

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

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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

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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.

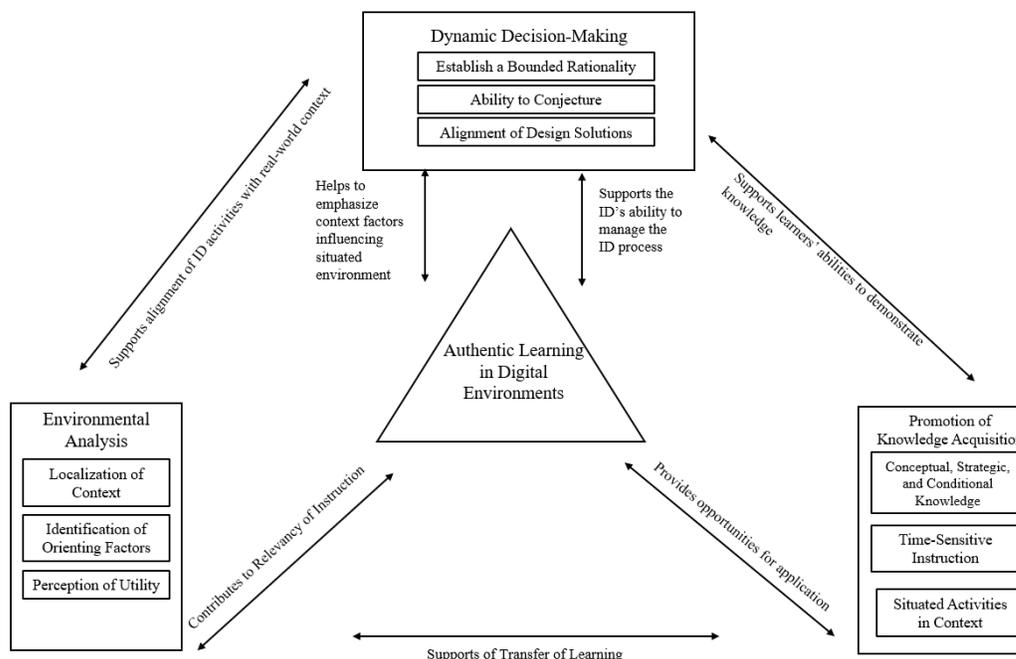
There is limited research on how instructional designers engage in decision-making and judgment during the co-evolution process, where they navigate between problem and solution spaces (Boling et al., 2017; Stefaniak & Hwang, 2021; Tomita et al., 2021). Other design scholars also highlight the need for 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 *a priori* codes to relevant segments of data yielded from our semi-structured interviews (Elliot, 2018). Any deviations or emergent patterns not captured by the *a 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

Theme 5: Balancing instructional scaffolding within situated experiences

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.

Theme 6: Supporting perceived utility in authentic learning

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.

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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?