relationship: the influence of task difficulty and baseline achievement on learner trajectory. *Higher Education Research & Development*, *42*(8), 1936–1953. https://doi.org/10.1080/07294360.2023.2197194

Huang, X., Chandra, A., DePaolo, C., & Simmons, L. (2016). Understanding transactional distance in web-based learning environments: An empirical study. *British Journal of Educational Technology, 47*(4), 734–747. https://doi.org/10.1111/bjet.12263

Hung, M. L., & Chou, C. (2015). Students' perceptions of instructors' roles in blended and online learning environments: A comparative study. *Computers & Education*, *81*, 315–325. http://dx.doi.org/10.1016/j.compedu.2014.10.022

Jiang, M. & Koo, K. (2020). Emotional presence in building an online learning community among non-traditional graduate students. *Online Learning, 24*(2), 93–111. https://doi.org/10.24059/olj.v24i4.2307

Joosten, T., & Cusatis, R. (2019). A cross-institutional study of instructional characteristics and student outcomes: Are quality indicators of online courses able to predict student success? *Online Learning, 23*(4), 354–378. http://dx.doi.org/10.24059/olj.v23i4.1432

Ku, H. Y., Tseng, H. W., & Akarasriworn, C. (2013). Collaboration factors, teamwork satisfaction, and student attitudes toward online collaborative learning. *Computers in Human Behavior*, *29*(3), 922–929. https://doi.org/10.1016/j.chb.2012.12.019

Kuo, Y. C., & Belland, B. R. (2016). An exploratory study of adult learners' perceptions of online learning: Minority students in continuing education. *Educational Technology Research and Development, 64*, 661–680. https://doi.org/10.1007/s11423-016-9442-9

Kuo, Y. C., Tseng, H., & Kuo, Y. T. (2020). Internet self-efficacy, self-regulation, and student performance: African-American adult students in online learning. *International Journal on E-Learning, 9*(2), 161–180.

Kuo, Y. C., Walker, A., Belland, B. R., & Schroder, K. E. E. (2013). A predictive study of student satisfaction in online education programs. *The International Review of Research in Open and Distance Learning, 14*(1), 16–39. https://doi.org/10.19173/irrodl.v14i1.1338

Lahdenperä, J., Postareff, L., & Rämö, J. (2019). Supporting quality of learning in university mathematics: A comparison of two instructional designs. *International Journal of Research in Undergraduate Mathematics Education*, *5*(1), 75–96. https://doi.org/10.1007/s40753-018-0080-y

Lin, J., & Wang, Y. (2024). Unpacking the mediating role of classroom interaction between student satisfaction and perceived online learning among Chinese EFL tertiary learners in the new normal of post-COVID-19. *Acta Psychologica*, *245*, 104233. https://doi.org/10.1016/j.actpsy.2024.104233

Lin, G. Y., Wang, Y. S., & Lee, Y. N. (2023). Investigating factors affecting learning satisfaction and perceived learning in flipped classrooms: the mediating effect of interaction. *Interactive Learning Environments*, *31*(9), 5759–5780. https://doi.org/10.1080/10494820.2021.2018616

Lowenthal, P. R., Dunlap, J. C., & Snelson, C. (2017). Live synchronous web meetings in asynchronous online courses: Reconceptualizing virtual office hours. Online Learning, 21(4), http://dx.doi.org/10.24059/olj.v21i4.1285

Majeski, R. A., Stover, M., & Valais, T. (2018). The community of inquiry and emotional presence. *Adult Learning, 29*(2), 53–61. https://doi.org/10.1177/1045159518758696

Marks, R. B., Sibley, S. D., & Arbaugh, J. B. (2005). A structural equation model of predictors for effective online learning. *Journal of Management Education, 29*(4), 531–563. https://doi.org/10.1177/1052562904271199.

Martin, F., & Bolliger, D. U. (2022). Developing an online learner satisfaction framework in higher education through a systematic review of research. *International Journal of Educational Technology in Higher Education, 19*(50). https://doi.org/10.1186/s41239-022-00355-5

Martin, F., Kumar, S., & She, L. (2021). Examining higher education instructor perceptions of roles and competencies in online teaching. *Online Learning*, *25*(4), 267–295. http://dx.doi.org/10.24059/olj.v25i4.2570

Martin, F., Ritzhaupt, A., Kumar, S., & Budhrani, K. (2019). Award-winning faculty online teaching practices: Course design, assessment and evaluation, and facilitation. *The Internet and Higher Education*, *42*, 34–43. https://doi.org/10.1016/j.iheduc.2019.04.001

Martin, F., Stamper, B., & Flowers, C. (2020). Examining student perception of their readiness for online learning: Importance and confidence. *Online Learning, 24*(2), 38–58. https://doi.org/10.24059/olj.v24i2.2053

Martin, F., Wang, C., & Sadaf, A. (2018). Student perception of helpfulness of facilitation strategies that enhance instructor presence, connectedness, engagement and learning in online courses. The Internet and Higher Education, 37, 52–65. https://doi.org/10.1016/j.iheduc.2018.01.003

Martin, F., Wang, C., & Sadaf, A. (2020). Facilitation matters: Instructor perception of helpfulness of facilitation strategies in online courses. *Online Learning, 24*(1), 28–49. https://doi.org/10.24059/olj.v24i1.1980

Melrose, S., Park, C., & Perry, B. (2013). *Teaching health professionals online: Frameworks and strategies*. AU Press. http://www.aupress.ca/index.php/books/120234

Miller, K., Zyto, S., Karger, D., Yoo, J., & Mazur, E. (2016). Analysis of student engagement in an online annotation system in the context of a flipped introductory physics class. *Physical Review Physics Education Research, 12*(2), 020143. https://doi.org/10.1103/PhysRevPhysEducRes.12.020143

Moore, M. G. (1993). Theory of transactional distance. In D. Keegan (Ed.), *Theoretical principles of distance education* (pp. 22–38). Routledge.

Moore, M., & Kearsley, I. (2012). *Distance education: A systems view of online learning* (3rd ed.). Wadsworth Publishing.

Naji, K. K., Du, X., Tarlochan, F., Ebead, U., Hasan, M. A., & Al-Ali, A. K. (2020). Engineering students' readiness to transition to emergency online learning in response to COVID-19: Case of Qatar. *Eurasia Journal of Mathematics, Science and Technology Education, 16*(10), em1886. https://doi.org/10.29333/ejmste/8474

Neroni, J., Meijs, C., Gilselaers, H., Kirschner, P., & de Groot, R. (2019). Learning strategies and academic performance in distance education. *Learning & Individual Differences, 73*, 1–7. https://doi.org/10.1016/j.lindif.2019.04.007

Nielsen, K. (2015). Teaching writing in adult literacy: Practices to foster motivation and persistence and improve learning outcomes. *Adult Learning*, *26*(4), 143–150. https://doi.org/10.1177/1045159515594178

Noel-Levitz. (2004). Priorities survey for online learners. Retrieved December 28, 2024, from https://www.ruffalonl.com/wp-content/uploads/pdf/2004OnlineLrnrPriorrpt.pdf

Oliveira, G., Grenha Teixeira, J., Torres, A., & Morais, C. (2021). An exploratory study on the emergency remote education experience of higher education students and teachers during the COVID-19 pandemic. *British Journal of Educational Technology, 52*, 1357–1375. https://doi.org/10.1111/bjet.13112

Parker, N. (2021). Best pedagogical practices for online instructor emotional presence. *Journal of Practical Nurse Education and Practice*, *1*(1), 14–30.

Paul, J. A., Baker, H. M., & Cochran, J. D. (2012). Effect of online social networking on student academic performance. *Computers in Human Behavior*, *28*(6), 2117–2127. https://doi.org/10.1016/j.chb.2012.06.016

Paul, J. & Jefferson, F. (2019). A comparative analysis of student performance in an online vs. face-to-face environmental science course from 2009 to 2016. *Frontiers in Computer Science, 1*(7), 1–9. https://doi.org/10.3389/fcomp.2019.00007

Pinxten, M., Van Soom, C., Peeters, C., De Laet, T., & Langie, G. (2019). At-risk at the gate: Prediction of study success of first-year science and engineering students in an open-admission university in Flanders—any incremental validity of study strategies? *European Journal of Psychology of Education, 34*(1), 45–66. https://doi.org/10.1007/sl 0212-017-0361-x

Rafique, G. M., Mahmood, K., Warraich, N. F., & Rehman, S. U. (2021). Readiness for Online Learning during COVID-19 pandemic: A survey of Pakistani LIS students. *The Journal of Academic Librarianship*, *47*(3), 102346. https://doi.org/10.1016/j.acalib.2021.102346

Reynders, G., Lantz, J., Ruder, S. M., Courtney, L. S., & Cole, R. S. (2020). Rubrics to assess critical thinking and information processing in undergraduate STEM courses. *International Journal of STEM Education, 7*(1), 1–15. https://doi.org/10.1186/s40594-020-00208-5

Richardson, J. C., Koehler, A. A., Besser, E. D., Caskurlu, S., Lim, J., & Mueller, C. M. (2015). Conceptualizing and investigating instructor presence in online learning environments. *The International Review of Research in Open and Distributed Learning, 16(*3), 256–297. https://doi.org/10.19173/irrodl.v16i3.2123

Salam, A. (2015). Input, Process and Output: system approach in education to assure the quality and excellence in performance. *Bangladesh Journal of Medical Science*, *14*(1), 1–2. https://doi.org/10.3329/bjms.v14i1.21553

Seibert, S. A. (2021). Problem-based learning: A strategy to foster generation Z's critical thinking and perseverance. *Teaching and Learning in Nursing*, *16*(1), 85–88. https://doi.org/10.1016/j.teln.2020.09.002

Swan, K. (2001). Virtual interaction: Design factors affecting student satisfaction and perceived learning in asynchronous online courses. *Distance Education, 22*(2), 306–331. https://doi.org/10.1080/0158791010220208

Tang, K.-Y., Hsiao, C.-H., Tu, Y.-F. Hwang, G.-J., & Wang, Y. (2021). Factors influencing university teachers' use of a mobile technology-enhanced teaching (MTT) platform. *Educational Technology Research and Development, 69*, 2705–2728. https://doi.org/10.1007/s11423-021-10032-5

Tang, Y., Tseng, H., Kuo, Y., Yeh, H., & Liu, J. (2025). Setting the stage for success: Readiness and connectedness as antecedents of learning continuance intention in online learning. *Online Learning, 29*(1)*,* 214–237. https://doi.org/10.24059/olj.v29i1.4402

Telli, E., Sarsar, F., & Cleveland-Innes, M. (2022). Emotional presence in online learning. In *Handbook of Research on Managing and Designing Online Courses in Synchronous and Asynchronous Environments* (pp. 330–351). IGI Global.

Tian, J. (2019). Investigating students' use of a social annotation tool in an English for science and technology course. In *International Symposium on Emerging Technologies for Education* (pp. 299–309). Springer. https://doi.org/10.1007/978-3-030-38778-5_33

Trigwell, K., Ellis, R. A., & Han, F. (2012). Relations between students' approaches to learning, experienced emotions and outcomes of learning. *Studies in Higher Education*, *37*(7), 811–824. https://doi.org/10.1080/03075079.2010.549220

Tseng, H., Kuo, Y. C., & Walsh, E. J. (2020). Exploring first-time online undergraduate and graduate students' growth mindsets and flexible thinking and their relations to online learning engagement. *Educational Technology Research & Development,* 68, 2285–2303. https://doi.org/10.1007/s11423-020-09774-5

Tseng, H. W., & Yeh, H. T. (2013). Team members' perceptions of online teamwork learning experiences and building teamwork trust: A qualitative study. *Computers & Education*, *63*, 1–9. https://doi.org/10.1016/j.compedu.2012.11.013

Tseng, H., Yeh, H. T., & Tang, Y. (2019). A close look at trust among team members in online learning communities. *International Journal of Distance Education Technologies (IJDET)*, *17*(1), 52–65. https://doi.org/10.4018/IJDET.2019010104

Waheed, M., Kaur, K., Ain, N., & Hussain, N. (2016). Perceived learning outcomes from Moodle: An empirical study of intrinsic and extrinsic motivating factors. *Information Development*, *32*(4), 1001–1013. https://doi.org/10.1177/0266666915581719

Wickersham, L. E., & McGee, P. (2008). Perceptions of satisfaction and deeper learning in an online course. *Quarterly Review of Distance Education, 9*(1), 73–83.

Wright, A. C., Carley, C., Alarakyia-Jivani, R., Nizamuddin, S. (2023). Features of high quality online courses in higher education: A scoping review. *Online Learning, 27*(1), 46-70. https://doi.org/10.24059/olj.v27i1.3411

Yeh, E., Choi, G. Y., & Friesem, Y. (2022). Connecting through Flipgrid: Examining social presence of English language learners in an online course during the pandemic. *CALICO Journal*, *39*(1), 26–52. https://doi.org/10.1558/cj.19647

Zampetakis, L. A., Bouranta, N., & Moustakis, V. S. (2010). On the relationship between individual creativity and time management. *Thinking Skills and Creativity*, *5*(1), 23–32. https://doi.org/10.1016/j.tsc.2009.12.001

Zhuofan, H., Hidayat, R., & Ayub, A. F. M. (2024). The mediating effect of engagement in the relationship between self-efficacy and perceived learning in the online mathematics environment among Chinese students. *Discover Sustainability, 5*, 469. https://doi.org/10.1007/s43621-024-00586-8

Gamifying English Proficiency: A Needs Analysis for EFL Student Course Design

Yazid Basthomi
Faculty of Letters, Universitas Negeri Malang, Indonesia; Research Fellow, Universiti Sultan Zainal Abidin, Malaysia

Francisca Maria Ivone
M. Kharis
Joko Slamet
Faculty of Letters, Universitas Negeri Malang, Indonesia
*(*Corresponding author: joko.slamet.2202219@students.um.ac.id)*

Abstract
This study addresses critical gaps in English proficiency assessments, particularly for English as a Foreign Language (EFL) students, by focusing on the foundational aspect of needs analysis in designing a platform to assist EFL students in preparation for real English proficiency tests. The existing tests, such as TOEFL and IELTS, often fail to align with the practical language skills necessary for test preparation. By conducting a needs analysis, this research aims to lay a robust foundation for the development of a gamified platform tailored to the specific linguistic demands of EFL learners. Employing a cross-sectional survey method, 120 participants from undergraduate (S1), master's (S2), and doctoral (S3) programs were purposively selected from the Faculty of Letters at Universitas Negeri Malang. Data analysis followed rigorous procedures using the Rasch Model to ensure the validity and reliability of responses, examining the alignment of each survey item with the intended constructs. The findings reveal both positive and negative insights into learner preferences and goals, highlighting the importance of interactive learning experiences and practical application opportunities. The study underscores the transformative potential of gamification in language learning, emphasizing its ability to enhance learner engagement and motivation. The implications of the study extend to language educators, curriculum developers, and policymakers, advocating for the integration of learner-centered approaches and gamified elements into English proficiency courses. The study's results suggest that tailored instructional materials and innovative pedagogical strategies are critical to addressing the diverse needs of EFL students. Recommendations include exploring cross-disciplinary applications of gamified learning strategies to further enhance educational practices in various settings.

Keywords: EFL students, English proficiency, gamification, need analysis

Basthomi, Y., Ivone, F. M., Kharis, M., & Slamet, J. (2025). Gamifying English proficiency: A needs analysis for EFL student course design. *Online Learning, 29*(2), pp. 241–268. https://doi.org/10.24059/olj.v29i2.4506

In the domain of English proficiency tests, such as the Test of English as a Foreign Language (TOEFL) and the International English Language Testing System (IELTS), there exists a notable limitation in assessing practical language proficiency essential for effective communication beyond academic settings (Richards, 2017; Wulyani et al., 2019). This limitation is particularly pronounced for English as a Foreign Language (EFL) students who grapple with distinctive linguistic challenges that extend beyond academic boundaries (Hammad, 2022; Işıklı & Tarakçıoğlu, 2017). This realization underscores the necessity for a comprehensive reassessment of testing methodologies, focusing on the specific linguistic needs of EFL students. Moreover, in acknowledging the global influence of standardized English proficiency tests and their impact on admissions within specific national academic contexts, it is crucial to recognize the incongruity between global test expectations and the nuanced linguistic requirements of local universities (Freeman, 2017; Renandya et al., 2018; Yassi et al., 2023). This sets the stage for a nuanced exploration of the urgency in needs analysis, emphasizing alignment of assessments with students' linguistic requirements in academic and professional contexts, ensuring a tailored and effective testing approach.

Globally, the demand for standardized English proficiency tests significantly impacts international educational mobility and admission processes (Frost et al., 2020; Lee, 2018; Wolf et al., 2023). Research exposes a mismatch between global test standards and local linguistic criteria, notably in regions like Indonesia. Meeting the varied linguistic needs of EFL students demands understanding these differences. This prompts a deeper look into the importance of aligning assessments with specific linguistic requirements in academic and professional contexts through need analysis (Chemir & Kitila, 2022; Matiini & Octasylva, 2020; McDonald, 2023; Moffett & Cassidy, 2023; Slamet & Mukminatien, 2024). Moreover, in the literature on designing English proficiency tests, there is a notable oversight in addressing the intricate challenges faced by EFL students in unique academic and professional contexts (Hess & Greer, 2016; Mustafa & Apriadi, 2016). Existing research underscores a significant gap in acknowledging the diverse linguistic landscapes of EFL students, crucial for crafting assessments aligned with their nuanced language proficiency requirements. Delving into these challenges during the need analysis phase becomes pivotal for developing assessments that surpass global standards and authentically address the specific linguistic nuances of EFL students.

The transformative potential of gamification in language learning spans critical areas essential for advancing English proficiency among EFL students (Amaya-Díaz & Bajaña-Zajia, 2020; Huseinović, 2023). One key advantage is its capacity to boost student engagement, fostering active participation and sustained interest (Dah et al., 2024; Rinjeni et al., 2024; Slamet et al., 2024a, 2024b). Gamification effectively tackles the issue of maintaining motivation, particularly crucial for EFL students who may face challenges such as frustration or learning plateaus (Amaya-Díaz & Bajaña-Zajia, 2020; Chen et al., 2018; Pereira & Wahi, 2021; Romsi et al., 2024; Şenocak et al., 2021; Slamet & Basthomi, 2024). The interactive and rewarding nature of gamified language learning sustains learner motivation and commitment. Moreover, gamification offers a dynamic and immersive environment for language practice, allowing EFL students to apply their skills in real-world scenarios (Demirbilek et al., 2022; Pereira & Wahi, 2021; Tan, 2018; Welbers et al., 2019). This practical application is instrumental in bridging the gap between theoretical knowledge and practical language use, a fundamental aspect of English proficiency. Gamification, with its adaptability to specific language areas such as vocabulary building and grammar reinforcement contributes to a comprehensive language learning experience (Amaya-Díaz & Bajaña-Zajia, 2020; Dah et al., 2024; Demirbilek et al., 2022; Zafar et al., 2024). Gamification's adaptability in tackling various language skills highlights its potential for enhancing English proficiency platforms for EFL students. Integrating gamification elements strategically, customized to different language abilities, enhances motivation and practical language usage, ultimately improving the effectiveness of such platforms.

The pivotal role of need analysis in shaping curriculum design cannot be overstated. This process delves deep into the intricate requirements of involving a comprehensive scrutiny of specific linguistic demands, navigating challenges within academic and professional contexts, and pinpointing motivational factors crucial for fostering language engagement (Chemir & Kitila, 2022; Mafulah et al., 2023; Mustafa & Apriadi, 2016). The significance of need analysis lies in its capacity to act as the linchpin for subsequent course design (Eshtehardi, 2017; Matiini & Octasylva, 2020), providing tailored solutions that precisely align with the diverse linguistic needs of EFL students. Thorough analysis is crucial for bridging the divide between general language education and the unique requirements of EFL students, especially in standardized test prep. This strategic method ensures a tailored curriculum, effectively tackling linguistic hurdles and enriching the language learning journey. However, despite its potential advantages, a notable gap remains in the literature, particularly regarding its benefits in English proficiency test preparation (Chemir & Kitila, 2022; Eshtehardi, 2017; Hess & Greer, 2016; Matiini & Octasylva, 2020; Mustafa & Apriadi, 2016). This gap emphasizes the urgency for further research and examination to gain a deeper understanding of how need analysis can be optimized to elevate the language learning experience for EFL students.

To the best of our knowledge, the existing literature reveals a significant misalignment of traditional English proficiency tests with the practical language requirements of EFL students, both on a global scale and within national contexts (Hammad, 2022; Renandya et al., 2018; Richards, 2017). Despite the emphasis on tailoring language assessments to specific linguistic needs, the literature on designing English proficiency tests falls short in addressing challenges unique to academic and professional settings faced by EFL students (Eshtehardi, 2017; Mustafa & Apriadi, 2016; Yassi et al., 2023). Moreover, there is a notable absence of attention to the incorporation of gamification into language learning, especially in the context of test preparation, creating a significant gap that hinders the comprehensive preparation of EFL students (Amaya-Díaz & Bajaña-Zajia, 2020; Chen et al., 2018; Dah et al., 2024; Demirbilek et al., 2022; Huseinović, 2023; Tan, 2018; Pereira & Wahi, 2021; Rinjeni et al., 2024; Şenocak et al., 2021). Importantly, the literature lacks sufficient acknowledgment of the crucial role of need analysis as a foundational stage in the design of platforms for English proficiency courses (Eshtehardi, 2017; McDonald, 2023; Moffett & Cassidy, 2023; Mustafa & Apriadi, 2016). This oversight represents a missed opportunity for enhancing engagement and motivation in language learning. In response, this research aims to bridge the gap by integrating a need analysis with gamification into English proficiency courses. This approach seeks to offer a more holistic and effective method aligned with the diverse linguistic needs of EFL students. This research is guided to address the research question: What are the goals and preferences of EFL students at Universitas Negeri Malang regarding the design of an English proficiency course, specifically for listening comprehension, structure and written expression, reading comprehension, and the integration of gamification?

Literature Review

English Proficiency Tests and Their Challenges

English proficiency tests, notably TOEFL and IELTS, are pivotal gatekeepers determining access to international academic and professional opportunities. In the extensive body of literature, studies have adeptly outlined the challenges confronting EFL students in navigating the linguistic demands of these assessments (Elyas & Alghofaili, 2019; Wulyani et al., 2019). These standardized tests aim to provide an objective and uniform measure of language proficiency; however, they often fall short in addressing the diverse linguistic landscapes of EFL students globally (Lee & Lo, 2017; Renandya et al., 2018). The very nature of these assessments may inadvertently favor certain linguistic backgrounds, disadvantaging others. This becomes especially pronounced when considering the varied accents, colloquialisms, and cultural references present in English, factors that can significantly impact an individual's performance (Lee, 2018). This discrepancy underscores the necessity for a customized and inclusive approach that goes beyond standardized testing norms. Such an approach should acknowledge and accommodate the linguistic diversity of EFL students, ensuring fair and accurate assessments of their communicative competence. However, while addressing this challenge is crucial, it also poses potential risks. Moving towards a more tailored approach may compromise the standardized comparability inherent in these tests (Sarifa, 2020; Slamet & Mukminatien, 2024). Striking a balance between inclusivity and maintaining a benchmark for proficiency becomes a delicate task. Furthermore, the resources required for the development and administration of customized assessments could be substantial, potentially exacerbating existing disparities in access to quality education (Richards, 2017). Thus, while the call for a more nuanced approach is clear, the journey towards a comprehensive solution demands careful consideration of the trade-offs and resource implications.

Demands for English Proficiency Tests in Global and National Contexts

The application of English proficiency tests within global and national contexts introduces additional layers of complexity. Research conducted by Elyas and Alghofaili (2019) have shed light on the discrepancies between global expectations and local linguistic requirements. The globalized nature of these tests often assumes a one-size-fits-all approach, neglecting the unique linguistic challenges present at the local level (Renandya et al., 2018; Wulyani et al., 2019). This raises questions about the validity and relevance of test scores in accurately reflecting an individual's language proficiency within their specific linguistic and cultural context. On a positive note, these disparities present an opportunity to scrutinize existing testing paradigms and underscore the importance of considering regional linguistic nuances in designing effective language proficiency courses. A move towards contextualization may not only enhance the authenticity of assessments but also contribute to a more inclusive and culturally sensitive evaluation of language proficiency (Phuong & Vo, 2019; Wu, 2019). Yet, navigating the intricate balance between global and local demands poses its challenges. Tailoring assessments to specific linguistic nuances risks creating a fragmented system that lacks the standardized comparability crucial for international recognition (Lee & Lo, 2017; Sarifa, 2020). Balancing global benchmarks with regional sensitivity is crucial. Implementing changes demands collaboration among educational institutions, testing agencies, and policymakers. Addressing contextual challenges requires strategic planning and careful implementation for a harmonized framework.

Needs Analysis: Gamification and its Integration in Course Design

The transformative potential of gamification in language learning opens up exciting possibilities for enhancing EFL education (e.g., Erümit & Yılmaz, 2022; Rinjeni et al., 2024; Romsi et al., 2024; Slamet & Basthomi, 2024; Slamet et al., 2024a; Tan, 2018). Gamification offers a dynamic and interactive approach to learning, leveraging elements of gameplay to engage learners and motivate their progress. Yet, despite its proven efficacy in other educational contexts, the application of gamification in the realm of English proficiency test preparation remains largely unexplored (Amaya-Díaz & Bajaña-Zajia, 2020; Demirbilek et al., 2022; Huseinović, 2023; Rinjeni et al., 2024; Slamet et al., 2025). This represents a missed opportunity to harness the motivational and engagement benefits of gamification to address the unique challenges faced by EFL students. Integrating gamified elements into test preparation holds promise for enhancing language skills and performance (Chen et al., 2018; Friedrich et al., 2020; Puig et al., 2023). Gamification promotes autonomy and self-directed learning, empowering students in their language journey. However, challenges arise in implementation, requiring consideration of pedagogy, game mechanics, and learner preferences (Pereira & Wahi, 2021; Romsi et al., 2024; Zourmpakis et al., 2023). Alignment with test content and format is crucial, as is ensuring platform accessibility for equitable learning opportunities. Successful integration demands meticulous planning, educator-designer collaboration, and ongoing evaluation for optimized outcomes.

In light of the transformative potential of gamification, a more nuanced examination of its application in English proficiency course design is warranted. Existing literature highlights that while gamification significantly enhances engagement and motivation in various educational settings (Dah et al., 2024; Ensmann & Whiteside, 2022; Rinjeni et al., 2024; Romsi et al., 2024; Slamet et al., 2024a, 2024b; Zafar et al., 2024), its specific impact on English proficiency test preparation remains underexplored. The integration of game-based elements into language learning has been shown to improve student motivation and autonomy (Ensmann & Whiteside, 2022; Pereira & Wahi, 2021; Şenocak et al., 2021; Slamet et al., 2024b). However, research reveals that successful gamification requires careful alignment with educational objectives and learner needs, ensuring that game mechanics support rather than detract from learning outcomes (Friedrich et al., 2020; Hidayati & Slamet, 2025; Pereira & Wahi, 2021). Challenges such as maintaining pedagogical rigor, ensuring accessibility, and addressing diverse learner preferences must be strategically managed to optimize the effectiveness of gamified interventions (Rinjeni et al., 2024; Romsi et al., 2024; Zafar et al., 2024). Further exploration is needed to bridge the gap between gamification theory and practical implementation in English proficiency courses, thereby maximizing the benefits of gamified learning approaches and addressing the specific challenges faced by EFL students.

The needs analysis phase emerges as a critical component in course design, particularly within the context of English proficiency test preparation (Eshtehardi, 2017; Matiini & Octasylva, 2020). The existing literature emphasizes the need to understand the specific requirements of EFL students. However, there is a notable gap in applying this knowledge to English proficiency testing. To address this gap, a needs analysis is crucial, ensuring that the gamified platform is precisely aligned with the diverse linguistic needs and challenges of EFL students (Mustafa & Apriadi, 2016). Systematically identifying learners' strengths, weaknesses, preferences, and learning styles enables tailored instructional materials and activities to address specific improvement areas effectively. Additionally, needs analysis identifies barriers to learning, like language proficiency, culture, and prior education, allowing for targeted interventions and support mechanisms (Hess & Greer, 2016). Thorough needs analysis involves time-consuming collaboration for accurate data, expert interpretation for actionable insights, ongoing reassessment of strategies, and careful planning for successful execution.

Method

Research Design and Participants

This study applied a cross-sectional survey methodology (Creswell, 2012; Yang et al., 2020) to comprehensively gather data on the goals, preferences, and challenges faced by the EFL students across various academic levels at the Faculty of Letters, Universitas Negeri Malang. The questionnaire used in this research was adapted from a variety of sources, including Eshtehardi (2017) for the Course Design Framework, Mustafa and Apriadi (2016) and Matiini and Octasylva (2020) for Materials Design, and Landers (2014) for Integrating Gamification Theory. The decision to use a survey methodology stemmed from two main considerations (Yang et al., 2020). A survey efficiently collects diverse data, capturing insights into EFL students' language learning needs, preferences, objectives, course design preferences, and openness to gamified learning approaches. The total of 120 participants, purposively selected from undergraduate (S1), master's (S2), and doctoral (S3) programs, aimed to provide a diverse representation of EFL students, ensuring the survey's insights reflect the broader student body (see Table 1 for participant demographics).

Table 1

Demographic Information of the Participants

Category	**Subcategory**	**Frequency (f)**	**Percentage (%)**
Gender	Male	45	37.5
	Female	75	62.5
Age	18–24	79	60
	25–34	22	18.33
	34–44	16	13.33
	45+	2	
Academic Level	S1 (Undergraduate)	80	66.67
	S2 (Postgraduate/Master's)	21	17.50
	S3 (Doctoral/PhD)	19	15.83
Academic Background	English Department	66	55
	Non-English Department	54	45
English Proficiency Level	Beginner	48	40
	Intermediate	59	49.17
	Advanced	13	10.83

Data Collection Procedure and Analysis

The survey instrument was distributed via WhatsApp to a purposively selected sample of EFL students, including those from undergraduate (S1), master's (S2), and doctoral (S3) programs. A total of 200 invitations were sent to potential participants to ensure a broad representation of EFL students. The survey was conducted over a four-week period in February 2024. Participants received a survey link along with comprehensive instructions detailing the survey's purpose and the importance of their participation. To enhance response rates and ensure the sample's representativeness, reminder messages were sent at regular intervals throughout the survey period, and personalized follow-up were employed to address any potential concerns from the participants. Out of the 200 invited participants, 120 completed the survey, yielding a response rate of 60%. This rate indicates a substantial level of engagement and provides a robust dataset for analyzing EFL students' language learning needs, preferences, objectives, and their openness to gamified learning approaches. The data collection process was designed to minimize biases and ensure inclusivity, with careful attention to the representation of students from various academic stages and language proficiency levels. Data analysis followed rigorous procedures to ensure both validity and reliability. The Rasch Model was employed to examine the alignment of each survey item with the intended constructs, offering a robust method for assessing the validity of the instrument and ensuring the accuracy of the data interpretation. (Yang et al., 2020).

Figure 1

Likert Scale Values of Questionnaire Results Around the Andrich Thresholds

```
        CATEGORY PROBABILITIES: MODES - Andrich thresholds at intersections
P     -+---------+---------+---------+---------+---------+---------+-
R  1.0 +                                                            +
O      |1                                                           |
B      | 11111                                                      |
A      |      111                                                   |
B   .8 +         11                                                5+
I      |           11                                           555 |
L      |             1                                        55    |
I      |              11                                    55      |
T   .6 +                1                                 55        +
Y      |                 1                  44444       55          |
    .5 +                  1             4444     4444 55            +
O      |                   1          44             *44            |
F   .4 +                    11       4             55   44          +
       |                     1 3333**33          55       444       |
R      |                     3*  44    333     55            44     |
E      |                   333  14        33 55                444  |
S   .2 +              222**2222**11        5*33                   44+
P      |         22222 33    44  22*2     55    333                 |
O      |   222222   333    44      1****5         3333              |
N      |222  3333333  44444      55555 11**2222        3333333      |
S   .0 +*************55555555555          1111**********************+
E     -+---------+---------+---------+---------+---------+---------+-
      -3        -2        -1         0         1         2         3
        PERSON [MINUS] ITEM MEASURE
```

Figure 1, delineating responses to a Likert-scale questionnaire focused on the need for a gamification platform in an English Proficiency course, reveals distinctive modes at various points along the Person (P) measure. To elaborate, assigning Likert scale values to these modes intensifies the interpretation. At P = -1.5, we observe a peak suggesting a concentration of responses indicative of disagreement (Likert scale value 2). Similarly, P = -0.5 aligns with neutrality (Likert scale value 3), P = 0.5 with agreement (Likert scale value 4), and P = 1.5 and 2.5 with strong agreement (Likert scale value 5). Quantifying Andrich thresholds strengthens our understanding of transitions between Likert scale categories. Assigning values like P = -1.5 and P = -0.5 highlights precise points where respondents shift from disagreement to neutrality. Statistical measures, including means and standard deviations, deepen analysis. A mean Likert score above the midpoint of 3 indicates an overall positive sentiment toward gamification. In summary, the Andrich thresholds validate the questionnaire's efficacy in assessing the respondents' attitudes toward integrating a gamification platform into English Proficiency courses. This result enhances the questionnaire's validity, providing valuable insights for informed decision-making in platform design.

The survey used Likert scales ranging from 1 to 5 (strongly disagree to strongly agree) across five sections: Goals and Preferences (10 items), Course Design encompassing Listening Comprehensive (10 items), Structure and Written Expression (10 items), and Reading Comprehensive (10 items), and Integrating Gamification Theory (10 items). Each section aimed to capture specific aspects of EFL students' language learning experiences, preferences, and attitudes towards course components and gamified learning. High Cronbach's alpha coefficients were obtained for each section: Goals and Preferences ($\alpha = 0.879$), Listening Comprehensive ($\alpha = 0.895$), Structure and Written Expression ($\alpha = 0.908$), Reading Comprehensive ($\alpha = 0.927$), and Integrating Gamification Elements ($\alpha = 0.934$), indicating strong internal consistency. Responses were analyzed using percentages to determine attitude prevalence, while standard deviations gauged response variability across participants, providing insights into opinion consensus and diversity among EFL students at Universitas Negeri Malang.

Ethical Considerations

This study received ethical clearance from the Ethics Committee of Universitas Negeri Malang (KEP UM) for Institutional Review Board (IRB) under reference number 7.3.1/UN32.14/PB/2024. The study adhered to ethical principles, including informed consent, confidentiality, and voluntary participation. Participants were briefed on the study's purpose and assured of response anonymity. Electronic consent was obtained before survey participation, with all data securely stored and used solely for research. Adhering to ethical guidelines, participant information remained confidential, and identifiable data were anonymized during analysis. The study upheld minimal risks and offered potential benefits, ensuring research integrity and ethical standards.

Results

The study encompasses a multifaceted exploration of English proficiency course design for EFL students, focusing on distinct aspects: Goals and Preferences (GF), Listening Comprehensive (LC), Structure and Written Expression (SWE), Reading Comprehensive (RC), and Integrating Gamification Theory (IGT). In evaluating Goals and Preferences, the survey delves into the overarching objectives and preferences of EFL students, providing valuable insights into their expectations.

Table 2 provides valuable insights into the goals and preferences of the EFL students, revealing their overarching objectives and expectations regarding language learning. From a desire for diverse reading materials to a preference for interactive learning activities, these findings underscore the importance of aligning course design with their individual goals and preferences.

Table 2

The Results from GF

Code	Item	SD (n, %)	D (n, %)	N (n, %)	A (n, %)	SA (n, %)	Mean	Std. Dev
GF1	I have specific goals for improving my English proficiency.	2 (1.7%)	3 (2.5%)	13 (10.8%)	55 (45.8%)	47 (39.2%)	4.18	.850
GF2	I am preparing for an English proficiency test in my goals.	2 (1.7%)	4 (3.3%)	28 (23.3%)	37 (30.8%)	49 (40.8%)	4.06	.964
GF3	I prefer learning through interactive ways.	1 (0.8%)	1 (0.8%)	17 (14.2%)	48 (40%)	53 (44.2%)	4.26	.794
GF4	I need practical examples significantly helpful in language learning.	3 (2.5%)	1 (0.8%)	15 (12.5%)	62 (51.7%)	39 (32.5%)	4.11	.838
GF5	I need a course that covers all sections of the English proficiency test.	3 (2.5%)	5 (4.2%)	24 (20%)	51 (42.5%)	37 (30.8%)	3.95	.951
GF6	I need regular feedback on my English proficiency.	3 (2.5%)	1 (0.8%)	16 (13.3%)	69 (57.5%)	31 (25.8%)	4.03	.809
GF7	I am motivated to enhance my English proficiency for my career prospects.	2 (1.7%)	1 (0.8%)	14 (11.7%)	45 (37.5%)	58 (48.3%)	4.30	.836
GF8	I am motivated to achieve a high	2 (1.7%)	2 (1.7%)	12 (10%)	37 (30.8%)	67 (55.8%)	4.37	.861

	score in the English proficiency test.							
GF9	I prefer studying alone in preparing the English proficiency test.	3 (2.5%)	19 (15.8%)	36 (30%)	39 (32.5%)	23 (19.2%)	3.50	1.053
GF10	I need a set of practices to boost my readiness for the English proficiency test.	2 (1.7%)	3 (2.5%)	20 (16.7%)	49 (40.8%)	46 (38.3%)	4.12	.891

The findings from the questionnaire concerning GF in English proficiency reveal insightful patterns among the respondents. GF1 showed a notable proportion strongly agreeing or agreeing to specific proficiency improvement goals (45.8% strongly agreed, 39.2% agreed; mean = 4.18, SD = 0.850). GF2 emphasized a significant emphasis on formal assessment and certification (30.8% strongly agreed, 40.8% agreed; mean = 4.06, SD = 0.964). GF3 indicated a strong inclination towards engaging and participatory educational experiences (40% strongly agreed, 44.2% agreed; mean = 4.26, SD = 0.794). GF4 underscored a general consensus on the importance of practical examples in language learning (51.7% strongly agreed, 32.5% agreed; mean = 4.11, SD = 0.838). GF5 showed a slightly lower level of agreement regarding the importance of a course covering all sections of the English proficiency test (42.5% strongly agreed, 30.8% agreed; mean = 3.95, SD = 0.951). GF6 reflected a consensus on the importance of ongoing assessment and support in the learning process (57.5% strongly agreed, 25.8% agreed; mean = 4.03, SD = 0.809). GF7 indicated a strong recognition of the instrumental value of language proficiency in professional advancement (48.3% strongly agreed, 37.5% agreed; mean = 4.30, SD = 0.836). GF8 demonstrated a performance-driven orientation towards language learning (55.8% strongly agreed, 30.8% agreed; mean = 4.37, SD = 0.861). GF9 revealed variability in learning preferences, with a substantial minority preferring to study alone (32.5% strongly agreed, 19.2% agreed; mean = 3.50, SD = 1.053). Finally, GF10 highlighted a general consensus regarding the importance of structured practices to boost readiness for proficiency tests (40.8% strongly agreed, 38.3% agreed; mean = 4.12, SD = 0.891). In summary, the results from Table 2 provide a detailed understanding of the diverse goals and preferences of respondents regarding English proficiency. While there is generally strong agreement on specific goals, test preparation, and preferences for interactive and practical learning, there are also variations in priorities and preferences, highlighting the need for tailored and flexible approaches in language learning initiatives.

Looking at Table 3, which explores LC, we find that students express specific preferences in their attitudes towards listening comprehension. These preferences, such as a preference for audiovisual materials, offer valuable guidance for designing listening activities that resonate with students, contributing to a more effective and engaging learning experience.

Table 3

The Results from Course Design in LC

Code	Item	SD (n, %)	D (n, %)	N (n, %)	A (n, %)	SA (n, %)	Mean	Std. Dev
LC1	I want a course to include a variety of listening comprehensive materials.	3 (2.5%)	1 (0.8%)	14 (11.7%)	59 (49.2%)	43 (35.8%)	4.15	.847
LC2	I think exposure to diverse accents is crucial for my listening comprehensive skill.	2 (1.7%)	0 (0%)	15 (12.5%)	59 (49.2%)	44 (36.7%)	4.19	.781
LC3	I believe interactive listening exercises for understanding spoken English.	2 (1.7%)	0 (0%)	15 (12.5%)	62 (51.7%)	41 (34.2%)	4.17	.771
LC4	I prefer real-life scenarios in listening exercises enhance my listening comprehension skill.	1 (0.8%)	0 (0%)	24 (20%)	59 (49.2%)	36 (30%)	4.07	.758
LC5	I need to track my progress in listening comprehension skill.	1 (0.8%)	2 (1.7%)	17 (14.2%)	59 (49.2%)	41 (34.2%)	4.14	.781
LC6	I prefer transcripts in listening exercises.	2 (1.7%)	5 (4.2%)	29 (24.2%)	40 (33.3%)	44 (36.7%)	3.99	.966
LC7	I believe authentic audio	1 (0.8%)	2 (1.7%)	18 (15%)	51 (42.5%)	48 (40%)	4.19	.813

	recordings with various accents are effective for my listening comprehensive skill.							
LC8	I prefer interactive videos related to real-world situations to improve my listening skills.	0 (0%)	2 (1.7%)	17 (14.2%)	52 (43.3%)	49 (40.8%)	4.23	.753
LC9	I prefer online course with real-time feedback that enhance my listening skills.	3 (2.5%)	6 (5%)	37 (30.8%)	49 (40.8%)	25 (20.8%)	3.72	.935
LC10	I prefer various types of questions in listening comprehensive exercises.	1 (0.8%)	4 (3.3%)	18 (15%)	58 (48.3%)	39 (32.5%)	4.08	.826

The insights from Table 3 shed light on the respondents' attitudes and preferences concerning listening comprehension skills. Beginning with LC1, a substantial majority (49.2% strongly agreed, 35.8% agreed) expressed a strong desire for courses with diverse listening materials (mean = 4.15, SD = 0.847), indicating openness to varied resources and potential effectiveness in accommodating diverse learning styles. LC2 and LC3 similarly showed consistent agreement levels, emphasizing the importance of exposure to diverse accents (mean = 4.19, SD = 0.781) and interactive exercises (mean = 4.17, SD = 0.771) in enhancing listening skills. Contrarily, LC4 revealed a preference for real-life scenarios in listening exercises (49.2% strongly agreed, 30% agreed) with a slightly lower mean score (4.07, SD = 0.758), suggesting differing opinions on the effectiveness of this approach. LC5 highlighted a significant proportion expressing the need for progress tracking in listening comprehension skills (49.2% strongly agreed, 34.2% agreed; mean = 4.14, SD = 0.781), indicating positive recognition of the importance of feedback and self-assessment. LC6 and LC7 presented mixed perspectives on preferences for transcripts and authentic audio recordings, indicating varied respondent opinions. LC8 favored interactive videos related to real-world situations (43.3% strongly agreed, 40.8% agreed; mean = 4.23, SD = 0.753), while LC9 demonstrated mixed preferences for online courses with real-time feedback (40.8% strongly agreed, 20.8% agreed; mean = 3.72, SD = 0.935). LC10 emphasized a preference for diverse question types in listening exercises (48.3% strongly agreed, 32.5% agreed; mean = 4.08, SD = 0.826), reflecting positively on the perceived effectiveness of varied assessment methods. In summary, the findings show predominantly positive attitudes towards listening comprehension skills, yet the variability emphasizes the need for customized instructional approaches. Educators and designers should leverage these insights, including mean scores and standard deviations, to create engaging language programs that cater to diverse learner needs and enhance proficiency outcomes.

Moving to Table 4, the EFL students' perspectives on SWE come to the forefront. Clear patterns in preferences for SWE strategies emerge, emphasizing the importance of addressing these aspects in course design to enhance their writing skills and overall language proficiency.

Table 4

The Results from Course Design in SWE

Code	Item	SD (n, %)	D (n, %)	N (n, %)	A (n, %)	SA (n, %)	Mean	Std. Dev
SWE1	I need regular practice in sentence structure is crucial for my improvement.	0 (0%)	2 (1.7%)	9 (7.5%)	73 (60.8%)	36 (30%)	4.19	.639
SWE2	I need interactive grammar exercises significantly contribute to my learning.	0 (0%)	0 (0%)	15 (12.5%)	66 (55%)	39 (32.5%)	4.20	.643
SWE3	I need practical application of grammar rules in the English proficiency course.	0 (0%)	0 (0%)	15 (12.5%)	68 (56.7%)	37 (30.8%)	4.18	.635
SWE4	I prefer interactive multimedia (e.g., e-book, presentation) to support my understanding in sentence structure.	1 (0.8%)	3 (2.5%)	26 (21.7%)	46 (38.3%)	44 (36.7%)	4.07	.871
SWE5	I need grammar-focused video	2 (1.7%)	1 (0.8%)	26 (21.7%)	47 (39.2%)	44 (36.7%)	4.08	.875

	lessons that are effective for mastering sentence structure.							
SWE6	I prefer interactive quizzes targeting sentence construction that enhance my learning.	2 (1.7%)	0 (0%)	28 (23.3%)	45 (37.5%)	45 (37.5%)	4.09	.870
SWE7	I need to practice choosing the best word or phrase to complete a sentence in English.	0 (0%)	1 (0.8%)	13 (10.8%)	66 (55%)	40 (33.3%)	4.21	.660
SWE8	I need to practice "identifying and correcting" errors in written English.	1 (0.8%)	1 (0.8%)	12 (10%)	62 (51.7%)	44 (36.7%)	4.23	.727
SWE9	I need online tool, such as an online dictionary, to assist my learning vocabulary (e.g., words, phrases).	1 (0.8%)	1 (0.8%)	14 (11.7%)	55 (45.8%)	49 (40.8%)	4.25	.759
SWE10	I need clear feedback on assignments is crucial for my improvement.	2 (1.7%)	0 (0%)	14 (11.7%)	68 (56.7%)	36 (30%)	4.13	.744

Table 4 provides a comprehensive overview of the respondents' perspectives on sentence structure and grammar learning, revealing diverse preferences and needs. Starting with SWE1, unanimous agreement (60.8% strongly agreed, 30% agreed) underscores the crucial role of regular practice in improving sentence structure skills (mean = 4.19, SD = 0.639). SWE2 reinforces the consensus on interactive grammar exercises, with a significant majority expressing strong agreement (55%) and agreement (32.5%) (mean = 4.20, SD = 0.643). Similarly, SWE3 reflects shared perspectives on the practical application of grammar rules, with strong agreement (56.7%) and agreement (30.8%) (mean = 4.18, SD = 0.635). In SWE4 and SWE5, despite minor disagreements, a considerable majority acknowledges the efficacy of multimedia resources and video lessons for grammar learning (mean = 4.07, SD = 0.871; mean = 4.08, SD = 0.875). SWE6 underscores the effectiveness of interactive quizzes, with a shared perspective among respondents (mean = 4.09, SD = 0.870). SWE7 highlights the consensus on practicing word selection for sentence completion (mean = 4.21, SD = 0.660), while SWE8 emphasizes the significance of error correction practice, despite minor disagreements (mean = 4.23, SD = 0.727). SWE9 reflects agreement on the importance of online resources for vocabulary learning (mean = 4.25, SD = 0.759), and SWE10 underscores the value of clear feedback on assignments (mean = 4.13, SD = 0.744). In summary, the results from Table 4 highlight a consistent agreement among respondents regarding the importance of various elements in sentence structure and grammar learning. The shared perspectives provide valuable insights that can inform the development of effective educational strategies and materials tailored to meet the diverse needs of learners.

Furthermore, in Table 5, the focus shifts to RC, were the students' preferences in reading materials and comprehension strategies. Understanding their inclination towards diverse and engaging reading materials guides educators in selecting content that aligns with their preferences, fostering improved RC skills.

Table 5

The Results from Course Design in RC

Code	Item	SD (n, %)	D (n, %)	N (n, %)	A (n, %)	SA (n, %)	Mean	Std. Dev
RC1	I need a course to provide a diverse range of reading comprehensive materials.	1 (0.8%)	3 (2.5%)	19 (15.8%)	56 (46.7%)	41 (34.2%)	4.15	.847
RC2	I prefer exposure to different genres enhances my reading comprehension.	2 (1.7%)	1 (0.8%)	18 (15%)	57 (47.5%)	42 (35%)	4.19	.781
RC3	I prioritize developing critical reading skills.	0 (0%)	1 (0.8%)	28 (23.3%)	60 (50%)	31 (25.8%)	4.17	.771

RC4	I prefer analyzing passages beneficial for my improvement in reading comprehensive skill.	0 (0%)	4 (3.3%)	23 (19.2%)	58 (48.3%)	35 (29.2%)	4.07	.758
RC5	I need regular progress tracking in reading comprehension motivates me.	0 (0%)	0 (0%)	20 (16.7%)	64 (53.3%)	36 (30%)	4.14	.781
RC6	I need multimedia elements (e.g., audio, video) to support my understanding in reading passages.	0 (0%)	2 (1.7%)	18 (15%)	44 (36.7%)	56 (46.7%)	3.99	.966
RC7	I need interactive e-books with multimedia elements that are effective to improve my reading comprehensive skill.	1 (0.8%)	2 (1.7%)	25 (20.8%)	45 (37.5%)	47 (39.2%)	4.19	.813
RC8	I need to practice reading for "main ideas and details" in English.	1 (0.8%)	1 (0.8%)	14 (11.7%)	59 (49.2%)	45 (37.5%)	4.23	.753
RC9	I need to practice reading for "inferences and implications" in English.	1 (0.8%)	2 (1.7%)	15 (12.5%)	57 (47.5%)	45 (37.5%)	3.72	.935
RC10	I prefer comprehension	1 (0.8%)	1 (0.8%)	23 (19.2%)	58 (48.3%)	37 (30.8%)	4.08	.826

	quizzes that improve my reading comprehensive skill.	

Table 5 provides valuable insights into the respondents' attitudes and preferences regarding reading comprehension skills, reflecting diverse perspectives on various aspects of RC. Starting with RC1, a vast majority of respondents expressed the need for diverse reading materials to enhance comprehension (mean = 4.15, SD = 0.847), despite minor disagreement. Similarly, RC2 highlights a preference for exposure to different genres (mean = 4.19, SD = 0.781), reflecting broad agreement among the participants. In RC3, there is a shared emphasis on developing critical reading skills (mean = 4.17, SD = 0.771), with no respondents disagreeing. RC4 underscores a preference for analyzing passages (mean = 4.07, SD = 0.758), despite minor disagreement, indicating prevailing support for this approach. Moving forward, RC5 demonstrates motivation from regular progress tracking (mean = 4.14, SD = 0.781), while RC6 reflects general consensus on multimedia elements, albeit with slightly lower agreement (mean = 3.99, SD = 0.966). RC7 emphasizes the preference for interactive e-books (mean = 4.19, SD = 0.813), with overall agreement despite minor disagreement. In RC8, respondents prioritize practicing reading for main ideas and details (mean = 4.23, SD = 0.753), reflecting strong support for this practice. Similarly, in RC9, there is recognition of the need to practice reading for inferences and implications (mean = 3.72, SD = 0.935), despite some variability in responses. Finally, RC10 highlights a preference for comprehension quizzes (mean = 4.08, SD = 0.826), with overall support for this practice, despite minor disagreement. Overall, the results from Table 5 highlight a strong consensus among respondents regarding the importance of various strategies and practices in improving reading comprehension skills. These insights can inform the development of tailored educational approaches to meet the diverse needs of learners in this domain.

Lastly, Table 6 delves into the students' attitudes towards IGT into language course. The findings reveal a positive inclination towards gamified learning approaches, indicating the potential effectiveness of incorporating game elements to enhance student engagement and motivation in English proficiency course. These insights offer a segue into a more immersive and interactive learning environment.

Table 6

The Results from Course Design in IGT

Code	Item	SD (n, %)	D (n, %)	N (n, %)	A (n, %)	SA (n, %)	Mean	Std. Dev
IGT1	I believe gamified elements would enhance my motivation to learn English.	1 (0.8%)	0 (0%)	18 (15%)	58 (48.3%)	43 (35.8%)	4.15	.847
IGT2	I need integrating games into the course that make learning more enjoyable for me.	1 (0.8%)	0 (0%)	17 (14.2%)	52 (43.3%)	50 (41.7%)	4.19	.781
IGT3	I prefer to track my progress through gamified features.	1 (0.8%)	1 (0.8%)	32 (26.7%)	57 (47.5%)	29 (24.2%)	4.17	.771
IGT4	I prefer to track my progress through gamified features.	1 (0.8%)	2 (1.7%)	30 (25%)	54 (45%)	33 (27.5%)	4.07	.758
IGT5	I need gamification that can simulate real-world English language situations effectively.	1 (0.8%)	1 (0.8%)	25 (20.8%)	54 (45%)	39 (32.5%)	4.14	.781
IGT6	I prefer achieving milestones in a gamified course.	0 (0%)	2 (1.7%)	22 (18.3%)	61 (50.8%)	35 (29.2%)	3.99	.966
IGT7	I would be more likely to complete the course if it	0 (0%)	1 (0.8%)	28 (23.3%)	59 (49.2%)	32 (26.7%)	4.19	.813

	includes gamified elements.							
IGT8	I need in gamifications elements (e.g., badges, points, level) that encourage healthy competition.	2 (1.7%)	1 (0.8%)	20 (16.7%)	53 (44.2%)	44 (36.7%)	4.23	.753
IGT9	I want gamified elements to be tailored to my individual learning style.	1 (0.8%)	2 (1.7%)	22 (18.3%)	60 (50%)	35 (29.2%)	3.72	.935
IGT10	I want the course's gamification to align with my personal preferences in learning.	0 (0%)	1 (0.8%)	25 (20.8%)	59 (49.2%)	35 (29.2%)	4.08	.826

Table 6 offers insights into the respondents' perspectives on integrating gamification elements into English learning courses, revealing various attitudes and preferences. In IGT1, respondents widely believed that gamified elements enhance motivation to learn English (mean = 4.15, SD = 0.847), with no disagreement. IGT2 similarly highlights a preference for integrating games for enjoyable learning experiences (mean = 4.19, SD = 0.781), indicating broad agreement. The respondents favored progress tracking through gamified features in IGT3 (mean = 4.17, SD = 0.771), with minimal disagreement. IGT4 also emphasized this preference (mean = 4.07, SD = 0.758), suggesting general agreement on progress tracking. IGT5 indicates a need for gamification to simulate real-world English situations (mean = 4.14, SD = 0.781), with minimal disagreement. In IGT6, respondents expressed a preference for achieving milestones in a gamified course (mean = 3.99, SD = 0.966), with slight variability in consensus. IGT7 demonstrates that respondents are more likely to complete a course with gamified elements (mean = 4.19, SD = 0.813), with minimal disagreement. IGT8 highlights a desire for gamification encouraging healthy competition (mean = 4.23, SD = 0.753), indicating general support. Respondents expressed a need for personalized gamification in IGT9 (mean = 3.72, SD = 0.935), with slight disagreement. Lastly, in IGT10, respondents wanted course gamification aligned with their learning preferences (mean = 4.08, SD = 0.826), with minimal disagreement. Overall, the results from table 6 highlight a positive attitude toward gamification in English courses, emphasizing motivation, enjoyment, progress tracking, realistic simulations, achievement milestones, completion likelihood, competition, and personalized experiences. These insights can guide the creation of engaging gamified learning environments.

Discussion

This study aims to explore the GF of EFL students, as well as their perceptions of course design encompassing LC, SWE, and RC. Additionally, it investigates the IGT into their needs and preferences. The findings from these aspects reveal valuable insights into learner motivations, preferred learning methods, and the potential impact of gamification on language acquisition.

In the GF dimension of enhancing English proficiency, the findings reveal that respondents adopt a proactive approach towards language learning, demonstrating specific goals for improving their English skills. This proactive stance aligns with contemporary research highlighting the critical role of goal-setting in language acquisition, which suggests that learners with well-defined objectives are more likely to sustain focus and motivation throughout their learning process (Işıklı & Tarakçıoğlu, 2017; McDonald, 2023; Moffett & Cassidy, 2023). Studies further underscore the relevance of goal-setting in the context of gamified learning environments. For instance, gamification research indicates that setting clear, achievable goals within game-based frameworks can significantly enhance learner engagement and persistence (Dah et al., 2024; Ensmann & Whiteside, 2022; Slamet et al., 2024a). Additionally, the respondents' preference for interactive learning methods and practical examples aligns with findings that emphasize the efficacy of experiential and task-based learning approaches in language education (Rinjeni et al., 2024; Romsi et al., 2024). This preference reflects a desire for hands-on learning experiences that not only engage learners but also facilitate the transfer of skills to real-world contexts. While these preferences are consistent with existing literature, it is important to consider individual learner differences, such as varying levels of intrinsic motivation or familiarity with technology, which may impact how effectively gamified approaches are received. Recent advancements in gamification highlight that incorporating interactive elements and real-world tasks within educational games can further boost the effectiveness of these approaches (Slamet et al., 2024b; Zafar et al., 2024). Nevertheless, while there is a clear demand for comprehensive course coverage, including all aspects of English proficiency tests, it is crucial to address individual differences in learning styles and preferences. Further research should investigate how personalized gamified learning experiences, which adapt to diverse learner needs, could enhance both engagement and learning outcomes. Recent research suggests that personalized gamified learning experiences, which adapt to diverse learner needs, can significantly improve instructional effectiveness and learner satisfaction (Dah et al., 2024). Thus, ensuring that instructional materials and activities are tailored to accommodate these varied preferences is essential for maximizing the impact of language learning interventions.

Moving on to course design, particularly focusing on LC, the study findings highlight the importance of interactive multimedia resources and regular feedback in enhancing listening skills. These findings resonate with research advocating for the integration of multimedia materials and personalized feedback to promote active engagement and skill development in language learners (Sarifa, 2020; Slamet & Mukminatien, 2024). Additionally, the preference for diverse listening materials and regular progress tracking underscores the need for varied and assessment-driven listening activities that accommodate different learning preferences and proficiency levels (Phuong & Vo, 2019; Wu, 2019; Yassi et al., 2023). While these preferences align with current trends in language learning, one must also consider the potential cognitive load that may arise from offering too many diverse materials without sufficient scaffolding. Recent advancements in gamified learning further illuminate the value of these components. For example, gamification research highlights that incorporating interactive multimedia and feedback within game-based environments can significantly increase learner engagement and motivation (Dah et al., 2024; Slamet et al., 2024a; Zafar et al., 2024). The preference for diverse listening materials and the importance of regular progress tracking reflects a broader trend towards personalized and adaptive learning experiences. However, one potential limitation of gamified approaches is their reliance on technology, which might be a barrier for students with limited access to digital devices or internet connectivity. Studies have shown that gamified approaches, which offer varied and interactive tasks, not only cater to different learning preferences but also provide timely feedback that supports ongoing improvement (Rinjeni et al., 2024; Romsi et al., 2024; Şenocak et al., 2021). By integrating gamified elements, such as interactive simulations and real-time feedback mechanisms, educators can create more dynamic and responsive learning environments. Consequently, incorporating these gamification strategies into language courses can lead to more effective development of listening skills, aligning with contemporary trends in educational technology and learner-centered design.

In terms of SWE, respondents express a strong preference for regular practice in sentence structure and interactive grammar exercises. This finding emphasizes the importance of scaffolded and repetitive practice in developing written language proficiency (Elyas & Alghofaili, 2019; Wulyani et al., 2019), indicating that learners benefit from consistent opportunities to apply grammar rules in context. Moreover, the desire for practical applications of grammar rules and multimedia support underscores the need for authentic and technology-enhanced learning experiences in writing instruction (Hammad, 2022; Renandya et al., 2018), suggesting that integrating multimedia resources and real-world examples into writing activities can enhance learner engagement and comprehension. Furthermore, recent research on gamification aligns with these findings, indicating that game-based learning environments that incorporate iterative practice and interactive elements can substantially improve learners' grammatical skills and writing proficiency (Dah et al., 2024; Slamet et al., 2024b). Gamified platforms often employ mechanics such as points, badges, and leaderboards to motivate and engage students in regular practice (Ensmann & Whiteside, 2022; Zafar et al., 2024). Therefore, incorporating gamified elements into writing instruction can align with learners' preferences for regular practice and multimedia support, ultimately enhancing their grammar proficiency and overall writing skills.

Regarding RC, the respondents prioritize exposure to diverse reading materials, different genres, and multimedia elements to support their understanding of written English. These preferences align with research advocating for varied reading materials and multimedia resources to develop reading comprehension skills effectively (Demirbilek et al., 2022; Huseinović, 2023), suggesting that learners benefit from exposure to authentic texts and multimedia resources that reflect real-world communication scenarios. Furthermore, the desire for interactive e-books and comprehension quizzes highlights the importance of integrating interactive and assessment-driven reading activities into language courses to promote active engagement and deeper comprehension (Amaya-Díaz & Bajaña-Zajia, 2020), indicating that incorporating these elements into reading instruction can enhance learner motivation and performance. Studies on gamification further reinforce this approach, revealing that integrating interactive and multimedia components into learning activities can significantly enhance learner engagement. For example, gamified reading platforms often use interactive e-books and comprehension quizzes to provide immediate feedback and create immersive learning experiences, which align with respondents' desires for interactive and assessment-driven activities (Pereira & Wahi, 2021; Rinjeni et al., 2024; Şenocak et al., 2021). This approach not only supports active engagement but also helps learners to apply their reading skills in practical contexts. Therefore, leveraging recent advances in gamification can provide a more effective and engaging approach to developing reading skills by integrating diverse materials and interactive resources.

Finally, in IGT, the respondents demonstrate a positive attitude towards gamified elements, indicating potential motivational benefits for learners. This finding is consistent with research highlighting the motivational advantages of gamification in education (Pereira & Wahi, 2021; Romsi et al., 2024), suggesting that incorporating gamified elements into language courses can enhance learner engagement and motivation. However, the need for personalized and adaptive gamification strategies underscores the importance of tailoring gamified elements to individual learning styles and preferences (Friedrich et al., 2020; Puig et al., 2023), indicating that educators should consider learners' individual differences and preferences when designing gamified learning experiences. By incorporating personalized and adaptive gamification strategies into language courses, educators can create dynamic and engaging learning environments that promote active participation and skill development effectively.

Overall, this study offers valuable insights into the goals, preferences, and learning approaches of EFL students, emphasizing the need for personalized and interactive instructional methods. By integrating literature and thoroughly exploring each aspect of the findings, we gain a deeper understanding of learner needs, informing effective instructional practices and curriculum design. These insights highlight the importance of diverse instructional methods to accommodate various learning styles and proficiency levels, enhancing engagement and promoting meaningful learning experiences for EFL students. However, further research should also consider the long-term effects of gamified learning and the potential for learner burnout or disengagement over time, providing a more comprehensive understanding of gamification's impact on language acquisition.

Conclusion

This study offers comprehensive insights into various dimensions of English language learning, ranging from learner preferences and goals to course design elements and the integration of gamification theory. The findings shed light on the nuanced needs and preferences of the EFL students, emphasizing the significance of tailored instructional approaches. By identifying specific learner goals, such as the desire for interactive learning experiences and practical application opportunities, this study underscores the importance of aligning course design with student expectations. Moreover, the integration of gamification theory emerges as a promising avenue for enhancing learner engagement and motivation. The findings highlight the potential of gamified elements to create dynamic and immersive learning environments, where students are empowered to actively participate and progress in their language acquisition journey. This aligns with previous research emphasizing the motivational benefits of gamified approaches in language education.

However, it is crucial to acknowledge the limitations of this study. The reliance on self-reported data may introduce biases, and the study's focus on a specific demographic or educational context could limit the generalizability of the findings. Additionally, while the study provides valuable insights into learner preferences and instructional strategies, further research is needed to explore the long-term effectiveness of gamification in language learning and its impact on language proficiency outcomes. Moving forward, this study has several implications for language educators, curriculum developers, and policymakers. By incorporating learner-centered approaches and integrating gamified elements into course design, educators can create more engaging and effective learning experiences for EFL students. Curriculum developers can use these findings to inform the design of English proficiency courses that address the diverse needs and preferences of learners, while policymakers can support initiatives aimed at promoting innovative instructional strategies in language education.

Declaration

The authors declare that there is no conflict of interest.

Acknowledgments

The authors gratefully acknowledge the financial support provided by Universitas Negeri Malang under the *Surat Perjanjian Pelaksanaan Penelitian* with reference number 4.4.759/UN32.14.1/LT/2024. We also extend our sincere thanks to the editors and the three anonymous reviewers for their valuable feedback and contributions to improving this study.

References

Amaya-Díaz, I. Y., & Bajaña-Zajia, J. X. (2020). The use of gamification to enhance the English as a foreign language. *Polo Del Conocimiento*, *5*(3), 865–881.

Chemir, S., & Kitila, T. (2022). Learners' needs analysis for English for academic purposes in Ethiopian higher education institutions: The case of Wachemo University freshman students. *Cogent Education*, *9*(1). https://doi.org/10.1080/2331186X.2022.2026190

Chen, C.-C., Huang, C., Gribbins, M., & Swan, K. (2018). Gamify online courses with tools built into your learning management system (LMS) to enhance self-determined and active learning. *Online Learning*, 22(3), 41–54. https://doi.org/10.24059/olj.v22i3.1466

Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research*. Pearson.

Dah, J., Hussin, N., Zaini, M. K., Linda, I. H., Ametefe, D. S., & Aliu, A. A. (2024). Gamification is not working: Why? *Games and Culture*. https://doi.org/10.1177/15554120241228125

Demirbilek, M., Talan, T., & Alzouebi, K. (2022). An examination of the factors and challenges to adopting gamification in English foreign language teaching. *International Journal of Technology in Education*, *5*(4), 654–668. https://doi.org/10.46328/ijte.358

Ensmann, S., & Whiteside, A. L. (2022). "It helped to know I wasn't alone": Exploring student satisfaction in an online community with a gamified, social media-like instructional approach. *Online Learning*, *26*(3), 22–45. https://doi.org/10.24059/olj.v26i3.3340

Elyas, T., & Alghofaili, N. M. (2019). Native English speakers versus non-native English speakers: The impact of language teachers on EFL learner's English proficiency. *English Review: Journal of English Education*, *7*(2), 27. https://doi.org/10.25134/erjee.v7i2.1773

Eshtehardi, R. (2017). Needs analysis and course design: A framework for designing exam courses. *International Journal of Applied Linguistics and English Literature*, *6*(6), 274. https://doi.org/10.7575/aiac.ijalel.v.6n.6p.274

Erümit, S. F., & Yılmaz, T. K. (2022). Gamification design in education: What might give a sense of play and learning? *Technology, Knowledge and Learning*. https://doi.org/10.1007/s10758-022-09604-y

Freeman, D. (2017). The case for teachers' classroom English proficiency. *RELC Journal*, *48*(1), 31–52. https://doi.org/10.1177/0033688217691073

Friedrich, J., Becker, M., Kramer, F., Wirth, M., & Schneider, M. (2020). Incentive design and gamification for knowledge management. *Journal of Business Research*, *106*, 341–352. https://doi.org/10.1016/j.jbusres.2019.02.009

Frost, K., Clothier, J., Huisman, A., & Wigglesworth, G. (2020). Responding to a TOEFL iBT integrated speaking task: Mapping task demands and test takers' use of stimulus content. *Language Testing*, *37*(1), 133–155. https://doi.org/10.1177/0265532219860750

Hammad, A. A. (2022). Investigating the low English proficiency of Saudi EFL learners. *Arab World English Journal*, *13*(1), 129–144. https://doi.org/10.24093/awej/vol13no1.9

Hidayati, D., & Slamet, J. (2025). Interactive multimedia via LMS on a reading comprehension course: Enhancing engagement and learning outcomes in Islamic higher education. *Journal of Studies in the English Language*, *20*(1), 95–122. https://so04.tci-thaijo.org/index.php/jsel/article/view/277426

Hess, A. K. N., & Greer, K. (2016). Designing for engagement: Using the ADDIE model to integrate high-impact practices into an online information literacy course. *Comminfolit*, *10*(2), 264. https://doi.org/10.15760/comminfolit.2016.10.2.27

Huseinović, L. (2023). The effects of gamification on student motivation and achievement in learning English as a foreign language in higher education. *MAP Education and Humanities*, 10–36. https://doi.org/10.53880/2744-2373.2023.4.10

Işıklı, C., & Tarakçıoğlu, A. Ö. (2017). Investigating problems of English literature teaching to EFL high school students in Turkey with focus on language proficiency. *Journal of Language and Linguistic Studies*, *13*(2), 82–95. www.jlls.org

Landers, R. N. (2014). Developing a theory of gamified learning: Linking serious games and gamification of learning. *Simulation and Gaming*, *45*(6), 752–768. https://doi.org/10.1177/1046878114563660

Lee, J. H., & Lo, Y. Y. (2017). An exploratory study on the relationships between attitudes toward classroom language choice, motivation, and proficiency of EFL learners. *System*, *67*, 121–131. https://doi.org/10.1016/j.system.2017.04.017

Lee, O. (2018). English language proficiency standards aligned with content standards. *Educational Researcher*, *47*(5), 317–327. https://doi.org/10.3102/0013189X18763775

Mafulah, S., Basthomi, Y., Cahyono, B. Y., & Suryati, N. (2023). Exploring Indonesian EFL teacher-student interactions in online learning. *Studies in English Language and Education*, *10*(2), 8. https://doi.org/10.24815/siele.v10i2.23804

Matiini, G., & Octasylva, A. R. P. (2020). English for IELTS test preparation: The needs analysis. *EnJourMe (English Journal of Merdeka): Culture, Language, and Teaching of English*, *5*(1), 54–64. https://doi.org/10.26905/enjourme.v4i2.4154

McDonald, J. K. (2023). The everydayness of instructional design and the pursuit of quality in online courses. *Online Learning*, *27*(2), 137–169. https://doi.org/10.24059/olj.v27i2.3470

Moffett, J., & Cassidy, D. (2023). Building a digital educational escape room using an online design-thinking process. *Online Learning*, *27*(2), 223–244. https://doi.org/10.24059/olj.v27i2.3279

Mustafa, F., & Apriadi, H. (2016). DIY: Designing a reading test as reliable as a paper-based TOEFL designed by ETS. *Proceedings of the 1st EEIC in Conjunction with the 2nd RGRS-CAPEU between Sultan Idris Education University and Syiah Kuala University*, 402–407.

Pereira, A., & Wahi, M. (2021). Development and testing of a roleplaying gamification module to enhance deeper learning of case studies in an accelerated online management theory course. *Online Learning*, *25*(3), 101–127. https://doi.org/10.24059/olj.v25i3.2273

Phuong, Y. H., & Vo, P. Q. (2019). Students' learning autonomy, involvement and motivation towards their English proficiency. *EduLite: Journal of English Education, Literature and Culture*, *4*(1), 1. https://doi.org/10.30659/e.4.1.1-12

Puig, A., Rodríguez, I., Rodríguez, Á., & Gallego, I. (2023). Evaluating learner engagement with gamification in online courses. *Applied Sciences (Switzerland)*, *13*(3). https://doi.org/10.3390/app13031535

Renandya, W. A., Hamied, F. A., & Joko, N. (2018). English language proficiency in Indonesia: Issues and prospects. *The Journal of AsiaTEFL*, *15*(3), 618–629. https://doi.org/10.18823/asiatefl.2018.15.3.4.618

Richards, J. C. (2017). Teaching English through English: Proficiency, pedagogy and performance. *RELC Journal*, *48*(1), 7–30. https://doi.org/10.1177/0033688217690059

Rinjeni, T. P., Rakhmawati, N. A., & Nadlifatin, R. (2024). Design of academic gamification model based on Myers-Briggs type indicator (MBTI) through pre-experimental design. *Journal of Information Technology Education: Research*, *23*, 018. https://doi.org/10.28945/5314

Romsi, A., Widodo, J. P., & Slamet, J. (2024). Empowering slow learners: Gamification's impact on students' engagement and academic performance in an LMS for undergraduate students. *International Journal of Information and Education Technology*, *14*(2), 193–203. https://doi.org/10.18178/ijiet.2024.14.2.2040

Sarifa, N. (2020). Enhancing EFL learners' English proficiency and intelligence by implementing the Eclectic method of language teaching. *Arab World English Journal*, *11*(1), 103–113. https://doi.org/10.24093/awej/vol11no1.9

Şenocak, D., Büyük, K., & Bozkurt, A. (2021). Examination of the Hexad user types and their relationships with gender, game mode, and gamification experience in the context of open and distance learning. *Online Learning*, *25*(4), 250–266. https://doi.org/10.24059/olj.v25i4.2276

Slamet, J., & Basthomi, Y. (2024). Assessing gamification-based LMS for EFL students: A self-directed learning framework. *Studies in Linguistics, Culture, and FLT*, *12*(2), 100–122. https://doi.org/10.46687/CVHT3942.%20

Slamet, J., Basthomi, Y., Ivone, F. M., & Eliyanah, E. (2024a). Unlocking the potential in a gamification-based MOOC: Assessing autonomous learning and self-directed learning behaviors. *Teaching and Learning Inquiry*, *12*, 1–20. https://doi.org/10.20343/teachlearninqu.12.19

Slamet, J., Basthomi, Y., Ivone, F. M., & Eliyanah, E. (2024b). Utilizing an SDL approach in designing a gamification-based MOOC to enhance autonomous learning. *Journal of Information Technology Education: Research*, *23*, 010. https://doi.org/10.28945/5278

Slamet, J., Basthomi, Y., Ivone, F. M., & Eliyanah, E. (2025). A needs analysis for designing a gamification-based MOOC in English for specific purposes. *Studies in Linguistics, Culture and FLT*, 120. https://doi.org/10.46687/ULRS1031

Slamet, J., & Mukminatien, N. (2024). Developing an online formative assessment instrument for listening skill through LMS. *LEARN Journal: Language Education and Acquisition Research Network*, *17*(1), 188–211. https://so04.tci-thaijo.org/index.php/LEARN/article/view/270382

Tan, Y. L. L. (2018). Meaningful gamification and students' motivation: A strategy for scaffolding reading material. *Online Learning*, 22(2), 141–155. https://doi.org/10.24059/olj.v22i2.1167

Welbers, K., Konijn, E. A., Burgers, C., de Vaate, A. B., Eden, A., & Brugman, B. C. (2019). Gamification as a tool for engaging student learning: A field experiment with a gamified app. *E-Learning and Digital Media*, *16*(2), 92–109. https://doi.org/10.1177/2042753018818342

Wolf, M. K., Bailey, A. L., Ballard, L., Wang, Y., & Pogossian, A. (2023). Unpacking the language demands in academic content and English language proficiency standards for English learners. *International Multilingual Research Journal*, *17*(1), 68–85. https://doi.org/10.1080/19313152.2022.2116221

Wu, Z. (2019). Lower English proficiency means poorer feedback performance? A mixed-methods study. *Assessing Writing*, *41*, 14–24. https://doi.org/10.1016/j.asw.2019.05.001

Wulyani, A. N., Elgort, I., & Coxhead, A. (2019). Exploring EFL teachers' English language proficiency: Lessons from Indonesia. *Indonesian Journal of Applied Linguistics*, *9*(2), 263–274. https://doi.org/10.17509/ijal.v9i2.20217

Yang, H., Su, J., & Bradley, K. D. (2020). Applying the Rasch model to evaluate the self-directed online learning scale (SDOLS) for graduate students. *International Review of Research in Open and Distributed Learning*, *21*(3), 1–22.

Yassi, A. H., Hanafiah, W., Sahib, H., Aswad, M., Nurchalis, N. F., & Azizi, Z. (2023). Exploring the effects of pair-interaction model on improving Indonesian adult learners' English proficiency. *Studies in English Language and Education*, *10*(1), 117–136. https://doi.org/10.24815/siele.v10i1.27406

Zafar, A. U., Shahzad, M., Shahzad, K., Appolloni, A., & Elgammal, I. (2024). Gamification and sustainable development: Role of gamified learning in sustainable purchasing. *Technological Forecasting and Social Change*, *198*. https://doi.org/10.1016/j.techfore.2023.122968

Zourmpakis, A. -I., Kalogiannakis, M., & Papadakis, S. (2023). Adaptive gamification in science education: An analysis of the impact of implementation and adapted game elements on students' motivation. *Computers*, *12*(7), 143. https://doi.org/10.3390/computers12070143

Using an Online Engagement Framework to Redesign the Learning Environment for Higher Education Students: A Design Experiment Approach

Melissa Fanshawe, Alice Brown, Petrea Redmond
University of Southern Queensland

Abstract
With more higher education courses being offered online, the design of the learning environment is an essential component of the educational experience. However, not all online learning environments facilitate student engagement. This paper describes the redesign of two online Initial Teacher Education courses in a regional university, using the Online Engagement Framework (OEF) for higher education. Following a design experiment approach, the online components of the course were audited and redesigned with consideration to the five elements of online learning and engagement. To understand the effectiveness of the redesign, we analysed student feedback from 24 course offerings along with course analytics. Data indicated an increase in student engagement, as well as feedback indicating students highly valued the cognitive, behavioural, and emotional elements of their online courses. The paper reinforces the importance of forefronting student input in course redesign, and offers timely and practical considerations to guide course redesign.

Keywords: Online learning, regional university, student engagement, teacher education, student success.

Fanshawe, M., Brown, A., & Redmond, P. (2025). Using an online engagement framework to redesign the learning environment for higher education students: A design experiment approach. *Online Learning, 29*(2), pp. 269–297. https://doi.org/10.24059/olj.v29i2.4447

The online learning environment plays an essential role in higher education, influencing how students perceive and engage with content in their courses (Krishnan, 2016). However, the effectiveness of the educational experience in online learning in higher education contexts varies greatly (Deng & Tavares, 2015). While online learning already existed in higher education programs and contexts, COVID-19 provided an impetus for a rapid transition to digital Learning Management Systems (LMS) for many universities globally (Marfuah et al., 2022). As more courses are offered through online offerings, online student engagement, understood to include behaviours that indicate regular synchronous, or asynchronous, participation in activities and commitment to learning (Brown et al., 2023; Redmond et al., 2023), has been forefronted (Bledsoe, 2013; Martin et al, 2018). Ensuring student engagement in the course design is important for the effectiveness of learning, as an essential component of the educational experience, and can be leveraged to support the completion of coursework, retention, and academic success (Costa et al., 2018).

In order to examine the types of engagement students experience in online learning environments, Redmond et al. (2018) developed an Online Engagement Framework (OEF) for higher education, built upon recurring themes within the literature, including students' beliefs, attitudes, and behaviours. The framework goes beyond a Community of Inquiry model (Garrison & Akyol, 2013), to identify other essential elements and considerations, such as emotional and collaborative engagement, which are asserted to be a crucial part of the online design process for higher education. With a desire to create a learning environment that supports student engagement in Initial Teacher Education (ITE) courses, this paper explains how the online learning environments of two ITE courses were audited and then intentionally redesigned using a design experiment methodology to support the five elements of student engagement from the OEF. It then presents an analysis of course survey reports to show how the new courses designs impacted students' online engagement and their overall satisfaction with the learning experience. Finally, major themes and recommendations for higher educators and course designers are discussed. This paper provides a significant contribution, by outlining a process to audit an online learning environment, as well as offering timely, and practical strategies, underpinned by theoretical reasonings to inform decision-making for course redesign of ITE courses and, more broadly, for programs within the higher education sector.

Background Literature

One of the challenges faced by designers of ITE programs is the increasing cohort of students who choose to study entirely online (Tualaulelei et al., 2022). Statistically, mature-aged students who study online and part-time are at more risk of disengagement from tertiary study due to a range of external difficulties (Costa et al., 2018), such as working full-time and supporting families (Stone & O'Shea, 2019). The complexity of factors underpinning this demographic heightens disengagement, with risk factors that include the diversity of the cohort (Dart & Spratt, 2021), student anxiety (Roland et al., 2018) and feelings of disconnectedness (Stone & O'Shea, 2019), all of which may affect students' ability to engage online.

In considering how to design online courses to support student learning and success, Stone et al. (2019) found that providing content in different modes (such as videos, eBooks, forums and tutorials) provided flexible learning options to better suit students' diverse needs and learning styles. In a study of over 600 students, including those studying mathematics, Burke & Fanshawe (2024) found that time pressure was an essential consideration for learners. Students being time-poor had implications for course design, particularly in terms of providing students with ways that enabled easy access to engage in the course, along with learning materials that afforded flexible study options and ways of working (e.g., opening all components of the course upfront; considerations about the timetabling of tutorials). Communicating expectations with students was found to increase student engagement and help reduce stress levels for ITE students (Burke & Fanshawe, 2024). Therefore, in an online learning environment, innovative design and supports are necessary to facilitate students' engagement in their learning.

A Conceptual Framework to Support Student Engagement

Working in ITE, Redmond et al. (2018) produced an engagement framework that provides a guide for online learning environments in higher education. The framework identified five crucial elements for engaging students in learning in online teaching spaces: behavioural, cognitive, social, collaborative, and emotional engagement, as shown in Figure 1. As the descriptions of the elements indicate, Redmond et al. (2018) adopted a broad view of engagement, drawing on extensive research from the field to develop the framework.

Figure 1

Image Adapted from the Five Elements of the Online Engagement Framework (Redmond et al, 2018)

Cognitive engagement is the active learning process related to what students do and think to promote learning. Indicators of cognitive engagement include thinking critically, activating metacognition, integrating ideas, and developing deep discipline understandings (Redmond et al, 2018). Online learning tasks that engage students on a cognitive level ask them to think critically about issues, integrate new ideas, develop and justify their position or understanding, or engage in metacognition (Redmond et al., 2018).

Behavioural engagement relates to participation and involvement in learning activities and academic pursuits that contribute to successful learning outcomes. Indicators of students' behavioural engagement include participation in, and completion of, learning activities, learning involvement through effort and persistence, supporting and encouraging peers and the development of student agency through activities that are meaningful and relevant (Wang, 2017). It has been recognised that course design that entices students' behavioural engagement early in the semester may be a precursor in developing and promoting deeper engagement and related student achievement (Wang, 2017).

Collaborative engagement is related to students' engagement with others and therefore is similar to social engagement. However, the focus is on academically worthwhile purposes such as collaborative discussion forums, tutoring, study groups, and group tasks or assessment. Redmond et al. (2018) suggest that students studying online are more likely to collaborate online because they are less likely to be located geographically near peers. Collaborative engagement also relates to students connecting to the university and the development of relevant industry professional networks.

Emotional engagement is about students' feelings or attitudes towards learning and is engagement's affective or emotional component. For example, in a mathematics-based ITE course, emotional engagement is particularly pertinent due to ITE students' often negative perceptions of mathematics and mathematical abilities (Everingham et al., 2017). Indicators that exemplify emotional engagement include managing expectations, articulating assumptions, recognising motivations, and committing to learning.

Finally, *social engagement* refers to students' social investment in the tertiary experience. It supports learning through building community, creating a sense of belonging, and helping students create purposeful relationships with others (Chen et al., 2010). It refers to informal opportunities for students to build rapport and trust in the online space and more formal connections that support learning.

Therefore, in pursuit of creating an online learning environment which would facilitate student engagement in their learning, we posed this research question:

> Can the Online Engagement Framework be used to as a tool to re-design a course to increase student engagement?

Methods

The researchers involved in this project were higher education academics from the School of Education in a regional Australian university, where the student cohort was predominately online (>75%) pre-COVID-19. We were all interested in creating engagement in online learning environments to ensure students were able to access content and prepare for future employment.

Our study was conducted over a seven-year period, from 2017 to 2023. The goal was to redesign two mandatory ITE courses, a first-year course (Y1), and a third-year course (Y3), both of which had an overarching goal of providing curriculum and pedagogy preparation for mathematics teaching in primary schools. The first author was the course writer and examiner for both courses, and the second and third authors, more senior academics, provided mentoring support with redesign considerations. At the time, the OEF had just been published by the 2nd and 3rd authors, and so afforded a tool for auditing and reflecting on possible strategies to facilitate student engagement in the online course redesign.

Research Design

The redesign of the courses followed the three steps of the methodology for design experiments in education, as proposed by Cobb et al. (2003). The use of design-based research in education has been identified as important because it has the potential to influence the teacher's professional practice (Fowler et al., 2022). Design experiments are conducted to develop theories, but are also pragmatic, as they study the resulting learning within the context of the design. Cobb et al. (2003) suggested three steps to redesign learning experiences, which are outlined below.

Step 1: Preparing for a Design Experiment

In order to prepare for a design experiment, Cobb et al. (2003) suggested a review or audit of the existing course be undertaken, complemented by an understanding of the students and researchers and the outcomes the re-design hopes to bring.

A review of the inherited courses found that the course content consisted of:

- recorded lectures and additional resources, typically in PDF files uploaded in each week's content (cognitive element);
- an assessment section with information regarding the assignments and criteria (cognitive element);
- discussion forums intended for peers to discuss topics (social element) and not monitored by teaching staff; and
- a study schedule with expected readings and content to complete (behavioural element).

An audit of existing data, including learning analytics and course survey reports, showed low participation and satisfaction with the course. Course learning analytics includes data generated by the LMS which can be used to identify the number of students who have interacted with each element of the course content (Tualaulelei, et al., 2022). While course analytics cannot tell if a student has made a cognitive connection with the materials, the data did provide an understanding of what materials were being "accessed" by the students, and who was interacting in the discussion forums provided in the course. Hence, this was a good indicator of participation and engagement. Learning analytics, which were automatically generated through the LMS from Y3-S1-2017, showed students were accessing only 30.7% of course content. While 56.2% students accessed lecture resources, only 5.7% interacted (i.e. contributed or responded to a post) in the discussion forums.

Course survey reports are created for each course throughout the university at the completion of each semester. Students are invited to indicate their course satisfaction using a combination of rating scales (quantitative feedback), and open-ended question (qualitative feedback). The quantitative section of the surveys used a 5 point Likert-type scale, where 1 indicated “strongly disagree,” and 5 indicated “strongly agree.” Survey participants are also asked to respond to the statement “overall I am satisfied with this course.” The qualitative responses to the open-ended questions provided anonymous feedback, which was not an indicator of engagement per se. Nevertheless, it was a means through which the students could provide a candid narrative on how they interacted with a course and its activities, the effects that instruction had on them, and how they perceived course learning activities (Linse, 2017). The course survey report for Y3-S1-2017 collected quantitative and qualitative data on student experiences following each course offering and indicated a score of 3.89 (maximum = 5) for student course satisfaction, with only 21.43% of the enrolled students providing feedback. These figures were regarded as low, because the university aimed for all courses to receive a score between 4.0 and 5.0, with a 25% response rate from students.

In addition, there had been a high rate of student attrition from the course. From 2015 to 2017, an average of 16% of students withdrew from the course. As one student explained, *I was very anxious about this course and dropped it three times before semesters began* (Y3-S1-2017). Similar findings were identified for the Y1 course, indicating the students were not engaging well in online mathematics courses.

Step 2: Conducting a Design Experiment

The second stage of the design experiment process was to seek to improve the initial design (Cobb et al., 2003). The redesign was conducted in 2017 through strategic implementation in the course design for each of the five of elements of engagement, as shown in Table 1 and summarised below.

Table 1

Comparative Elements of Course Design Pre- and Post-Redesign.

Type of engagement	Inherited courses	Course redesign and justification
Behavioural	• Study schedule with expected readings and content to complete	• Getting started section – included a video outlining the explicit intentions of the course • Weekly course updates emailed to students, or internal course NEWS announcements, to explain weekly content • Study schedule with expected readings and content to complete • Course layout – like an iPhone with all the information for one topic in one place. • Step-by-step instructions for assessment expectations
Cognitive	• Lectures – I hour pre-recorded • Tutorial – 2 hours pre-recorded	• Lectures – Moodle eBook – students can go through the content independently. Mini lectures recorded within the book – maximum of 10 mins

	• Course readings – uploaded in PDF • Assessment – 2 essays (90%), participation (10%)	• Tutorial – live via zoom and recorded – allow students to interact with lecturer and others (social and collaborative). Hands-on activities for praxis-based understanding of mathematical content • Course readings – linked directly to the university library for digital access • Assessment – praxis-based so students could engage with mathematics activities to keep as future resources in their classrooms.
Social	• Discussion forums "if students had questions"	• Introduction forum to meet other students • Check-ins – as well as tutorials, check-ins were an informal place just to come and talk about maths content the students may be doing in practicum placements one hour a week.
Collaborative		• Tutorials on Zoom with breakout rooms, so students could solve a maths problem collaboratively. • Meet-up leader – a students who had previously done the course to meet in an informal manner on Zoom with the students.
Emotional		• Personal emails to students to check-in on wellbeing and congratulate them for success in assignments. • Badges to reward and congratulate students for completing tasks. 

Cognitive elements added to the course included replacing the 2-hour lecture with a Moodle eBook which students could complete independently at a time that suited their schedule. Mini lectures (up to 10 minutes) were included in the eBook. Hands-on activities were included in the course re-design, providing practical learning activities that were aligned with the assessment tasks (Ayalon & Wilkie, 2020). In addition, individualised feedback for students was provided before the assessment, and in tutorials and forums, so the students would have the opportunity to address misconceptions before submitting assessment, as well as a positive opportunity to reaffirm their efforts and thinking (emotional engagement).

To provoke and challenge students and thus engage them cognitively, online learning activities were designed to present the content that helped students develop an understanding of the discipline (Kennedy, 2020). Real-world examples and hands-on investigations involving active participation were included, with students using materials around the home to facilitate learning (Simon, 2022).

Behavioural elements were included in the redesign to entice students to engage in the courses by replicating the design of an iPhone, with content accessed by clicking on an icon that mimicked the image of an "app" on the iPhone (see Figure 2). The intention was to create a design that would be more intuitive for students, particularly supporting students who were less confident with technology to access the the Moodle learning management system (Kilgour et al., 2019).

Figure 2

The Online Interface Design That Mimicked iPhone Format

To additionally guide behavioural engagement, a *Getting Started* section was added, which included a video that explicitly outlined the intentions of the course and step-by-step assessment instructions to outline assignment expectations in the course. Weekly announcements, which were also sent as emails to the students, were created to guide students' study direction for each week. A number of Activity Tracking tools, already embedded in the LMS, were harnessed to provide nudges to students to engage in required activities (Lawrence et al., 2021).

To encourage collaborative and social engagement in online interactions, the redesign recognised that, by nature, people are social beings, and today's innovations such as virtual classrooms in the LMS provide virtual spaces that enable teacher presence and student interactions. These considerations were critical in designing the learning environment and fostering an online learning community.

Collaborative elements were included in online tutorial sessions. Rather than a pre-recorded tutorial, synchronous tutorials were available which also allowed students an opportunity to interact with the lecturer and other students. Breakout rooms were used so students could solve a problem collaboratively, at the same time deepening their understandings of content. It was also acknowledged that not all students could attend tutorials, so forums were set up as an alternative for students to share responses to activities and their reflections. These intentional engagement strategies reflecting the theory that affirms that learning together can nurture a positive mindset and learning from and with others helps students, whilst also recognising and manage anxiety in educational settings (Russell & Topham, 2012).

Another major component of the course redesigns was the integration of emotional elements. These efforts strategically considered that emotional engagement impacts student motivation to learn, which has a flow-on effect on student satisfaction (Kucuk et al, 2019). Teacher presence was created by including an avatar, a digital representation of the teacher (Falloon, 2010), integrated and used throughout the course materials. As well, the instructor created digital badges to send instantaneous feedback to students (Fanshawe et al., 2020), thus fostering a positive sense of achievement as students progressed through the course (Dowling-Hetherington & Glowatz, 2017). Badges were intended to offer a personalised feeling to the course, so students felt supported but also helped add behavioural guidance to the course, so students completed activities to receive a badge. Personal emails were sent to each student prior to assessment to check on their progress and remind them of supports available (Dart & Spratt, 2021). As an additional support, a student who had previously completed the course was employed as a peer leader to meet students in an informal manner on Zoom and assist current students with any course or university questions (Kimmins, 2013).

Social elements of the redesign included an introduction forum/social forum that invited students to introduce themselves, share a little bit of their background and goals for the course and build initial connections and trust with the fellow students. As well as tutorials, check-ins were added, which were an informal place to discuss mathematics content that the students may be doing in practicum placements for one hour a week. The check-ins provided an opportunity for students to engage informally with each other in the course.

Step 3: Conducting Retrospective Analysis

The final step of the design experiment process was to evaluate the effectiveness of the redesign, to answer the research question "How can the Online Engagement Framework be used to as a tool to re-design a course to increase student engagement?" Prior to commencing this stage, ethical approval was gained from the University Human Research Committee to use current and retrospective data to evaluate the courses (approval # ETH2020-0100, ETH2023-0847).

Data Collection

Data were collected from two mathematics courses scheduled in the first and third year which were mandatory in the ITE program. Data were collected between 2018 and 2023, over 13 iterations of the Y1 course and 11 iterations of the Y3 course, following the redesign of the two courses at the end of 2017. Data collected included the course survey report (quantitative and qualitative) and course learning analytics (quantitative).

Data Analysis

Quantitative data from the course survey report and course analytics of participation of online students were collated from each offering and compared using simple comparative analysis. To analyse the qualitative data from the course survey report we used thematic content analysis. This approach examines the data and looks for the meaning of the words prior to coding (Maguire & Delahunt, 2017). First, the data references for each course offering (n=24) were examined for how they aligned with any of the five elements of the OEF. This involved the researchers drawing meaning from the text and highlighting parts of the student comments in the course survey report that related to each element of engagement. The coding was performed separately by two authors, who then met with the remaining author to discuss any differences in the results. This helped to ensure research rigour and increase data dependability.

Next, the qualitative data for the two courses (24 offerings) were combined for analysis. To further ensure validity, the comments were uploaded into NViVO, a tool which enabled us to identify key words used throughout the students' data. The data sets related to each engagement element were manually analysed to identify themes that represented specific engagement elements that students perceived as having supported their learning in the online environment.

Findings and Discussion

This section of the paper addresses the analysis of the quantitative data obtained from the course survey reports, along with themes from the qualitative data presented in the findings for each data set. Data from the learning analytics is presented initially, and then again in relation to the qualitative data descriptions, to enable a comparison of student comments and activity on the LMS.

Learning Analytics

A significant finding was the impact of the course redesign on students' engagement with the cognitive aspects of course content. For example, Figure 3 shows a comparison of learning analytics of the lecture resources in the third-year course, Y3-S1-2017, where green represented the percentage of students who accessed the lecture resource, yellow represented the percentage of students who did not access the resource, and black indicated the percentage of students who had not yet accessed the course. Prior to the redesign, the average access to the first five lectures was 56.2% of students. However post-redesign, 91.46% of students in Y3-S1-2018 evidenced access to the Moodle books, indicating an increase in engagement in cognitive learning content post redesign for these courses.

Figure 3

Comparative Learning Analytics Y3-S1-2017 & Y3-S1-2018 Immediately Pre and Post redesign.

Learning analytics data highlighted that increased access to the course has been consistent since the redesign. Data from 2020 to 2023 showed students accessed an average of 76% of the course content (Table 2). Participation in course elements was slightly higher for students enrolled in the first-year subject at 78.14%, as opposed to 74.75% for the third-year subject.

Table 2

Learning Analytics Data Showing Average Percentage of Course Content Accessed by Students from 2020 to 2023 for Y1 and Y3 Courses.

Y1 course	**S1 2020**	**S2 2020**	**S1 2021**	**S2 2021**	**S2 2022**	**S3 2022**	**S2 2023**	**Total**
# Students	46	144	158	124	116	80	168	836
Average %	80.12%	79.94%	79.27%	73.85%	85.95%	86.67%	80.66%	78.14%
Y3 course	**S1 2020**	**S1 2021**	**S3 2021**	**S1 2022**	**S3 2022**	**S1 2023**		**Total**
# Students	53	86	74	83	102	90		488
Average %	70.66%	73.88%	79.91%	72.64%	75.32%	75.22%		74.75%

Course Survey Report: Quantitative Data

The quantitative data from the course survey report comprised Likert scale responses from 570 students; 332 and 238 in Y1 and Y3, respectively. These figures represented 31% and 28% of students enrolled. Table 3 shows the details of student evaluation scores, and response rates for each of the course offerings. The redesigned Y1 received an average of 4.66 for overall student satisfaction with a 31% response rate. The Y3 received an average of 4.56 for overall satisfaction with a 28% response rate. The large majority of 570 students responded with a 4 (satisfied), or a 5 (very satisfied) on the Likert scale, indicating that most students agreed or strongly agreed that it was a good course.

Table 3

Evaluation Scores, Numbers of Students Who Responded, Response Rates and Qualitative Data References for Each of the Examined Course Iterations

First year course				**Third year course**			
Offering	Score/5	#Students	Response rate	Offering	Score/5	#Students	Response Rate
S2 2023	4.5	32	19%	S1 2023	4.5	18	20%
S3 2022	4.9	24	30%	S3 2022	4.7	20	20%
S2 2022	4.9	26	22%	S1 2022	4.5	15	18%
S2 2021	4.5	30	24%	S3 2021	4.5	8	11%
S1 2021	4.2	39	25%	S1 2021	4.5	18	21%
S2 2020	4.7	40	28%	S1 2020	4.8	16	30%
S1 2020	4.6	13	28%	S2 2019	4.5	20	36%
S2 2019	4.6	28	35%	S1 2019	4.4	15	49%
S1 2019	4.5	34	44%	S3 2018	4.5	63	36%
S3 2018	4.6	19	40%	S2 2018	4.5	17	21%
S2 2018	4.9	17	41%	S1 2018	4.8	28	45%
S1 2018	4.8	30	45%				
Total	4.66	**332**	31%	**Total**	4.56	**238**	28%

Data indicated that the student satisfaction score in all iterations of the two courses (range 4.2 to 4.9) surpassed the scores for 2017 (3.89 and 4.15). In other words, the students in 2018–2023 expressed more satisfaction with the mathematics courses than students had before the redesign. In addition, as shown in Table 4, student dropout from the courses was lower following the redesign of the courses. It should be noted that the university had an overall higher attrition in 2020–2022 which may be attributed to COVID-19. Regardless, the redesigned courses still remained below pre-course redesign attrition figures.

Table 4

Student Dropout Percentage Pre (2015–2017) and Post (2018–2023) Course Design.

Pre-course redesign			**Post-course redesign**					
2015	2016	2017	2018	2019	2020	2021	2022	2023
16%	15%	17%	7%	4%	9%[1]	14%[1]	11%[1]	4%

[1] COVID-19 may have impacted attrition in 2020 -2022

The quantitative data from the course survey report shows decreased attrition rates for the redesigned courses. The findings show approximately 30% of students in 23 offerings of mathematics courses were satisfied or very satisfied with the course following the redesign. The analysis of the course report surveys found an improvement in student satisfaction from below university expectations of 4.0/5.0 to an average of 4.6 for the 24 offerings. These results indicate that the majority of students who responded were satisfied with the course.

Course Survey Report: Qualitative Data

To fully understand what elements of the course redesign were important to the students in their learning, we analysed the qualitative data from the course survey reports. In total 451 data references were collected from 23 offerings; which included 255 Y1 and 196 Y3 data references.

The first step of the coding of the qualitative data resulted in the allocation of the student comments into the five engagement elements identified in the OEF for each course. The data references were coded as 123 cognitive, 106 behavioural, 50 collaborative, 143 emotional and 30 social engagement, as shown in Table 5.

Table 5

Total Number of Data References Coded into Each Element of Engagement for Y1 and Y3 Courses.

First year	**Cognitive**	**Behavioural**	**Collaborative**	**Emotional**	**Social**	**Total**
Y1 S2 2023	6	4	3	9	1	23
Y1 S3 2022	5	4	3	6	1	19

Y1 S2 2022	7	4	1	5	3	20
Y1 S2 2021	6	2	5	5	3	21
Y1 S1 2021	3	2	3	8	4	20
Y1 S2 2020	5	6	1	9	1	22
Y1 S1 2020	3	1	0	6	0	10
Y1 S2 2019	3	7	2	6	2	20
Y1 S1 2019	4	5	2	6	1	18
Y1 S3 2018	3	8	1	6	1	19
Y1 S2 2018	8	12	3	14	2	39
Y1 S1 2018	6	5	4	7	2	24
Total Y1	61	60	28	86	21	255
Percentage	24%	23%	11%	34%	8%	

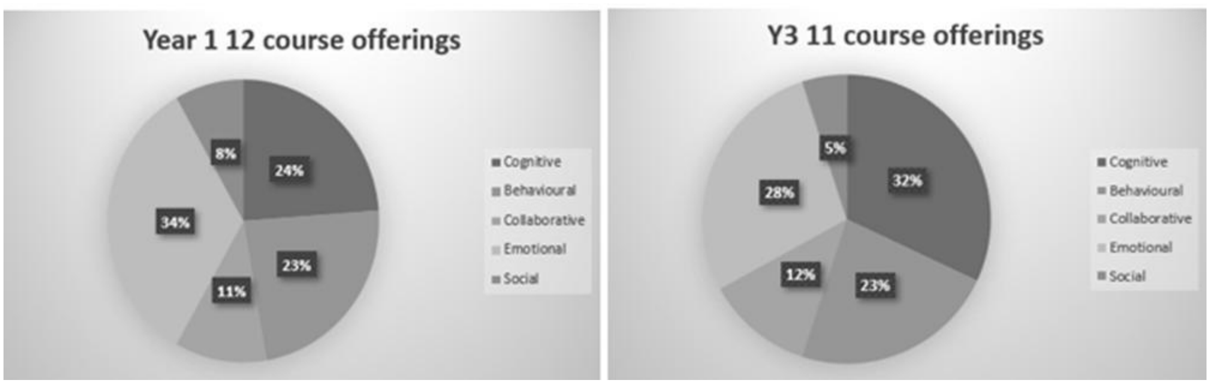
Third year	**Cognitive**	**Behavioural**	**Collaborative**	**Emotional**	**Social**	**Total**
Y3 S1 2023	4	5	1	4	1	15
Y3 S3 2022	4	6	2	4	1	17
Y3 S1 2022	9	3	2	1	3	9
Y3 S3 2021	2	2	1	1	0	6
Y3 S1 2021	4	2	1	3	1	11
Y3 S1 2020	2	2	0	1	4	9
Y3 S2 2019	2	1	0	2	1	6
Y3 S1 2019	16	9	1	9	0	35
Y3 S3 2018	12	6	9	17	0	44
Y3 S2 2018	1	2	1	1	0	5

Y3 S1 2018	12	9	5	12	1	39
Total Y3	62	46	22	57	9	196
Percentage	32%	23%	12%	28%	5%	

Interestingly, the distribution across the engagement elements was very similar between the two course offerings as shown in Figure 4. The only notable difference differences between Y1 and Y3 were cognitive and emotional engagement. In Y3 emotional engagement was higher (32%) than Y1 (24%). Emotional engagement was higher in Y1 (34%) than Y3 (28%).

Figure 4

Data References per Engagement Element, Represented as a Percentage of the Total Data References, by Course.



In the second step of the qualitative data analysis, the data sets related to the five engagement elements were manually analysed to identify themes that represented specific aspects of the elements that students perceived as having supported their learning in the online environment. The following sections present each of the elements of online engagement with students' comments (including year and course offering).

Cognitive Engagement

Cognitive engagement was coded for 123 references from the 23 courses. Evidence of cognitive engagement included comments about how students interacted with online learning tasks. Data from the course survey report indicated students particularly enjoyed the cognitive content of the course. The change from a lecture to a Moodle book was identified by students as a positive aspect of the redesign.

> I really dislike listening to lectures and find them a struggle to sit through. … Having the modules enabled me to engage the class resources (Y3-S1-2018).

> The information in the ebooks was easy to read (peppered with humour, anecdotes and interesting videos and memes—all while remaining relevant) (Y3-S1-2020).

Providing content in multiple forms assisted the students to visualise concepts (Baya'a & Daher, 2009).

As many students can be anxious about content knowledge in mathematics (Everingham et al., 2017), the content of the Moodle book was designed to develop students' content knowledge in small manageable amounts. This was successful according to one student:

> I am very nervous about my understanding of concepts. This course offered in-depth knowledge for each of the learning areas of the mathematics curriculum that I can use for future teaching (Y3-S1-2023).

Students showed a belief that the course developed knowledge of the content,

> by the end of the unit, I come away with a sense of accomplishment, confidence and competence to engage students with mathematical concepts (Y3-S1-2019).

Other students also shared satisfaction that the course materials were useful for the classroom*:* "So many classroom-based resources and tools. A lot of sharing of cool games and visual aids will be so helpful for me as a beginner teacher." Preparation for employment through engagement in course content was a positive outcome for these students.

Redmond et al. (2018) suggested that an indicator of cognitive engagement is student reference to the praxis connection of their learning in the course; that is, when students discuss how they will use learnings from the course—or the course content—in their discipline practice (in this case teaching), or discuss how they have applied it to practice or to other learning contexts. These examples arguably demonstrated their ability to connect their learning and its future application to practice (Everingham et al., 2017). The redesign of the course increased participation in the course materials as identified by the learning analytics. While the analytics cannot tell if a student has comprehended the materials, they can show what was accessed. Course access for the modules in the first- and third-year courses ranged from 62.3% to 100%, with an average of all modules being 90.02%, higher than the average of 56.2% from prior to the redesign (Table 6).

Table 6

Learning Analytics Data Showing Percentages of Students Who Accessed Course Lecture Materials (Moodle Books) from 2020 to 2023 for Y1 and Y3 courses.

Y1 course	**S1 2020**	**S2 2020**	**S1 2021**	**S2 2021**	**S2 2022**	**S3 2022**	**S2 2023**	Total
Module 1	100%	98.6%	98%	97.2%	98.7%	100%	98.3%	98.69%
Module 2	97.8%	98.6%	95.3%	91.5%	100%	97.3%	97.5%	96.86%
Module 3	100%	97.1%	96%	88.7%	96%	95.9%	97.5%	95.89%
Module 4	97.8%	97.1%	92.6%	87.3%	97.3%	94.5%	96.7%	94.76%
Module 5	95.76%	95.7%	85.9%	85.9%	97.3%	93.2%	94.2%	92.57%
Module 6	95.76%	94.3%	91.9%	78.9%	96%	93.2%	90.9%	91.57%

Module 7	95.76%	94.3%	85.9%	78.9%	94.7%	91.8%	90.9%	90.32%
Module 8	95.76%	92.9%	77.9%	78.9%	93.3%	91.8%	92.6%	89.02%
Module 9	95.76%	92.9%	79.9%	71.8%	92%			86.47%
Module 10	95.76%	92.9%	72.5%	71.8%	92%			84.99%
							Average Y1	92.11%

Y3 course	**S1 2020**	**S1 2021**	**S3 2021**	**S1 2022**	**S3 2022**	**S1 2023**		**Total**
Module 1	100%	95.2%	98.5%	90%	99%	98.4%		96.85%
Module 2	88.7%	96.4%	93.9%	95%	92.8%	92.2%		93.17%
Module 3	90.6%	89.2%	92.4%	87.5%	88.7%	90.6%		89.83%
Module 4	79.2%	92.8%	93.9%	87.5%	86.6%	89.1%		88.18%
Module 5	90.6%	84.3%	89.4%	75%	80.4%	89.1%		84.8%
Module 6	62.3%	92.8%	92.4%	82.5%	78.4%	92.2%		83.43%
Module 7	86.8%	85.5%	83.3%	72.5%	90.7%	93.8%		85.43%
Module 8	64.2%	77.1%	80.3%	75%	79.4%	92.2%		78.03%
							Average Y3	87.47%
							Average all modules	90.02%

Assessment in the redesigned courses focused on preparing students for teaching and learning in the classroom upon graduation, which was noted by a student; “The assessment felt relevant to the profession of teaching” (Y1-S2-2022). Assessment tasks aligned with the course content and provided scaffolded opportunities to engage in content knowledge and hands-on mathematics activities, even online: “I have enjoyed the 3rd assignment and found it quite useful as an interactive assessment to develop knowledge on the concepts covered but also my academic writing and referencing over the course of the semester” (Y1-S1-2021). Surprisingly only four negative comments were received about assessment workload, an improvement from 26/34 negative assessment comments in the course survey reports in 2017, prior to the redesign. This may be in part because “Our assessment pieces are broken up into smaller workloads for each week, with both peer and examiner feedback to help direct and improve our understandings and overall abilities” (Y1-S2-2022). Ensuring course content and assessment were provided in manageable workload portions appeared to be a positive aspect of the course redesign.

Interestingly deeper readings were included in the design of the third-year course. Less than a third of students accessed these resources over five offerings (Table 7) and there was no mention of the deeper readings as positive or negative in the course survey reports. Despite these findings, deeper readings have remained in the course as they provide a resource to the students who may want to access for consolidation of course content.

Table 7

Learning Analytics Data Showing Percentage of Students Who Accessed Deeper Readings 2020 to 2023 in Y3 course

Y3 course	S1 2020	S1 2021	S3 2021	S1 2022	S3 2022	S1 2023	Total
Deeper readings	24.5%	30.1%	37.9%	30%	39.2%	17.2%	29.81%

The results from the analysis of the high engagement in the course content identified in the learning analytics and the large number of data references in the course survey reports indicate that cognitive engagement in the course is highly valued by students.

Behavioural Engagement

Behavioural engagement was coded for 106 references from the 23 courses. The most powerful theme to emerge from these comments was the perceived value of the course design/structure on students' learning and engagement. "I appreciated the way so much effort was given to design" (Y3-S1-2020). Similarly another student said, "the best aspects of this course was the clear instructions and course design" (Y3-S1-2018). Almost half of the comments about behavioural engagement (52) related to the theme "course structure" with 10 references from the first-year course and 11 from the third-year course mentioning layout. A first-year student commented, "thank you for making something I was dreading into something easy to navigate" (Y1-S1-2020); another was more specific, "the setup and layout of completing modules were easy to use and found it to be of great benefit when being engaging with course" (Y1-S2-2021). A more experienced student expressed a similar sentiment: "the layout, both visual and practical has been the best in my 8 years studying with [university]. I would love it if other courses followed suit with how the course page, modules etc are set up" (Y3-S3-2018). Other students indicated that the way the course design enabled behavioural guidance through the course, "each topic was layout in a manner that could be easily progressed through" (Y1-S2-2019). Indeed, research supports the students' statements that a well-designed virtual classroom can support students' active engagement in learning, while a poorly designed LMS can hinder engagement (Rubin et al., 2010).

A sub-theme of course structure was students' value for the course being "self-paced." "It was extremely helpful having the course material available for online students to work at their own pace" (Y1-S2-2018). The modules were designed "into ten separate modules which could be undertaken at our own pace so we could arrange our life around prac and other requirements" (Y3-S1-2018) which "made working through the content at your own pace to get ahead when convenient for your study pattern" (Y3-S1-2019). Flexibility is particularly important in the online learning context, where many learners choose to study in this mode for its flexible nature (Stone et al., 2019).

Directed navigation from the course examiner was also identified as helpful. "[The course examiner] was fabulous at guiding me through the learning and provided extremely helpful and friendly feedback during the course" (Y3-S3-2018). Table 8 outlines a number of behavioural initiatives that were included in the course redesigns. The Getting Started section contained information about the course and how to engage in the course for success. There were no comments specifically about the Getting Started section in the course survey reports, and the completion of the Getting Started activities ranged between 48.3% and 91.3% in the first-year courses and 42.4% and 72.5% in the third-year courses, indicating a wide disparity between the courses and offerings.

Announcements on a weekly basis guided students in their study and provided students with the tasks to do in one week. Announcements would be uploaded onto the LMS on a Monday morning and would also be automatically sent to the students' university email. For students, this meant "the weekly breakdown and learning was easy to understand, find and navigate online" (Y1-S1-2018). Weekly emails were accessed slightly more by first-year students, with an average of 74% as compared to 63.83% of third-year students (Table 8).

Table 8

Learning Analytics Data Showing Course Elements Coded as Behavioural from 2020 to 2023 for Y1 and Y3 courses.

First year course	S1 2020	S2 2020	S1 2021	S2 2021	S2 2022	S3 2022	S2 2023	Total
Getting Started	58.7%	48.3%	91.3%	58.3%	86.7%	89%	72.7%	72.14%
Announcements	67.4%	75.5%	81.9%	73.2%	69.3%	89%	62%	74.04%
Course Examiner tips	93.5%	48.3%	40.3%	85.9%	26.7%	26%	14.9%	47.94%
Step by Step guide to assessment	93.5%	85.3%	99.3%	95.8%	92%	95.9%	95%	93.82%
Total	78.28%	64.35%	78.2%	78.3%	68.68%	74.98%	61.15%	71.99%

Third year course	S1 2020	S1 2021	S3 2021	S1 2022	S3 2022	S1 2023	Total
Getting started	64.2%	62.7%	42.4%	72.5%	52.6%	45.3%	56.61%
Announcements	64.2%	60.2%	71.2%	62.5%	57.7%	67.2%	63.83%
Step by Step Guide assessment	98.1%	97.6%	100%	97.5%	100%	98.4%	98.6%
Total	75.5%	73.5%	71.2%	77.5%	70.1%	70.3%	73.01%

Step-by-step guides were developed to provide students with clear instructions about how and what was expected to be included in the assessment, along with links to resources that would help them in the course content (e.g., referencing tools). Students stated: "the step-by-step guides for the assignments were incredibly helpful (Y3-S1-2019) and one of the best things about this program is how well scaffolded the assignments were" (Y3-S1-2019). This is evidenced by approximately one fifth (n=18) of comments pertaining to the usefulness of the step-guide, and the highest access by students of all materials on the LMS, averaging at 93.82% in the first-year course and 98.6% in the third-year course. Fanshawe et al. (2020) indicated that providing early access to support and stating specific expectations are likely to enhance student engagement. A first-year student explained, "the clear step-by-step guide of the assessment made it a lot easier to understand what was required" (Y1-S2-2018). Students indicated that the step-by-step guides helped them to succeed: "the scaffolding provided for the assessments was appreciated and allowed me to prepare high quality submissions" (Y3-S3-2018). The guides were also designed to increase students' confidence:

> Each task was stepped out very explicitly leaving no room for guessing. It was also great how it had the relevant part of the rubric next to the step of task description to help you focus in on what was required (Y3-S1-2019).

This comment indicates that the step-by-step guide helped the student feel confident they were meeting the assessment criteria. Additionally, the step-by-step guides were designed to support development of the assessment throughout the course: “I loved that I could stay on track easily with a weekly task, making finishing before the assessment due dates stress free” (Y1-S2-2020). Wanner (2014) argued ongoing assessment rather than leaving it to the last minute is crucial for student success.

A final theme and consideration in the course redesigns was the use of “badges.” These are digital awards presented to students in the virtual classroom upon completing specified tasks (Fanshawe et al., 2020). Comments which related to the use of the badges (n=17), reinforced their value for tracking learning progress and motivating students. As a first year student shared, “I liked that the badges showed when you had completed all requirements for a topic” (Y1-S2-2019). Third year students also thought “the badges were a great way of tracking my progress” (Y3-S1-2019). Dowling-Hetherington and Glowatz (2017) found that badges were a type of gamification which could be used to encourage students to achieve desired educational outcomes. This was supported by student comments: “receiving badges was a good motivator (Y2-S2-2020). We got badges and emails to encourage us to keep going with the course (which surprisingly worked!)” (Y3-S2-2018). That is, the badges helped to shape students’ learning behaviours. These comments indicated that behavioural elements in the course were valued by students.

Collaborative Engagement

Collaborative engagement was coded for 50 of 451 references from the 23 courses. While collaborative engagement items made up only a small percentage of the codes, tutorials, forums and a meet-up leader were identified as valued for collaborative engagement in the courses. Tutorials on Zoom included a joint problem, or hands-on maths activity that students had to work with others to achieve “A really collaborative and productive environment” (Y1-S2-2021). Students reported “Tutorials are a great time to collaborate with colleagues and talk over the content for the week” (Y1-S1-2023). As students met regularly, they had a familiar group of peers in tutorials which made the information, activities and brainstorming so much more comfortable and valuable (Y1-S2-2021). Despite students reporting the usefulness of tutorials on Zoom, attendance numbers remained low across both year levels, with first year participation ranging from 21.7% to 55.9% and third year from 35% to 66% (Table 9). To ensure all students were able to have collaborative activities, forums were designed as a way to contribute asynchronously to conversations about the course. Forum participation ranged from 62% to 89% in the first-year course and 82.5% to 94.3% in the third-year course.

Table 9

Learning Analytics Data Showing Course Elements Coded as Collaborative from 2020 to 2023 for Y1 and Y3 Courses

First year course	S1 2020	S2 2020	S1 2021	S2 2021	S2 2022	S3 2022	S2 2023	Total
Tutorial on Zoom	21.7%	55.9%	38.3%	33.8%	*	*	*	37.43%
Forum participation	67.4%	75.5%	81.9%	73.2%	69.3%	89%	62%	74.04%

Third year course	S1 2020	S1 2021	S3 2021	S1 2022	S3 2022	S1 2023	Total
Tutorial on Zoom	66%	50.6%	56.1%	35%	47.4%	37.5%	48.77%
Forum participation	94.3%	81.9%	93.9%	82.5%	87.6%	84.4%	87.43%

*Access to Zoom links were not recorded in course analytics for these offerings.

Forums were valued by students both as "a great way to see other students' perspectives, analyse ideas and make connections" (Y1-S3-2021) and because "the activities we have to complete for the forums are fun and engaging" (Y1-S1-2023). Participation in forums increased students' belief in their ability as they worked with their peers: "I loved being able to participate so much throughout the course. As daunting as the forums initially were it was a great way to learn from my fellow peers and even gave me some great ideas for my future role as an educator" (Y1-S2-2018). The preference to interact asynchronously by students in both courses was perhaps due to the time-poor nature of our students and their need to balance their higher education learning with family, work, and other tasks (Burke & Fanshawe, 2024).

One initiative implemented in the third-year course was using a *meet-up leader* who ran one tutorial per week. Meet-up leaders were members of course teams who had previously completed the course and were paid to tutor groups of current students in the course content through a peer-to-peer process. As the course is about mathematics, the meet-up leaders were employed to coordinate tutorials and work one-on-one with students who felt they wanted extra help with the course's mathematical concepts. The feedback from students who attended these sessions was positive. For instance one participant "loved having a past student to be able to contact and discuss the course and assessment" (Y3-S1-2021). Students reported that the meet-up leaders helped them increase their understanding of the concepts being taught in the class, thus reducing some of their anxieties around mathematics. Research (e.g., Kimmins, 2013) suggests that peer tutorial programs such as Meet-Up have positive benefits on confidence, by connecting students with someone who has successfully navigated the course (Redmond et al., 2018).

Emotional Engagement

Emotional engagement was coded for approximately one third of the references (n=143) from the 23 courses. Two main themes emerged from the student comments relating to emotional engagement. The first of these was related to positive relationships and emotional connections with the course examiner, and the second was a positive disposition towards the course and the content upon completion.

Emotional reactions of and to others in the course were indicators of emotional engagement (Redmond et al., 2018). Comments from 48 data references highlighted that the "enthusiasm" and "positive attitude" displayed by the facilitator were valued and that this helped them to connect emotionally with the course: "[The course examiner] created a positive and exciting atmosphere every class and made learning about maths very exciting!" (Y3-S1-2019). Research indicates that, although enthusiasm is an individual quality of a course facilitator, "positive emotions can facilitate activation of attention and engagement" (Sinatra et al., 2015, p. 2). This means that university educators need to be aware of how their attitudes can impact students' engagement in an online course. Furthermore, emotion is also "important to student adjustment to the role of online learner" (Cleveland-Innes & Campbell, 2012, p. 272).

Mentioned by 37 students, the support of course facilitators impacted how students perceived the course. The comments indicated that students felt the teacher cared for their learning and well-being, which in turn impacted how they participated in the course (Burke et al, 2022). "[The course examiner] was supportive …and personally emailed me to congratulate me on my marks and offer her support … this made me keep going" (Y1-S2-2018). Others indicated that they felt they were getting quality learning due to the care presented by the course examiner*:*

> I greatly appreciated her emails checking on students' understanding of the course and assessments, you do not get these from many lecturers but you could tell she truly cared about her students and wished to provide the best education to them as possible (Y3-S1-2019).

Interestingly, strategic use of inbuilt technologies helped to give students the impression that the course examiner knew how every student was performing. For example badges, although implemented in the course as a behavioural guide, also made students feel "as though she really cared about how I was tracking throughout the course" (Y3-S1-2019). Connecting with students and regular positive contact can provide interaction for students to find belonging (Burke & Lamar, 2021) as evidenced by a first-year student: "studying online can be lonely but [examiner] made us feel very much a part of her course and was really supportive" (Y1-S2-2018). Thus emotional connection, although personal for each course examiner, should be considered in the design to provide opportunities for students to feel belonging in their course and program (Cleveland-Innes, & Campbell, 2012).

From the data analysis, it was clear that students had emotionally engaged with their courses. For some students, an outcome of that engagement was a change in attitude towards mathematics: "I found that the course was almost designed for enjoyment and to change our (students') view of math. And it truly did" *(*Y3-S3-2018). Other students described indicators of emotional engagement that suggested they valued learning, acquired knowledge and skills, and appreciated success. The emotional engagement element has been explained as related to positive and negative attitudes toward learning and content (Sinatra et al., 2015). In courses where the content traditionally makes students anxious, then positive engagement may arguably be demonstrated by a change in attitude, such as a willingness to engage with materials that were previously viewed negatively or considered difficult. Many students described a change in attitude towards mathematics due to taking the courses: "I had maths anxiety going into the course but this quickly resolved with the way the content was taught and the support offered throughout. By far one of my favourite courses so far" *(S1-S2-2020).* These findings suggest that emotional engagement and support for students plays a fundamental role in online engagement.

Social Engagement

Social engagement was coded for 30 of 451 references from the 23 courses, representing less that 10% of data. Feedback on the aspects of the course that were designed to encourage social engagement was mixed, as was participation. Social forums in the third-year course, designed to have asynchronous conversations not related to course content, had an average participation of 58.55% of students. In the first-year course, a catch-up session was offered in 2020 and 2021, designed to check in on students socially. As fewer than 20% of students attended any of the catch-up sessions, the catch-ups were removed from the course and social forums were introduced with an increased participation rate of 57.53% (Table 10). Low attendance at catch-ups indicated that students may prefer to connect online rather than in person, or it could have been related to COVID-19.

Table 10

Learning Analytics Data Showing Course Elements Coded as Social Engagement from 2020 to 2023 for Y1 and Y3 Courses.

First year course	S1 2020	S2 2020	S1 2021	S2 2021	S2 2022	S3 2022	S2 2023	Total
Catch up	15.2%	16.2%	19.8%	-				17.07%
Social forum					61.3%	65.8%	45.5%	57.53%

Third year course	S1 2020	S1 2021	S3 2021	S1 2022	S3 2022	S1 2023	Total
Social forum	45.3%	56.6%	74.2%	55%	60.8%	59.4%	58.55%

Although some students found that these aspects supported their learning through "having an enjoyable conversation with peers" (Y3-S1-2023) or just to have social contact to "stay engaged with other peers" (Y1-S-2018). Six of the 32 comments were negative, relating to students wanting to have social chats in tutorials rather than learn, or commenting that social forums were "not effective teaching tools and do not have much educational value" (Y3-S1-2018). These findings suggest that the social aspects are elements that still might be improved; however, at the same time, they may be indicative of a general malaise that many students show for social or collaborative aspects of courses (Krishnan, 2016).

A final word cloud (Figure 5) was produced by NVIVO, which included the top 50 words used in the course survey reports. The word cloud identified high frequency words, resulting in course, learning, tutorials, teaching, lecturers, assignments, students, engagement, assessment, and content as the 10 most frequently used words by students to describe their perceptions of what they valued and did not value in their course.

Figure 5

A Word Cloud Generated by NVIVO from Highest Frequency of Words in Course Survey Reports.

These words reiterate the high student satisfaction from students who have been engaged in the redesigned courses, and offer the possibility that the OEF can play an important role in redesigning online courses with student engagement in mind.

Conclusion

This paper has provided an overview of the design experiment method (Cobb et al. (2003) and used the OEF in Higher Education (Redmond et al., 2018) to audit the effectiveness of a first- and third-year course in the School of Education at a regional Australian university. Several recommendations are provided as a result of redesigning the courses using a design experiment methodology. First, improving ITE courses, and more generally higher education programs, begins with ensuring the students have engaging online learning environments to learn content that will prepare them for employment (Martin, et al, 2018). As shown in the results of this study, it is not just the cognitive content that students value, but also behavioural aspects of the course, and the emotional connection to the course and the content. Additionally, collaborative and social engagement, while shown to a lesser degree, were important to course participation and engagement for students in this study.

The second recommendation is to prepare university teaching staff with the knowledge and skills to design online higher education courses, with a valuable tool being referencing and utilising a framework to inform practice, such as the elements of the OEF. This paper illustrates how using the OEF as an audit tool enabled critical thinking and reflection on evidence and gaps in relation to different ways in which engagement was integrated into the design of courses. These insights thus helped refine the courses further in the redesign by integrating new elements to augment particular elements of engagement. The results indicating the course redesign increased course satisfaction across the courses over 23 offerings.

The authors acknowledge that while the paper presents results from a single case study from one regional university in one type of course (i.e., ITE mathematics course), details of the methodological process and redesign are insightful in offering knowledge of arange of engagement elements (cognitive, behavioural, emotional, social, and collaborative) in the redesign of courses. Future research could investigate the impacts of engagement-focused design on other courses. The paper highlights that for tertiary educators, the Online Engagement Framework for higher education was of value as a tool for examining how courses stimulate online student engagement, systematically designing how engagement might be enhanced, and evaluating how each element was valued by online higher education students.

Declarations

Ethical approval was gained from the University of Southern Queensland Human Research Committee approval # ETH2020-0100 and ETH2023-0847.

The authors declared no potential conflicts of interest concerning this article's research, authorship, and/or publication.

References

Ayalon, M., & Wilkie, K. (2020). Developing assessment literacy through approximations of practice: Exploring secondary mathematics pre-service teachers developing criteria for a rich quadratics task. *Teaching and Teacher Education, 89*. 1-14. https://doi.org/10.1016/j.tate.2019.103011

Baya'a, N. F., & Daher, W. M. (2009). Learning mathematics in an authentic mobile environment: The perceptions of students. *International Journal of Interactive Mobile, 3(*S1), 6–14. https://doi.org/10.3991/ijim.v3s1.813

Bledsoe, T. (2013). A multimedia-rich platform to enhance student engagement and learning in an online environment. *Online Learning Journal*, *17*(4). https://www.learntechlib.org/p/183762/.

Brown, A., Lawrence, J., Redmond, P., Cohen, J., Foote, S.M., & Stone, C. (2023). *HERDSA Guide: Enhancing Online Engagement in Higher Education*. HERDSA. https://www.herdsa.org.au/publications/guides/enhancing-online-engagement-higher-education

Burke, K., & Fanshawe, M. (2024). Student perceptions of supports for managing study in higher education according to internal and external locus of control. *Journal of Further and Higher Education*, 1-12. https://doi.org/10.1080/0309877X.2024.2362843

Burke, K., Fanshawe, M., & Tualaulelei, E. (2022). We can't always measure what matters: Revealing opportunities to enhance online student engagement through pedagogical care. *Journal of Further and Higher Education*, *46*(3), 287-300. https://doi.org/10.1080/0309877X.2021.1909712

Burke, K.M., & Larmar, S.A. (2020). Acknowledging another face in the virtual crowd: Reimagining the online experience in higher education through an online pedagogy of care. *Journal of Further and Higher Education, 45*(5), 601 - 615. https://doi.org/10.1080/0309877X.2020.1804536

Chen, P.-S. D., Lambert, A. D., & Guidry, K. R. (2010). Engaging online learners: The impact of web-based learning technology on college student engagement. *Computers & Education, 54*(4), 1222–1232. https://doi.org/10.1016/j.compedu.2009.11.008

Cleveland-Innes, M., & Campbell, P. (2012). Emotional presence, learning, and the online learning environment. *The International Review of Research in Open and Distributed Learning, 13*(4), 269–292. https://doi.org/10.19173/irrodl.v13i4.1234

Cobb, P., Confrey, J., DiSessa, A., Lehrer, R., & Schauble, L. (2003). Design experiments in educational research. *Educational Researcher, 32*(1), 9-13

Costa, C., Murphy, M., Pereira, A. L., & Taylor, Y. (2018). Higher education students' experiences of digital learning and (dis)empowerment. *Australasian Journal of Educational Technology, 34*(3), 140–152. https://doi.org/10.14742/ajet.3979

Dart, S., & Spratt, B. (2021). Personalised emails in first-year mathematics: Exploring a scalable strategy for improving student experiences and outcomes. *Student Success*, *12*(1), 1-12. https://doi.org/10.5204/ssj.1543

Deng, L., & Tavares, N. J. (2015). Exploring university students' use of technologies beyond the formal learning context: A tale of two online platforms. *Australasian Journal of Educational Technology, 31*(3), 313–327. https://doi.org/10.14742/ajet.1505

Dowling-Hetherington, L., & Glowatz, M. (2017). The usefulness of digital badges in higher education: Exploring the students' perspectives. *Irish Journal of Academic Practice, 6*(1), Article 1. https://doi.org/10.21427/D7Z13C

Everingham, Y. L., Gyuris, E., & Connolly, S. R. (2017). Enhancing student engagement to positively impact mathematics anxiety, confidence and achievement for interdisciplinary science subjects. *International Journal of Mathematical Education in Science and Technology, 48*(8), 1153–1165. https://doi.org/10.1080/0020739X.2017.1305130

Falloon, G. (2010). Using avatars and virtual environments in learning: What do they have to offer? *British Journal of Educational Technology, 41*(1), 108–122. https://doi.org/10.1111/j.1467-8535.2009.00991.x

Fanshawe, M., Delaney, N., & Powell, A. (2020). Utilizing instantaneous feedback to promote self-regulated learning in online higher education courses: The case for digital badges. In *Technology-enhanced formative assessment practices in higher education* (pp. 41-59). IGI Global.

Fowler, S., Cutting, C., Fiedler, S.H., & Leonard, S. (2022). Design-based research in mathematics education: Trends, challenges and potential. *Mathematics Education Research Journal*. https://doi.org/10.1007/s13394-021-00407-5

Garrison, D., & Akyol, Z. (2013). *The community of inquiry theoretical framework. Handbook of Distance Education*, 3, 104-120.

Kennedy, G. (2020). *What is student engagement in online learning … and how do I know when it is there? Melbourne CSHE Discussion Paper*. Melbourne Centre for the Study of Higher Education, The University of Melbourne.

Kilgour, P., Reynaud, D., Northcote, M., McLoughlin, C., & Gosselin, K. P. (2019). Threshold concepts about online pedagogy for novice online teachers in higher education. *Higher Education Research & Development, 38*(7), 1417–1431. https://doi.org/10.1080/07294360.2018.1450360

Kimmins, L. R. (2013). Meet-up for success: The story of a peer led program's journey. *Journal of Peer Learning*, *6*, 103–107. https://ro.uow.edu.au/ajpl/vol6/iss1/9

Krishnan, S. (2016). Students' perceptions of learning mode in mathematics. *The Malaysian Online Journal of Educational Sciences 4*(2), 32–41. https://mojes.um.edu.my/article/view/12647

Kucuk, S., & Richardson, J. C. (2019). A structural equation model of predictors of online learners' engagement and satisfaction. *Online Learning, 23*(2), 196-216. http://doi:10.24059/olj.v23i2.1455

Lawrence, J., Brown, A., Redmond, P., Maloney, S., Basson, M., Galligan L., & Turner, J. (2021). Does course specific nudging enhance student engagement, experience and success? A data-driven longitudinal tale. Student Success, 12(2), 28–37. https://doi.org/10.5204/ssj.1914

Linse, A. R. (2017). Interpreting and using student ratings data: Guidance for faculty serving as administrators and on evaluation committees. *Studies in Educational Evaluation, 54*, 94–106. https://doi.org/10.1016/j.stueduc.2016.12.004

Maguire, M., & Delahunt, B. (2017). Doing a thematic analysis: A practical, step-by-step guide for learning and teaching scholars. *All Ireland Journal of Teaching and Learning in Higher Education, 9*(3), 3351–3364. https://ojs.aishe.org/index.php/aishe-j/article/view/335

Marfuah, M., Novita, R., & Danoebroto, S. W. (2022). Book review: Supporting mathematics educators through and towards online learning. In K. Hollebrands, R. Anderson, & K. Oliver (Eds.), *Online learning in mathematics education*. *Educational Studies in Mathematics*. https://doi.org/10.1007/s10649-022-10175-z

Martin, F., & Bolliger, D. U. (2018). Engagement matters: Student perceptions on the importance of engagement strategies in the online learning environment. *Online learning*, *22*(1), 205-222. http://doi:10.24059/olj.v22i1.1092

Redmond, P., Alexsen, M., Maloney, S., Turner, J., Brown, A., Basson, M., Galligan, L., Lawrence, J. & Henderson, R. (2023). Student perceptions of online engagement. *Online Learning*, *27*(1), 383-403. https://doi.org/10.24059/olj.v27i1.3320

Redmond, P., Heffernan, A., Abawi, L., Brown, A. & Henderson, R. (2018) An online engagement framework for higher education. *Online Learning, 22*(1), 183-204. https://doi.org/10.24059/olj.v22i1.1175

Roland, N., Frenay, M., & Boudrenghien, G. (2018). Understanding academic persistence through the theory of planned behavior: Normative factors under investigation. *Journal of College Student Retention: Research, Theory & Practice, 20*(2), 215–235. https://doi.org/10.1177/1521025116656632

Rubin, B., Fernandes, R., Avgerinou, M. D., & Moore, J. (2010). The effect of learning management systems on student and faculty outcomes. *The Internet and Higher Education, 13*(1), 82–83. https://doi.org/10.1016/j.iheduc.2009.10.008

Russell, G., & Topham, P. (2012). The impact of social anxiety on student learning and well-being in higher education. *Journal of Mental Health, 21*(4), 375–385. https://doi.org/10.3109/09638237.2012.694505

Simon, M. (2022). Contributions of the learning through activity theoretical framework to understanding and using manipulatives in the learning and teaching of mathematical concepts, *The Journal of Mathematical Behavior, 66*. https://doi.org/10.1016/j.jmathb.2022.100945

Sinatra, G. M., Heddy, B. C., & Lombardi, D. (2015). The challenges of defining and measuring student engagement in science. *Educational Psychologist, 50*(1), 1–13. https://doi.org/10.1080/00461520.2014.1002924

Stone, C., Freeman, E., Dyment, J., Muir, T., & Milthorpe, N. (2019). Equal or equitable? The role of flexibility within online education. *Australian and International Journal of Rural Education, 29*(3), 26–40. https://journal.spera.asn.au/index.php/AIJRE/article/view/221

Stone, C., & O'Shea, S. E. (2019). My children … think it's cool that Mum is a uni student: Women with caring responsibilities studying online. *Australasian Journal of Educational Technology, 35*(6), 97–110. https://doi.org/10.14742/ajet.5504

Tualaulelei, E., Burke, K., Fanshawe, M., & Cameron, C. (2022). Mapping pedagogical touchpoints: Exploring online student engagement and course design. *Active Learning in Higher Education*, *23*(3), 189-203. https://doi.org/10.1177/1469787421990847

Wang, F. H. (2017). An exploration of online behaviour engagement and achievement in flipped classroom supported by learning management system. *Computers & Education, 114*, 79–91. https://doi.org/10.1016/j.compedu.2017.06.012

Wanner, T. (2014). Parallel universes: Student and teacher expectations and interactions in online vs face-to-face teaching and learning environments. *Ergo, 3*(3), 37–45.

Offline Versus Remote Teaching: Exploring Cultural Minority Student and Teacher Perceptions of Inclusive Learning Environments in Higher Education

Rinotha Senathirajah
Research Group Digital Education, Centre of Applied Research Future-Proof Education, Avans University of Applied Sciences, Breda, the Netherlands

Jana Vietze and Marieke Meeuwisse
Department of Psychology, Education and Child Studies, Erasmus University Rotterdam, Rotterdam, the Netherlands

Abstract
Perceived inclusiveness of higher education (HE) learning environments plays a major role in the academic outcomes and well-being of cultural minority students. Teachers create more inclusive learning environments through practices (i.e., culturally responsive teaching), especially if teachers share their students' cultural minority status. In this qualitative study, we investigated how cultural minority students and teachers perceived changes in the inclusiveness of their HE learning environment during the transition from offline to remote teaching (RT) as a result of the COVID-19 pandemic. We conducted online focus group interviews with twelve cultural minority students and five cultural minority teachers at a large urban university in the Netherlands. Thematic analysis revealed four teaching principles that contributed to the perceived inclusiveness in both the offline and RT learning environment: an inclusive curriculum, culture-related and caring teaching practices, cultural representation, and available (tech) resources. Students and teachers perceived caring teaching practices to be more important in RT compared to the offline learning environment. Teachers considered access to technological resources particularly important for making RT more inclusive for students. Findings emphasise the need for empirical research on online pedagogies during RT, incorporating the perspectives of cultural minority students and teachers.

Keywords: Higher education, remote teaching, inclusiveness, cultural minority, qualitative research

Senathirajah, R., Vietze, J. & Marieke, M. (2025) Offline versus remote teaching: Exploring cultural minority student and teacher perceptions of inclusive learning environments in higher education. *Online Learning 29*(2), pp. 298–321. https://doi.org.10.24059/olj.v29i2.4336

While many educationalists around the world strive to achieve inclusivity in higher education (HE) many students of cultural minority groups are struggling to fit in the educational system (Shyman, 2015; Tamtik & Guenter, 2020). In this study, the term cultural minority is used as umbrella term to entail ethnic minority, racial minority, national minority, and/or persons with a migration background, as is common in European scholarship (e.g., Vietze et al., 2019). Perceived inclusiveness of learning environments in HE is defined by Lee et al. (2014) as making students feel welcomed, respected, valued, and supported. According to these authors, achieving an inclusive learning environment is necessary to make each student feel comfortable and to allow students to integrate academically.

Despite the importance of inclusion for all students, current HE learning environments are often tailored to students from cultural majority groups (García et al., 2021), undermining the potential positive effects of an inclusive learning environment for cultural minority students' well-being and academic achievement (Lee et al., 2014). From a teacher perspective, while creating and sustaining an inclusive HE learning environment can be challenging in offline, face-to-face education (Civitillo et al., 2017; Schachner et al., 2016), remote teaching (RT) as a consequence of the COVID-19 pandemic has led to additional difficulties, such as connecting to students in terms of building trust and a bond with each other (Fletcher et al., 2023; Jiang et al., 2023; Korthals Altes et al., 2023). RT is a momentary shift of teaching instruction to an alternative form due to crisis circumstances, such as the COVID-19 pandemic, extreme weather conditions or circumstances where refugees do not get the opportunity to follow education at a safe place, versus online learning environments where the online courses are pre-planned (Jiang et al., 2023).

This qualitative study aims to better understand cultural minority students' and teachers' unique experiences of remote learning in HE during the COVID-19 pandemic. Therefore, we investigated how cultural minority students and cultural minority teachers perceived inclusiveness of RT during the COVID-19 pandemic, compared to mainly offline learning environments before the COVID-19 pandemic.

An Inclusive Higher Education Learning Environment

Prior studies on campuses in the United States have shown that it is important to create a diverse and supportive learning environment to make all students feel included (Dayley, 2020; Lee et al., 2014). Teachers play a significant role in fostering inclusiveness in any learning environment, for example by making students feel seen and heard (Bhatti et al., 2019; Campbell-Whatley et al., 2015). It starts with teachers recognising their students' need for more inclusion (Banks, 1993; Gay, 2013; Sandoval et al., 2020).

Multiple theoretical frameworks regarding diversity and inclusion propose that a focus on teaching through cultural diversity as well as a non-discriminatory climate at an educational institution may positively impact the learning outcomes of all students, including cultural minority and cultural majority students (Baysu et al., 2023; Civitillo et al., 2019; Gay, 2013; Schachner, 2019). For example, culturally responsive teaching (CRT) is described as using the cultural characteristics, experiences, and perspectives of students to teach them effectively (Gay, 2002). By referring to existing prior knowledge of students, the learning content becomes more meaningful for them and therefore increases their interest and facilitates (deep) learning

(Civitillo et al., 2019; Gay, 2013). Including ethnic and culturally diverse content in the curriculum is an aspect of CRT that is often researched and found to have a positive impact on cultural minority students' success (Aronson & Laughter, 2016; Gay, 2013). This aspect emphasizes that a course should be created to suit diverse learning environments (Gay, 2002). Another aspect within CRT is cultural scaffolding, which involves leveraging students' own cultural backgrounds and experiences to broaden their intellectual horizons and enhance their academic success. Cultural scaffolding includes teachers showing culturally sensitive care and fostering culturally responsive learning environments (Gay, 2002).

Whereas much research on cultural diversity in education focuses on teacher attitudes, the actual perceptions of teaching practices remain understudied (Civitillo et al., 2019). Like CRT, the framework of cultural diversity approaches in schools encompasses both beliefs and practices related to the inclusion of culturally diverse students in education (Civitillo et al., 2019; Schachner et al., 2021). On the one hand, schools can promote *equality and inclusion*, meaning that they prefer to not focus on differences but rather similarities between students in a classroom. On the other hand—and sometimes even simultaneously—schools can promote *cultural pluralism*, meaning that they acknowledge and promote cultural differences, see diversity as a resource and an added value, and represent different cultures in teaching materials (Schachner et al., 2021). Whereas both approaches may aim to increase the inclusiveness of an educational environment in their own way—one by ignoring, and the other by acknowledging differences—we still lack a substantial understanding of how minority students and minority teachers in Europe perceive and promote these approaches in HE teaching practices. The present study will investigate the perceptions of cultural diversity teaching practices to determine which practices became more relevant to cultural minority students and teachers in RT times.

To be able to create a complete view and deep understanding of inclusive HE, we need to include the unique perceptions and experiences of cultural minority students and their cultural minority teachers (Navarro et al., 2022; Schachner, 2019). In this study, cultural minority members provide their own rich experiences of navigating RT during COVID-19, therefore adding important—yet in Europe understudied—narratives of the success, resilience, and empowerment of cultural minorities in HE (García et al., 2021; Shyman, 2015). Also, contrasting student and teacher perceptions of equality and diversity in this study allows us to identify the necessary areas of teacher training but also competencies of students and teachers for effectively promoting inclusive learning environments (Fine-Davis & Faas, 2014; Kim et al., 2024).

Inclusiveness in Offline Learning Environments versus in Remote Teaching

Offline learning environments, or on-campus education, has been studied elaborately in the last few decades (Kumi-Yeboah et al., 2018; Meskhi et al., 2019). Inclusive pedagogies, such as CRT, have also been studied extensively in offline learning environments (Civitillo et al., 2019; Schirmer & Lockman, 2022). Due to the COVID-19 pandemic, education worldwide needed to shift to RT without adequate tools or infrastructure for teachers (Carrasco-Hernández et al., 2023). This presented teachers with abrupt and unique challenges for creating not only pedagogically sound, but also inclusive learning spaces. During RT, teachers need to adapt to different circumstances and tools compared to the offline environment (Carrasco-Hernández et al., 2023; Rice & Deschaine, 2020), and RT can benefit from the lessons learned from research in online education. For example, research in the United States showed that the perceived sense of connectedness of online students influenced the likelihood to continue with online courses (Tseng et al., 2022).

Earlier empirical findings have been inconclusive whether online learning environments are by default less inclusive than offline learning environments. Despite best-practice examples for creating inclusive online environments (e.g., Woodley et al., 2017), teachers may not always succeed in fostering high levels of community among online learners, due to an ineffective instructional design or a lack of directed facilitation of contact among students (Shea et al., 2006). Importantly, a qualitative study with African-American and Hispanic students showed that the mere lack of physical and social presence in online learning environments may be linked to experiences of isolation and frustration and directly affect students' communication and relationships with classmates (Kumi-Yeboah et al., 2018). In contrast, findings from universities in Russia considered access to online education as the first principle to create more inclusive learning environments for students (Meskhi et al., 2019). An explanation could be found in research from the United Kingdom, suggesting that the way of communication in online education is one of the reasons the online learning environment lacks inclusiveness (Funes & Mackness, 2018). Funes & Mackness (2018) state that due to reduced contact between teachers and students in online education, communication and presentation of learning content became more important than in an offline learning environment.

Recently, CRT in online learning environments has received increasing attention in educational research (Kim et al., 2024; Schirmer & Lockman, 2022; Woodley et al., 2017). Whereas CRT may be less evident in discussion forum posts and responses (Schirmer & Lockman, 2022), this theoretical framework covers mutual and different understandings, strategies, and challenges of students and their teachers related to inclusive online learning environments (Kim et al., 2024). However, little is known about the stability or adaptiveness of these understandings, strategies, and challenges over time and under changing contextual conditions. In the current study, we explore to what extent the perceptions related to CRT changed during the transition to RT as a result of the COVID-19 pandemic.

Research on the sudden impact of COVID-19 on education showed that because of the emergency situation educators were mostly focusing on the structure of their courses, by setting up online tutorials, lectures, and exams (Carrasco-Hernández et al., 2023; Thompson & Copeland, 2020). Exploring the possibilities of making online education inclusive for students was often neglected by teachers due to a shortage of resources. The shift in study routines and adjustments to course formats not only made students long to be heard and seen but also to feel less lonely during the sudden change of life and learning environments (Platt & Warwick, 2020; Thompson & Copeland, 2020).

In the present study, we explored the overarching question of how cultural minority students and teachers perceived inclusiveness of their learning environment in HE after the transition from offline to RT during the COVID-19 pandemic. We answered this question by exploring two sub-questions:

RQ 1) How important are inclusive elements of the offline learning environment and RT perceived by cultural minority students and teachers?

RQ 2) What are similarities and differences in inclusive elements of offline and RT HE learning environments?

By researching these questions, we aim to provide insight in the added value of the perspectives of both cultural minority students and teachers in HE.

Methods

Design

The present study is a qualitative study using focus group interviews with cultural minority students and cultural minority teachers in the Netherlands. Focus groups are well suited to provide rich and meaningful data on the topic of inclusiveness in HE (Barbour & Morgan, 2017; Leyerzapf & Abma, 2017). We conducted these focus groups between February and April 2021, after students and their academic institutions had experienced multiple transitions between offline teaching and RT since March 2020. Each transition, prompted by the COVID-19 pandemic and national lockdown rules, lasted from several weeks to several months.

Sampling Procedure and Participants

This study focused on the perceptions of cultural minority students and teachers who identified themselves as being part of a minority culture group in the Netherlands (Statistics Netherlands, 2021). To recruit participants, we employed convenience sampling, including a combination of criterion sampling and snowball sampling (Barbour & Morgan, 2017). The recruitment of participants took place from December 2020 to February 2021. First, the first author e-mailed social sciences Bachelor students from a large research university in the Western part of the Netherlands. Students were asked to reply if they were interested in the study and fit the following criteria: (a) currently studying or having studied at the university at the moment of data collection; (b) identifying as part of a cultural minority; (c) speaking Dutch fluently, as the focus group interviews were conducted in Dutch; (d) started studying before December 2019 and/or gained extensive experience in the offline environment. Next, we recruited students through the snowball method (Barbour & Morgan, 2017), in which the first author and study participants informed fellow students who fit the inclusion criteria. In parallel, the second author recruited cultural minority teachers through email. The inclusion criteria to recruit teachers were: (a) teaching or having direct teaching responsibilities at university (such as planning, execution, and/or evaluation of teaching); (b) identifying as part of a cultural minority; (c) speaking Dutch fluently; (d) started working at the university before the start of the COVID-19 pandemic in December 2019.

The final sample consisted of twelve cultural minority students and five cultural minority teachers (Table 1). The student sample consisted of both females (N = 8) and males (N = 4), and the teacher sample consisted of only females. The age range of the students was 21 to 28 (M_{age} = 21.42), and for teachers the age range was 30 to 39 (M_{age} = 34.20). The sample represented a range of the largest cultural minority groups in the Netherlands, such as Turkish, Surinamese, and Moroccan (Statistics Netherlands, 2021). All participants, except one student, were connected to the social sciences faculty. Before the COVID-19 pandemic, most participants had not followed online or hybrid education. Only two students of our sample had experienced some type of online education prior to COVID-19, as part of studying abroad. The other participants had no prior experiences with online education.

We conducted five focus group interviews and one individual interview with a teacher. First, four students participated in a pilot focus group interview but did not meet all final sampling criteria (i.e., had not experienced RT) or were not studying at the moment of data collection). Because they provided rich descriptions of personal experiences regarding inclusiveness in offline HE, we decided to include the pilot data for parts of the analysis (i.e., only regarding the offline learning environment). After finalizing the sampling criteria based on the pilot study, we interviewed two additional groups of cultural minority students and conducted three focus group interviews with cultural minority teachers. Apart from one interview that was conducted with a single participant, the focus groups varied in size from two to five participants.

Data Collection Procedure

We conducted the focus group interviews online via *Zoom* between February and April 2021. The goal of the focus group interviews was to explore cultural minority students' and teachers' perceptions of inclusiveness in the offline learning environment and during RT in HE. The focus of the interviews was to identify elements that would make learning environments more or less inclusive for cultural minority students. Thus, next to teachers' personal experiences of inclusion in HE, teachers were also asked questions regarding how they perceived, anticipated, and facilitated inclusive learning environments for their students.

To ensure methodological integrity, we created an interview outline (see Appendices 4 and 5) (Levitt et al., 2017). We created separate topic lists for the student and teacher interviews. To facilitate the flow of the focus group interviews and provide valuable context information, participants completed a short questionnaire before the interviews including personal data such as name, age, study programme, and with which culture they identify. The latter was an open question in which participants could describe their own culture, while some example answers were given (e.g., Dutch, Surinamese, Dutch-Surinamese…). Additionally, they graded how included they felt at their current university from 1 (= not included at all) to 10 (= very included). These grades were later used to prompt discussion during the focus group interviews. To facilitate storytelling, we asked the participants to think of concrete examples of inclusive and non-inclusive experiences at the university in preparation for the focus group interview.

To create a safe space for the participants to share their experiences, each focus group interview started with a short introduction round. To establish the main topic, the participants were first asked to define inclusiveness in their own words. After that, the interviewer provided a working definition of an inclusive learning environment in HE, namely, making students feel welcomed, respected, valued, and supported (Lee et al., 2014). To facilitate the conversation around inclusive learning environments, participants ranked inclusive curriculum elements (Radstake, 2017), first for the offline and then for the RT learning environments and elaborated on their ranking choices by use of concrete examples. Inclusive curriculum elements included for example "teaching and learning contexts," which can be described as course contents and teaching materials consisting of inclusiveness-related theoretical and practical knowledge (Radstake, 2017). The ranking was based on what the participants perceived as the most important (1) to the least important element (7) to feel included at university. At the end of the interview, there was room for the participants to share more experiences regarding inclusiveness at university.

Table 1

Participant Characteristics (Students and Teachers)

Name (Anony-mized)	Role	Gen-der (M/F)	Age	Cultural Self Identifi-cation	Study Programme	Grade Inclusive-ness Students (1-10) [a]	Grade Inclusive-ness Teachers (1-10) [b]
Brandon	Bachelor Student	M	24	Dutch-Indonesian	Psychology	8	-
Chayenne	Master's Student	F	25	Dutch-Surinamese	Governance and management of complex systems	7	-
Norah	Master's Student	F	23	Curaçaoan	Educational Sciences	4	-
Roshni	Bachelor Student	F	22	Dutch-Hindu-Surinamese	Pedagogical Sciences	9	-
Saphira	Master's Student	F	28	Surinamese-Creole	Public Administration	7	-
Tano	Master's Student	M	22	African-Dutch	Psychology	6	-
Tijana	Master's Student	F	24	Dutch-Serbian	Clinical Child and Family Studies	7	-
Halima	Course coordinator & tutor	F	39	Dutch-Moroccan	-	7	7
Irmak	Tutor	F	35	Turkish-Dutch	-	7	6.5

Jaanvi	Tutor	F	30	Dutch-Surinamese-Indian	-	6	7
Özlem	Practical coordinator	F	36	Dutch-Turkish	-	7	6.5
Ruby	Course coordinator & tutor	F	31	Belgian	-	6	6.5

[a] Students graded how included they felt in their current (RT) learning environment. Teachers anticipated how included their students felt in the current (RT) learning environment.
[b] The participants reported how included they felt in their current working environment.

Data Analysis

We used thematic analysis to analyse the research questions (Braun & Clarke, 2006; Pinto & Araújo e Sá, 2020). The focus within the analysis was on two different learning environments, namely the offline and RT learning environment, and on two different perceptions, namely of the cultural minority students and cultural minority teachers. The focus group interviews were transcribed verbatim and anonymised.

We coded the data with the software *ATLAS.ti* (Syed & Nelson, 2015). The manner of coding was deductive and inductive, as both theories of culturally responsive teaching (CRT; Gay, 2002) and cultural diversity approaches (Civitillo et al., 2017; Schachner et al., 2016), and information from the interviews were used to create codes (Braun & Clarke, 2006). A first draft of the codebook was based on the theoretical frameworks, which we used to code two student focus group transcripts. The final codebook consisted of 25 codes, of which 13 codes were derived from cultural diversity approaches (Civitillo et al., 2017; Schachner et al., 2016) and five codes from CRT (Gay, 2002). The remaining seven codes were inductive, of which five codes were related to an inclusive climate and two codes specifically described the characteristics of participants.

In line with the constructivist paradigm, participants and researchers were considered as active co-constructors of knowledge (Braun & Clarke, 2006). To ensure trustworthiness, the first author constantly reflected on her role as a cultural minority researcher and how this may have influenced the data collection and analysis (Morrow, 2005). To improve the research rigor, we adapted the research tools (i.e., interview outline, questionnaires) after the pilot study (Levitt et al., 2017). Furthermore, fidelity was enhanced by following the guidelines to plan and conduct focus group interviews, and thematically analyse them (Barbour & Morgan, 2017).

The first and second author analysed and coded the data, which ensured reliability as we discussed the codes together and adjusted the codebook along the way. We calculated inter-rater agreement through *ATLAS.ti* with Kippendorff's alpha (α) using a full student focus group interview. The inter-rater agreement of $\alpha = 0.84$ meant that coding was assumed reliable and there was sufficient agreement between the coders (Syed & Nelson, 2015).

Ethics

Prior to the focus group interviews, the participants filled in and signed a consent form. In this consent form, all the participants gave their informed and active consent for audio recording and use of the focus group interview data for research. The participants received an alias to ensure the anonymity of the data. Additionally, personal information given in the interview itself was anonymised. During the focus group interviews, a safe environment was created by giving the participants the freedom to leave the interview at any moment if they felt unsafe or uncomfortable. The study design was approved by the ethics committee of the HE institution where the research was conducted (application number #19-056a).

Results

The focus of this study was to compare perceptions of inclusiveness of offline and RT learning environments in HE by cultural minority students and cultural minority teachers. By means of thematic analysis, four themes emerged that represented core teaching principles that contributed to the perceived inclusiveness of the learning environment, namely (1) an inclusive curriculum, (2) culture-related and caring teacher practices, (3) cultural representation, and (4) available (tech) resources. In total, we coded 252 segments. The results are reported in the order of the four themes. Within each theme, we first describe the most important elements for perceived inclusiveness of the offline learning environment and then RT (RQ1). Second, we elaborate on similarities and differences between the offline learning environment and RT, and between student and teacher perceptions (RQ2). Finally, we provide summary of the most important findings. To illustrate the findings, we use pseudonymised coded segments from the focus group interviews. In Table 2 below, we have given an overview of perceived inclusive aspects in offline learning environments and in RT environments. We highlighted aspects that are different in italics.

Table 2

Overview of Perceived Inclusive Aspects in Offline Versus Remote Teaching Learning Environments

Themes	Offline learning environment	Remote teaching
1) Inclusive curriculum	• Including articles of diverse authors • Learning focused on different (religious) beliefs and groups • Learning not to discriminate based on cultural background • Including diverse examples in learning materials • Use cultural scaffolding	• Including articles of diverse authors (mentioned by students only) • Learning focused on different (religious) beliefs and groups • Learning not to discriminate based on cultural background • Including diverse examples in learning materials • Use cultural scaffolding • *A suitable way of assessment* (mentioned by students only)

2) Teacher practices	• Creating a safe environment • *Not discriminating between students* • *Asking about cultural experiences (e.g. 'How is this experienced in your heritage culture?')*	• Creating a safe environment • *Being approachable for students* • *Asking about student well-being (e.g. 'How are you doing?')* (mentioned by students only)
3) Cultural representation	• Diversity of students and teachers • *Lectures from culturally diverse teachers*	• Diversity of students and teachers • *Out-of-classroom experiences strengthening the bond with fellow students* (mentioned by students only) • *Promoting culturally diverse student organisations* (mentioned by students only)
4) Available (tech) resources	• *Facilitating student performance by supporting learning materials*	• *Facilitating a working laptop with a camera and microphone, and a stable internet connection* (mentioned by teachers only)

Inclusive Curriculum

The theme "inclusive curriculum" is described as a curriculum covering inclusive elements in HE. This means that the curriculum is designed with diverse topics suiting various cultural experiences but also learning intercultural competences. This theme consisted of 56 coded segments and is in line with the theoretical aspect "designing a culturally relevant curriculum" of CRT (Gay, 2002). Furthermore, in line with promoting cultural pluralism (Schachner, 2021), according to participants it is important that learning examples are focused on different religious beliefs and groups, but also on how people from different cultures can have different beliefs and attitudes. Moreover, students perceived being taught not to discriminate based on cultural background and to intervene when they witness ethnic discrimination as key elements of an inclusive curriculum. Effective discussions and conversations between students seemed to enhance the understanding of the curriculum as well as each other.

Most of the students and teachers considered inclusive curriculum elements as the most feasible option to increase the inclusiveness of the learning environments. Student Malini shared that the learning contents could be made more inclusive by including diverse examples: "I think that for example in the study programme of Psychology, we followed problem-based learning with those vignettes, you can easily adjust those and make it inclusive." Another student emphasised the importance of integrating articles of diverse authors. Her perception was shared by most students and teachers and nuanced the theoretical aspect promoting cultural pluralism (Schachner, 2021):

> I am very disappointed that in the years I have been studying at the [name university], the diversity in authors of suggested articles was very low. (…) I think of all the articles I had to read, only one article was written by a coloured person. (Chayenne, student)

Participants revealed that an inclusive curriculum is even more important during RT compared to the offline learning environment. A shared perspective of most of the students and teachers was that due to the sudden change to RT during COVID-19, the curriculum was one of the elements which needed to suit the students the most. As examples for an inclusive curriculum, participants revealed that assessments needed to be more inclusive as these were perceived to favour the majority culture students. Tano (student) elaborated on how important assessments are: "You should not be affected by the method of assessment because you have a different background et cetera. Assignments should not favour the cultural majority students more than the cultural minority students."

An example of a teacher's perspective on an inclusive curriculum is the quote of Özlem, a practical course coordinator, who perceived making the curriculum more inclusive as one of her most important tasks: "Education needs to contain it. (…) I would even adjust my teaching content if the university wouldn't support it because I find it of high importance, and it is my duty." Furthermore, teachers emphasised the need of focusing on students' knowledge and earlier experiences. A general perception of the participants was that more diverse examples and nuanced cultural perspectives needed to be covered in the learning content. Additionally, cultural scaffolding could be used to let students identify more with the learning content, which consequently would result in positive learning outcomes.

To conclude, certain elements of the curriculum were perceived as important by students and teachers to enhance the inclusiveness of the learning environments. These included covering diverse examples, adding non-Western literature to learning materials, transforming these materials into relatable prior (cultural) knowledge and experiences of students, and making assessment methods more inclusive, especially during RT compared to the offline learning environment.

Teacher Practices

The second theme "teacher practices" is the whole of teacher efforts, beliefs, attitudes, and activities that are meant to make students feel more included in the HE learning environment, such as being open to prior (cultural) experiences of students and use them as an asset for discussions. Overall, 89 coded segments were covered by this theme. Different aspects of CRT were comparable to this theme, for example "demonstrating cultural caring and building a learning community" (Gay, 2002). Furthermore, similar to the aspect "fostering equality" of cultural diversity approaches (Schachner et al., 2021), equal treatment, support for contact, and cooperation among students and teachers were considered important to feel included in learning environments. In general, teachers demonstrating care for students was perceived as one of the key elements to create an inclusive learning environment.

Notably, students perceived the role of the teacher as essential to create a safe learning environment. Roshni shared: "It starts with the teachers, they can make things open for discussion". Another student, Nigel, explained that students will be encouraged if teachers create a safe and inclusive atmosphere "for students to feel free to express themselves." In contrast, some teacher practices were perceived to make students feel discriminated against. An example of a non-inclusive learning environment, where the teacher's attitude affected the student is illustrated by the following experience of a student. A teacher questioned her multiple times at the very beginning of her master's programme if she was at the correct place, which made her uncomfortably conscious about her cultural background:

> It was the first day of my master's. (…) A coordinator or some other teacher was standing next to the door and for every student, the door was opened, and he heartily greeted everyone. Only when I entered (…) that teacher asked me three or more times if I was at the correct place and if I needed to enter there. (Chayenne, student)

Students perceived that it was easier to become invisible in the online classroom, and more challenging for teachers to prevent this. Saphira shared that teachers tried to enhance this process by putting students in smaller groups, in so-called "break-out rooms" in *Zoom*. She added that she found it pleasant that some teachers were approachable if students needed to share anything personal. Overall, teachers found it easier to create an inclusive learning environment in the offline classroom compared to the online classroom, as Jaanvi (teacher) shared "when you sit in a room with each other, you depend more on each other." Nevertheless, demonstrating care towards the students, especially in challenging times like the COVID-19 outbreak, was perceived as highly important for teachers.

Both students and teachers shared the importance of teachers in creating an inclusive offline and RT learning environment. Perceptions differed on how much assistance was given by the university for creating inclusive learning environments. Ruby, a course coordinator and teacher, shared that she was actively trying to make her teaching more inclusive. However, she emphasised the importance of guidance from the university in creating an inclusive learning environment, and that she currently felt she had to figure it out by herself. A teacher who had a background in educational sciences was aware of CRT in her practices:

> You must show interest to make students feel appreciated and seen. But also, from the didactic or educational perspective, it is important to spark the interest of students and suit their world to make sure the learning content sticks. (…) Because it then links to their knowledge or experience. (Irmak, teacher)

In conclusion, teacher practices such as attitudes and activities towards students are perceived to make students feel included in the learning environments in HE. Thus, it is crucial to create safe and inclusive learning environments for all students. Findings suggested that teachers need tools and more guidance to enhance the inclusiveness of the learning environments.

Cultural Representation

The third theme, "cultural representation," refers to the diversity of students as well as teachers, but also the availability of and familiarity with student organisations. This theme not only covers the presence of diversity within students and teachers, but also the representation of authors who are not from Western, Educated, Industrialised, Rich and Democratic (WEIRD) countries in suggested literature in curricula. In total, 53 of the coded segments were related to cultural representation. Different elements of "promoting cultural pluralism" of the cultural diversity approaches (Schachner et al., 2021) were found to have a positive impact on feeling included in the learning environment. For example, participants revealed that visual representation of different cultural minorities increased the sense of feeling at home. Noticing diverse students on the campus or being with them in the tutorial or practical groups, but also seeing diverse teachers lead (guest)lectures, tutorial, or practical groups decreased individual students' feelings as the odd one out. Illustrating this, Heru (alumnus) shared that he felt more included in his master's because he could "meet people from various cultures and countries." Chayenne (student) added that she found it important to relate her experiences with the experiences of the teachers.

During RT, students indicated that opportunities to represent different cultures were essential to feel included. Students needed more spaces of cultural representation than only in the curriculum. Malini shared that she longed for an online place where she could share experiences or expectations. Between the offline learning environment and RT, there were not many differences in cultural representation. However, having contact with fellow students is perceived as harder during RT, which makes it even more difficult for students to find other students they can identify with. The university promoting diverse student organisations and illustrating them equally as the majority culture organisations seemed to strengthen the sense of feeling included as perceived by cultural minority students. This was highlighted by the quote of Chayenne, in which she addressed the importance of promoting culturally diverse student organisations: "I think a lot of students would love to get in contact with a fellow person of colour who understands your situation better. It would be nice to highlight them [culturally diverse student organisations] more."

When student and teacher perceptions were compared, students seemed to emphasise the cultural representation in out-of-classroom experiences more. According to the participants, the importance of cultural diversity among teachers were perceived similar. Teachers seemed to recognise the need for cultural representation, which was illustrated in the following quote:

> For students, it is quite exceptional to see someone with for example a Moroccan background in front of a lecture hall. I got feedback from a girl [student] that, you know that you are the first person I kind of look like? Because you have curls too. Youknow, it is that simple. (Halima, course coordinator and teacher)

Additionally, a teacher (Jaanvi) confirmed the lack of cultural diversity in her department staff. She considered this lack a "shame" and stressed the value of diversity: "For students coming from a village, they have never seen coloured people. (…) I think that as a teacher you can contribute, when having a different background, to various knowledge and different experiences."

Altogether, being culturally represented in fellow students and teachers seemed to play a major role in feeling included. The findings suggested that the diversity of teachers and fellow students were both playing a key role to feel included as a student. The teachers considered the current lack of cultural diversity in teachers as a point of improvement for the university. Out-of-classroom experiences, such as the availability of and familiarity with culturally diverse student organisations boosted the feeling of being represented as connections between students seem to be strengthened.

Available (Tech) Resources

The fourth and final theme was "available (tech) resources," which consisted of 30 coded segments. This inductive theme covered the need of students for technological resources to study and communicate with teachers and fellow students, such as a laptop. Although students mentioned the need for the university to facilitate their learning process, this theme mainly focused on the needed (tech) resources during RT as it was perceived as more important compared to the offline learning environment.

When participants were asked how they would define inclusiveness of the learning environment in HE, most of them mentioned the need for support to perform well. Ratna (student) shared that when she would define inclusiveness, she would think of "everyone getting equal opportunities to perform and get the needed sources." This perception was shared by other students as well, such as Brandon, who emphasised the importance of the university in creating equal opportunities. Universities ought to be responsible to facilitate learning, "if it is harder for certain people."

The main difference between the offline learning environment and RT was the access to online education. Most teachers emphasised the importance of facilitating the needed sources for students to support creating an inclusive learning environment. Technical elements, such as a working laptop, a microphone, a camera, and a stable internet connection were perceived as very important to follow online education, which was considered as the basic need to include all students. Halima (course coordinator and teacher) perceived that it is much harder to create inclusiveness because "you miss that connection with the students." Circumstances of online education seemed to make it harder to create an inclusive learning environment:

> Sometimes you do not know who is in front of you, as in sometimes the camera does not work. (…) Because communication is difficult, I do notice that I have much less time and room for attention to inclusiveness. (…) So, to be able to take a step back and just have a conversation, that's not possible with the online or recorded lectures. (Halima, course coordinator and teacher)

While teachers were very particular about facilitating resources for students during RT, it was noticeable that the students did not emphasise the general need for extra support for resources during RT. In general, they did express their need for facilitating their performance, but specifically technological resources are mentioned by teachers only.

To conclude, findings suggested that the university was perceived to facilitate the students' learning by offering resources. This theme was thought to be more important during RT, as the teachers emphasised the need for technological resources to follow online education smoothly by students without any limitations which could lead to an inclusive learning environment for all students.

Other Perceptions of Inclusive Learning Environments

Next to the four above-mentioned teaching principles, some other perceptions of inclusiveness of the learning environment were related to university policies regarding diversity and inclusion. As examples, students named the slogans used by the university which could enhance feelings of inclusivity by the choice of words. In addition to university policy, a general sense of belonging due to other characteristics than cultural background (e.g. social preferences) seemed to play a role too. This is illustrated by a perspective from a student who describes how initiatives from students fostered inclusiveness:

> The inclusiveness I experience just comes from what we as students organize I think. So by contacting each other and by having group conversations [during RT]. It is not like I experience it from the university (…). It is because you search for things to be included. (Tano, student)

Furthermore, these characteristics played a role in the level of feeling included in the learning environment, such as relationships with other students, interest, and agency in bonding with others. Other experiences, such as working at the university also seemed to have a positive impact on the level of feeling included.

Difference in Perspectives Between Students and Teachers

As a consequence of the COVID-19 pandemic, students found that contact with teachers and fellow students was more important for feeling included than other aspects that were necessary in offline learning environments. Not all teachers appeared fully aware of their new caring role during RT, as they understandably focused more on transitioning to online education. Saphira (student) elaborates on her need to be heard by her teachers of the course, by the following quote:

> I believe there are differences within the university, promoting feeling included, as you can say. For an example it would matter if a teacher actually explicitly says something like 'if you want to share anything, you can always contact me for a Zoom conversation' or something like that. (Saphira, student)

Due to the added vulnerability of cultural minority students during the pandemic, caring conversations were more valuable. These interpretations of the above-mentioned results are necessary to understand cultural minority students and teachers' perspectives when generalising the findings to create inclusive learning environments.

Discussion

The main aim of this study was to investigate how cultural minority students and cultural minority teachers in HE perceive the inclusiveness of offline learning environments and RT. The perceived important inclusive elements are discussed (RQ1), as well as the similarities and differences of these elements between the two learning environments and student and teacher perspectives (RQ2). Focus group interviews with cultural minority students and cultural minority teachers revealed that perceptions of inclusiveness differed during RT compared to the offline learning environment. Key findings indicate that both students and teachers view the teacher's role as crucial in creating an inclusive learning environment. However, students and teachers tend to focus on different aspects of teaching practice. RT needs to be inclusive on several domains, besides merely making teaching materials available online.

Regarding the first research question, students perceived teacher practices as important in creating an inclusive offline learning environment as well as during RT. Understanding the cultural characteristics and contributions of different cultures, using cultural scaffolding and using diverse culturally relevant examples in instruction are important elements that seem to have a positive impact on creating an inclusive learning environment. These findings reinforce the theoretical guidelines for CRT (Gay, 2002). As practical implication, teachers in HE may use cultural scaffolding in teaching culturally diverse students. Through cultural scaffolding teachers utilise their cultural knowledge and experiences to teach students, such as sharing culturally relevant experiences (Gay, 2002). Universities can support by organising workshops that focus on specific teaching strategies to create an inclusive environment, such as embracing the need to use caring teaching practices and valuing cultural pluralism (Civitillo et al., 2019; Rice & Deschaine, 2020; Robson et al., 2018). Awareness of the impact of caring practices by teachers (Kim et al., 2024), through discussing this concept with teachers and providing or co-creating tools for using caring practices, can be integrated in supporting workshops for teachers and through other forms of support.

Additionally, cultural representation was perceived as one of the most important inclusive elements of the offline learning environment. This can be explained by the need for feeling represented to increase the sense of belonging (García et al., 2021). Students will be able to connect more easily with teachers or fellow students when they have similar backgrounds (García et al., 2021; Lee et al., 2014). Cultural representation is still valued much during RT, but more on the level of student organisations where students can meet fellow cultural minority students. A possible explanation is a need for more connections during RT due to students' increased feelings of loneliness during the COVID-19 pandemic (Kaplan-Rakowski, 2020; Tseng et al., 2022). Based on these findings, universities are recommended to consider the level of cultural representation when forming their teaching team—which is dependent on the institutional policies as well as institutional practices regarding hiring procedures. Furthermore, not only the most popular student organisations that mostly endorse the majority culture should be promoted but also cultural minority student organisations (Campbell-Whatley et al., 2015).

Available (tech) resources are perceived to be the most important element during RT by teachers. The reason for this might be the extra sources needed to follow online education, such as technological resources (Funes & Mackness, 2018). While it might be possible to find or ask for these resources more easily in the offline learning environment, it is harder to do during RT (Jiang et al., 2023). Besides, the fact that not all students can follow online education can also be explained by financial differences between students (Gravlee, 2020). To make it possible to create a strong base for an inclusive online environment, it is recommended to make sure that all students have the technological resources (Meshki et al., 2019). Potential extra measures taken by universities to provide these resources need to be communicated clearly to the students.

Regarding the second research question, looking at the perceived similarities of both the offline learning environment and RT, it seems that having an inclusive curriculum contributes to feeling included in both learning environments. Students perceive that learning about fellow students' heritage cultures, especially through discussions of personal experiences, enhances the feeling of inclusiveness in the learning environments (Banks 1993; Schachner et al., 2021). However, it seems more important during RT, as the sudden change to online education has created an unfamiliar situation (Jiang et al., 2023; Kaplan-Rakowski, 2020). The curriculum is perceived as one of the elements which needs to suit the students the most in emergency situations such as COVID-19 pandemic. It is recommended to make necessary adjustments alongside making learning materials available online, such as creating suitable assessment methods and content (Carrasco-Hernández et al., 2023; Thompson & Copeland, 2020). When comparing the experiences of both learning environments, the findings suggest that social presence is valued as an asset in fostering inclusion (Kumi-Yeboah et al., 2018).

Notably, one of the perceived differences between the two learning environments is teacher practices focused on creating an inclusive learning environment. In the online learning environment, teachers seem to play a significant role in creating an inclusive HE learning environment. Teachers demonstrating care towards the students are perceived as very valuable, for example by asking informally about how students are feeling. This could be explained by the sudden impact that the COVID-19 pandemic had on the well-being of students (Kaplan-Rakowski, 2020). Since students have less contact with others, the need of feeling cared for increased. Future research should also include cultural majority teachers for inclusion workshops to better suit all teachers (Lee et al., 2014).

Finally, the perspectives of students and teachers seem to differ more in RT in comparison to the offline learning environment. This could be explained by the fact that other factors may play a role in feeling included during RT, compared to the offline learning environment (Funes & Mackness, 2018; Kaplan-Rakowski, 2020; Kumi–Yeboah et al., 2018; Meskhi et al., 2019). When suddenly transitioning to RT, it is not only important to move the learning content into online lectures and tutorial groups, but the teachers and the students also need to be prepared for the change of learning environments (Jiang et al., 2023; Thompson & Copeland, 2020). Furthermore, students seem to long for out-of-classroom experiences and perceive these experiences as crucial in enhancing feeling included and in strengthening connections to other students (Dayley, 2020). In contrast, the teachers seem to value in-class experiences more, as they appear to have more control over these experiences (Jiang et al., 2023; Sandoval et al., 2020). We recommend for future research to focus on the difference in perceptions between students and teachers as they seem to be highly meaningful to minimise the obstacles for students of cultural minority groups to perform well and protect their well-being (Carrasco-Hernández et al., 2023; Lee et al., 2014).

Participants in this study held contrasting opinions about the need for available (tech) resources during RT. Teachers experienced a lack of technological sources for students and perceived this lack as an obstacle to follow online education for students. These available (tech) resources can not only increase the inclusiveness of the learning environment but also enhance learning outcomes, such as being able to follow a full online tutorial without losing the network connection (Carrasco-Hernández et al., 2023; Platt & Warwick, 2020). Differences in social-economic status among students could cause unequal access to the needed resources for RT, such as a laptop with access to a camera and microphone (Platt & Warwick, 2020; Tamtik & Guenter, 2020). However, in contrast to teachers, students did not specifically mention the lack of technical resources. Students did emphasise the importance of the university offering resources to facilitate learning (Lee et al., 2014), but more research is needed to explore the specific needs of students during RT (Carrasco-Hernández et al., 2023).

As most cultural-diversity research has focused on teaching attitudes, in this study we wanted to fill the gap in the understudied perceptions of teaching practices (Civitillo et al., 2019). The theoretical frameworks we used for coding were diversity perspectives (Civitillo et al., 2019; Schachner, 2019) and CRT (Gay, 2002). The findings suggested that teachers were mostly occupied with general teaching practices during RT, such as shifting to online courses and available (tech) resources, instead of culturally sensitive teaching practices. Students perceived caring teacher practices valuable, as teachers' caring conversations and gestures were much needed to feel inclusive during RT. Earlier research has shown that these caring practices of teachers are similarly valued in online learning environments (Gardner & Leary, 2023; Kim et al., 2024).

Limitations

This study explored perceptions towards inclusiveness of the offline and RT HE learning environments by cultural minority students and teachers. Nonetheless, some limitations should be noted. A first limitation was that the COVID-19 pandemic made it more difficult to find enough participants. Consequently, some focus group interviews were organised in smaller groups or even one interview with one participant. This could have an impact on the discussions held within the focus groups. Secondly, the experiences of the students and teachers were influenced by the complex and drastic consequences of the COVID-19 pandemic for students' and teachers' daily lives (Kaplan-Rakowski, 2020; Thompson & Copeland, 2020). Due to these circumstances, these findings are specific to the context and experiences of our study/participants.

During RT, it seems to be important to offer the needed resources to make the students feel included. Teachers should receive more guidance and training in increasing the inclusiveness of the learning environment, by emphasising the need for demonstrating more care towards the students and including other aspects of CRT (Gay, 2002; Gay, 2013). Furthermore, universities should facilitate online education by making technological resources available to students such as affording study places with computers or laptops with working camera, microphone, and a stable internet connection. Finally, when students feel more culturally represented through the curriculum, teachers, and fellow students, they can experience a learning environment that can boost them to reach great academic heights (Schachner et al., 2021).

Conclusions

This study explored the perceptions of inclusiveness of HE learning environments by cultural minority students and teachers after the transition to RT during the COVID-19 pandemic. To feel included in a HE learning environment, cultural minority students need an inclusive curriculum, culturally relevant and caring teacher practices, cultural representation, and available (tech) resources. These teaching principles align with earlier research (Civitillo et al., 2019; Gay, 2013; Schachner, 2019), except for the theme *available (tech) resources*. This theme adds to the canon of inclusive higher learning environments.

As empirical research on the perceptions of cultural minority students and teachers in HE in the European context is scarce, we believe that the current findings could be a starting point for investigating inclusiveness in blended learning environments (Korthals Altes et al., 2023) that have gained in popularity since the COVID-19 pandemic. These findings are interesting for universities across Europe where RT is needed.

As instruction has moved to online, hybrid, and blended in HE in the past years, these findings can be interesting when conducting further research integrating online elements in education (Funes & Mackness, 2018). As students were forced to follow online education during the COVID-19 pandemic and will most likely follow some sort of hybrid education in the future, it is crucial to better understand its consequences for inclusiveness in the learning environment (Carrasco-Hernández et al., 2023; Gravlee, 2020; Kaplan-Rakowski, 2020). We believe that future studies with a longitudinal, quantitative design can help test and possibly generalise our findings in other learning environments containing online elements and other study populations. It is essential to involve cultural minority students' and teachers' perceptions in working towards inclusive learning environments. Their voices are often unheard, but most important to make a positive difference in diverse learning environments in the near future.

References

Aronson, B., & Laughter, J. (2016). The theory and practice of culturally relevant education: A synthesis of research across content areas. *Review of Educational Research, 86*(1), 163–206. https://doi.org/10.3102/0034654315582066

Banks, J. A. (1993). Multicultural education: Historical development, dimensions, and practice. *Review of Research in Education, 19*, 3-49. https://doi.org/10.2307/1167339

Barbour, R. S., & Morgan, D. L. (2017). *A new era in focus group research: Challenges, innovation and practice*. Palgrave Macmillan. https://doi.org/10.1057/978-1-137-58614-8

Baysu, G., Agirdag, O., & De Leersnyder, J. (2023). The association between perceived discriminatory climate in school and student performance in math and reading: A cross-national analysis using PISA 2018. *Journal of Youth and Adolescence, 52*(3), 619–636. https://doi.org/10.1007/s10964-022-01712-3

Bhatti, M. A., Alshagawi, M., Zakariya, A., & Juhari, A. S. (2019). Do multicultural faculty members perform well in higher educational institutions? Examining the roles of psychological diversity climate, HRM practices and personality traits (Big Five). *European Journal of Training and Development, 43*(1/2), 166–187. https://doi.org/10.1108/EJTD-08-2018-0081

Braun, V. & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77-101. http://dx.doi.org/10.1191/1478088706qp063oa

Campbell-Whatley, G. D., Wang, C., Toms, O., & Williams, N. (2015). Factors affecting campus climate: Creating a welcoming environment. *New Waves Educational Research & Development, 18*(2), 40-52.

Carrasco-Hernández, A., Lozano-Reina, G., Lucas-Pérez, M. E., Madrid-Garre, M. F., & Sánchez-Marín, G. (2023). Impact of an emergency remote teaching model on students' academic performance during COVID-19. *Technology, Knowledge and Learning, 29*(1), 483-508. https://doi.org/10.1007/s10758-023-09665-7

Centraal Bureau Statistiek. (2021, June). Hoeveel mensen met een migratieachtergrond wonen in Nederland?. https://www.cbs.nl/nl-nl/dossier/dossier-asiel-migratie-en-integratie/hoeveel-mensen-met-een-migratieachtergrond-wonen-in-nederland-

Centraal Bureau Statistiek. (2021, May). Persoon met een migratieachtergrond. https://www.cbs.nl/nl-nl/onze-diensten/methoden/begrippen/persoon-met-een-migratieachtergrond-

Civitillo, S., Juang, L. P., Badra, M., & Schachner, M. K. (2019). The interplay between culturally responsive teaching, cultural diversity beliefs, and self-reflection: A multiple case study. *Teaching and Teacher Education, 77*, 341-351. https://doi.org/10.1016/j.tate.2018.11.002

Civitillo, S., Schachner, M., Juang, L., van de Vijver, F. J. R., Handrick, A., & Noack, P. (2017). Towards a better understanding of cultural diversity approaches at school: A multi-informant and mixed-methods study. *Learning, Culture and Social Interaction, 12,* 1–14. https://doi.org/10.1016/j.lcsi.2016.09.002

Dayley, C. (2020). Student perceptions of diversity in technical and professional communication academic programs. *Technical Communication Quarterly, 29*(1), 49-69. https://doi.org/10.1080/10572252.2019.1635210

Fine-Davis, M., & Faas, D. (2014). Equality and diversity in the classroom: A comparison of students' and teachers' attitudes in six European countries. *Social Indicators Research, 119*(3), 1319–1334. https://doi.org/10.1007/s11205-013-0547-9

Fletcher, T. L., Jefferson, J. P., Boyd, B., Park, S. E., & Crumpton-Young, L. (2023). Impact of COVID-19 on sense of belonging: Experiences of engineering students, faculty, and staff at Historically Black Colleges and Universities (HBCUs). *Journal of Engineering Education, 112*(2), 488-520. https://doi.org/10.1002/jee.20512

Funes, M., & Mackness, J. (2018). When inclusion excludes: A counter narrative of open online education. *Learning, Media and Technology, 43*(2), 119–138.https://doi.org/10.1080/17439884.2018.1444638

García, I., Jackson, A., Harwood, S. A., Greenlee, A. J., Lee, C. A., & Chrisinger, B. (2021). "Like a fish out of water": The experience of African American and Latinx planning students. *Journal of the American Planning Association, 87*(1), 108–122. https://doi.org/10.1080/01944363.2020.1777184

Gardner, K., & Leary, H. (2023). Online learning for first-generation and underrepresented minoritized students: A literature review using a model of student engagement. *Online Learning, 27*(1). https://doi.org/10.24059/olj.v27i1.3392

Gay, G. (2002). Preparing for culturally responsive teaching. *Journal of Teacher Education, 53*(2), 106-116. http://dx.doi.org/10.1177/0022487102053002003

Gay, G. (2013). Teaching to and through cultural diversity. *Curriculum Inquiry, 43*(1), 48–70. http://dx.doi.org/10.1111/curi.12002

Gravlee, C. C. (2020). Systemic racism, chronic health inequities, and COVID-19: A syndemic in the making? *American Journal of Human Biology, 32*(5). https://doi.org/10.1002/ajhb.23482

Jiang, X., Nam, B. H., Tian, X., & Jin, H. (2023). How to cope with emergency remote teaching for university academics: The case of a high-profile language university in China. *Sage Open, 13*(1). https://doi.org/10.1177/21582440231158026

Kaplan-Rakowski, R. (2020). Addressing students' emotional needs during the COVID-19 pandemic: A perspective on text versus video feedback in online environments. *Educational Technology Research and Development, 69*, 133-136. https://doi.org/10.1007/s11423-020-09897-9

Korthals Altes, T., Muftugil-Yalcin, S., & Slootman, M. (2023). Belonging in online synchronous classrooms: Experiences of minoritized students in Dutch higher education during the COVID-19 pandemic. *Education Sciences, 13*(10), 986. https://doi.org/10.3390/educsci13100986

Kim, Y., Kumi-Yeboah, A., & Mohammed, Z. (2024). Promoting culturally responsive teaching in online learning: Experiences and challenges of instructors and students in higher education. *Distance Education*, *45*(3), 1-18. https://doi.org/10.1080/01587919.2024.2345635

Kumi–Yeboah, A., Dogbey, J., & Yuan, G. (2018). Exploring factors that promote online learning experiences and academic self-concept of minority high school students. *Journal of Research on Technology in Education, 50*(1), 1–17. https://doi.org/10.1080/15391523.2017.1365669

Lee, W. C., Matusovich, H. M., & Brown, P. R. (2014). Measuring underrepresented student perceptions of inclusion within engineering departments and universities. *International Journal of Engineering Education, 30*(1), 150-165.

Levitt, H. M., Motulsky, S. L., Wertz, F. J., Morrow, S. L., & Ponterotto, J. G. (2017). Recommendations for designing and reviewing qualitative research in psychology: Promoting methodological integrity. *Qualitative Psychology, 4*(1), 2-22. http://dx.doi.org/10.1037/qup0000082

Leyerzapf, H., & Abma, T. (2017). Cultural minority students' experiences with intercultural competency in medical education. *Medical Education, 51*(5), 521–530. http://doi.org/ 10.1111/medu.13302

Meskhi, B., Ponomareva, S., & Ugnich, E. (2019). E-learning in higher inclusive education: Needs, opportunities and limitations. *International Journal of Educational Management, 33*(3), 424–437. https://doi.org/10.1108/IJEM-09-2018-0282

Navarro, O., Ronan, B., & Reyes Patron, I. (2022). Teacher candidates of color experiences and perceptions of culturally responsive teaching within teacher education: "They hit the target, not the bullseye." *Journal for Multicultural Education, 16*(4), 374–386. https://doi.org/10.1108/JME-01-2022-0007

Pinto, S., & Araújo e Sá, M. H. (2020). Researching across languages and cultures: A study with doctoral students and supervisors at a Portuguese university. *European Journal of Higher Education, 10*(3), 276-293. https://doi.org/10.1080/21568235.2020.1777449

Platt, L., & Warwick, R. (2020). COVID-19 and ethnic inequalities in England and Wales. *Fiscal Studies, 41*(2), 259–289. https://doi.org/10.1111/1475-5890.12228

Radstake, H. (2017). Quick scan for "diversity sensitive teaching and learning" http://learningindiversity.com/diversity-scan-diversity-inclusion/

Rice, M. F., & Deschaine, M. E. (2020). Orienting toward teacher education for online environments for all students. *The Educational Forum, 84*(2), 114-125. https://doi.org/10.1080/00131725.2020.1702747

Robson, S., Almeida, J., & Schartner, A. (2018). Internationalization at home: Time for review and development? *European Journal of Higher Education, 8*(1), 19-35. https://doi.org/10.1080/21568235.2017.1376697

Sandoval, M., Vázquez, C. M., Simon, C., & Sandigo, A. M. (2020). Student and faculty perspectives of inclusive teaching practices in teacher training degree programs. *Revista Brasileira de Educação Especial, 26*(4), 551-554.

Schachner, M. K., Noack, P., Van de Vijver, F. J. R., & Eckstein, K. (2016). Cultural diversity climate and psychological adjustment at school-equality and inclusion versus cultural pluralism. *Child Development, 87*(4), 1175–1191. https://doi.org/10.1111/cdev.12536

Schachner, M. K. (2019). From equality and inclusion to cultural pluralism – Evolution and effects of cultural diversity perspectives in schools. *European Journal of Developmental Psychology, 16(*1), 1–17. https://doi.org/10.1080/17405629.2017.1326378

Schachner, M. K., Schwarzenthal, M., Moffitt, U., Civitillo, S., & Juang, L. (2021). Capturing a nuanced picture of classroom cultural diversity climate: Multigroup and multilevel analyses among secondary school students in Germany. *Contemporary Educational Psychology, 65*, 1-14. https://doi.org/10.1016/j.cedpsych.2021.101971

Schirmer, B., & Lockman, A. (2022). Culturally responsive teaching in an undergraduate online general education course. *Online Learning, 26*(3). 142-148 https://doi.org/10.24059/olj.v26i3.2805

Shea, P., Li, C. S., & Pickett, A. (2006). A study of teaching presence and student sense of learning community in fully online and web-enhanced college courses. *The Internet and Higher Education, 9*(3), 175-190. https://doi.org/10.1016/j.iheduc.2006.06.005

Shyman, E. (2015). Toward a globally sensitive definition of inclusive education based in social justice. *International Journal of Disability, Development and Education, 62*(4), 351–362. https://doi.org/10.1080/1034912X.2015.1025715

Syed, M., & Nelson, S. C. (2015). Guidelines for establishing reliability when coding narrative data. *Emerging Adulthood, 3*(6), 375-387. https://doi.org/10.1177/2167696815587648

Tamtik, M., & Guenter, M. (2020). Policy analysis of equity, diversity and inclusion strategies in Canadian universities – How far have we come? *Canadian Journal of Higher Education, 49*(3), 41–56. https://doi.org/10.7202/1066634ar

Thompson, K. M., & Copeland, C. (2020). Inclusive considerations for optimal online learning in times of disasters and crises. *Information and Learning Sciences, 121*(7/8), 481-486. https://doi.org/ 10.1108/ILS-04-2020-0083

Tseng, H., Kuo, Y. C., Yeh, H. T., & Tang, Y. (2022). Relationships between connectedness, performance proficiency, satisfaction, and online learning continuance. *Online Learning, 26*(1), 285-301. https://doi.org/10.24059/olj.v1i1.2637

Van Wig, A., Yang, S., Bahlmann Bollinger, C., Chen, X., Karkar-Esperat, T., Pole, K., & Wilson, N. (2022). "Simplicity is key": Literacy graduate students' perceptions of online learning. *Online Learning, 26*(1), 203-220. https://doi.org/10.24059/olj.v26i1.2607

Vietze, J., Schachner, M. K., & Juang, L. (2019). Peer cultural socialisation: A resource for minority adolescents' cultural identity, life satisfaction, and school values. *Intercultural Education, 30*(5), 579-598. https://doi.org/10.1080/14675986.2019.1586213

Woodley, X. M., Mucundanyi, G., & Lockard, M. (2017). Designing counter-narratives: Constructing culturally responsive curriculum online. *International Journal of Online Pedagogy and Course Design (IJOPCD), 7*(1), 43-56. https://doi.org/10.4018/IJOPCD.2017010104

Impact of Laboratory Exercises on Undergraduate Learning Outcomes in Online STEM General Education Courses Among Working Adult and Returning Students

Kristen A. Miller
Department of Space Studies

Shelli N. Carter
Department of Biology and Chemistry

Joseph Marra
Department of Physics and Engineering
American Public University System, Charles Town, West Virginia, U.S.A.

Abstract
Fully online courses and degree programs are popular with students. These courses should provide the rigor and value of traditional learning in a face-to-face classroom to ensure mastery of concepts and learning objectives. This research expands previous work to investigate the effectiveness of online laboratory exercises in enhancing student understanding of core concepts taught in fully online introductory astronomy, physics, and biology courses. Identical classes, with or without an online laboratory, were compared to determine gains in content mastery. A Likert-style survey was also used to quantify student perception of the laboratory component for those courses and measure overall student satisfaction. Results indicated astronomy and physics students in online laboratory courses showed significant gains in mastery of learning outcomes, thereby demonstrating effectiveness; biology students in online courses showed more mixed results. Further, surveys indicated student perceptions strongly support the belief that the labs helped to learn the course material and labs were an effective "hands-on" experience, directly contributing to student satisfaction in all disciplines studied. As such, this study represents an assessment of the effectiveness of different online course designs in achieving student mastery and satisfaction.

Keywords: Online laboratory, student satisfaction, student mastery of learning outcomes, STEM education, online learning

Miller, K.A., Carter, S.N., & Marra, J. (2025). Impact of laboratory exercises on the achievement of undergraduate learning outcomes in online STEM general education courses among working adult and returning student. *Online Learning Journal*, *29*(2), pp. 322–356. https://doi.org/10.24059/olj.v29i2.447010.

Online options in higher education are becoming more common and increasing in market share, with 61% of undergraduate students taking at least one distance education course as of fall 2021 (U.S. NCES, 2023). Online learning options offer flexibility for adult and returning learners and opportunities for advancement for working professionals and active-duty military service members. Online learning also attracts technology savvy younger generation students who are more comfortable using virtual learning methods. Online courses and degree programs are an integral part of educational systems today and are considerably more prevalent following the COVID-19 pandemic.

Prior Work Review

The effectiveness of online learning experiences compared to face-to-face experiences has been studied for years, with results helping to inform curriculum development, guide teaching strategies, and improve experiences for instructors and students. Several studies have compared online and face-to-face learning environments with consistent conclusions. Johnson identified that students achieved learning outcomes at similar levels, although online learners reported different perceptions of instructor and course quality (Johnson, 2000). Lovern demonstrated that assessment of student achievement of learning outcomes could not be distinguished between online, hybrid and face-to-face learning environments (Lovern, 2011). Some studies have extended this research to laboratory experiments, concluding that online laboratory experiments were as effective and, in some cases, more effective than hands-on laboratory experiments, with results varying depending on the specifics of the laboratory exercises and their role within the course (Darrah et al., 2014; Corter et al., 2011; Brinson, 2015). Implementation of laboratory experiments in introductory science courses presents unique challenges. Course designers and instructors must decide between which lab content to use and how to employ it; some research indicates that laboratory assignments focused on teaching experimental techniques are more valuable than those reinforcing classroom instructions (Holmes and Wieman, 2018.)

As online options increase in scope as well as student numbers, it is vital to ensure the quality of education is comparable to that provided by traditional learning experiences. This study focuses on Science, Technology, Engineering, and Mathematics (STEM) learning in the online environment and evaluates the efficacy of online laboratory exercises as a means of augmenting student mastery of core concepts in fully online, introductory STEM classes.

Phase 1 of this research focused on the use of fully online laboratory exercises in virtual introductory astronomy classrooms (see Miller & Carter, 2023). The astronomy classes targeted in Phase 1 were 100-level survey-style general education courses. The textbook, lecture materials, assessments, teaching pool, and student population were identical for the classes; the only difference was whether the classes included online laboratory exercises. Phase 1 evaluated student quiz results from the first (pre-quiz) and last (post-quiz) weeks of class, comparing learning gains between classes that did/did not include laboratory exercises. The quiz questions were identical in both sets of classes and in both the pre- and post- quizzes; they were designed to evaluate core topics covered by the lecture and readings in both classes but emphasized by the labs. All students were expected to master these core topics, which were directly linked to course learning outcomes, but students in the lab sections received supplemental exposure to the topics through completing the labs. The goal of Phase 1 was to determine whether online laboratory exercises were an effective means of increasing student learning gains in a virtual classroom setting in the introductory astronomy courses. Student enjoyment and perception were also assessed through a Likert-style survey.

A total of 331 students participated in Phase 1 of this study, with 186 from the non-lab classes and 145 from the lab classes. The results from Phase 1 demonstrated significant gains in assessment scores for students who participated in the classes, which included the labs compared to their peers in the classes without labs, suggesting that the online lab exercises effectively increased content mastery. Student reception to the labs was evaluated and showed a strong perception of both the effectiveness of the online labs as a learning tool as well as increased enjoyment of the online class experience when labs were included. These perceptions were universal and not directly linked to measured student performance; in other words, students enjoyed the labs and believed that they increased understanding of the material regardless of individual student learning gains in the course.

The labs in Phase 1 represented three different styles. The first lab style were fully pre-designed simulation-based laboratory exercises, available on the Astronomy Education at the University of Nebraska-Lincoln website (http://astro.unl.edu) through the Nebraska Astronomy Applet (NAAP). These labs include detailed instructions and supplemental/background reading material to help students better understand the labs and concepts. The second style were exercises created by the course designer centered around web-based astronomy simulations. These included instructions but no background/supplemental information. The third style were exercises created by the course designer using open-access astronomical databases. These labs included only basic instructions, allowing students freedom to investigate correlations within the data. Phase 1 results indicated that the style of online lab was a key factor in the efficacy of the laboratory experience, and that labs with a component of realism, e.g., those that allowed the students to use astronomical datasets as opposed to simulated data from virtual lab exercises, resulted in the highest gains in student learning (see Miller & Carter, 2023 for further details on Phase 1).

The current phase of this research study, reported here, focuses on STEM learning in the online environment and evaluates the efficacy of online laboratory exercises as a means of augmenting student mastery of core concepts in fully online, introductory STEM classes across three different disciplines. The current work expands upon the results presented in Phase 1 by evaluating the impact of adjunct virtual lab exercises on the students' ability to meet learning outcomes in online introductory biology and physics courses. New results for the introductory astronomy courses are also discussed.

Literature Review

Overview

Laboratory exercises provide significant value as part of a science curriculum. Phase 1 of this work discussed above explored the integration of online laboratory exercises in fully online introductory astronomy courses, comparing classes with and without virtual labs, finding that simulated hands-on experiences are effective supplements to traditional learning components in online education (Miller & Carter, 2023). Phase 1 of this study confirmed previous work indicating that laboratory exercises increase student performance in science courses (Marino, 2018, Bandura et al., 1996). Additionally, laboratory exercises offer the students who benefit from different instructional approaches options to learn material in a way that's best suited for them (Marino, 2018).

Laboratory experiments are not limited to the use of hands-on materials—virtual laboratory experiments can be performed using software simulation as explored by Cancilla and Albon, who addressed the transition of science labs from traditional to online, reviewing the various challenges and noting the growing interest in online labs across many disciplines (Cancilla & Albon, 2008).These virtual laboratory experiments have advantages and disadvantages when compared with the traditional hands-on laboratory experiments. Virtual laboratory experiments are less expensive and more convenient to perform (Bhargava et al., 2006; Lynch & Ghergulescu, 2017; Heradio et al., 2016). Virtual laboratory experiments also provide accessibility options; they are particularly effective for students with disabilities (Lynch & Ghergulescu, 2017). Despite these advantages, virtual labs do not expose students to the use of laboratory equipment, experiment set up and the challenges of dealing with real world data (Lynch & Ghergulescu, 2017; Lewis, 2014).

Online Laboratory Exercises in Astronomy Courses

Research on the use of virtual laboratory exercises in astronomy courses is consistent with the general findings discussed above. Beznosko et al. (2021) documented high student satisfaction when transitioning their introductory astronomy courses to virtual laboratory exercises as part of an initiative to reduce student financial burden and increase collaboration. Similarly, Vogt et al. (2013) found that students using online astronomy labs that included image and spectra analysis performed at least as well as their on-campus counterparts. Khorolskyi (2023) also showed that the improved student perception of the course due to the interactive aspect of virtual laboratory exercises was a major factor in students' improved performance. Together, these studies support the conclusion that the use of virtual laboratory exercises in astronomy courses contributes positively to students' achievement of learning outcomes. However, confidence in the conclusions drawn from these studies could be strengthened with larger samples and the use of quantitative measurements of achievement instead or in addition to qualitative assessments such as student satisfaction.

Online Laboratory Exercises in Physics Courses

Similar data exists for the use of virtual laboratory exercises in physics courses. Darrah et al. (2014) studied the use of physics laboratory exercises to reinforce concepts presented in classroom lecture-based instruction confirms that the use of virtual labs can be at least as effective as hands-on labs. Taghavi and Colen (2009) found that the computer simulation exercises resulted in students learning more when used with traditional course material. Sokoloff et al. studies the use of Real Time Physics, a virtual laboratory tool that improved students understanding of introductory physics concepts (Sokoloff et al., 2007). Campbell et al. (2004) examined the performance of groups of students who were assigned to either physical labs or a combined virtual/physical lab, finding that students in the virtual/physical lab group performed as well as their counterparts. These studies confirm the effectiveness of virtual laboratory exercises and provide quantitative data regarding how students performed with meaningful sample sizes. However, there are some gaps in these studies that provide opportunities for future research. These studies are limited in their scope to classes during a short duration, potentially exposing results to variations that may occur over a longer time period. Also, it is unclear if the population of students participating in these studies consists of adult or traditional learners and how the conclusion may be affected by differences between those groups.

Online Laboratory Exercises in Biology Courses

The use of virtual laboratory exercises in biology courses has also been researched, and conclusions support the idea that virtual laboratory exercises are effective when compared with a face-to-face approach. One study assessed student perceptions of the effectiveness of virtual exercises alongside other students who performed similar exercises in person and identified that most students found the virtual content to be effective (Stuckey-Mickell and Stuckey-Danner, 2007). Additionally, Delgado et al. (2021) confirmed that virtual laboratory experiments allow more focus on concepts and reduce inefficiencies related to lab set (Delgado et al., 2021). Renna and Kumbaraci (2022) also investigated the effectiveness of virtual biology laboratory experiments and concluded that online laboratory experiments were effective in improving student performance. Finally, Son et al. (2016) compared the use of virtual labs and traditional labs in an undergraduate biology course, finding that the use of virtual labs resulted in higher grades and improved students' perception of the course overall. Together, these studies provide a strong basis for the validity of virtual laboratory exercises in biology courses. Similarly to the other areas reviewed, research to date indicates a need for more quantitative analysis with representative sample sizes, a deeper dive into the differences in responses based on the type of learners using the virtual laboratory exercises and increased focus on the type of virtual laboratory exercises used.

Literature Review Conclusion

In conclusion, research on the use of virtual laboratory exercises confirms the benefits of integrating these exercises into science curricula by showing the improved student performance, an opportunity for increased flexibility and access, and an increase in positive student perception of the course. These exercises provide students with an instructional approach that can be central to a curriculum or complement non-laboratory classroom material. Conclusions from these studies can be strengthened by increased emphasis on quantitative over qualitative assessments. For instance, Son et al.'s (2016) biology study used 748 students, while Taghavi and Colen (2009) explored physics education with a small group of 22 participants. In some cases, studies did not explicitly identify the number of participants or data points analyzed. These ranges highlight the need for expanded sample sizes in future studies that explore the use of virtual laboratory exercises in science courses.

Additionally, the reviewed studies show a mix of quantitative and qualitative approaches to draw conclusions. Quantitative methods were seen in studies from Darrah et al. (2014), Sokoloff et al. (2007), Taghavi and Colen (2009), and Vogt et al. (2013), with those studies focusing on statistical analysis of exam scores. Qualitative methods were seen in studies by Son et al. (2016), Renna and Kumbaraci (2022), Stuckey-Mickell and Stuckey-Danner (2007), Beznosko et al. (2021), Khorolskyi (2023) and Delgado et al. (2021). These studies explored student perceptions, providing descriptive reviews of students' perceptions about online laboratory exercises in science courses. While both approaches contribute valuable perspectives, future studies focusing on quantitative data can provide relationships between student outcomes and more detailed factors such as laboratory exercise types and relationship with specific course content.

Additional opportunities exist for research where student populations are more diverse, particularly in the type of learners (adult or traditional). Some of the reviewed studies addressed traditional and non-traditional learners, such as Vogt et al. (2013) who compared outcomes between online learners (considered non-traditional, typically older) and traditional learners (typically younger) in astronomy education. Other studies, such as Darrah et al. (2014), Sokoloff et al. (2007), Taghavi and Colen (2009), and Renna and Kumbaraci (2022), did not explicitly specify student demographics beyond their quantitative analyses. Future studies are needed to identify opportunities for implementation of virtual laboratory exercises depending on the type of student.

Materials and Methods

Research Questions

Research questions for this study mirror those from Phase 1, focusing on the core idea that including simulated laboratory exercises in online introductory STEM classes increases student mastery of core concepts taught in the class, thus enhancing the learning experience.

Question 1. Does the inclusion of online laboratory exercises significantly increase student mastery of core concepts in biology, physics, and astronomy courses?

Question 2. Are online laboratory exercises which include aspects of realism more effective at promoting student mastery of core concepts than simulation-based labs?

Question 3. Do online laboratory exercises increase perceived student mastery of core concepts, as reported by the students, and how does this vary by discipline?

Question 4. Do online laboratory exercises increase student enjoyment of a class in different STEM disciplines?

Experimental Setup

The research reported in this paper and in Phase 1 was reviewed and approved by the APUS IRRB committee under approval ID 2019-205-APUS. All participants in this study were students enrolled in undergraduate classes at the American Public University System (APUS). APUS is a fully online, open-enrollment university offering associate’s, bachelor’s, and masters’ degrees in a wide range of majors. The student body at APUS is older than the national average by about four years (Reyes, 2023) and is mainly composed of returning students and/or working adults (91%; average age 31). Sixty-six percent of students are serving active duty in the military while enrolled, with an additional 23% veterans or otherwise military-affiliated students (APUS, 2023).

The courses in this study comprise three sets of paired, introductory (100-level) classes: one pair of astronomy classes, one pair of physics classes, and one pair of biology classes. As in Phase 1, the pairs of classes were designed to be nearly identical internally, the only substantial difference being the inclusion or exclusion of laboratory exercises.

Paired classes use the same chapters in the same textbook, the same lecture materials, and the same assessments. Each pair shares a common set of learning objectives, all of which are well covered by the lecture and readings. These learning objectives are assessed by the same weekly quizzes in the courses, as well as through exams that pull questions from the same question pool. Students in each pair of classes are generally successful in meeting learning objectives for the course.

Evaluation of mastery of the learning objectives was performed using pre- and post-quizzes, which consisted of fifteen multiple choice questions in astronomy and biology and twelve questions in physics. The questions were identical in both the pre-and post-quizzes and for both lab and non-lab sections of the classes. Completion of the pre- and post-quizzes was completely voluntary, and the scores on the quizzes did not affect student grades in any way. The questions were designed to directly address a subset of course learning outcomes. They were carefully crafted to focus on concepts that the lab helped reinforce but that were also taught in the non-lab classes. This means that students in both the lab and non-lab classes were expected to learn these concepts based on the primary material in the course textbook. However, the laboratory exercises specifically reinforced these concepts for the students in the classes which included lab exercises.

In addition to the pre- and post- quizzes, a Likert-style survey was given to the students in the lab class at the end of the course. This survey assessed student perceptions of the labs and whether they believed that the labs helped them to master the concepts taught in the course. The surveys also gauged ease of use for the labs, student enjoyment of the laboratory exercises, and whether the students felt that the labs provided a hands-on learning experience in the virtual classroom (see Results for a description of which quiz questions assessed these perceptions). See Appendix A for the survey questionnaire used: all laboratory students in all disciplines received the same questionnaire. This qualitative assessment is an important aspect to consider, as evidence shows that student satisfaction directly relates to retention and persistence (Schreiner and Nelson, 2013; Eather et al., 2022). Studies to date, however, have focused on initiatives for student support and satisfaction at an institutional level rather than the impact of individual course content or design.

All of the courses in this study were part of the general education core required by APUS, and all content and assignments in the courses were delivered asynchronously. In each pair of classes, the course with lab is generally intended for students majoring in the course, or closely related, topic or for programs with higher natural science credit requirements while the course without the lab is intended for non-majors. The general education requirement applies to all APUS students, not just students in the School of STEM; thus, both versions of the courses typically include students from a range of schools, including business and humanities. None of the courses in this study had a pre-requisite requirement; most were taken during the Freshman or Sophomore year of coursework. Data collection occurred during a two-year period comprising 2022 and 2023. The courses were developed, and exclusively taught, by faculty from the School of STEM at APUS. Each of the courses was taught by faculty members with credentials specific to the course content; all faculty were qualified to teach both the lab and non-lab courses during the period of this research.

During this research study, the astronomy courses were taught by 18 different instructors, including three full-time faculty members. Ten instructors taught the lab version of the course for a total of 16 sections. Seven instructors taught the non-lab version of the course for a total of 19 sections. Four of the instructors, two full-time and two part-time taught both lab and non-lab courses. A total of 558 students participated in the study, with 353 from the non-lab course and 205 from the lab course.

The physics courses in this study were taught by 13 different instructors, all but one of whom were part-time faculty members. Six instructors taught the lab version of the course for a total of 21 sections. Nine instructors taught the non-lab version of the course for a total of 19 sections. Two instructors (one of whom was a full-time faculty member) taught both lab and non-lab courses. A total of 587 students participated in the study, with 272 from the non-lab course and 315 from the lab course.

During the study, the biology courses were taught by 12 different instructors, including two full-time faculty members. Nine different instructors taught the non-lab version of the course for a total of 16 different sections; three instructors taught the lab version of the course for a total of six sections. During the length of the study, there was no overlap in the instructor pool for the two biology courses, though this does occur regularly within the teaching cohort. An equal number of sections of the two courses were taught by full-time faculty; more part-time faculty taught the non-laboratory version during this period. A total of 477 students participated in the study, with 331 from the non-lab course and 146 from the lab course.

For the astronomy courses, the lab exercises covered six topics, including planetary orbits, phases of the Moon, the greenhouse effect, the Sun, the HR diagram, and circumstellar habitable zones. As in Phase 1, three different styles of labs were used: instructor-generated labs using web-based simulations created by the University of Colorado Boulder (2024) as part of their PhET Interactive Simulations (the lab content and questions were the same for all sections of the study and the same for both phases), fully developed laboratory exercises using the NAAP laboratory exercises (University of Nebraska-Lincoln, n.d.), and exploratory lab exercises using publicly available astronomical datasets (Helioviewer, n.d.).

For the physics courses, four topics were covered by the lab exercises, which included density (SimPop, n.d.), momentum (Fendt, n.d.), specific heat capacity (Pearson Education, n.d.), and reflection/refraction of light (The Physics Classroom, n.d). The physics labs were all instructor-generated labs using web-based simulations; these did not vary by section (all instructors used one common set of labs).

For the biology classes, six topics were covered by lab exercises; these were the scientific method (SM), evolution & common descent, evolution & evolutionary pressures, virus characteristics, general evolution, and biotechnology, centering on forensic investigations. The biology laboratories were based on publicly available simulations of experiments and data provided by the Howard Hughes Medical Institute (HHMI) Bioactives (HHMI, n.d.). Students used the simulations developed by HHMI but completed exercises and analyzed their results using worksheets contained within the virtual classroom. Worksheets were not submitted; students were assessed on their understanding and completion of the exercise as part of the course's weekly quizzes. As such, the weekly quiz assessments in the laboratory and non-laboratory course versions differed slightly in the biology pairing, but only in the presence or absence of lab-specific questions. The weekly quizzes carried the same weight in the overall course grades. However, as noted above, the pre- and post-quizzes used for this study were identical.

Study Limitations and Bias

The unique nature of the parallel course design between laboratory and non-laboratory versions of the same course is a key strength of this study. The use of general education courses, all of which follow an overall uniform design approach, allowed for randomized enrollments within the student cohorts, as discussed above. However, as the results are based on voluntary student participation, it is important to acknowledge the potentially limited nature of the sample pool. Throughout the study, we attempted to address this by conducting the data collection over multiple sections with a diverse instructor cohort and across multiple course starts. An additional limitation is our inability to assess lab impact on persistence and retention. The presentation of the satisfaction survey and post-quiz assessment in the final week of the courses removes the possibility of assessing laboratory impact on persistence: only those students that persist for the entire course would complete the study activities. Similarly, as this study is restricted to a final anonymized pool, we have no way of following students to assess the impact on retention.

In addition to the limitations noted above, the data reported in this study is based on average results and is not correlated by individual student responses. Thus, it is limited in that the learning gains are per class rather than per student. Response rates for all classes were high, ranging from 67% to 81% for the post-quizzes and from 84 to 89% for the pre-quizzes; thus, the averages well represent the class as a whole. The high response rates, coupled with the large number of classes and the fairly consistent number of participants between lab and non-lab classes across each discipline included in the study, make it unlikely that the reported averages might be dominated by an unrepresentative sample of the student population. Finally, the APUS student population differs from the average college freshman class in that the students are mostly working adults and returning students; this represents a bias in the reported results.

Data Description

In this study, “content mastery” is evaluated based on the quiz questions. The pre-quiz question averages indicate the students’ baseline understanding of the topics at the start of the class (pre-instruction). Learning gains are defined by the difference between the post- and pre-quiz performance. Student satisfaction in this study is based on student enjoyment of the labs [survey questions (6) and (7)] and is discussed separately from student experience using the labs [survey questions (4) and (5)]. Student perception of content mastery is based on survey questions (1), (2), and (3); this is different from learning gains, or actual content mastery, as indicated by quantitative performance on the quizzes.

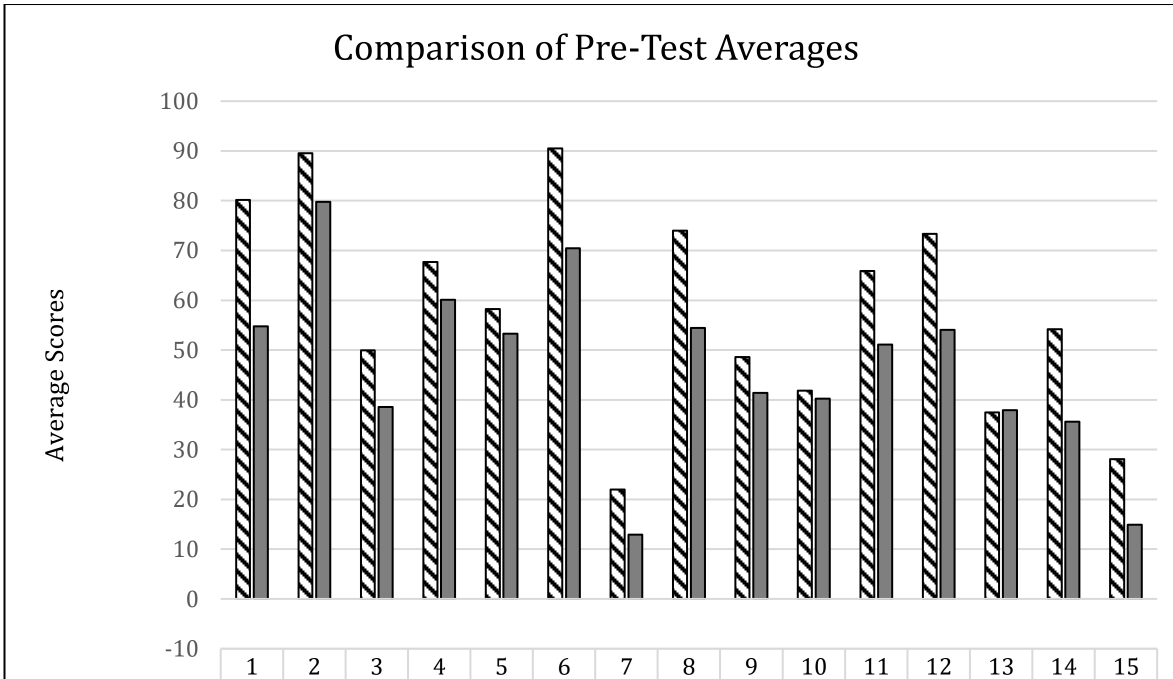
New Astronomy Results

The pre-quiz averages for Phase 2 of the study are shown in Figure 1. The averages are shown for each question on the quiz without weighting. About 90% of students enrolled in the courses completed the pre-quiz (91% for the lab course and 88% for the non-lab course). Averages for the classes with labs are shown with striped bars, while the averages for the classes without labs are shown in solid grey. The students in the lab class outperformed those in the non-lab sections on every question. The largest differences are seen for questions 1, 6, 8, 12, and 14; these correspond with planetary orbits, the greenhouse effect, the Sun, the HR diagram, and circumstellar habitable zones. The pre-quiz averages indicate that students taking the lab section of the course had a foundational knowledge which was not limited to a specific area but instead covered a of a broad range of core topics.

Levene's test for equality of variance was performed to validate the assumption of homogeneity of variance ($p = 0.55$), and then an independent two-sample, one-tailed t-test was performed to compare the lab ($M = 0.59$, $SD = 0.04$) and non-lab ($M = 0.47$, $SD = 0.03$) student populations to determine the degree of significance in these results. The test met the criterion for significance at the 90% confidence level ($t(28) = 1.69$, $p = 0.05$, $d = 3.13$). This confirms an overall moderate difference between the populations in the study.

Figure 1

Pre-test Score Averages by Question



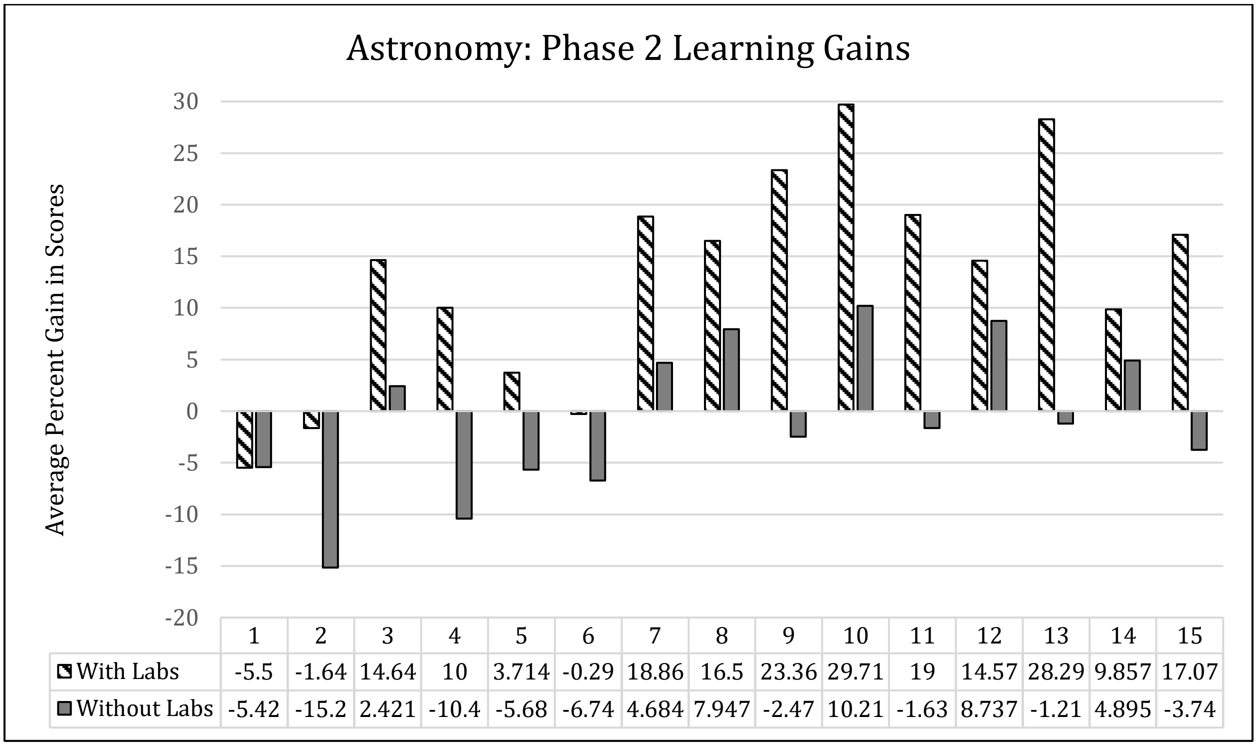
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
With Labs	80.14	89.57	49.93	67.71	58.21	90.5	22	74	48.57	41.86	65.86	73.36	37.5	54.21	28.07
Without Labs	54.74	79.79	38.58	60.11	53.26	70.47	12.89	54.42	41.42	40.21	51.11	54.05	37.89	35.63	14.89

Note. This graph shows the pre-test average scores for both the courses with and without labs in Phase 2.

Figure 2 presents the average learning gains per question; learning gains were calculated by comparing the pre-quiz and post-quiz averages in each case. The average gains per question are shown beneath the graph. Approximately 81% of the students completed the post-quiz in each class (87% for the lab class and 76% for the non-lab class), corresponding to $N = 558$ for the astronomy classes. For all questions except the first, the students in the lab class scored higher than those in the non-lab sections. Students in the non-lab sections frequently showed negative learning gains, meaning that they performed worse at the end of the course than at the beginning.

Figure 2

Phase 2 Learning Gains for Astronomy Courses



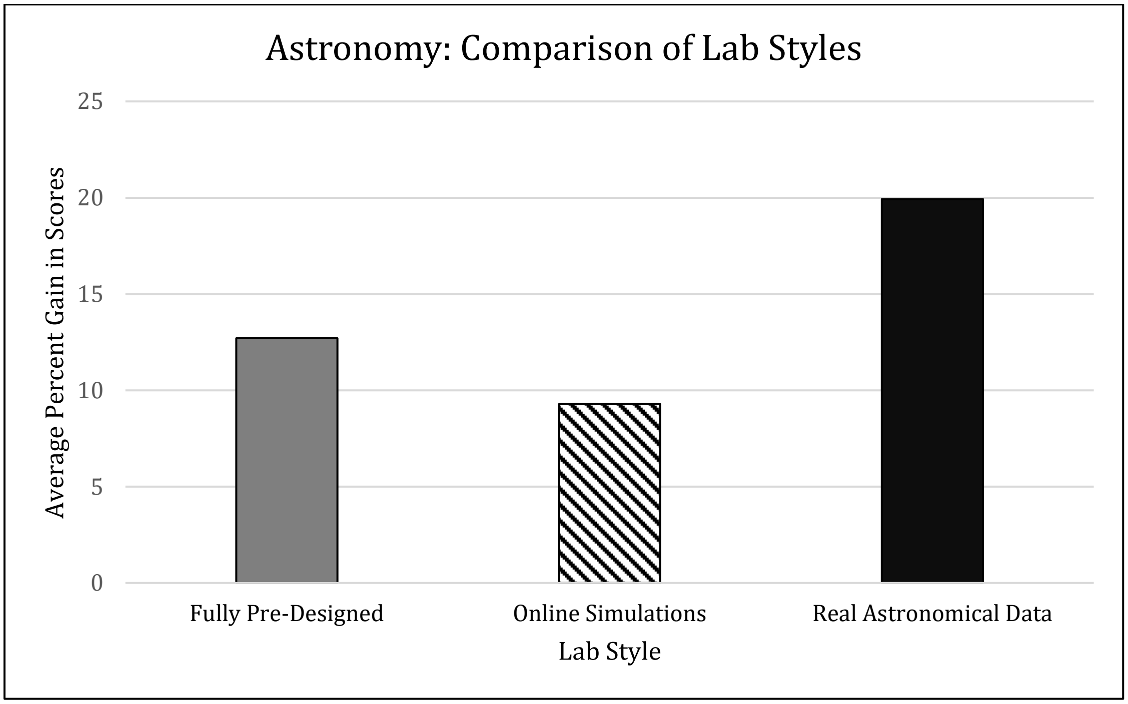
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
With Labs	-5.5	-1.64	14.64	10	3.714	-0.29	18.86	16.5	23.36	29.71	19	14.57	28.29	9.857	17.07
Without Labs	-5.42	-15.2	2.421	-10.4	-5.68	-6.74	4.684	7.947	-2.47	10.21	-1.63	8.737	-1.21	4.895	-3.74

Note. This figure shows the average percentage gain in scores per question for the astronomy courses in Phase 2 of the study.

Figure 3 shows an analysis of the learning gains as a function of lab style. The averages were performed over the subset of questions on the pre/post quizzes which were directly related to the topics of the laboratory exercises in each category. The data show that labs which allow students to interact with astronomical datasets are associated with the highest learning gains, followed by fully pre-designed labs which use simulated data and labs based on independent online simulations.

Figure 3

Average Learning Gains as a Function of Lab Style

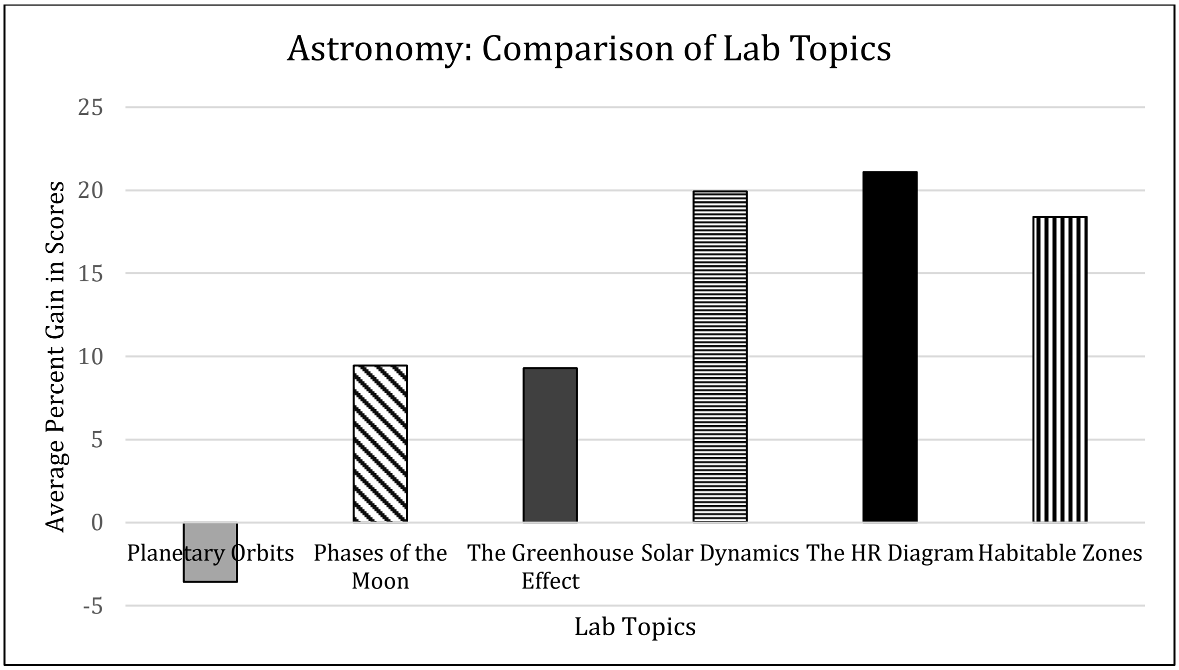


Note. This figure shows the average learning gains for each type of laboratory exercise for the astronomy courses.

Figure 4 shows the learning gains as a function of topic; these are shown in the order in which they occur during the class. The Planetary Orbits lab is an outlier, demonstrating negative learning gains, which indicates that the students actually performed better on the quiz questions relating to this lab at the beginning of the course than after completing the lab. As the first lab in the course, familiarity with the lab software could play a role here. This lab is also the most heavily math-based lab, which might be a confounding factor. Another possibility is retention: because the post quiz is given at the end of the course, students may have forgotten the concepts learned in this lab more than in subsequent labs. Higher gains were seen in the labs completed during the second half of the course in general. However, it is important to remember that the learning gains shown here represent the difference in the students' knowledge at the end of the course compared to the beginning, so a negative learning gain does not simply equate to a lack of retention but is instead an indicator of regression of understanding. No dependence on the style of the lab is seen in this data as labs of the same style were taught at different times throughout the class.

Figure 4

Average Learning Gains as a Function of Lab Topic

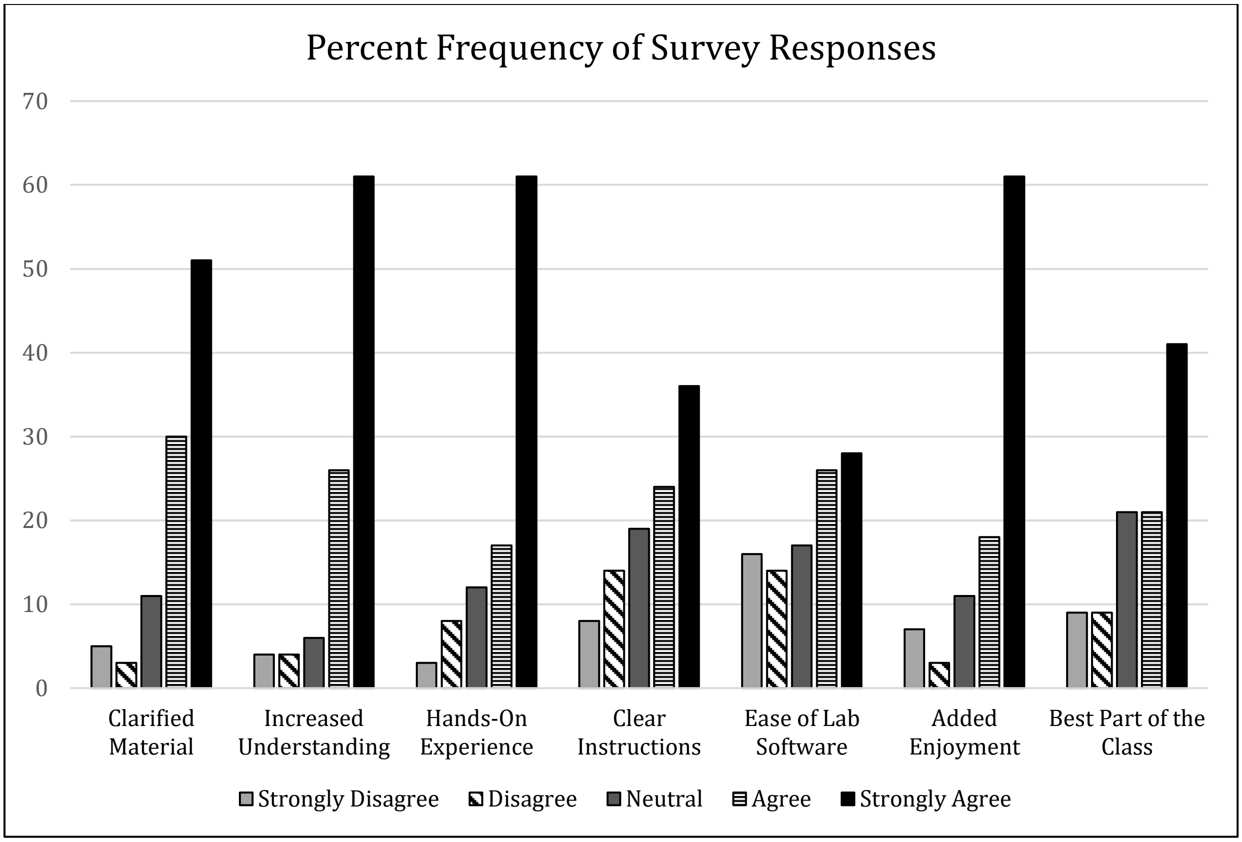


Note. This figure shows the average learning gains for each of the different topics covered by the laboratory exercises in the astronomy courses.

Figure 5 presents the results of the Likert survey that was administered to the lab classes. The survey questions can be grouped as evaluating student perception of the following areas: (1) how well the labs helped the students to understand the core topics (questions 1 and 2); (2) whether the labs added a "hands-on" component to the class (question 3); (3) how easy it was to complete the labs (questions 4 and 5); and (4) how enjoyable it was to do the labs (questions 6 and 7). The data was weighted by the number of responses and averaged over all respondents.

Figure 5

Survey Responses for the Astronomy Courses



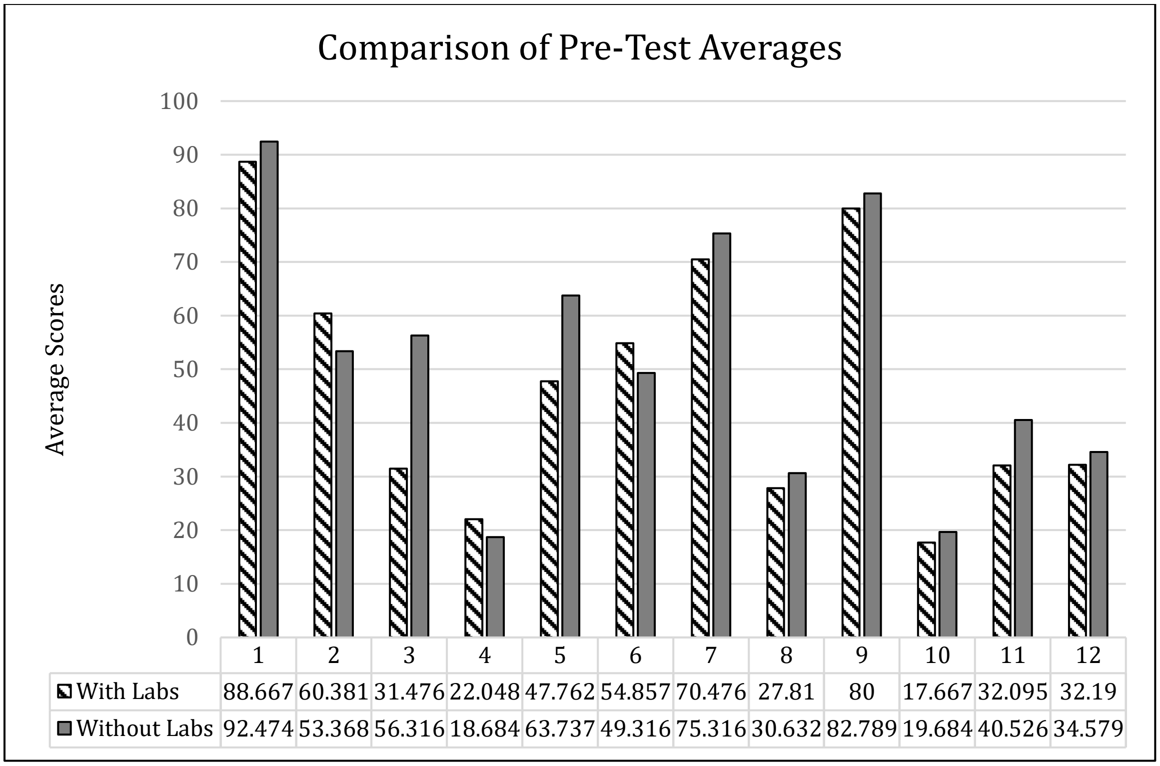
Note. This figure shows the rankings reported by the astronomy courses with labs.

Physics Results

The pre-quiz results for the physics courses are shown in Figure 6 and the average learning gains per question are shown in Figure 7. The physics quizzes consisted of 12 questions. Roughly 86% of students enrolled in the course completed the pre-quiz (84% for the lab class and 88% for the non-lab class), and 68% completed the post-quiz (63% for the lab class and 73% for the non-lab class), corresponding to $N = 587$ for the physics classes. Except for question 3, none of the pre-quiz results show any significant difference between the two classes. The non-lab course students scored higher than the lab course students on question 3, which is unexpected given that the lab classes tend to attract students with a stronger interest/inclination in STEM. Question 3 evaluates understanding of Archimedes' principle.

Figure 6

Pre-Test Average Scores for Physics Classes



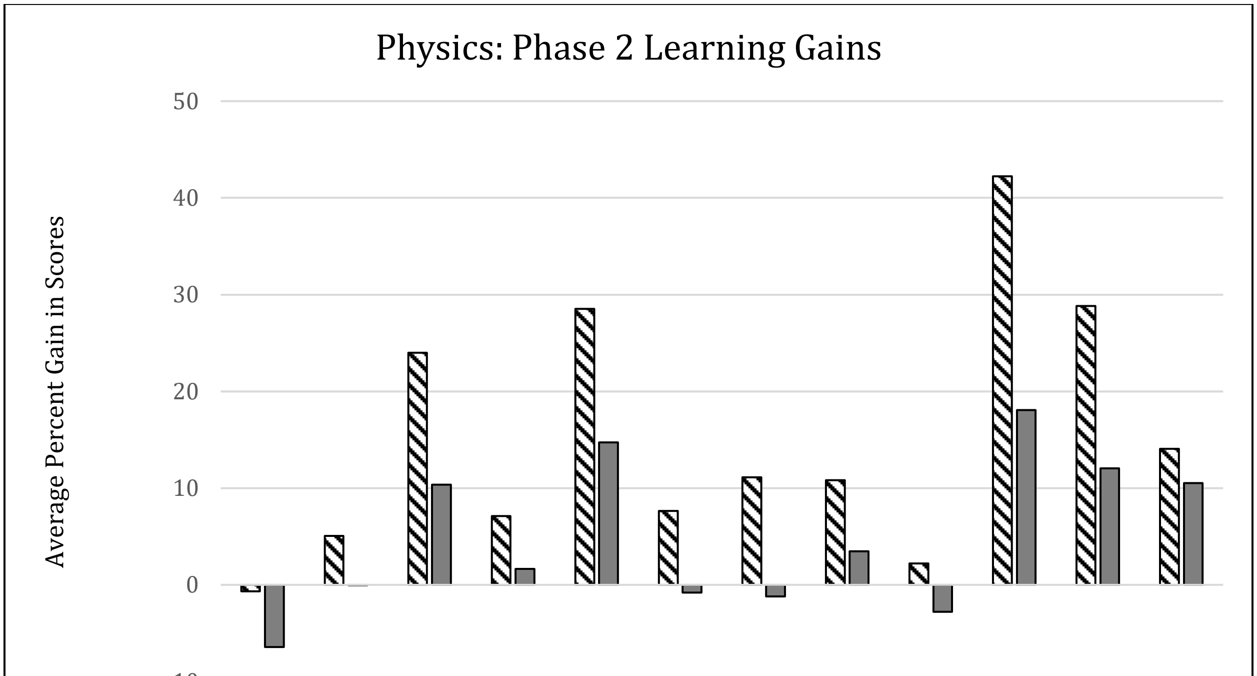
	1	2	3	4	5	6	7	8	9	10	11	12
With Labs	88.667	60.381	31.476	22.048	47.762	54.857	70.476	27.81	80	17.667	32.095	32.19
Without Labs	92.474	53.368	56.316	18.684	63.737	49.316	75.316	30.632	82.789	19.684	40.526	34.579

Note. This figure shows the average pre-test scores per question for both the physics lab and non-lab courses.

The learning gains shown in Figure 7 are based on the differences between the pre- and post- quiz scores. In each case, the students enrolled in the lab sections of the course outperformed students in the non-lab sections. The non-lab sections of the classes resulted in negative learning gains for one-third of the quiz questions; the topics addressed by these questions include density, elastic collisions, and thermodynamics, including heat transfer and specific heat capacity.

Figure 7

Phase 2 Learning Gains for Physics Courses



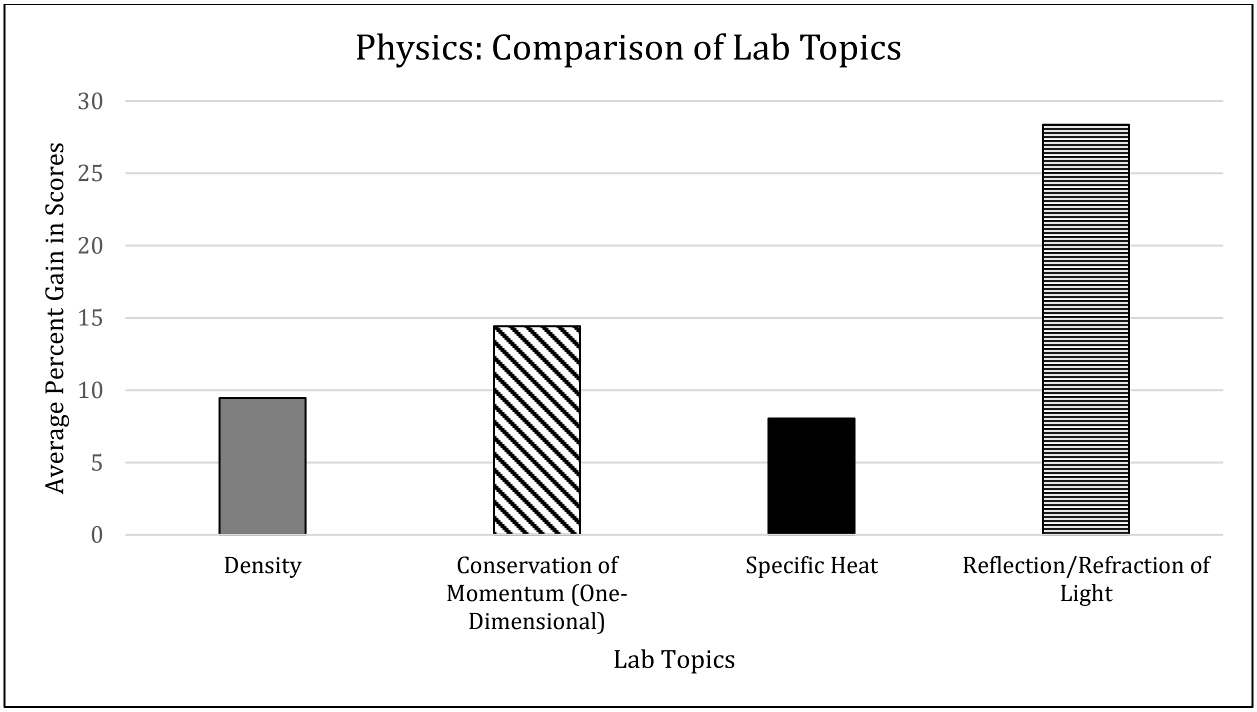
	1	2	3	4	5	6	7	8	9	10	11	12
With Labs	-0.667	5.0714	23.976	7.119	28.524	7.6429	11.119	10.81	2.2143	42.238	28.81	14.048
Without Labs	-6.421	-0.053	10.368	1.6316	14.737	-0.789	-1.211	3.4737	-2.789	18.053	12.053	10.526

Note. This figure shows the average percentage gain in scores per question for the physics courses with and without labs.

The average learning gains by topic are shown in Figure 8. The lab topics are shown in the same order in which the labs are completed in the course, e.g., density is the first lab and light is the last. There is no significant difference in learning gains for the first three lab topics, which are density, conservation of momentum, and specific heat capacity. The learning gains from the lab exercise investigating the wave-like nature of light are twice that of the other labs; this lab was completed at the end of the class, spanning the same time period during which the post-quiz was offered.

Figure 8

Average Scores by Topic

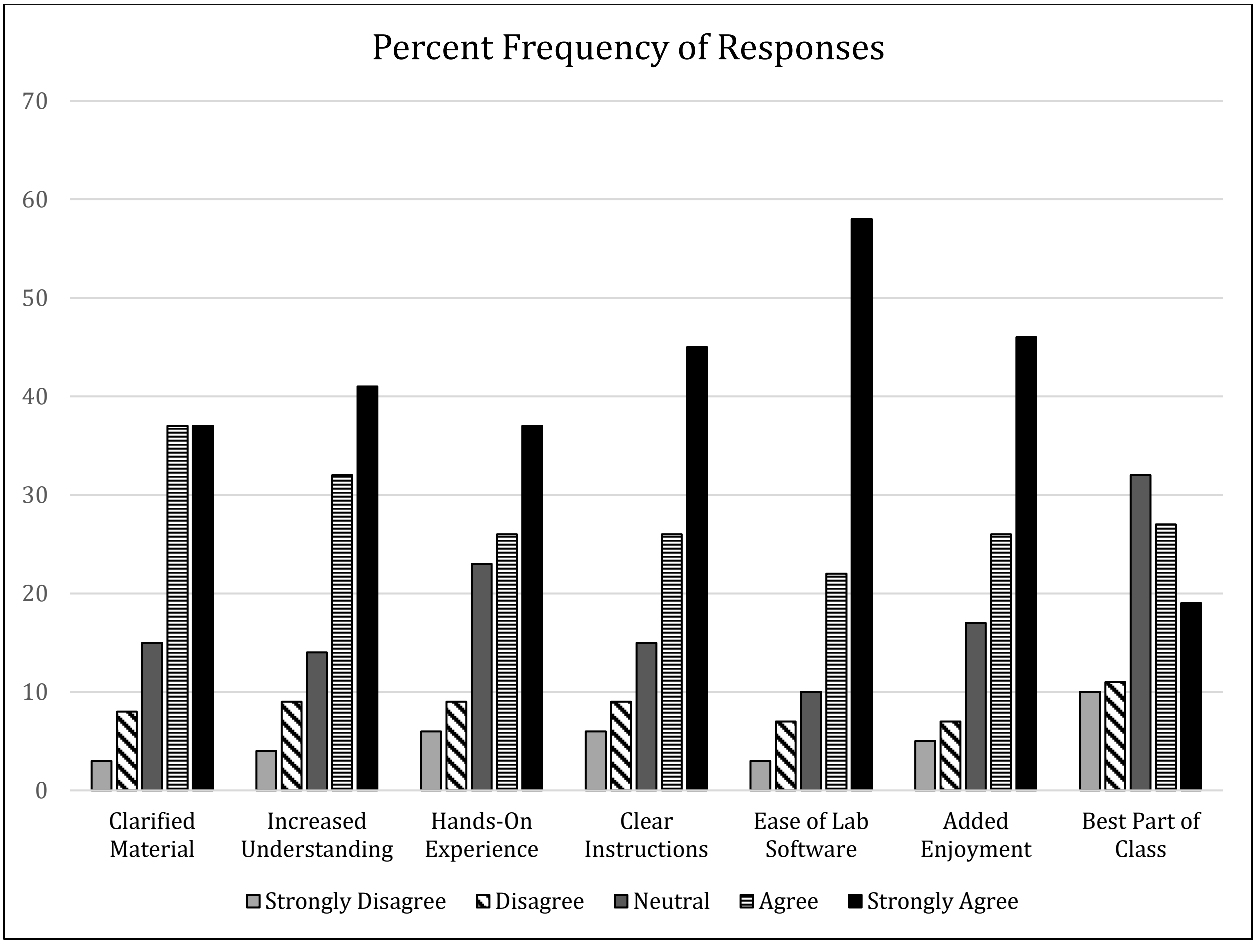


Note. This figure shows the average gain in scores per topic covered by the laboratory exercises in the physics courses.

Figure 9 presents the student survey results from the physics classes. Student perception of the value of the labs as a learning tool (questions 1 through 3) and enjoyment of the labs (question 6) are both positive overall, with the majority of the responses in the "agree" and "strongly agree" categories. In general, the students found the labs clear and easy to use (questions 4 and 5). The results regarding whether the labs were considered the best part of the class were neutral to moderately positive.

Figure 9

Survey Responses for the Physics Courses



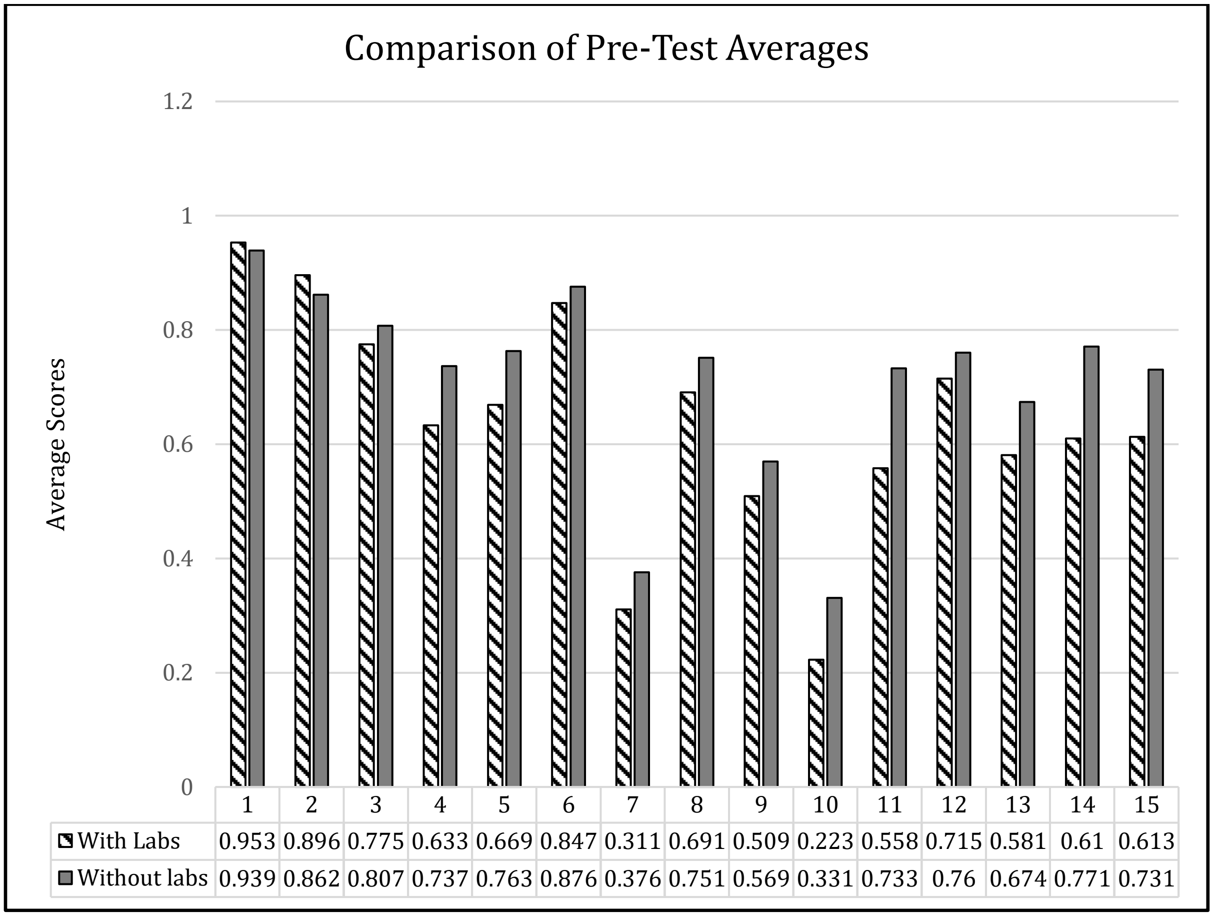
Note. This figure shows the student survey responses which evaluated the laboratory exercises in the physics courses.

Biology Results

Figure 10 presents the pre-quiz results for the biology classes. Roughly 85% of students enrolled in the course completed the pre-quiz, with 82% for the lab classes and 86% for the non-lab classes. No significant difference is seen in any of the 15 questions evaluated in the pre-quiz.

Figure 10

Pre-Test Average Scores for Biology Classes

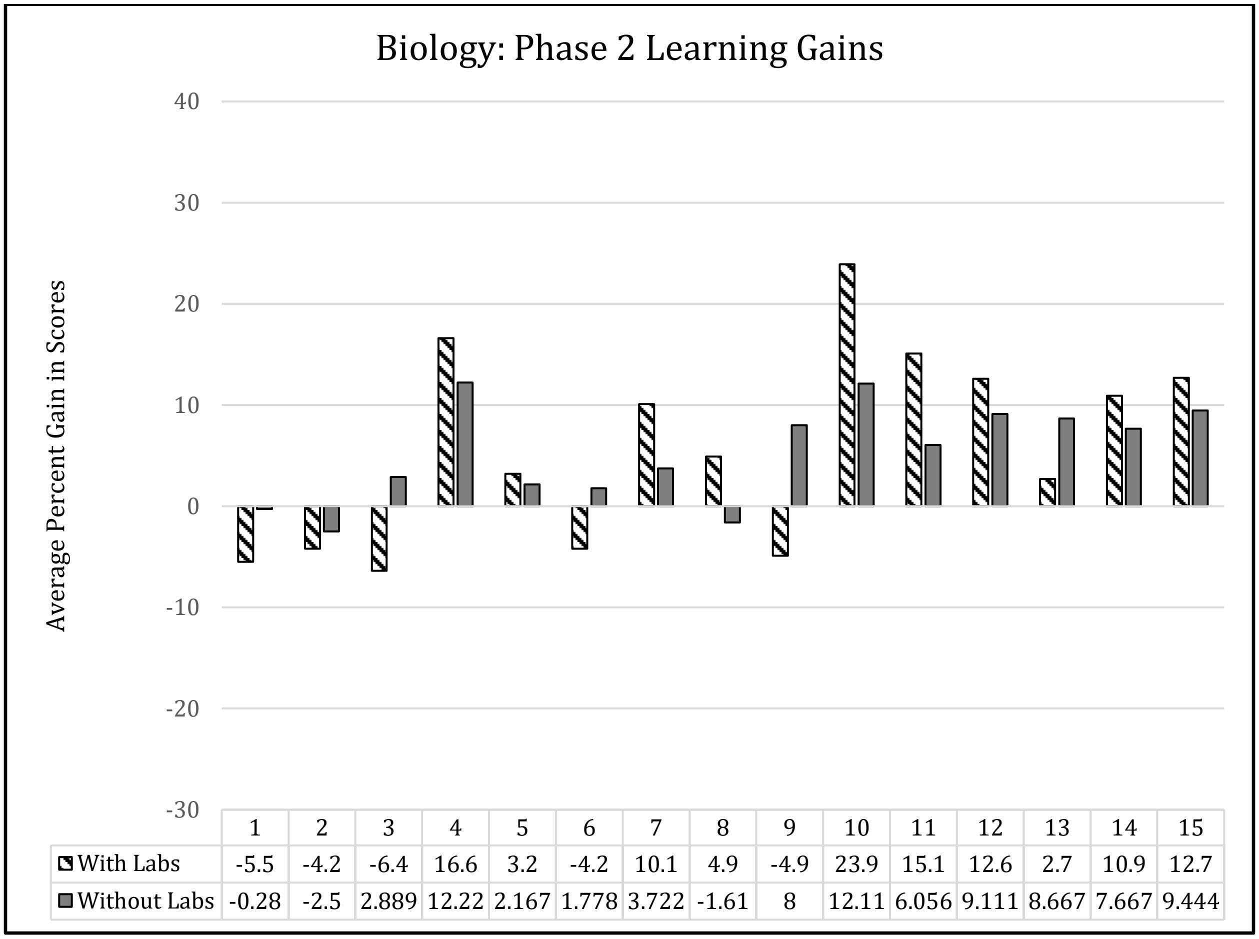


Note. This figure shows the average pre-test scores per question for both the biology lab and non-lab courses.

Figure 11 shows the learning gains calculated by percentage increase in average scores on the pre- vs. post- quizzes. Roughly 73% of students enrolled in the course completed the post-quiz, corresponding to *N = 477*, with 68% for the lab class and 76% for the non-lab class. Learning gains for students in the lab classes were significantly higher compared to the non-lab classes for 3 questions (questions 8, 10, and 11); these questions correspond to the patterns of inheritance and biotech topics. One-third of the quiz questions (questions 1, 3 ,6, 9, and 13) show significantly lower learning gains for the lab classes compared to the non-lab classes. The topics covered by these questions are evolution, patterns of inheritance, molecular biology, and diversity of plants. Students in the lab version of the course had negative learning gains for five of the quiz questions (questions 1, 2, 3, 6, and 9), which address evolution, patterns of inheritance, and molecular biology. For 60% of these questions, the non-lab students showed positive learning gains. The reverse situation (negative learning gains for the non-lab students and positive learning gains for the lab students) occurred on only one question (question 8), which related to patterns of inheritance.

Figure 11

Phase 2 Learning Gains for Biology Courses

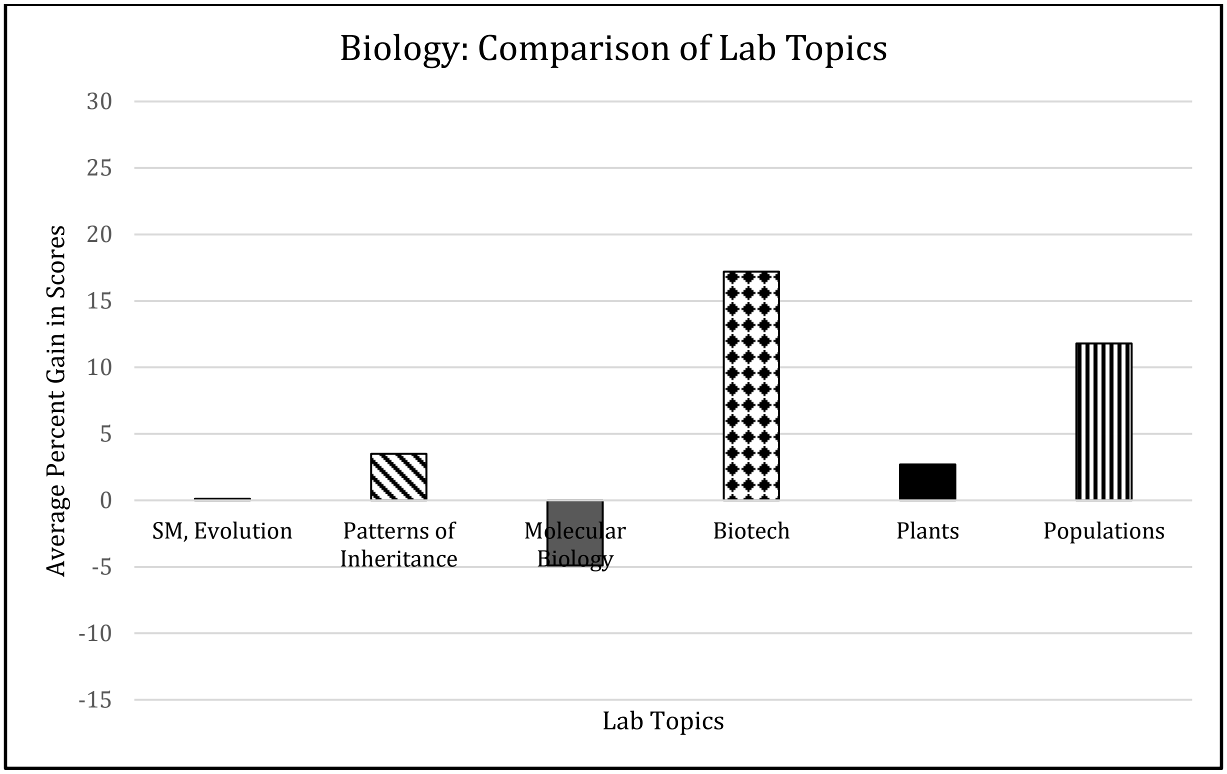


Note. This figure shows the average percentage gain in scores per question for the physics courses with and without labs.

Figure 12 presents the average learning gains as a function of topic. Two topics, biotech and populations, show large learning gains. The evolution topic shows essentially no gains at all, and the molecular biology topic shows negative learning gains, which suggests that this lab confused the students rather than clarifying the concepts. The labs are shown in consecutive order; no overall increase in learning gains is shown over time.

Figure 12

Average Scores by Topic

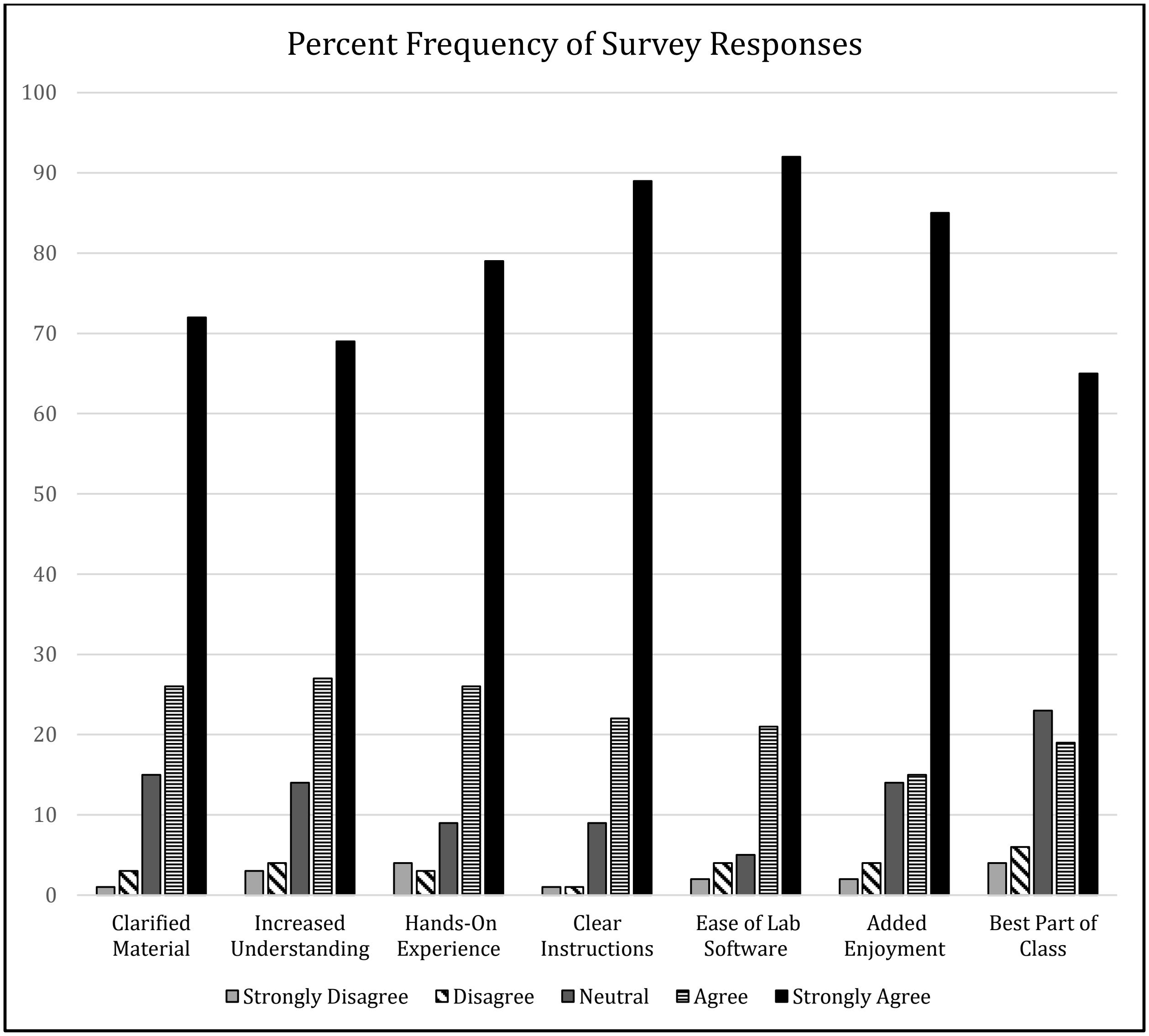


Note. This figure shows the average gain in scores per topic covered by the laboratory exercises in the biology courses.

Figure 13 shows the survey results from the biology classes. The survey results from the biology classes are overwhelmingly positive across all categories. The students strongly believed that the labs helped them to learn and that the labs were clear and easy to work with. They also strongly supported the idea that the labs were enjoyable and provide a hands-on laboratory experience.

Figure 13

Survey Responses for the Biology Courses



Note. This figure shows the student survey responses that evaluated the laboratory exercises in the biology courses.

Discussion

New Astronomy Results

The pre-quiz results from Phase 1 of this study showed no indication of difference in the sample populations for the astronomy courses included in the data collection. Although the lab version of the course was intended for majors only, the development of the non-lab course option occurred at the beginning of the study, and a large share of the students in the course were grandfathered into the course progression, resulting in essentially no distinction in the student populations. The current research shows a systematic difference in the pre-quiz scores (see Figure 1); this is likely because now mainly students majoring in space studies are enrolled in this course while the non-lab class includes students from majors across all disciplines. As space studies/astronomy majors, these students are more likely to have an initial understanding of basic astronomical concepts prior to the start of the course.

Analysis was then performed to evaluate the efficacy of the lab exercises in the mastery of course learning objectives for these more knowledgeable students. As in Phase 1, the students in the courses with labs achieved higher learning gains based on a comparison of the pre- and post- quiz scores (see Figure 2). The data in Phase 2 showed much stronger gains for the lab courses compared to the gains reported in Phase 1. In this study, all but three questions on the test showed significant gains at the 0.05 level, with all but one question demonstrating gains at the 0.10 level. Fifty-three percent of the questions overall had significant gains at the 99% confidence level and, of the questions for which significant learning gains were shown, 57% were significant at the 99% level. In the previous study, fewer questions showed significant gain in learning, with 47% at the 99% confidence level and 13% at the 90% confidence level. Table 1 summarizes the statistical analysis for both phases. It confirms that more questions showed significant learning gains in Phase 2 compared with Phase 1 and that, of the questions that were significant in both phases, the gains were either comparable or larger in Phase 2. The increase in gains during Phase 2 of the study suggests that the virtual laboratory exercises benefit all students but are more effective for those with a baseline knowledge of astronomical concepts. This implies that the students who come into the class with prior knowledge are able to better use the lab exercises to increase their learning gains.

Table 1

Statistical Results Per Question

Phase 2	T Statistic	Phase 1	T Statistic
Q2	$t(15) = 4.55, p < 0.001$	**Q2**	$t(13) = 1.45, p = 0.084$
Q3	$t(15) = 2.38, p = 0.016$	**Q3**	$t(13) = 2.64, p = 0.010$
Q4	$t(15) = 3.69, p < 0.011$	**Q4**	$t(13) = 4.02, p < 0.001$

Q5	$t(15) = 2.42$, $p = 0.014$		*(not significant)*
Q6	$t(15) = 2.28$, $p = 0.019$	**Q6**	$t(13) = 3.69$, $p = 0.0012$
Q7	$t(15) = 3.02$, $p = 0.0043$	**Q7**	$t(13) = 3.65$, $p = 0.0013$
Q8	$t(15) = 1.64$, $p = 0.061$	**Q8**	$t(13) = 3.11$, $p = 0.0038$
Q9	$t(15) = 7.29$, $p < 0.001$	**Q9**	$t(13) = 6.56$, $p < 0.001$
Q10	$t(15) = 4.14$, $p < 0.001$		*(not significant)*
Q11	$t(15) = 5.33$, $p < 0.001$	**Q11**	$t(13) = 3.69$, $p = 0.0012$
Q12	$t(15) = 1.55$, $p = 0.071$	**Q12**	$t(13) = 1.47$, $p = 0.082$
Q13	$t(15) = 2.97$, $p = 0.0048$	**Q13**	$t(13) = 2.95$, $p = 0.0053$
Q14	$T(15) = 1.51$, $p = 0.076$		*(not significant)*
Q15	$t(15) = 6.44$, $p < 0.001$		*(not significant)*

Note. These results show the statistical significance of the learning gains per question for the astronomy lab courses during both phases of the study.

Learning gains as a function of lab style were analyzed to determine if the style of lab influenced student performance on the pre/post quizzes (see Figure 3). As in Phase 1, the highest gains were achieved for the exploratory style labs that used astronomical datasets; average gains were nearly twice those of the other lab styles. However, there was a small increase in gains for labs using fully pre-designed simulations compared to Phase 1.

Finally, the data was analyzed to determine if there was any correlation between learning gains and course topic; this is shown in Figure 4. In general, the labs on solar dynamics, the HR diagram, and habitable zones show twice the gains of the labs on the phases of the moon or the greenhouse effect, with no clear distinction between lab style indicated. In Phase 1, the gains for the HR diagram and the habitable zones labs showed smaller gains; this may be because these more complicated topics were more difficult overall for the students, who were not able to benefit as much from the lab exercises as a result. The planetary orbits lab shows a small increase in gain compared to the non-lab course, instead of the decrease in learning gain noted in Phase 1.

The survey results, shown in Figure 5, show a strong indication of student satisfaction with the labs, similar to Phase 1. The data reveal that the majority of students believe the labs increase their learning and add an authentic hands-on experience in the virtual classroom. Eighty to ninety percent of the students believe that the labs increase learning, clarify the course material, and increase enjoyment of the course. Sixty percent of students agree or strongly agree that the labs are the best part of the class, although the results are evenly divided in terms of the ease of use of the software. Difficulties using the simulations and software in the labs could contribute to the lower learning gains seen in the lab exercises that depend on simulations rather than astronomical datasets, as shown in Figure 3.

Key Points

Overall, the larger (compared to Phase 1) increases in learning gains on the post-quiz indicate that inclusion of online laboratory exercises is beneficial to learning mastery of astronomical concepts for both majors and non-majors, but that the labs are even more effective for students with a prior understanding of astronomical concepts. The improvement in learning gains over Phase 1 may be due to increased student interest in material that is more directly relevant to their educational plans, prompting greater diligence and care in working on the laboratory exercises, or it could be simply due to the benefits of prior knowledge gained from interest in the field. Regardless, the results of this study suggest that student populations that enter the course with a foundational understanding of astronomical concepts are better able to use online laboratory exercises to augment learning mastery of course topics.

Physics Results

Figure 6 clearly confirms there is no significant difference in student populations at the beginning of each class. APUS currently offers no physics degrees, and the electrical engineering program uses a different set of physics courses for its students. As such, any student enrolled in either physics course included in the study is completing general education requirements. The post-quiz results show strong learning gains across the board, with every question demonstrating a clear increase in performance (see Figure 7). Sixty-six percent of the questions show gains that are significant at the 95% level, and 58% of the questions indicate gains significant at the 99% level, as shown in Table 2. Comparing just the questions with significant learning gains, 64% are significant at the 99% level. These results are stronger than those reported above for the astronomy classes and those reported in Phase 1 of the study, suggesting that hands-on laboratory exercises are especially beneficial in physics classes.

Table 2

Statistical Results Per Question

Physics	**T Statistic**
Q1	$t(20) = 3.29, p = 0.0018$
Q2	$t(20) = 1.45, p=0.08$
Q3	$t(20) = 2.72, p < 0.0066$

Q4	$t(20) = 1.54, p = 0.070$
Q5	$t(20) = 3.54, p = 0.0010$
Q6	$t(20) = 2.76, p = 0.0060$
Q7	$t(20) = 3.18, p < 0.0024$
Q8	$t(20) = 1.98, p = 0.031$
Q9	$t(20) = 1.41, p = 0.087$
Q10	$t(20) = 6.11, p < 0.001$
Q11	$t(20) = 2.81, p = 0.0054$

Note. These results show the statistical significance of the learning gains per question for the physics lab courses.

Data for five of the post-quiz questions (41%) show a decrease in learning for the classes which did not include the laboratory exercises, indicating that the non-lab students performed worse at the end of the course than at the beginning. For all of these questions, the classes in which students completed the labs performed better. On one question, the lab classes show a significantly smaller decrease, while on the other four, the lab classes show strong positive learning gains. This reinforces the importance of the lab exercises in student retention of learning concepts as well as mastery.

The dependence of learning gains on topic, shown in Figure 8, shows a strong increase for the laboratory exercise exploring the nature of light, specifically concentrating on reflection and refraction. The learning gains on questions reinforced by this lab are two to three times larger than those for any other topic. This lab is offered near the end of the course, just before the post-quiz is administered. It is possible that the strong learning gains for this lab reflect retention over time: students may perform better on questions relating to concepts taught later in the course simply because that material is fresh in their minds, although, as discussed above, the learning gains are a comparison with baseline knowledge at the beginning of the class not simply a reflection of retention of new knowledge gained. Familiarization with the lab software is a possible compounding variable in the study as it could also lead to an increase in post-quiz scores for later labs compared with those completed early on. However, no overall time dependence for the learning gains is noted in the results shown in Figure 8. This suggests that the learning gains are not influenced by the students becoming more familiar with the lab software over time, strengthening the conclusion that the gains shown here represent student mastery of learning objectives.

The physics lab survey results, shown in Figure 9, are generally positive, indicating that the students enjoy the labs and believe that completing them increases their ability to master core concepts in the course. The results are not as strongly positive as those for Astronomy and Biology, however. Approximately 70% of students in the physics classes believe that the labs helped to clarify the course materials and that completing the labs increased their understanding of the topics; they also indicated that the labs increased their enjoyment of the course. Roughly

60% believed that the labs provided a hands-on experience in the course. These percentages are 10 to 20% lower than the results from the astronomy and biology classes. Only 48% percent listed the labs as the best part of the course, compared with 60% for astronomy and 80% for biology. However, the survey questions relating to the use of the software itself elicited very strong positive results. Eighty percent of the students indicated that the lab software was easy to use, and 70% agreed that the instructions for the labs were clear. This is 20 to 30% higher than the responses in the astronomy classes. These responses are comparable to those in the biology classes (~90%) and may reflect the fact that only one style of lab exercise was used in the physics and biology courses compared with three different lab styles in astronomy. For the physics students, perceived ease of use did not correlate with increased perception of learning or increased enjoyment of the lab exercises.

Key Results

The physics results confirm those of the astronomy courses in both Phase 1 and Phase 2 that the inclusion of virtual laboratory exercises in online science courses strongly supports student mastery of learning outcomes. Retention of information may play a role in the strength of the learning gains from the lab exercises, but the current research does not support a correlation between familiarity with the lab software and improvement in student understanding. While the students do not seem to enjoy these particular physics labs as much as the labs in other APUS STEM courses, as seen by comparing Figures 5, 9, and 13, the physics labs clearly help to increase student mastery of course learning outcomes, nonetheless. The anti-correlation between learning gains and student-reported evaluation of learning and satisfaction suggests that student perception may not be an accurate assessment of the effectiveness of classroom learning activities.

Biology Results

Pre-quiz average scores for the biology classes show no significant difference in biology knowledge upon entry to the course, as shown in Figure 10. This is to be expected as the students entering these courses are a diverse cross-section of university majors. While some majors, such as health science-related degrees, tend to take the laboratory versions, there are students representing a wide range of majors who complete the lab version to meet their program’s natural science credit requirements. As with physics, APUS currently does not offer a biology degree, though a closely related natural science degree does exist.

The post-quiz average scores for biology show the most mixed results of this study, with five questions showing a reduction in learning gains for the laboratory classes (see Figure 11). Only 20% of the questions show positive learning gains that are significant, as shown in Table 3. As such, the biological science results may indicate that virtual laboratories have the least impact on student learning gains of the three disciplines studied in this research.

Table 3

Statistical Results Per Question with Learning Gain

Phase 2	T Statistic
Q8	$t(9) = 1.78, p = 0.055$
Q10	$t(9) = 2.55, p = 0.016$
Q11	$t(9) = 2.73, p = 0.012$

Note. These results show the statistical significance of the learning gains per question for the biology lab courses.

Table 4

Statistical Results Per Question with Learning Loss

Phase 2	T Statistic
Q1	$t(9) = -1.76, p = 0.056$
Q3	$t(9) = -2.06, p = 0.035$
Q6	$t(9) = -1.56, p = 0.077$
Q9	$t(9) = -3.06, p = 0.0068$
Q13	$t(9) = -1.47, p = 0.088$

Note. These results show the statistical significance of the learning loss per question for the biology lab courses.

Notably, five of the post-quiz questions (33%) show a statistically significant decrease in learning for the classes which include the laboratory exercises, as shown in Table 4. This indicates that the lab students performed worse at the end of the course on these questions than on the pre-quiz. Questions 1 and 3 relate to topics covered in Week 1. As such, the decrease may be attributable to uncertainty with the laboratory exercises or a mismatch between the timing of the laboratory exercises in relation to the period when those topics were covered in the main coursework. For example, Question 6 corresponds to a laboratory exercise that is two weeks after the main course content, indicating the possibility that students are not accurately synthesizing or retaining information. Question 9 and Question 13 offer no clear explanation for the decrease in quiz scores, other than the focus as discussed below. It is important to note that all topics were covered in both courses and during the same time in each course. The only functional difference is that concepts being reinforced in the laboratory exercises may have been presented several weeks after students were first exposed to the main content. As noted, this mismatch could indicate a lack of information retention or it could indicate student focus had shifted to novel concepts as emphasized in the main course materials.

The learning gains for each topic, shown in Figure 12, indicate a strong increase for the laboratory exercises exploring patterns of inheritance, biotechnology, and populations and community ecology. A minor gain is shown for the plant focused lab exercise. Only the molecular biology related lab exercises show a marked reduction in percentage gain in score. This does correspond to the question that shows the greatest loss in student learning achievements (Question 9), which may indicate a larger mismatch in the laboratory activities compared to how those topics were discussed as part of the main learning content in the course. Question 13 is focused on plant biology, which corresponds to a lab topic showing a small overall gain in student learning achievement. The laboratories focused on evolution and the scientific method show no significant impact on learning gains; these labs match Questions 1 and 3 discussed above. This may indicate that these laboratories do not enhance, nor detract from, the main course content. Overall, the most reasonable explanation for the decreases shown in student mastery of learning objectives at the question level is likely due to an insufficient alignment in the timing of the laboratory exercises and main course content. As such, future efforts may entail investigating the impact of different laboratory simulations on these topics or a better alignment between presentation of topics and their re-enforcement with laboratory exercises.

Despite the mixed results as quantified by the post-quiz data, students in the biology laboratory version overwhelmingly felt the laboratory experience contributed to their learning environment, as shown in Figure 13. Across all questions surveyed, students in the biology lab course rated the labs and their impact on mastery and enjoyment higher than did students in either astronomy or physics. Nearly 90% of students in the biology classes believe that the labs helped to clarify the course materials and that completing the labs increased their understanding of the topics. A similar number of students also indicated that the labs increased their enjoyment of the course. Nearly 85% stated the labs added sufficient enjoyment to be the best part of the course. Interestingly almost 90% assessed the virtual labs as being a 'hands-on experience', though from the practice of biological sciences, it in fact is not. Laboratory exercises that contributed to the highest percent gains by students are focused on topics where practitioners do spend less time manipulating biological materials and more time analyzing with modern computing programs. This is illustrated in Figure 12 in the results indicating high gains in Biotech and Populations. These topics include evolution related topics such as evolutionary relationships and population growth and regulation, or biotechnology where data are frequently analyzed via visual examination of images. As such, these online learning labs may better mimic a working laboratory environment in this subdiscipline of biology.

Key Points

Overall, the biology results indicate only a mild correlation between the inclusion of online laboratory exercises and increases in student mastery of learning outcomes. The results reported here suggest that the timing of labs (in relation to when concepts are taught in the course) is a significant factor in the benefits students gain from completing the lab exercises and that discrepancies in this timing can lead to negative learning and lack of retention compared with non-lab classes. Online laboratory exercises meant to simulate hands-on practices such as manipulation of materials are less effective than those which correspond with subjects that are traditionally based on computer manipulation of data, which is not surprising. This research shows an exceptionally strong anti-correspondence between both student perception of learning and student enjoyment with actual learning outcomes for online biology students.

Conclusion

The research presented here reinforces the conclusion from Phase 1 that online laboratory exercises in a remote learning environment contribute significantly to learning outcome achievements. In addition, these results indicate a strong correlation between the inclusion of online labs in a course and student satisfaction. As such, this study and Phase 1 both support the conclusion that fully virtual laboratory exercises contribute to both mastery of learning objectives and a sense of student satisfaction, although the gains are not equal for all STEM disciplines. Future work in this area could include a more detailed look at the impact of type of online laboratories, with an emphasis on realism in the field/discipline, as well as examining the impact of online laboratories on student retention rather than simple course level satisfaction. The retention question may be particularly important when considering major-focused courses in online education rather than only general education offerings.

Declarations

The authors report there are no competing interests to declare.

The research reported in this paper and in Phase 1 was reviewed and approved by the APUS IRB committee under approval ID 2021-002-APUS and by the APUS IRRB committee under approval ID 2019-205-APUS.

References

APUS (2023). *APUS Fast Facts*. https://www.apus.edu/about/fast-facts/

Beznosko, D., Krivosheev, T., & Iakovlev, A. (2021). Transformation of the physics and astronomy courses. *37th International Cosmic Ray Conference (ICRC 2021).* https://pdfs.semanticscholar.org/1108/fcc325e11a2c22bbf98e294952ac2195ada1.pdf

Brinson, J. R. (2015). Learning outcomes achievement in non-traditional (virtual and remote) versus traditional (hands-on) laboratories: A review of the empirical evidence. *Computers & Education 87*, 218–237. https://doi.org/10.1016/j.compedu.2015.07.003

Campbel, J., Bourne, J., Mosterman, P., Nahvi, M., Rassai, R., Brodersen, A., & Dawant, M. (2004). Cost-effective distributed learning with electronics labs. *Online Learning*, *8*, 5–10. https://doi.org/10.24059/olj.v8i3.1816

Cancilla, D., & Albon, S. (2008). Reflections from the moving the laboratory online workshops: emerging themes. *Journal of Asynchronous Learning Networks*, *12*. https://doi.org/10.24059/olj.v12i3-4.1683

Corter, J. E., Esche, S. K., Chassapis, C., Ma, J., & Nickerson, J. V. (2011). Process and learning outcomes from remotely-operated, simulated, and hands-on student laboratories. *Computers & Education, 57*(3), 2054–2067. https://doi.org/10.1016/j.compedu.2011.04.009

Darrah, M., Humbert, R., Finstein, J., Simon, M., & Hopkins, J. (2014). Are virtual labs as effective as hands-on labs for undergraduate physics? A comparative study at two major universities. *Journal of Science Education and Technology*, *23*, 803–814. https://doi.org/10.1007/s10956-014-9513-9

Delgado, T., Bhark, S. J., & Donahue, J. (2021). Pandemic teaching: Creating and teaching cell biology labs online during COVID-19. *Biochemistry and Molecular Biology Education*, *49*(1), 32–37. https://doi.org/10.1002/bmb.21482

Eather, N., Mavilidi, M., Sharp, H., & Parkes, R. (2022). Programmes targeting student retention/success and satisfaction/experience in higher education: A systematic review. *Journal of Higher Education Policy and Management, 44*(3), 223–239. https://doi.org/10.1080/1360080X.2021.2021600

Fendt, W. (n.d.). *Collision*. Retrieved July 10, 2024, from https://www.walter-fendt.de/html5/phen/collision_en.htm

Helioviewer.org (n.d.) *A Solar Data Browser*. https://www.helioviewer.org/

Holmes, N. G., & Wieman, C. E. (2018). Introductory physics labs: We can do better. *Physics today*, *71*(1), 38–45. https://doi.org/10.1063/PT.3.3816

Howard Hughes Medical Institute (n.d.). *Teaching Tools*. HHMI BioInteractive. https://www.biointeractive.org/teaching-tools

Johnson, S. D., Aragorn, S. R., & Shaik, N. (2000). Comparative analysis of learner satisfaction and learning outcomes in online and face-to-face learning environments. *Journal of Interactive Learning Research*, *11*(1), 29–49. https://www.learntechlib.org/primary/p/8371/

Khorolskyi, O. (2023). The role of virtual platforms in modern astronomy education: Analysis of innovative approaches. *Futurity Education*, *3*(3), 249–265. https://futurity-education.com/index.php/fed/article/view/216/114

Klein, P., Ivanjek, L., Dahlkemper, M. N., Jeličić, K., Geyer, M.-A., Küchemann, S., & Susac, A. (2021). Studying physics during the COVID-19 pandemic: Student assessments of learning achievement, perceived effectiveness of online recitations, and online laboratories. *Physical Review Physics Education Research, 17*(1), 010117. https://doi.org/10.1103/PhysRevPhysEducRes.17.010117

Lovern, J. J. (2010). Is there a difference in student achievement based on the delivery method in an undergraduate assessment course: A comparison of face-to-face, hybrid, and online sections. In *EdMedia+ Innovate Learning* (pp. 2462–2467). Association for the Advancement of Computing in Education (AACE). https://www.learntechlib.org/p/34984/

Miller, K.A. & Carter, S.N. (2023). Efficacy of online laboratory exercises in achieving undergraduate learning outcomes in introductory astronomy classes. *International Journal of Teaching and Learning in Higher Education*, *35*(2), 160–170. https://isetl.org/ijtlhe/pdf/IJTLHE4381.pdf

Pearson Education. (n.d.). *Calorimetry*. https://media.pearsoncmg.com/bc/bc_0media_chem/chem_sim/calorimetry/Calor.php

Renna, L., & Kumbaraci, N. (2022). Survey and analysis of virtual vs. in-person biology teaching labs. *The FASEB Journal*, *36*. https://doi.org/10.1096/fasebj.2022.36.S1.R4571

Reyes, A. (2023). *What is the average age of college students?* https://www.collegeranker.com/what-is-the-average-age-of-college-students/

Schreiner, L. A., & Nelson, D. D. (2013). The contribution of student satisfaction to persistence. *Journal of College Student Retention: Research, Theory & Practice, 15*(1), 73–111. https://doi.org/10.2190/CS.15.1.f

SimPop. (n.d.). Buoyancy. https://simpop.org/buoyancy/buoyancy.htm

Sokoloff, D. & Laws, P., & Thornton, R. (2007). RealTime physics: Active learning labs transforming the introductory laboratory. *European Journal of Physics*, *28*. doi: 10.1088/0143-0807/28/3/S08.

Son, J., Narguizian, P., Beltz, D., & Desharnais, R. (2016). Comparing physical, virtual, and hybrid flipped labs for general education biology. *Online Learning*, *20*, 228–243. https://doi.org/10.24059/olj.v20i3.687.

Stuckey-Mickell, T. A., & Stuckey-Danner, B. D. (2007). Virtual labs in the online biology course: Student perceptions of effectiveness and usability. *MERLOT Journal of Online Learning and Teaching*, *3*(2), 105–111. https://jolt.merlot.org/vol3no2/stuckey.pdf

Taghavi, S. E., & Colen, C. (2009). Computer simulation laboratory instruction vs. traditional laboratory instruction in digital electronics. *Journal of Information Technology Impact*, *9*(1), 25–36.

The Physics Classroom. (n.d.). Refraction Interactive. https://www.physicsclassroom.com/Physics-Interactives/Refraction-and-Lenses/Refraction/Refraction-Interactive

University of Colorado (2024). *Simulation by PhET interactive simulations*. https://phet.colorado.edu/

University of Nebraska-Lincoln. (n.d.) *Astronomy education at the University of Nebraska-Lincoln*. https://astro.unl.edu/

United States National Center for Education Statistics (US NCES). (2023). *Condition of education*. U.S. Department of Education, Institute of Education Sciences. https://nces.ed.gov/programs/coe/indicator/cha

Vogt, N. P., Cook, S. P., & Muise, A. S. (2013) A new resource for college distance education astronomy laboratory exercises. *American Journal of Distance Education, 27*(3), 189–200. https://arxiv.org/pdf/1505.00051

Appendix A

Likert Survey Questions

All student satisfaction and perception surveys used the same Likert-style questionnaire, shown below.

Please rank each statement on a scale of 1–5, with 5 being “strongly agree,” 4 being “agree,” 3 being “neutral,” 2 being “disagree,” and 1 being “strongly disagree.”

1. The labs clarified material in the text and lessons.

2. The labs helped me to understand the material better.

3. The labs provided a “hands-on” learning experience.

4. The lab instructions were clear.

5. I was able to get the lab software to work without problems.

6. I enjoyed doing the labs in this class.

7. The labs were the best part of the class.

Impact of Culturally Relevant Pedagogy on Black Learners Enrolled in Online Undergraduate Mathematics Classes

Dr. Alexandra Schindel
Department of Learning and Instruction, Graduate School of Education, University at Buffalo, The State University of New York Buffalo, NY 14260, USA

Dr. Lauren Hennings
Department of Learning and Instruction, Graduate School of Education, University at Buffalo, The State University of New York Buffalo, NY 14260, USA

Abstract
Scholars have often proposed the use of *Culturally Relevant Pedagogy* (CRP) as a way to improve the experience of Black learners in mathematics classrooms. Prior research shows Black learners show improvement in comprehension, engagement, motivation, and confidence as a result of CRP's use. However, there is limited research on whether Black learners respond similarly when exposed to CRP in undergraduate online learning environments. This qualitative teacher-researcher case study examines learners' experiences in an online undergraduate algebra course to explore CRP's pedagogical design in an online mathematics environment and its impact on three Black learners' engagement, motivation, and confidence. Results show that as a result of the use of culturally relevant problems as part of the online course, specifically in weekly discussion boards and written reflection assignments, participants showed improved engagement, confidence, and motivation towards learning mathematics.

Keywords: Black learners, online learning, undergraduate math, culturally relevant pedagogy, engagement, motivation

Schindel, A. & Hennings, L. (2025). Impact of culturally relevant pedagogy on Black learners enrolled in online undergraduate mathematics classes. *Online Learning, 29*(2), pp. 357–392. https://doi.org/10.24059/olj.v29i2.4453

One of the most significant needs in US schools today lies in increasing achievement among Black students in mathematics. In 2015, only 7% of Black twelfth graders were at or above proficient level in mathematics, while White Americans were at 32% and Asians at 47% (National Center for Education Statistics, 2015). Black learners have also historically been excluded from and underrepresented in mathematics and STEM-based careers. While accounting for 12% of the American population, Black workers only hold 5% of STEM jobs (Milner, 2016). Mathematics acts as a gateway to STEM fields and can be linked to economic success since STEM graduates can access prestigious and lucrative careers (Adelman, 2006; Anderson & Kim, 2006) and since many high-paying jobs exist in STEM fields (Masterson, 2021).

While knowing achievement gaps exist is important, this measure should not be the sole reason for reforming mathematics education. Research concerned with increasing success in mathematics among Black learners frequently attends to their learning experiences and environments. Research shows that Black learners are more likely than their White counterparts to encounter low academic expectations, implicit bias of mathematics ability, negative stereotyping, and less access to rigorous and advanced mathematics coursework (McMillian, 2003; Minor, 2014; Morton & Riegle-Crumb, 2020). However, Black learners bring significant assets and identities to their mathematics learning which they harness as capable mathematics knowers and doers. A significant body of research demonstrates that rigorous and culturally sustaining pedagogies in mathematics can support Black learners by helping improve students' confidence, engagement, understanding, and overall attitudes toward learning (Corp, 2017; Hubert, 2014; Nasir, 2000).

Asset-based pedagogies can improve outcomes for Black learners in mathematics (Battey & Neal, 2018; Bonner & Adams, 2012). One such pedagogy is Culturally Relevant Pedagogy (CRP)—a method of teaching that empowers students intellectually, emotionally, socially, and politically by using cultural references to influence knowledge, skills, and attitudes (Ladson-Billings, 2009). While the use of CRP within in-person mathematics is growing and demonstrating success for historically marginalized learners (Hubert, 2014; Corp, 2017; Nasir, 2000; Fulton, 2009), more research is needed on CRP's role within online learning environments (McLoughlin, 2001).

This research explores the impact of CRP on Black learners in an online undergraduate algebra course. The following research questions guide this study: (1) How does an instructor design and implement CRP for Black undergraduate learners in an online mathematics classroom? (2) What is the impact of CRP on Black learners' engagement, motivation, and confidence? Findings describe the instructor's design of CRP mathematics problems that referenced various features of students' personal lives and addressed critical concerns, such as racial disparities in wealth, homeownership, criminal justice. Black students' interest, engagement, motivation, and confidence were positively impacted by CRP mathematics in online learning.

In what follows, we describe the theoretical frameworks and review relevant literature, including CRP in math classrooms and CRP in online learning. Following a description of the research methods, the results are outlined by first discussing the design of the culturally relevant problems and then the students' responses and reactions to the problems presented. The discussion problematizes key theoretical and practical issues and implications related to CRP in online mathematics that this study's findings reveal.

Theoretical Framework

Culturally Relevant Pedagogy in Mathematics

Ladson-Billings' Culturally Relevant Pedagogy (CRP) proposes a type of pedagogy that encourages students to maintain cultural integrity while challenging the system of oppression (Ladson-Billings, 1995; Ladson-Billings, 2009). The three components of CRP are academic achievement, cultural competence, and sociopolitical consciousness (Ladson-Billings, 1995). Academic achievement extends beyond test scores to include a variety of types of student achievement, such as being able to solve problems at all levels of sophistication, asking questions, and peer reviewing problem solutions (Ladson-Billings, 1995). Further, CRP instruction must bridge the gap between what students have or should have learned in prior grade levels to what they are currently required to learn (Laughter & Adams, 2012).

In speaking about the importance of the second element, cultural competence, Ladson-Billings (1995) stresses the need to design a learning environment where success in the classroom is compatible with learners' identities. Culturally competent instructors should engage themselves in the communities of the students being taught and be open to learning from those communities to influence their teaching practices (Irizarry & Antrop-Gonzalez, 2007). Thus, this facet of CRP encourages instructors to cultivate strong relationships with students and their communities to fluidly integrate culturally responsive and community-specific information and contexts into instruction. For example, mathematics instructors can utilize their students' favorite music/artists or foods to design a problem involving fractions or ratios to determine how much of a certain ingredient they would need to serve their favorite dish to a certain number of people or use an exponential formula to determine the frequency of the highest note in their favorite singer's vocal range.

The third component of CRP, sociopolitical consciousness, assists students in challenging the status quo by developing critical understanding of unjust systems and using their learning to challenge oppressive systems. However, sociopolitical consciousness is often underrepresented in CRP teaching, including within mathematics (Morrison et al., 2008, Thomas & Berry, 2019). In the context of teaching mathematics, sociopolitical consciousness can be developed as learners utilize mathematical concepts to further understand and reflect upon inequities, such as utilizing statistics to examine racial profiling (Hubert, 2014; Langlie, 2008).

For the context of this research, the researchers utilized CRP as the theoretical framing in the development of instructional design.

This research is also informed by theories of critical caring since the care perspective that teachers take within their work represents a foundational underpinning of CRP. Gilligan (1982), a pioneer of care theory, defines an "ethic of care" as the following vision.

> The self and the other will be treated as of equal worth, that despite differences in power, things will be fair; the vision that everyone will be responded to and included, that no one will be left alone or hurt. (Gilligan, 1982, p. 63)

Noddings' (1984) work on the ethics of care describes how caring relationships between students and educators are only valid if learners believe and confirm educators care for them. Although Noddings (2002) contends the concept of care does not apply universally or similarly for all students in all situations, care theories have paid minimal attention to the intersection of cultural relevance and care. Care theories often leave out the context of caring for Black learners and the contributions Black educators bring to the field of care (Roberts, 2010). These principles align with CRP but emphasize the need for instructors to develop critically caring perspectives within their practice. Thus, Culturally Relevant Critical Teacher Care (CRCTC) aligns with our research on CRP and assists us in articulating our roles as teacher-researchers exploring our practice and the many facets of our students' experiences.

Literature Review

In what follows we review relevant literature to CRP. This includes research that aligns qualitatively with CRP and its facets, and other similar frameworks such as Culturally Responsive Teaching (CRT), and social justice education. Note that while CRP and CRT have differences—CRP centers on attitudes and dispositions, while CRT focuses on competency and practice (Aronson & Laughter, 2016)—they also share similarities. They both embrace social justice in the classroom and viewing cultural differences as an asset.

Our literature review highlights relevant empirical research that studies the use of either of the two pedagogical practices (CRP and CRT) in traditional K-12 in-person mathematics classrooms. To examine more thoroughly what it means to facilitate the under-studied facet of sociopolitical consciousness in math classrooms, we dedicate a separate section below to highlight literature that specifically falls under the framework of Critical Mathematics (CM) or Teaching Mathematics for Social Justice (TMSJ). Empirical studies on CRP in online learning and college math is limited but relevant and will also be highlighted.

CRP and CRT in K-12 Math Classrooms

The body of research reviewed below reveals findings from implementation and outcomes in research featuring CRP and CRT in K-12 math classrooms.

How Do Teachers Implement CRP and CRT?

Studies suggest instructors who successfully implement CRT and CRP are highly knowledgeable of math content and emphasize the connection between mathematics and everyday life. Researchers have provided in-depth examples of what this looks like in practice. Corp (2017) utilized storytelling, via the use of quality African-American literature with realistic or historical context, followed by assignments prompting mathematical reasoning to address issues referenced in the literature. As an example, *Lucky Beans,* a story about a family living during the Great Depression and who had to eat canned beans every night, was used to introduce an exercise prompting students to use mathematical reasoning to estimate how many beans were in a can. Hubert (2014) integrated sociopolitical consciousness by developing activities requiring students to use quadratic and exponential equations to tackle major societal issues impacting their own communities, such as HIV and teen pregnancy. Successful culturally relevant instructors of Black and Hispanic high-school students try to demystify mathematics by reducing the use of abstract terms and putting more emphasis on real world applications (Langlie, 2008). As these examples demonstrate, culturally relevant topics vary but are attuned to the lives, interests, and critical topics in students' lives. Consequently, due to the unique nature of culturally relevant problems, teachers utilize open-ended questioning as opposed to routine, pre-defined problems (Tate, 1995).

Culturally relevant mathematics teaching frequently emphasizes teachers' having an awareness of the underlying mathematical presence already existing within students' cultures. Researchers emphasize that students' first language is the foundation and can be used to promote empowerment and biculturalism (Gutstein et al., 1997). For example, in efforts to utilize CRP to develop a mathematics curriculum in Ichishkíin, an Indigenous language, instructors took an active approach to discover where fractions reside in Yakama culture. The calculation of fractional geometric measurements, for example, was required for Yakama women who had to build conical homes and tipis without the use of written patterns (Ruef et al., 2020). Notably, the concept of factoring has been linked to the role of kinship and family that is revered in Black culture in efforts to contribute to the development of students' math identity (Bonner, 2014).

Successful culturally relevant teachers form relationships, use connections as foundations of curriculum building, believe in student capabilities, and act as "warm demanders" of academic excellence (Milner, 2016; Berry & McClain, 2009; King-Miller, 2015). Empirical research provides insight into what constitutes critical caring relationships and can be broken into three major findings: (1) Educators show an awareness in how race plays a role in their students' lives; (2) have high expectations; and (3) build interpersonal bonds with students. We make specific note of research aligned with our study's focus on Black learners in mathematics. Educators who successfully implement care into their CRP practice expect greatness (Hambacher, 2018; Hambacher & Bondy, 2016; Ware, 2006) and prepare Black students for the reality of often having to work twice as hard as their White peers to become successful (Jones, 1982). Further, successful Black teachers of Black learners engage in political clarity discussions with their students by acknowledging race plays a role in the realities Black learners experience in their everyday lives, unmasking the overt and covert faces of racism (Collins, 1991; Roberts, 2010; Hambacher & Bondy, 2016, Acosta, 2013). Taking time out to get to know students instead of jumping right into teaching the curriculum, as well as letting them get to know their teachers, demonstrates care to students and makes them more comfortable (Hambacher, 2018, Watson, Sealey-Ruiz, & Jackson, 2016). CRCTC may also include the practice of "othermothering" (or "otherfathering"), expressing parental care in addressing the psychoeducational needs of students (Hambacher, 2018). Students exposed to empathetic care express a sense of connectedness that helps foster students' perceived value and relevance of math (Maloney & Matthews, 2020).

In summary, successful implementation of CRP in mathematics is fostered through teachers' development of authentic caring relationships in which they integrate math learning with students' rich cultural, historical, and political backgrounds. However, all of the research explored in this section occurred within in-person learning environments, leaving open the exploration of implementation in online settings.

What Are the Results of Culturally Relevant Mathematics?

Empirical research tells us CRP and/or CRT practices in K-12 math classrooms help improve student engagement, confidence, and overall attitudes towards learning the subject. CRT positively correlated to elementary school students' engagement and enjoyment (Corp, 2017). Black secondary school learners showed an increase in confidence and motivation levels towards learning math (Hubert, 2014). Middle school Latinx youth participating in culturally responsive math afterschool programs felt more connected to their peers and staff and promoted engagement (Yu et al., 2021).

In addition to the promising results in student attitudes towards learning, empirical research shows CRP and/or CRT approaches help bridge the connection between math learned in school and math utilized outside of the classroom, or everyday mathematics. The mathematics students use outside the classroom may not be reflected in the curricula they are exposed to in school. The everyday cultural use of mathematics by Black students in particular, such as through shopping in local markets and engaging in sports, can and should be used to build connections to mathematics learned in classrooms (Nasir, 2000; Taylor, 2009).

Curricular reforms that connect content learned in the classroom to everyday math improve students' understanding of the subject and enhance mathematical reasoning (Yu et al., 2021; Fulton, 2009). Urban high school students required to complete a culturally relevant statistics project not only exhibited improved statistical reasoning but were also able to make claims about inequities based on quantitative evidence (Enyedy & Mukhopadhyay, 2007). Schema instruction combined with culturally and linguistically responsive practices improved the skill of solving math word problems for elementary school English language learners (Driver & Powell, 2017). Culturally and linguistically responsive instruction contributes positively to student mathematics performance overall (Driver & Powell, 2017; Matthews & López, 2018).

CRT strengthens students' sense of becoming successful mathematical thinkers (Fulton, 2009). In addition, empirical research demonstrates learners become empowered to achieve mathematics excellence (Gutiérrez, 2013).

Critical Mathematics

Critical scholars in mathematics education argue for curricular changes that allow learners to leverage mathematics learning to understand and analyze injustices and to propose mathematical solutions to them (Frankenstein, 1989; Gutstein, 2006). In his work on Teaching Mathematics for Social Justice (TMSJ), Gutstein (2016) emphasizes that students must learn to *read* the world through mathematics, and consequently develop sociopolitical consciousness, while also *writing* the world, or using that knowledge to better shape society. Students are encouraged to situate themselves in the context of problems and are prompted to figure out how to use math to challenge the status quo and take action against injustices (Harper, 2019; Gutstein, 2003; Kokka, 2019; Gutstein & Peterson, 2005; Gregson, 2013).

Scholarship in the field of TMSJ highlights learners' increased engagement in deep discussions and the substantial use of mathematics in analyzing social justice issues. TMSJ also encourages learners to go beyond the use of straightforward procedures and calculations. Problem-solving typically involves data collection and analysis, substantial math work, and proposing solutions to societal issues. Students play a major role in deriving the mathematical content needed to tackle such issues and are better able to navigate through advanced mathematics (Harper, 2019).

Various curricular examples highlight ways to integrate sociopolitical awareness into mathematics. For example, activities centering on issues such as wealth distribution and income inequality (Gutstein, 2003), living on minimum wage and gentrification (Kokka, 2019), police brutality (Gutstein & Peterson, 2005), and youth criminalization (Gregson, 2013) elicit students' understanding of the world and its inequities through the use of math.

Overall, empirical research shows critical approaches to mathematics learning fosters engagement and helps nurture learners' complex problem-solving skills that are required to tackle pertinent societal issues that impact their communities.

CRP in College Mathematics

Unsurprisingly, the empirical research that focuses on CRP in college math courses tends to have similar characteristics as seen in pre-collegiate levels (Greer et al., 2009; Downing & McCoy, 2021; Jett, 2013; Yull, 2013). However, CRP-influenced reforms within college STEM departments often include encouraging collaboration among students (Johnson & Elliott, 2020). For example, collaborative and community learning is encouraged through mixed ability grouping that supports students who may be struggling (Yull, 2013). Finally, one of the first examples of critical mathematics was articulated in college mathematics learning environments (Frankenstein, 1989).

CRP in Online Learning

When it comes to learning math online, students find it more challenging due to lack of social support and their sense of isolation. Students who already struggle in courses where algebra is taught, for instance, may experience more difficulties if enrolled in an online course (Kim, Park, & Cozart, 2014). While students are at risk of underperforming in an online classroom compared to the in-person environment, for Black learners the performance gap is wider (Xu & Smith, 2014). While these issues exist, one study shows an African-American male still seeing a benefit to online learning due to less pressure of having to conform to white cultural norms that may be present in in-person classrooms (Corey & Bower, 2005). Nevertheless, it is not enough to just throw students into an online classroom and expect everything will turn out for the best. Something must be done to address these concerns.

While there are very few examples of empirical research focusing on CRP online learning in the mathematics classroom, there are works that provide insight into how CRP operates in online settings regardless of subject. Online faculty who are properly trained, engage, and understand the importance of CRP are an asset to teaching diverse learners (Heitner & Jennings, 2016). While these works show similar characteristics found in research focusing on in in-person classrooms, culturally responsive teaching in online settings also includes providing feedback frequently (Smith & Ayers, 2006) and result in students responding positively to group work activities (Smith & Ayers, 2006; Majewski & Vereen, 2021). Studies also stress the need for instructors to take advantage of collaborative learning activities and varied resources needed to facilitate student interaction (Kumi-Yeboah & Amponsah, 2023). Practices also include asking students to complete a preliminary course assessment to gauge current student ability to engage with technology required for online learning, allowing students to use multiple methods to create and submit reflection assignments, such as audio or video, blogs, or just simple Microsoft Word submissions, letting students facilitate online discussions, and providing students with the opportunity to co-design the course (Woodley et al., 2017).

Purpose

Our review of the literature reveals that little is known about the integration of CRP in undergraduate online math classrooms, and its effectiveness on Black learners remains relatively elusive. Research using non-quantitative measures of learning to examine the effectiveness of CRP on learners is robust, especially when the focus is on student engagement and confidence. However, aside from Hubert's (2014) study, there is limited focus on motivation. Further, Aronson and Laughter's (2016) synthesis of culturally relevant research noted that CRP's positive impact on student motivation was explicitly mentioned when discussing CRP in science and ELA education, but not in the field of math education. Our study addresses the need for additional research in CRP in online mathematics settings while attending to the under-researched areas of instructor care, sociopolitical consciousness, and learners' motivation.

Methods

Methodological Approach and Positionality

The researchers identified that a qualitative teacher-researcher case study approach was well-suited to address the research questions exploring the design, implementation, and impact of CRP on Black undergraduate learners in a seven-week online Algebra course. Case studies are often used to document reaction, attitudes, and behaviors of the participants in response to a particular event (Saldaña & Omasta, 2018). Cochran-Smith and Lytle (2009) define practitioner research as forms of inquiry where the practitioner is also a researcher who aims to improve students' learning experiences through continuous engagement of inquiry. Research is typically conducted by insiders, i.e. the practitioners, using their own site (classes, schools, districts) (Anderson, Herr, & Nihlen, 2007). Practitioner research requires having a great deal of knowledge of the educational contexts and/or situations one works or participates in (Cochran-Smith & Lytle, 2009, p. 42). This form of research, McKernan (2021) asserts, is based on three assumptions: (1) Naturalistic settings are best studied by those experiencing the problem, (2) naturalistic settings influence behavior and (3) qualitative inquiry is best suited for examining naturalistic settings.

As authors, we are a Black woman (Lauren) and a white woman (Alexa). For this manuscript, Lauren acted as the principal investigator and practitioner researcher, and Alexa contributed content expertise in developing the manuscript. The first author (Lauren) taught the online undergraduate math course in this study for three years prior to the research. Lauren's positionality as a Black female is important in this study in which the academic excellence, cultural competence, and political awareness of Black learners is explored because the shared racial and cultural identity provides them with some aspects of shared knowledge and experience. Lauren has also been a student in online classes and shares the experience of being one of only a few Black students in an online learning platform. This positionality made her conscientious of the classroom social situations of student participants.

Course Context and Procedures

The study context is a seven-and-a-half-week *College Mathematics* course designed to help students develop quantitative literacy skills for their personal and professional lives. Students use reasoning and mathematical methods to find solutions to real-world problems and use algebraic, financial, proportional, probabilistic, and statistical methods to draw conclusions and/or make decisions. Students were required to complete online homework and quizzes administered through an online tutoring and assessment program.

For this study, participants were recruited via email prior to the course beginning. The email explained the purpose of the study and included an attached consent form for students to sign. After consenting, participants completed an online introductory survey which asked students about their personal lives, such as, where they are from, their hobbies, and their family life, as well as about their prior math experiences in school, particularly surrounding algebra, their perceived mathematical ability, and the relationship between sociopolitical issues and mathematics. The survey was designed to mitigate instructor stereotyping and to personalize the design of culturally relevant mathematics problems. For example, in Jaylen's introductory survey responses, she said she saw a connection between math and social justice, stating "I believe it can play a role in local thinking. Using statistics and patterns to determine where the issues lie and how can they be corrected." Therefore, designing a problem that referenced statistics and patterns through a graph was warranted.

All students were required to participate in weekly discussion boards by making an initial post and replying to at least three other posts. The instructor replies to each student's initial post with additional mathematical problems. For the students who agreed to be participants in this study, the reply posts consisted of a culturally relevant problem either similar to a problem they got wrong on the homework or a problem that was related to that week's topic of discussion. All students also submit four written assignments reflecting on what they found most important about the week's lesson and the application of their learning in their everyday life or career. Participants were also prompted to complete an optional culturally relevant problem with their reflections.

The course curriculum, homework, discussion board topics, and reflection questions were prescribed by the school, leaving little room for instructors to make changes. Thus, CRP was implemented as an added or secondary component to the standard (prescribed) curriculum. Regardless of whether student participants respond to the culturally relevant problems the instructor posted, students were still required to complete the homework and quizzes the school assigned, which contain what might be considered traditional, non-culturally relevant problems.

Participants

Three female students who identify as Black or African American participated in this study. They will be referred to by the pseudonyms Jaylen, Tiffany, and Candace. Candace identified her proficiency level in algebra as moderate and testified on her struggle with figuring out what next steps to take in a problem. Jaylen said she was really good at algebra but was not too fond of graphing. Tiffany confessed she was "just ok" at algebra but struggled the most with taking tests and memorizing formulas. All three were enrolled in the online *College Mathematics* course Schindel (author one) taught at a private for-profit college that offers associate degrees on all campuses and bachelor's degrees at some campuses. All the students in the study came from the same school and were enrolled in the same course, although different sessions, which constitutes within-case sampling (Saldana & Omasta, 2018).

Data Collection and Sources

Researchers collected data during all phases of the research, which included a lengthy planning phase, implementation phase, and follow-up phase in which participants were interviewed after course completion. To address the first research question regarding the design and implementation of CRP, the data collected included detailed field notes, the designed culturally relevant problems, and instructor feedback responses. The use and collection of field observation notes is similar to other practitioner research (Gutstein, 2013; Martell, 2013). After each week in the course, the researcher audio-recorded field notes to provide a detailed reflection of what occurred during that week, including the students' engagement and performance in the class, and the use and design of culturally relevant problems. I (Lauren) also reflected on my own positionality in field notes, examining my views of the sociopolitical issues in problems and how my own experience as a STEM student and worker contribute to how I designed problems and my interaction with the participants.

To assess the impact of CRP on the learners (RQ2), the following forms of data were collected during this study: answers and explanations to the culturally relevant problems assigned in the discussion boards and reflection tasks, more observation field notes, and end-of-course interview responses. After the course ended, participants participated in a one-on-one audio recorded interview focused on participants' perceived level of engagement, motivation, and confidence, their thoughts on how to use math to address a posed societal issue, and their experience using math outside the classroom. Interviews also explored participants' responses to the culturally relevant problems posted. All participants were asked to assess their performance in the class and to evaluate their experience.

Data Analysis

All data collected were transcribed and then analyzed using the data analysis software Dedoose©. To answer the first research question, an initial first phase of data analysis was conducted and consisted of deductive coding the designed culturally relevant problems using preset codes. The deductive codes initially used were the three facets of CRP: cultural competence, sociopolitical consciousness, and academic excellence. The data were then further analyzed utilizing inductive coding to explore the ways in which each element of CRP evolved within the research. I used Dedoose software to figure out if there were any common themes or trends present that would help define features of the culturally relevant problems used. The software helped list the common descriptive codes present in excerpts that were deductively coded. For example, below is the analysis from Dedoose showing how often certain inductive codes appeared alongside the parent deductive code "Academic Excellence", i.e. the common themes that showed up in culturally relevant problems that demonstrate this one-third component of CRP.

Figure 1

Codes	Academic Excellence	Graphs	More Guidance Provided	More practice	New Technology	Totals
Academic Excellence		2	27	9	6	44
Graphs	2		2			4
More Guidance Provided	27	2		3	2	34
More practice	9		3			12
New Technology	6		2			8
Totals	44	4	34	12	8	

The field observation notes collected were coded using descriptive coding. The instructor feedback was also analyzed using inductive and descriptive coding in efforts to discover common themes present in the interaction between the practitioner-researcher and student participant.

To answer the second research question, a combination of in vivo and emotion coding was applied to the one-on-one interview transcripts. In vivo coding uses the interviewee's own language to derive codes (Saldana & Omasta, 2018). For example, excerpts were coded as "relatable" when students explicitly said the problems were more relatable to them. The emotion coding used applied labels to "the emotional states experienced or recalled by the participant, or inferred by the researcher about the participant" (Saldana & Omasta, 2018, pg. 130). These methods were useful in discerning instances when students indicated they felt confident, engaged, and/or motivated towards learning, with or without them explicitly stating so. For instance, if a student expressed they were comfortable doing a problem, that excerpt would be coded as "confidence," The following examples are excerpts from all three student interviews that were coded as "motivation" based on the participants' responses.

Figure 2

Student Interview Excerpts Coded as "Motivation"

Resource **Lauren & [redacted] Interview transcript.docx** Added **01/30/2021** Username **LaurenHenn** # Codes **5**

No, it has increased it. I know further down the line when leasing cars or when paying back student loans, I now understand how interest rates come into play or even having a savings account. And I know that that is important and looking for banks that will actually apply to my end goal is, I didn't

Resource **[redacted] Course Responses.docx** Added **01/26/2021** Username **LaurenHenn** # Codes **2**

With my new attitude towards my coursework, I can see and feel my accomplishments.

Resource **Math 201 Nov 2020 [redacted] Observation Notes Transcript.docx** Added **01/20/2021** Username **LaurenHenn** # Codes **4**

ard." She also mentioned that she has a new attitude towards her coursework. So that speaks to the confidence factor and the motivation factor.

Resource **Lauren & [redacted] Interview transcript.docx** Added **01/19/2021** Username **LaurenHenn** # Codes **9**

I liked discussions. Every time we posted a discussion, how you went back and gave us questions to help us further understand, and with the reflection questions, I like how I can actually relate to it. So it wasn't something I had to actually sit, think about, and try to get information to answer the questions. It was based on my life, so I could give you feedback based on how I actually felt.

Resource **Interview transcript LHennings &[redacted].docx** Added **01/19/2021** Username **LaurenHenn** # Codes **7**

Like for this class, having culture relevant mathematics. I mean, it increased my curiosity, my when I want to learn [inaudible 00:22:20] because just playing mathematics, these things or these questions are not asked especially in relevance to our culture. So I think that if this culturally relevant, then it would make to the more intrigued to learn and ready to learn because it's in relation to their culture. It deals with their culture and what they deal with in life and in their community. So I think that'll be a big plus with mathematics.

Inductive and descriptive coding were applied to the student answers to the culturally relevant problems and to the rest of the field observation notes. The coding applied on the student answers and field observation notes was used to determine in what ways instances of high engagement showed up in problem solving. Below is a summary of all data sources, their purpose, and how they were coded.

Figure 3

Summary List of Data Sources

Phase	Data Source	Description	Coding
Planning	Introductory Survey Responses	Responses collected from students prior to beginning of course. Used to get to know students on a more personal level. Asks about hobbies, life outside of school, prior experience with math, etc… Information used to design individualized culturally relevant problems.	N/A
Implementation	Culturally Relevant Problems	Designed using info from introductory surveys. Assigned in discussion board reply posts and reflection assignments throughout duration of study. Data used to develop common themes exhibiting how three tenets of CRP show up in problem design.	Deductive coding using one of three codes : "cultural competence", "academic excellence" or "sociopolitical consciousness". Later applied descriptive coding.
	Students' Answers to Problems	Data used to gauge levels of engagement exhibited by students during problem solving.	Inductive and descriptive coding.
	Instructor Feedback	Data used to determine nature of feedback exhibited from instructor in a culturally relevant online environment.	Inductive and descriptive coding.
	Field Observation Notes	Recorded and documented to reflect instructor's thoughts and mindset during implementation process. What was instructor thinking? Why did the instructor design the problems the way she did? How did instructor view students' responses to problems? What did instructor want to convey during problem design and while providing feedback? Etc...	Inductive and descriptive coding.
Follow Up	One-on-One Zoom Interviews	Data collected from student participants at the end of course, after grades were submitted. Provided forum for students to reflect on their experience during the study. Data used to determine how students viewed their own levels of engagement, motivation, and confidence as a result of CRP problems.	Emotion, amd in-vivo coding

Teaching CRP in Online College Mathematics

In this section, we describe how Lauren integrated and implemented CRP into an online college mathematics classroom to cater to Black learners. I provide examples and excerpts of problems for each of the three components of CRP and I share my reasoning behind the problem design. Lastly, I discuss the feedback I provide to students and how the nature of the feedback sought to contribute to a culturally relevant environment.

While the three facets of CRP are discussed separately below, they were in fact integrated within the problems I designed. Problems exemplifying academic excellence have also encouraged cultural competence, sociopolitical consciousness, or both. One problem, for example, asked a student to think beyond the scope of the course by using technology, specifically a new Excel formula, to analyze the racial gaps we see in student loan debt. In this sense, I encouraged students to learn new tools or higher-level mathematics thinking than that of the original course curriculum. Academic excellence is not compromised when either cultural competence or sociopolitical consciousness is stimulated.

While I did not design problems that explicitly epitomized all three facets of CRP, I would argue that problems inspiring sociopolitical consciousness and academic excellence also embody cultural competence. Church and religion are very important and highly respected elements of Black culture. Cultural practices found in Black churches, such as the nature of call-and-response interaction during service and the prominent use of imagery, have been shown to influence strong activism (Pattillo-McCoy, 1998). Hence, sociopolitical consciousness has also become an innate facet of Black culture. Problems encouraging sociopolitical consciousness can be argued to also show cultural competence since these problems acknowledge and respect an already existing component of Black customs and heritage: Black activism.

Cultural Competence: Hobbies, Student Life, & Current Events

I drew upon the information I learned about and from the students in their survey response to design problems. The problems that were initially deductively coded as promoting *cultural competence* had some reoccurring themes appear during the inductive coding process. These problems often referenced known factors of the student's life, such as their family, their outside-of-school jobs, and their hobbies. There were also instances where current events or trending topics that involved Black Americans were referenced when designing problems.

For example, Jaylen indicated that she loves crafting and shared the names of her siblings. The culturally meaningful mathematical problems I posted for Jaylen in the discussion board and in reflection assignments referenced these factors and were also connected to the content the students were learning, such as proportional reasoning and probability. Below is one example.

> Review the YouTube video for instructions on how to craft and use a fortune teller origami: https://www.youtube.com/watch?v=Mj7WE30zJUk . Assume you and your younger sister <sister's name>, are playing with the origami, with you as the fortune teller (the person holding the origami).

> To play the game, your sister has to pick among the four colors (orange, red, blue, and black). Depending on the color she picks, you make a number of movements (pinches/pushes) equal to the number of letters in the color she picks. Your movement results alternate between showing 1, 2, 5, 6 or 3, 4, 7, 8, with the first movement showing 1, 2, 5, 6. You then ask her to pick one of the four numbers shown.
>
> Now that you know how the game works, calculate the probability of <sister’s name> picking orange or blue and then picking an even number or a 3. Explain your reasoning in at least 150 words.

Here, the problem encourages the student to enhance their understanding of probability while also appreciating their love for crafting. In this example, cultural competence is fostered in and through mathematics by demonstrating respect for the students’ culture. The problem is aligned with the students’ interest and fosters a deeper understanding of the craft by seeing it through a mathematics lens.

In Candace’s initial survey, she indicated that she likes to bowl as one of her hobbies, comes from a nine-child family, (seven sisters and a brother), and likes to listen to gospel music. The problems below—two from discussion boards and one from a reflection assignment—were designed for her specifically.

> In a 9-child family, what is the probability of having 1 boy and 8 girls? (Birth order is irrelevant.)
>
> What is the probability of knocking down exactly 5 pins in a frame?
>
> What was the average number of album sales for gospel music from 2008 to 2014? During which year did album sales seem to differ most from the average?

Figure 4

Chart of Data Provided to Candace Along with Assigned Gospel Music Problem Above

Music album sales in the United States from 2008 to 2014, by genre

(in millions)

Search: Records: 13

	2008	2009	2010	2011	2012	2013	2014
Christian / Gospel*	29.79	27.82	24.23	23.73	22.9	19.53	17.36
Country	47.66	46.13	43.72	42.92	44.6	36.46	30.46
Dance / Electronic	-	-	8.74	10.05	8.7	7.11	5.26
Latin	25.13	16.5	12.35	11.81	9.7	8.27	6.26
R&B	77.01	69.89	57.87	55.44	49.7	47.78	35.75
Rock	139.67	124.16	103.71	105.69	102.5	92.93	85.25
Pop	-	-	-	-	-	24.62	27.71
Alternative	80.92	68.2	53.73	55.03	52.2	-	-
Classical	13.32	12.14	8.96	9.57	7.5	-	-
Jazz	11.79	11.78	8.78	11.08	8.1	-	-
Metal	50.48	38.73	32.55	32.21	31.9	-	-
New Age	2.94	2.35	1.66	1.93	1.7	-	-
Rap	33.41	26.44	27.33	28.25	24.2	-	-

These examples integrate cultural competence along with mathematical thinking by referencing pieces of information surrounding the student's life while also connecting to probability and statistics lessons. Here, math is used to determine the uniqueness of a family like hers, the likelihood of a certain outcome in a game she loves, as well as outliers in yearly album sales for a genre she enjoys.

Sociopolitical Consciousness: Addressing Racial Disparities in Home Ownership, Mental Health, & Criminal Justice Reform; Open-Ended Questions

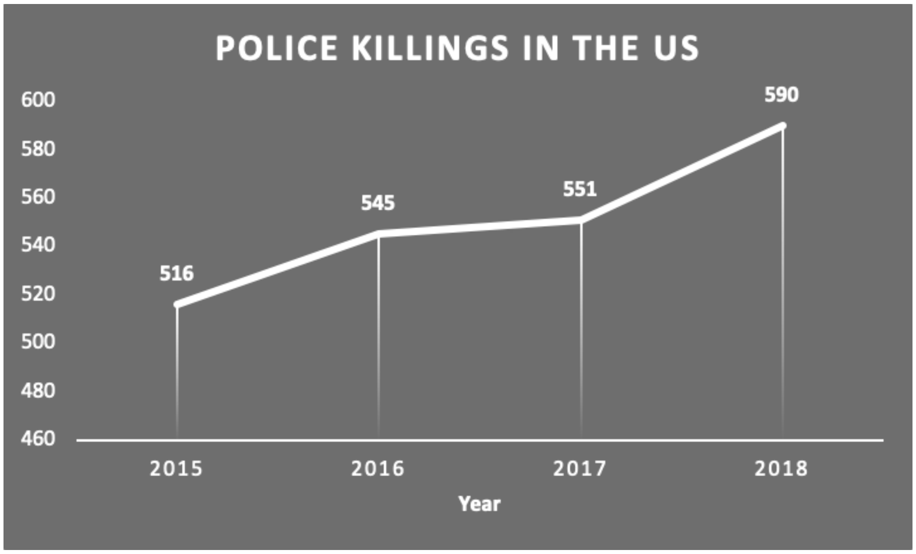
Problems designed to promote *sociopolitical consciousness* and deductively coded encouraged students to use their mathematics learning in class to address sociopolitical issues, particularly those that highlight injustices in the Black community. I incorporated the following topics into math problems: racial disparities in wealth, home ownership, police brutality, and other issues that the students brought up in the initial survey. Candace expressed interest and personal involvement in social justice causes; she works with a community organization that deals with conflict resolution between citizens and police. Policing was one of the top issues for Black voters during the 2020 presidential election (Clement, Balz, & Guskin, 2020). Hence, I designed the problem below to encourage students to use their learning on exponential growth to solve a problem on police killings.

> According to AmericanProgress.org (https://mappingpoliceviolence.org), the line graph below shows the number of police killings across a 3-year period.

> Does the graph illustrate more exponential growth or linear growth in police killings? Based on your answer, calculate either the exponential growth rate OR the linear slope.

Figure 5

Line Graph Provided to Student(s) Along with Police Brutality Problem Above



This problem prompted students to use their math learning to analyze real data on police killings. Granting students the opportunity to calculate the rate of police killings not only enhances their math skills but may also encourage them to think about the issue of police brutality on a deeper level. Mathematic calculations further emphasize the seriousness of the issue and can potentially further students' thinking about how the issue can be resolved.

Tiffany considered math to be useful when dealing with issues surrounding the cost of living and historical inequalities—based on race—in interest rates charged on loans. In composing a problem for her, I referenced OneUnited Bank, the country's largest Black-owned bank, whose goal is to improve financial literacy, build up neighborhoods, and support Black-owned businesses. The role of the bank in the context of the problem serves as a potential place where the student can save money for a home if the bank were to open up a branch where the student resides. I also mention the city of Milwaukee because it is the city where the student says she resides but is also considered one of the top cities where there is a high disparity in income between Black and white Americans (Schneider, 2015).

> OneUnited Bank, the nation's largest Black-owned bank, is thinking of opening locations in Milwaukee. In seven years, you are interested in purchasing a house worth $120k and want to save up $24k for the down payment. OneUnited Bank offers their customers a BankBlack Savings account with APR 0.10%, compounded monthly. How much would you have to invest per month for 7 years in order to accumulate $24k in savings?

Jaylen, as indicated in her survey responses, aspired to one day own a community center and was very candid in talking about her struggle with mental health. She touched on the stigma surrounding mental health and counseling we often see in the Black community, the reluctance to say there is a problem and to get help (Fripp & Carlson, 2017). The topic of statistical correlations was in the course curriculum. I therefore took the opportunity to try to improve Jaylen's understanding of correlations by referencing the topic of mental health, a topic she seemed passionate about.

Open-ended questions were used in almost all problems promoting sociopolitical consciousness and critical thinking. The intent here was to get students to use their knowledge about the issue at hand to provide their own opinions on why the issue exists or how to solve the issue. Below are examples of these open-ended questions.

> Why do you think there is a big discrepancy in Black homeownership between these 2 cities?
>
> What do you think can be done to ensure the number of people killed by police will decrease over the years instead of increase?
>
> How do you think the increased presence of community centers will correlate to mental health?

Sociopolitical consciousness in education involves utilizing skills and concepts learned in the classroom to analyze, identify, and solve real-world issues (Ladson-Billings, 2014). The problems discussed above prompted students to use what they learned to tackle issues such as racial disparities in income, homeownership, criminal justice reform, mental health, etc. Based on the introductory survey responses, these were issues in which students expressed interest. Often, the topics referenced were also thoroughly discussed in mainstream media at the time. Real-world data and stats were provided to give full and accurate depiction of the issues at hand and to also provide the foundation for the mathematical problem-solving portion of the problems. Hence, the connection between mathematics and addressing pertinent and relevant issues was built in efforts to integrate sociopolitical consciousness in the classroom.

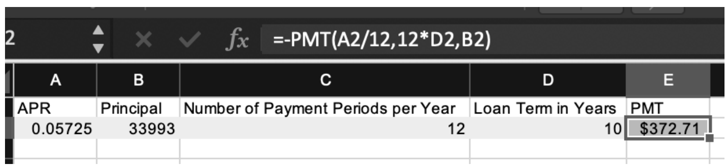
Academic Excellence: New Technology, Higher Difficulty Problems, and Scaffolding

As an instructor, academic excellence was also a significant feature of my work. Some common themes appeared in the problems deductively coded as promoting *academic excellence.* To encourage academic excellence, I integrated supportive feedback and structures into the course design. These included encouraging students to use new technology and providing thorough guidance for high-difficulty problems when needed. For example, as part of the course, all students had to complete a portfolio project which required the use of Excel©. This project was not due until Week 6. Prior to that, the use of Excel as part of the curriculum during the first five weeks was limited. There were several instances where I took the opportunity to expand students' knowledge of Excel during that period. I introduced students to the PMT function in Excel, which can be used to calculate the monthly payments of a loan given the loan value, the length of the loan, and the interest rates. Below is one example of a problem I designed for Candace and an excerpt of the Excel model itself.

Problem for Candace: According to the US Department of Education, on average Black students owe $33,993 upon graduation compared to the national average of $29,669. Assuming the average APR is 5.725% for everyone, how much more are Black students paying every month across a 10-year repayment period? Here is a payment calculator I created in Excel. Using the calculator, we find that a $33,993 loan requires a monthly payment of $372.71. Can you finish the rest of the problem?

Figure 6

Snippet of Example Provided to Student Showing How to Use PMT Excel Formula to Calculate Loan Payment



=-PMT(A2/12,12*D2,B2)

A	B	C	D	E
APR	Principal	Number of Payment Periods per Year	Loan Term in Years	PMT
0.05725	33993	12	10	$372.71

In addition, when designing problems, I often went beyond the scope or the level of difficulty featured in the prescribed curriculum. My intent was to either broaden the students' understanding or require them to use their prior knowledge of math. In these instances, I made sure to either partially remind them of math concepts they may have learned in lower-level math courses or give them hints. Linear slope, for example, was not a topic included in the course curriculum but would be included in a lower-level class. For example, when I asked Jaylen to determine whether a data model on police brutality showed linear growth or exponential growth, The researcher provided a picture demonstrating the two and a formula on how to calculate linear growth.

Academic excellence in the context of CRP means stimulating intellectual growth in students (Ladson-Billings, 2014). The above examples show students were encouraged to go beyond the learning as outlined in the curriculum and connect their prior knowledge to new learning. Students were also given support and thorough explanations when they did not solve a problem correctly. These techniques in instruction and problem designing help to communicate that the instructor has confidence in students' ability to succeed, not just at learning the concepts outlined in the curriculum, but also to take their skills to the next level and grow as a math learner. Furthermore, the scaffolded support provided shows students that they are supported in the learning process, which may assist students in building the confidence needed to tackle new concepts.

Culturally Relevant Feedback: Personable, Caring, and Relatable

In this section, the researcher discussed types of feedback provided over the course of the study. When coding the feedback excerpts, the common themes that showed up were "personable," "caring," and "relatable." The feedback went beyond simply letting students know if their answer was correct or why their answers were incorrect. Instead, I integrated my personal information about myself and my understandings related to the math problems whenever possible. In this way, I not only gathered the students' interests but expressed vulnerability in sharing my own. I drew upon prior research which shed light on the ways that CRP must be carried out in all elements of a teacher's practice (Hubert, 2014; Milner, 2016; Hambacher, 2018; Ladson-Billings, 2009) as I sought to situate learning and assessment within genuine, caring relationships. Below is one example where I express personal information about myself that is related to the topic being discussed.

> You raise some good points about community outreach when it comes to teaching people about investing. When I first learned about investing in stock, for instance, it was made to seem more complicated than it actually is. It was not until I met my fiancé when I really learned about it. My family and I come from a working-class background while his family came from an upper middle-class background. Therefore, he knew more about investing in stock and always advised me to invest in stock holding companies I liked to shop with. For certain clothing stores I found buying some shares of their stock and letting it sit long term was a better investment than simply buying clothes from them on a regular basis.

It was also important to acknowledge and empathize with the student's experience, what they are going through, and value their input on how to fix certain social justice issues which is heavily influenced based on their experience.

> Thank you for sharing your own personal struggle with mental health. Sending positive thoughts your way! Unemployment definitely is a correlating factor. When you open your community center, in addition to offering services that help with unemployment, financial instability, etc... do you plan on offering direct mental health counseling? I think that would be a great idea and given your passion for helping people, it will definitely go a long way in giving back. There are so many people suffering and sometimes all they need is someone to talk to.

During the summer and early fall of 2020, massive worldwide protests broke out in response to the high-profile police killings of Breonna Taylor and George Floyd. One of the course sessions I was teaching for this study happened during this period. In late September, a grand jury decided not to charge officers for Breonna's death. I reached out to Tiffany via email to offer words of encouragement or support.

> So far, your participation has been great and extremely helpful to my research. However, I wanted to reach out to you specifically about the most recent headlines regarding the Breonna Taylor verdict. The country is going through very hard times and people are hurting. Regardless of where you stand on the issue, the verdict, or whether you are aware of the incident, I want you to know that if you need to vent or express your feelings about the situation, or any other current events, and whether your focus on school is being impacted due to what is happening, please do not hesitate to contact me. I am here to help you succeed no matter what.

These above pieces of dialogue between the myself and the participants I deem culturally relevant. They possess the common characteristics of being personable, caring, and relatable in a way that aims to demonstrate connectedness with the students. Ladson-Billings (2009) argues for culturally relevant instructors to find ways to facilitate interaction outside of the classroom. Because I am teaching an online class and I do not live near the students, this would be difficult to do. However, if there is a way to communicate with students in a similar manner as one would outside the classroom, that can possibly lead to a level of connectedness between students and instructor akin to that found if there is in-person communication outside of the classroom. Telling students about myself, letting them know I am there for them, thanking them for being open, as well as comforting them on issues that might be impacting them in the real world are great ways to build the connectedness that is encouraged by CRP scholars.

Findings

In our analysis of the student data, we identified evidence of high engagement, confidence, and motivation among the student participants. We also identified various ways that students related these factors to their culturally relevant learning experiences.

High Engagement: Personable, Lengthy Responses & Explanation of Answers

Examining student engagement as a measure of learning takes the focus off of scores and places it on the students themselves and their experience in the classroom. Student engagement has historically been shown to positively correlate with student achievement (Skinner, Wellborn, & Connell, 1990; Finn, Pannozzo, & Voelkl, 1995). Student engagement has been defined by looking at the length of time and amount of physical energy students spend on activities in the classroom. This includes the amount of effort students use to study and practice a subject, analyze and solve problems, and obtain feedback (Jacobi et al.,1987; Kuh, 2003).

There were some commonalities found in students' responses to the culturally relevant problems. First, students explained how they derived their mathematical answers and also provided thorough responses to questions. Their responses provided further insight into their lives and how their experience shaped their reaction to social justice issues presented. Additionally, although students were not required or given direction to show their work when answering the culturally relevant problems, for the most part they still showed their work and thoroughly explained their answers, exemplifying high levels of engagement exhibited in CRP problem solving.

A prime example of a student explaining their reasoning was Jaylen's response to the origami probability problem shown earlier. Jaylen did not simply state her final answer. Instead, she listed out all the possible outcomes of the origami game, picked the correct ones, and explained her reasoning. Below are a few more examples of students giving step-by-step explanations of their answers.

Figure 7

Examples of Students Providing Step-By-Step Solutions to Problems

The current median saving balance for b is $6999.99.

$B(1 + 0.04)^4 = 8189$

B(1.17)=8189

B=8189/1.17

B= 6999.99

The current median saving balance among Black America, C is $1516.34

$C(1 + 0.04)^{43} = 8189$

C(5.40)=8189

C=8189/5.40

C=1516.34

> Based on the bar graph the 80% is correct. (88-49)/49 equals to 0.795918367, rounded it would be .80 = 80%. I don't agree with what it says about Black women because I think the number is higher for Black women than any other group. If my math is correct (2272-1018)/1018 =1.231827112 =123.1= 123%.

Below is one example of Jaylen providing lengthy answers, demonstrating their interest and engagement in talking about the social justice components of some problems. These pieces of dialogue demonstrated the student's personal knowledge of the issue, based on historical knowledge or experience, and what values they have that guide their proposed solutions to certain issues.

> The topic you brought is one i am most familiar with. I hope to open a community center to help with issues just as this one. I believe that offering my community assistance with issues that can lead to depression such as homelessness, unemployment, financial instability, and lack of resources can help tremendously. I have personally been one who has face severe depression disorder. Without the right treatment, support, willingness to recover and resources it can be hard for anyone to recover. I know community centers who are aware of the issue and know how to deliver the right assistance can help the mental health of individuals, and the community as a whole. An example of a positive correlation involving major depression disorder in Black American adults is the rise in unemployment causes a higher rate on major depression disorder. The more Black Americans become unemployed, they are unable to provide for themselves or find resources to help them, the more likely they are to face major depression disorder. More are unemployed ==> More facing depression.

Here, Jaylen was asked to provide an example of a contributing factor that correlates to the disproportionate number of Black American adults experiencing major depressive disorder. The last three sentences in Jaylen's response directly answer the question. The first six sentences show information that was volunteered by the student on her own. Jaylen demonstrated comfort sharing her insight and experience which translates into her ability to explain her reasoning thoroughly in extensive responses. Such an example of meaningful engagement with the topic signifies high engagement. It is significant to highlight here that the level of engagement was higher in students who solved the CRP problems compared to students who answered traditional non-CRP questions.

When asked in the one-on-one interviews whether students felt the use of culturally relevant questions influenced their engagement in the classroom, all students indicated that they were more engaged because the questions were personally relevant to them or issues they cared about. Jaylen stated she liked the nature of the discussions, which included the addition of culturally relevant problems, and that she enjoyed relatable material. Joy is notable as an indicator of emotional engagement (Skinner, Furrer, Marchand, & Kindermann, 2008). As another example, Tiffany emphasized how relevant problems helped her to learn mathematics, stating:

> I think it was very relevant and it helped me understand. And it made me want to participate more knowing that you were culturally aware and you did... I don't know, it's just nice to know that somebody cares. So I think what you did was perfect and it was different than what I've ever experienced in a class.

Tiffany shared here that the CRP problems made her "want to participate more," which signify effort and exertion, indicators of behavior engagement (Skinner, Furrer, Marchand, & Kindermann, 2008).

Confidence and Motivation

Culturally relevant mathematics problems increased students' motivation to engage with mathematics and their confidence to do so. Each of the three participants expressed they were more eager to learn and solve problems due to the problems being more culturally relevant or addressing issues of interests. Students shared that CRP made them more curious and eager to engage with mathematics and to understand more about their culture and community through culturally relevant problem solving. Candace emphasized her motivation to learn when she shared the following:

> Like for this class, having culture relevant mathematics. I mean, it increased my curiosity, my when I want to learn [inaudible] because just [plain] mathematics, these things or these questions are not asked especially in relevance to our culture. So, I think that if this culturally relevant, then it would make [people] more intrigued to learn and ready to learn because it's in relation to their culture. It deals with their culture and what they deal with in life and in their community. So I think that'll be a big plus with mathematics.

Notably in this excerpt Candace compares her prior experience in mathematics, which she deemed as not being culturally relevant, to her experience during this study. She highlights the fact that CRP makes people more eager to learn and enthusiastic, something that she may not have experienced previously. In addition, Jaylen added that the culturally relevant problems made her more interested in solving problems, stating:

> It was definitely related to what we were learning and it gave me more, like I said, more time to actually practice using the formula and it was interesting to find out... I was eager to find out, "Okay, what is the actual difference between the average savings and then Black American savings?" So it made the question something I was actually interested in answering.

In this quote, Jaylyn describes feeling "eager to find out" the answer to a culturally relevant problem. By emphasizing how she was "actually interested" in these problems, she indicates a comparison between prior courses she has taken and the course now that exposes her to culturally relevant problems.

Participants also expressed confidence in their mathematical ability to succeed and solve problems due to the use of culturally relevant problems. Jaylen expressed a sense of confidence in understanding mathematics problem solving through a shift in viewing math beyond solely numerical input. She stated:

> Before, it was just numbers. I can do the numbers, I can put the calculations in. Now it's more, okay not only can I do the calculations if I don't know the formula or something, I could put it into words that I can actually relate and then try to solve it that way.

Here, Jaylen seemingly discovers a new way of problem solving. If she comes across a problem she has trouble solving or does not know which formula to use, instead of giving up, the exposure to culturally relevant problems has given her the confidence to try or retry the question by putting the problems into a more familiar context. Often, when we have to use math outside of the classroom, we may not have access to formulas or theorems from a textbook. Rather we have to use logic, arithmetic, and math we are already familiar with to come up with a solution. Although our solutions are often based on existing formulas and theorems, sometimes unknowingly, the process of finding the correct solution in real world contexts can better prepare students to solve problems seen in the classroom.

Confidence seemed to be positively impacted when it comes to solving problems outside of the classroom as well. When asked whether the use of culturally relevant problems had increased Tiffany's confidence, she indicated it did as she felt she was now more suited to tackle real world problems that require math.

> It has increased it. I know further down the line when leasing cars or when paying back student loans, I now understand how interest rates come into play or even having a savings account. And I know that that is important and looking for banks that will actually apply to my end goal is, I didn't really have an understanding on it before. And now I will. I know that I can be more competent in calculating these things and looking at future outcomes and things like that.

Here, it is clear the use of culturally relevant problems provided Tiffany with the tools to better tackle problems outside of the classroom and to better understand concepts that would be required to make decisions in the real world. She is now more confident when it comes to making decisions such as leasing a car or taking out and paying back a loan due to a greater understanding of concepts such as interest rates.

Discussion

This research explicates what CRP mathematics looks like for Black learners in an online higher education course. In a very short, 7-week online learning environment, Lauren was able to work creatively to develop forms of caring, trust, and relatability that extended throughout the curricula, pedagogy, and assessment. The discussion highlights and further contextualizes these significant factors by answering the posed research questions.

> RQ1 How does an instructor design and implement CRP for Black undergraduate learners in an online mathematics classroom?

Features of Culturally Relevant Problems

Problems intended to encourage cultural competence referenced various features of students' personal lives, hobbies, and current events. The bridging of the mathematics present in students' life outside of school with the math in the curriculum was consistent with the prior studies such as those of Corp (2017), Nasir (2000), and Taylor (2009). Sociopolitical consciousness was promoted when problems addressed racial disparities in wealth, homeownership, criminal justice, and other issues students expressed interest in. These themes were similar to those found in prior works by Hubert (2018), Gutstein (2003), Kokka (2019) and Langlie (2008). The focus on topics students themselves found interest in when designing problems was highly influenced by Hambacher (2018), Flores-Koulish, & Shiller, (2020), and Watson, Sealey-Ruiz, & Jackson, (2016).

Asking open-ended questions where students were provided leeway to give their take on the issues was a dominant feature in these problems. This was a common feature also found in Tate's (1995) study. Academic excellence in students was stimulated through the use of new technology and higher difficulty exercises, with guidance provided alongside. Having high expectations for students is an essential feature in works highlighting Culturally Relevant Critical Teacher Care (Hambacher, 2018; Hambacher & Bondy, 2016; Ware, 2006). Lauren's objective in the course was to convey to students that who they are matters, they have a voice in addressing pertinent issues that can be supported by math, and their instructor believes in their ability to succeed.

Open and Relatable Feedback

When providing feedback to students, it was significant to go beyond letting students know their answers were correct or simply say "good job." Lauren used feedback as an opportunity to help students get to know her and see her as relatable. Here, the need to build connectedness with the students was consistent with Maloney & Matthews's (2020) study. Additionally, Lauren was careful to make sure she acknowledged the validity of students' experiences and viewpoints on certain issues, similar to the works of Collins (1991), Roberts

(2010), Hambacher and Bondy (2016), and Acosta (2013). This approach was also partially influenced by Lauren's own experience as a STEM student and as someone who has worked in corporate America—where in both experiences she witnessed the acute underrepresentation of Black students and employees. For example, during the protests in support of Breonna Taylor and George Floyd, Lauren's supervisor at her job scheduled a meeting to check in with everyone on his team to see how they were doing. At the meeting, everyone was instructed to be open and honest about the issues and conversations the nation was having at the moment regarding race, but as the only Black American in the meeting, Lauren felt hesitant to speak up. She had many thoughts, but during the meeting she froze, unable to voice her thoughts. In retrospect, she identified that she was uncomfortable and felt unsafe speaking up as the sole Black person in the meeting. Would she be "representing" everyone? Would she make others uncomfortable? Why was she concerned about their comfort on matters of racial inequality? Would she be perceived as an "angry Black woman?" Experiences such as this are unfortunately not uncommon for Lauren and other Black folks who often face discomfort, racism, and oppressive circumstances while navigating historically white institutions. However, this experience left an impression upon Lauren. As a teacher, she was in a position of authority relative to her students, and she utilized the opportunity to develop something different for the students. Considering this racialized experience and applying it to her teaching, Lauren wanted to ensure she granted a forum for students to be open. Further, she knew it would be beneficial for her to make the first step in developing a comfortable classroom culture since students may otherwise be hesitant to speak openly. It was imperative to recognize potential mutual vulnerabilities when providing feedback as part of the course's design. In particular, the email Lauren sent to one student regarding the grand jury's decision not to indict the officers who killed Breonna Taylor was sent to the student in private. While all other communication in online forums was public (all students in the course could see it), this communication was different. While the student did not respond to the email, Lauren wanted her to know she could express her feelings, if any, about the situation without the pressure of feeling nervous or judged by peers.

> RQ2 What is the impact of CRP on Black learners' engagement, motivation, and confidence?

Students were engaged in problem solving, evident from their lengthy answers, detailed explanations, and willingness to be personable. When asked what prompted the nature of these responses, students indicated they appreciated having access to problems that referenced their personal lives and current events. Students felt like the problems were designed purposely for them. Students felt like the questions themselves granted them more opportunities to master the material being covered, making them more motivated to learn. Furthermore, the additional problems made them more confident in their mathematical ability. Once problems were designed to be more relatable to them, the confidence students expressed in the issues and topics they cared about spilled over into confidence towards the math itself. Overall, the participants seemed to respond positively to the study, specifically with respect to their confidence, motivation, and engagement levels. These results are consistent with studies focusing on the use of CRP in in-person K-12 learning (Corp, 2017; Hubert, 2014; Yu et al., 2021).

Distinguishing Features

This study's emphasis on defining what culturally relevant feedback looks like in online learning is one factor that makes it distinct from prior research. Because online instructors don't interact with students in person, feedback to students in an online environment will look different than in a traditional classroom. Arguably, assessment should possibly be more thorough in virtual classrooms to ensure students are engaged and to maintain retention that may be compromised when students learn virtually. Studies show feedback is even more important in online learning due to its correlation to the learner's performance and satisfaction (Dennen et al., 2007; Espasa & Meneses, 2010). Since a lot of online learning consists of students doing self-guided work (e.g., spending a lot of time reading a textbook on their own), quality feedback is of the upmost importance. If we want students to be engaged, we as instructors should also show we are engaged in the learning process along with them. CRP instructors who are obligated to be open and caring have to go beyond simply creating culturally relevant problems. The act of creating problems that are culturally relevant is not enough. Rather, the dialogue that happens after a student solves a problem should also exhibit care and be personable, qualities argued for by CRP scholars (Ladson-Billings, 2009; Hambacher, 2018). This study also differs from other works since it gives personal insight to the mindset and experience of Lauren as a Black female STEM worker and instructor and how that impacts her behavior in the classroom, including the nature of her feedback.

Lastly, my study and its findings uniquely point out what factors of the online learning environment itself can be used successfully to enact CRP. As discussed briefly before, my use of CRP was more of an add-on feature to the curriculum. Meaning, the curriculum in the online classes I taught was already preset by the school and the required textbook readings and homework assignments built into the course did not contain any CRP problems. However, I was still able to utilize the discussion board forums and the written reflection assignments to introduce CRP to the study's participants. In my experience, discussion board prompts usually ask students to respond to one particular problem or question. They are often set up to give students open access before making their initial post. In other words, before a student makes their initial post, they could look at what their classmates said and just repeat their peers' answers when making their own initial posts. This can take away an opportunity for learning or the ability to master the material if the student does not have to come up with their own response. Using the discussion board forums to assign unique CRP problems in my reply posts granted me more of an opportunity to personalize the student's experience and for the students to enhance their learning. The CRP problems I designed were personalized to the individual and therefore required the students to do the work to come up with their own answers. These problems afforded the student more time to practice the material learned that week and hopefully master the content. Hence, my study shows if instructors find they do not have agency to change the course's default curriculum to be more culturally relevant, the discussion board forums can still be used as an effective tool to implement CRP.

Conclusion

Implication

While attention has been paid to achievement levels of Black learners in mathematics by various scholars, disparities continue to exist. Furthermore, these disparities have worsened due to the COVID pandemic. Due to school shutdowns, students of color were about three to five months behind in their mathematical learning, compared to white students who were one to three months behind. While some schools have reopened to either full in-person or hybrid learning, Black students have been more likely to remain full-time online learners (Dorn et al., 2021). Further, research has shown that the technological disparities have been heightened by the pandemic, leading to even greater inequality than in pre-pandemic times (Golden et al., 2023).

What then should our responses entail in online learning environments where there may be heightened potential for exacerbating rather than reducing racial disparities in learning mathematics? It is imperative for educators, particularly at the undergraduate level, to figure out how to design an online classroom environment that engages and retains Black students while learning mathematics. This study reveals that CRP provides one significant answer to online learning. By (1) utilizing online introductory surveys to get to know the students, (2) designing problems that connect the curriculum to students' culture, interests, and experiences, (3) taking advantage of discussion board forums and reflection tasks in the assignment of culturally relevant problems, and (4) providing prompt and caring feedback, we see that engagement, confidence, and motivation are positively impacted among Black learners, providing hope that we can close the disparities even in online environments.

Limitations

Since the study focuses solely on students who identify as Black or of African descent, we do not have results demonstrating how non-Black students would react to the course. If we used the exact type of problems as used in this study, but assigned them to all the students in the class, what impacts might be seen? Would we see positive results in engagement, confidence, and motivation for the entire class? Would non-Black students accept or reject this pedagogical approach and accept or reject a Black female instructor who utilizes CRP? These are essential questions since the experiences of students and instructors in CRP classrooms in higher education is situated within the broader context of racial politics within the United States. Most Black undergraduate students, for instance, attend predominantly white institutions (PWI) and attend math courses where they are the minority.

Future Studies

Future studies should also consider examining what collaboration looks like in a culturally relevant online mathematics course. Ladson-Billings (2009) argues that culturally relevant teachers advocate for collaboration among students and that students should take responsibility for their peers' success. The question of how does this show up in an online classroom where students are not face-to-face with each other is an important one. Online discussion boards encourage students to communicate with one another. However, many times students make their own response to a question, an initial post, and when they have to respond to others, they simply state whether they agree or disagree with what another student says. Are students really learning how to solve problems from one another ? And if so, what deems this collaborative learning culturally relevant as opposed to traditional?

Final Thoughts

The legendary B.B. King once said, "The beautiful thing about learning is that nobody can take it away from you." To the learner, that is an inspirational quote that puts the agency of learning into his or her own hands. But what does that mean to the educator? Does it simply mean educators should repeat this quote to their students to inspire learning? Well, yes, but it can mean something deeper. To successful educators of Black online learners who choose to use CRP, it means we should convey to students that what they learn does not simply come from a textbook. Rather, who we are plays an important role. Our culture, interests, experiences, and prior knowledge is relevant to their learning. Black online learners will always have a sense of who they are, and as long as educators provide students an adequate learning environment where their culture, experience, and interests are viewed as an asset to the curriculum, learning is inevitable. We are enough and we matter, including in online math class.

Declarations

This study was approved by the University at Buffalo's IRB (Protocol number: STUDY00004111).

Mrs. Lauren Hennings and Dr. Alexandra Schindel declare no conflicts of interest.

References

Acosta, M. (2013). *A culture-focused study with accomplished black educators on pedagogical excellence for African American children (Unpublished doctoral dissertation).* University of Florida.

Adelman, C. (2006). *The toolbox revisited: paths to degree completion from high school through college.* US Department of Education

Anderson, E. & D. Kim. (2006). *Increasing the success of minority students in science and technology.* American Council on Education.

Anderson, Herr, K., & Nihlen, A. S. (2007). *Studying your own school an educator's guide to practitioner action research* (2nd ed.). Corwin.

Aronson, B., & Laughter, J. (2016). The theory and practice of culturally relevant education: a synthesis of research across content areas. *Review of Educational Research*, *86*(1), 163–206. https://doi.org/10.3102/0034654315582066

Baker, K. (2016). Culturally responsive mathematics teaching and young learners. *Journal of Interdisciplinary Teacher Leadership*, *1*(1).

Battey, D., & Neal, R. A. (2018). Detailing relational interactions in urban elementary mathematics classrooms. *Mathematics Teacher Education & Development*, *20*(1), 23-42.

Berry, R. Q., III, & McClain, O. L. (2009). Contrasting pedagogical styles and their impact on African American students. In D. B. Martin (Ed.), *Mathematics teaching, learning, and liberation in the lives of Black children* (pp. 123–144). Routledge.

Boaler, J. (2008). Promoting "relational equity" and high mathematics achievement through an innovative mixed-ability approach. *British Educational Research Journal, 34*, 167–194. https://doi.org/10.1080/01411920701532145.

Boaler, J., & Staples, M. (2008). Creating mathematical futures through an equitable teaching approach: The case of railside school. *Teachers College Record, 110*, 608–645.

Bonner, E. P., & Adams, T. L. (2012). Culturally responsive teaching in the context of mathematics: A grounded theory case study. *Journal of Mathematics Teacher Education, 15*, 25–38. https://doi.org/10.1007/s10857-011-9198-4

Bonner, E. P. (2014). Investigating practices of highly successful mathematics teachers of traditionally underserved students. *Educational Studies in Mathematics, 86*, 377–399. https://doi.org/10.1007/s10649-014-9533-7

Cholewa, B., Goodman, R. D., West-Olatunji, C., & Amatea, E. (2014). A qualitative examination of the impact of culturally responsive educational practices on the psychological well-being of students of color. *The Urban Review, 46*(4), 574-596. doi:10.1007/s11256-014-0272

Clement, S., Balz, D., & Guskin, E. (2020). Black Americans say racism, policing top issues for November, favor Biden by huge margin, Post-Ipsos poll finds: Trump is seen in starkly negative terms, while there is less enthusiasm for Biden among younger Black Americans. *The Washington Post*.

Cochran-Smith, & Lytle, S. L. (2009). *Inquiry as stance: Practitioner research for the next generation.* Teachers College Press.

Collins, P. H. (1991). *Black feminist thought: Knowledge, consciousness, and the politics of empowerment*. Routledge & Keagan Paul.

Corey, D. L., & Bower, B. L. (2005). The experiences of an African American male learning mathematics in the traditional and the online classroom--a case study. *The Journal of Negro Education*, *74*(4), 321–331.

Corp, A. (2017). Using culturally responsive stories in mathematics: Responses from the target audience. *School Science and Mathematics, 117*(7-8), 295–306. https://doi.org/10.1111/ssm.12247

Dennen, V. P., Aubteen Darabi, A., & Smith, L. J. (2007). Instructor-learner interaction in online courses: The relative perceived importance of particular instructor actions on performance and satisfaction. *Distance Education, 28*(1), 65–79. https://doi.org/10.1080/01587910701305319

Dorn, E., Hancock, B., Sarakatsannis, J., & Viruleg, E. (2021, March 1). COVID-19 and learning loss—disparities grow and students need help. *McKinsey & Company*. https://www.mckinsey.com/industries/public-and-social-sector/our-insights/covid-19-and-learning-loss-disparities-grow-and-students-need-help

Downing, G.A., & McCoy, W.N. (2021). Exploring mathematics of the sociopolitical through culturally relevant pedagogy in a college algebra course at a historically Black college/university. *Journal of Urban Mathematics Education, 14*(1), 45-70

Driver, & Powell, S. R. (2017). Culturally and linguistically responsive schema intervention: improving word problem solving for English language learners with mathematics difficulty. *Learning Disability Quarterly*, *40*(1), 41–53. https://doi.org/10.1177/0731948716646730

Enyedy & Mukhopadhyay, S. (2007). They don't show nothing I didn't know: emergent tensions between culturally relevant pedagogy and mathematics pedagogy. *The Journal of the Learning Sciences*, *16*(2), 139–174. https://doi.org/10.1080/10508400701193671

Espasa, A., & Meneses, J. (2010). Analysing feedback processes in an online teaching and learning environment: an exploratory study. *Higher Education*, *59*(3), 277–292. https://doi.org/10.1007/s10734-009-9247-4

Finn, J. D., Pannozzo, G. M., & Voelkl, K. E. (1995). Disruptive and inattentive-withdrawn behavior and achievement among fourth graders. *The Elementary School Journal*, *95*(5), 421–434. https://doi.org/10.1086/461853

Flores-Koulish, & Shiller, J. T. (2020). Critical classrooms matter: Baltimore teachers' pedagogical response after the death of Freddie Gray. *Education and Urban Society, 52*(6), 984–1007. https://doi.org/10.1177/0013124519889042

Frankenstein, M. (1989). *Relearning mathematics: A different third R--radical math(s)*. Free Association Books.

Fripp, J., & Carlson, R. (2017). Exploring the influence of attitude and stigma on participation of African American and Latino populations in mental health services. *Journal of Multicultural Counseling and Development, 45*(2), 80–94. https://doi.org/10.1002/jmcd.12066

Fulton, R. (2009). *A case study of culturally responsive teaching in middle school mathematics* (Doctoral dissertation). ProQuest Dissertations & Theses Global database. (UMI No. 3372472)

Gilligan, C. (1982) *In a different voice.* Harvard University Press.

Golden, A. R., Srisarajivakul, E. N., Hasselle, A. J., Pfund, R. A., & Knox, J. (2023). What was a gap is now a chasm: Remote schooling, the digital divide, and educational inequities resulting from the COVID-19 pandemic. *Current Opinion in Psychology*, *52*, 101632-101637. https://doi.org/10.1016/j.copsyc.2023.101632

Greer, B., Mukhopadhyay, S., Powell, A. B., & Nelson-Barber, S. (2009). *Culturally responsive mathematics education.* Routledge.

Gregson, S. A. (2013) Negotiating social justice teaching: one full-time teacher's practice viewed from the trenches. *Journal for Research in Mathematics Education, 44*(1), 164–198. https://doi.org/10.5951/jresematheduc.44.1.0164

Gutiérrez, R. (1999). Advancing urban Latina/o youth in mathematics: Lessons from an effective high school mathematics department. *The Urban Review, 31,* 263–281. https://doi.org/10.1023/a:10232 24027473

Gutiérrez, R. (2002). Beyond essentialism: The complexity of language in teaching mathematics to Latina/o students. *American Educational Research Journal, 39*, 1047–1088. https://doi.org/10.3102/000283120390041047.

Gutiérrez, R. (2013). The sociopolitical turn in mathematics education. *Journal for Research in Mathematics Education, 44*(1), 37–68. https://doi.org/10.5951/jresematheduc.44.1.0037.

Gutstein. (2016). “Our issues, our people—math as our weapon”: critical mathematics in a Chicago neighborhood high school. *Journal for Research in Mathematics Education, 47*(5), 454–504. https://doi.org/10.5951/jresematheduc.47.5.0454

Gutstein, Lipman, P., Hernandez, P., & de los Reyes, R. (1997). Culturally relevant mathematics teaching in a Mexican American context. *Journal for Research in Mathematics Education*, *28*(6), 709–737. https://doi.org/10.2307/749639

Gutstein, E. (2003). Teaching and learning mathematics for social justice in an urban, Latino school. *Journal for Research in Mathematics Education, 34*(1), 37–73. https://doi.org/10.2307/30034699

Gutstein, E., & Peterson, B. (2005). *Rethinking mathematics: Teaching social justice by the Numbers.* Rethinking Schools.

Gutstein, E. (2006). *Reading and writing the world with mathematics: Toward a pedagogy for social justice*. Routledge.

Hambacher, & Bondy, E. (2016). Creating communities of culturally relevant critical teacher care. *Action in Teacher Education*, *38*(4), 327–343. https://doi.org/10.1080/01626620.2016.1226206

Hambacher. (2018). Resisting punitive school discipline: perspectives and practices of exemplary urban elementary teachers. *International Journal of Qualitative Studies in Education*, *31*(2), 102–118. https://doi.org/10.1080/09518398.2017.1349958

Harper, F. (2019). A qualitative metasynthesis of teaching mathematics for social justice in action: pitfalls and promises of practice. *Journal for Research in Mathematics Education*, *50*(3), 268–310. https://doi.org/10.5951/jresematheduc.50.3.0268

Heitner, K. L., & Jennings, M. (2016). Culturally responsive teaching knowledge and practices of online faculty. *Online Learning, 20*(4), 54-78. https://doi.org/10.24059/olj.v20i4.1043

Hubert, T. L. (2014). Learners of mathematics: High school students' perspectives of culturally relevant mathematics pedagogy. *Journal of African American Studies*, *18*(3), 324-336. https://doi.org/10.1007/s12111-013-9273-2

Irizarry, J. G. & Antrop-Gonzalez, R. (2008). RicanStructing the discourse and promoting school success: extending a theory of culturally responsive pedagogy for diasporicans. *Hispanic Heath Care International, 6(*4), 172-184

Jackson, C. (2013). Elementary mathematics teachers' knowledge of equity pedagogy. *Current Issues in Education, 16*(1), 1–13.

Jacobi, M., Astin, A., Ayala, F., Jr. (1987). *College student outcomes assessment.* Clearinghouse on Higher Education.

Jett, C. C. (2013). Culturally responsive collegiate mathematics education: implications for African American students. *Interdisciplinary Journal of Teaching and Learning, 3*(2), 102-116.

Johnson, A., & Elliott, S. (2020). Culturally relevant pedagogy: a model to guide cultural transformation in STEM departments. *Journal of Microbiology & Biology Education, 21*(1), 5–16. https://doi.org/10.1128/jmbe.v21i1.2097

Jones, F. C. (1982) Dunbar high school of Little Rock: a model of educational excellence, *Phi Delta Kappan, 63*(8), 540–542.

Kim, C., Park, S., & Cozart, J. (2014). Affective and motivational factors of learning in online mathematics courses. *British Journal of Educational Technology*, *45*(1), 171–185. https://doi.org/10.1111/j.1467-8535.2012.01382.x

King Miller, B. A. (2015). Effective teachers: Culturally relevant teaching from the voices of Afro-Caribbean immigrant females in STEM. *SAGE Open, 5*(3), https://doi.org/10.1177/2158244015603427

Kokka, K. (2019). Healing-informed social justice mathematics: promoting students' sociopolitical consciousness and well-being in mathematics class. *Urban Education, 54*(9), 1179–1209. https://doi.org/10.1177/0042085918806947

Kuh, G. D. (2003). What we're learning about student engagement from NSSE. *Change, 35,* 24–31.

Kumi-Yeboah, A., & Amponsah, S. (2023). An exploratory study of instructors' perceptions on inclusion of culturally responsive pedagogy in online education. *British Journal of Educational Technology, 54*(4), 878–897. https://doi.org/10.1111/bjet.13299

Ladson-Billings, G. (1995). Toward a theory of culturally relevant pedagogy. *American Educational Research Journal*, *32*(3), 465–491. https://doi.org/10.3102/00028312032003465

Ladson-Billings, G. (2006). From the achievement gap to the education debt: understanding achievement in U.S. schools. *Educational Researcher, 35*(7), 3–12. https://doi.org/10.3102/0013189X035007003

Ladson-Billings, G. (2009). *The dreamkeepers successful teachers of African American children.* (2nd ed.). Jossey-Bass Publishers.

Ladson-Billings, G. (2014). Culturally relevant pedagogy 2.0: a.k.a. the remix. *Harvard Educational Review*, *84*(1), 74–84. https://doi.org/10.17763/haer.84.1.p2rj131485484751

Langlie. (2008). *The effect of culturally relevant pedagogy on the mathematics achievement of black and Hispanic high school students*. ProQuest Dissertations Publishing.

Laughter, J. C. & Adams, A. D. (2012). Culturally relevant science teaching in middle school. *Urban Education, 47*(6), 1106–1134. https://doi.org/10.1177/0042085912454443

Majewska, & Vereen, E. (2021). Fostering student-student interactions in a first-year experience course taught online during the COVID-19 pandemic. *Journal of Microbiology & Biology Education*, *22*(1). https://doi.org/10.1128/jmbe.v22i1.2417

Maloney, & Matthews, J. S. (2020). Teacher care and students' sense of connectedness in the urban mathematics classroom. *Journal for Research in Mathematics Education*, *51*(4), 399–432. https://doi.org/10.5951/jresematheduc-2020-0044

Martell. (2013). Race and histories: examining culturally relevant teaching in the U.S. history classroom. *Theory and Research in Social Education, 41*(1), 65–88. https://doi.org/10.1080/00933104.2013.755745

Masterson, Victoria. (2021). These are the degrees that will earn you the most money when you graduate - and the ones that won't. *World Economic Forum*, https://www.weforum.org/agenda/2021/10/stem-degrees-most-valuable/.

Matthews, J. S., & López, F. (2018). Speaking their language: The role of cultural content integration and heritage language for academic achievement among Latino children. *Contemporary Educational Psychology*. https://doi.org/10.1016/j.cedpsych.2018.01.005.

McKernan. (1991). *Curriculum action research :A handbook of methods and resources for the reflective practitioner*. St. Martin's Press.

McLoughlin, C. (2001). Inclusivity and alignment: Principles of pedagogy, task and assessment decisions. *Distance Education, 22*(1), 7-29.

McMillian, M. M. (2003). Was no child left behind 'wise schooling' for African American male students? *The High School Journal, 87*(2), 25–33.

Milner, H. (2016). A black male teacher's culturally responsive practices. *The Journal of Negro Education, 85*(4), 417-432.

Minor. (2014). Racial differences in teacher perception of student ability. *Teachers College Record (1970), 116*(10), 1–22. https://doi.org/10.1177/016146811411601004

Morrison, K. A., Robbins, H. H., & Rose, D. G. (2008). Operationalizing culturally relevant pedagogy: a synthesis of classroom-based research. *Equity & Excellence in Education*, *41*(4), 433–452. https://doi.org/10.1080/10665680802400006

Morton, & Riegle-Crumb, C. (2020). Is school racial/ethnic composition associated with content coverage in algebra? *Educational Researcher, 49*(6), 441–447. https://doi.org/10.3102/0013189X20931123

Nasir, N. S. (2000). "Points ain't everything": emergent goals and average and percent understandings in the play of basketball among African American students. *Anthropology & Education Quarterly, 31*(3), 283–305.

National Center for Education Statistics. (2015). *National Assessment of Educational Progress: An overview of NAEP*. National Center for Education Statistics, Institute of Education Sciences, U.S. Dept. of Education.

Noddings, N. (1984). *Caring: A feminine approach to ethics and moral education.* University of California Press.

Noddings, N. (2002). *Starting at home: Caring and social policy.* University of California Press

Pattillo-McCoy, M. (1998) Church culture as a strategy of action in the Black community. *American Sociological Review*, *63*(6) 767–84. https://doi.org/10.2307/2657500

Roberts, M. A. (2010). Toward a theory of culturally relevant critical teacher care: African American teachers' definitions and perceptions of care for African American students. *Journal of Moral Education, 39*(4), 449–467. https://doi.org/10.1080/03057241003754922

Ruef, Jacob, M. M., Walker, G. K., & Beavert, V. R. (2020). Why indigenous languages matter for mathematics education: a case study of Ichishkíin. *Educational Studies in Mathematics, 104*(3), 313–332. https://doi.org/10.1007/s10649-020-09957-0

Saldaña, J., & Omasta, M. (2018). *Qualitative research: Analyzing life.* SAGE.

Schneider, D. (2015). The worst place in the U.S. to be black is. *Dollars & Sense,* 321, 13–19.

Skiba, R. J., Horner, R. H., Chung, C., Karega Rausch, M., May, S. L., & Tobin, T. (2011). Race is not neutral: A national investigation of African American and Latino disproportionality in school discipline. *School Psychology Review,* 40, 85–107.

Skinner, E. A., Wellborn, J. G., & Connell, J. P. (1990). What it takes to do well in school and whether I've got it: a process model of perceived control and children's engagement and achievement in school. *Journal of Educational Psychology*, *82*(1), 22–32. https://doi.org/10.1037/0022-0663.82.1.22

Skinner, E., Furrer, C., Marchand, G., & Kindermann, T. (2008). engagement and disaffection in the classroom: part of a larger motivational dynamic? *Journal of Educational Psychology*, *100*(4), 765–781. https://doi.org/10.1037/a0012840

Smith, & Ayers, D. F. (2006). Culturally responsive pedagogy and online learning: implications for the globalized community college. *Community College Journal of Research and Practice*, *30*(5-6), 401–415. https://doi.org/10.1080/10668920500442125

Tate. (1995). Returning to the root: A culturally relevant approach to mathematics pedagogy. *Theory into Practice*, *34*(3), 166–173. https://doi.org/10.1080/00405849509543676

Taylor, E. V. (2009). The purchasing practice of low-income students: The relationship to mathematical development. *The Journal of the Learning Sciences, 18*(3), 370–415.

Thomas, C. A., & Berry, R. Q. (2019). A qualitative metasynthesis of culturally relevant pedagogy & culturally responsive teaching: unpacking mathematics teaching practices. *Journal of Mathematics Education at Teachers College*, *10*(1), 21-30. https://doi.org/10.7916/jmetc.v10i1.1668

Ware, F. (2006) Warm demander pedagogy: Culturally responsive teaching that supports a culture of achievement for African American students, *Urban Education, 41*(4), 427–456.

Watson, Sealey-Ruiz, Y., & Jackson, I. (2016). Daring to care: the role of culturally relevant care in mentoring Black and Latino male high school students. *Race, Ethnicity and Education*, *19*(5), 980–1002. https://doi.org/10.1080/13613324.2014.911169

Woodley, X., Hernandez, C., Parra, J., & Negash, B. (2017). Celebrating difference: best practices in culturally responsive teaching online. *TechTrends, 61*(5), 470–478. https://doi.org/10.1007/s11528-017-0207-z

Xu, D., & Smith Jaggars, S. (2014). Performance gaps between online and face-to-face courses: differences across types of students and academic subject areas. *The Journal of Higher Education, 85*(5), 633–659. http://muse.jhu.edu/journals/journal_of_higher_education/v085/85.5.xu.html

Yu, Liu, Y., Soto-Lara, S., Puente, K., Carranza, P., Pantano, A., & Simpkins, S. D. (2021). Culturally responsive practices: insights from a high-quality math afterschool program serving underprivileged Latinx youth. *American Journal of Community Psychology*, *68*(3-4), 323–339. https://doi.org/10.1002/ajcp.12518

Yull, D. (2013). Moving beyond the barrier of mathematics and engaging culturally relevant pedagogy in the classroom for racial and ethnic minority stem students in community colleges. (2013). In Palmer, R. T. & Wood, J. L. (Eds.), *Community colleges and STEM* (pp. 143–158). Routledge.