Impact of Scenario-Based Learning and Universal Design for Learning on Student Self-Efficacy in Applying Learning Theories

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Instructional Design
learning theory application
scenario-based learning (SBL)
student self-efficacy
Universal Design for Learning (UDL)

This mixed-methods study evaluates the effectiveness of integrating Scenario-Based Learning (SBL) and Universal Design for Learning (UDL) principles in redesigning a graduate learning theories course. Survey results from Likert-scale and open-ended questions indicate that most students strongly agreed or agreed that real-life scenarios increased their self-efficacy in applying learning theories and understanding their practical applications. The study found that combining SBL

and UDL enhanced students' self-efficacy significantly, making them more confident in applying learning theories to real-world scenarios—a key factor for creating effective and inclusive learning environments. Limitations include a small sample size (27.3% response rate) and reliance on self-reported data, affecting result generalizability.

Introduction

Fostering students' self-efficacy—specifically, their self-efficacy in applying what they learn—and enhancing learning outcomes are critical challenges that educators must address through innovative instructional strategies (Paolini, 2015). Existing research highlights self-efficacy as a key factor in academic success (Farrell & Brunton, 2020). The shift towards online education has introduced additional complexities in engaging students and supporting their ability to apply theoretical knowledge effectively, exacerbating these challenges (Anderson, 2008). Traditional passive instructional methods frequently fail to engage students actively, resulting in lower motivation, reduced understanding, and significant disparities in learning outcomes (Kozanitis & Nenciovici, 2022). Universal Design for Learning (UDL) is recognized as a promising framework for creating inclusive learning environments by emphasizing the need for multiple means of engagement, representation, and expression (Espada-Chavarria et al., 2023). Scenario-Based Learning (SBL), on the other hand, has shown the potential to foster greater engagement among learners by allowing them to apply theoretical knowledge in practical, real-world contexts (Mamaki et al., 2023). Despite the potential of these strategies, limited research exists on their combined impact on student self-efficacy in applying what they are learning.

This study examines how integrating UDL and SBL impacts student self-efficacy and learning outcomes in a graduate online learning theories course. Understanding this relationship has the potential to equip educators to boost engagement and improve academic outcomes across diverse learner groups. Instructional team members sought to address a gap in the course, which met its objectives but lacked opportunities for students to apply learning theories in real-world instructional design contexts. This limitation hindered the course's alignment with the program's goal of preparing students for careers in learning experience design. To enhance engagement, inclusivity, and practical application, instructional team members redesigned the course to integrate SBL activities with UDL principles. This redesign bridges the gap between theoretical knowledge and practical application, enabling students to apply learning theories in creating digital learning designs and instructional materials.

To assess the effectiveness of this redesign, the instructor employed a mixed-methods approach, combining quantitative survey questions to measure student self-efficacy and confidence levels after implementing UDL and SBL with qualitative questions to gain deeper insights into students' experiences. This research uniquely focuses on the intersection of UDL and SBL, offering new insights into how these approaches can be integrated to support students' self-efficacy. This study advances current understanding in this field by providing empirical evidence of the benefits of combining these strategies in higher education.

Literature Review

Learning and Its Challenges

Online learning has fundamentally reshaped instructional delivery in higher education, offering flexibility and accessibility to a diverse range of learners (Anderson, 2008). The rise of online education has been particularly beneficial for non-traditional students, including working professionals, parents, and those with disabilities, who require learning environments that accommodate their unique needs (Park & Shea, 2020). Online learning, while beneficial, faces challenges with student engagement and equitable access (Dixson, 2012; Farrell & Brunton, 2020) that require innovative design approaches to support diverse learners' success.

There is a risk of student disengagement in online learning, resulting from the absence of face-to-face interaction, lack of motivation, and feelings of isolation (Lowe, 2023). To address these issues, instructional designers increasingly adopt inclusive and community-centered approaches, prioritizing student voices and experiences (Adams et al., 2023). Design Justice practices elevate the experiences of people directly impacted by the design process, viewing students as experts based on their lived experiences (Lowe, 2023). Combined with Community of Practice frameworks, Design Justice fosters collaborative learning environments where participants share information, explore common challenges, and develop new knowledge together (Costanza-Chock, 2020). Community-centered instructional design also advocates involving the entire community, including students, educators, and caregivers, in reimagining learning experiences (Breen et al., 2023).

By integrating these principles, instructional designers can create online courses that foster interaction and critical thinking and promote equity, inclusivity, and sustainable, community-led outcomes. Embracing participatory and justice-focused design processes has prompted the adoption of innovative strategies that empower learners and address the deepest challenges our educational communities face (Collier, 2020). One such strategy in online education is Scenario-Based Learning (SBL), which aligns well with these community-centered principles by providing realistic, context-rich learning experiences that reflect students' diverse backgrounds and needs.

SBL in Online Education

SBL immerses students in realistic, context-rich scenarios where they must apply theoretical knowledge to solve complex problems (Clark & Mayer, 2012). This makes it particularly effective in online education, where it bridges the gap between theory and practice (Nguyen

et al., 2023). SBL enhances students' ability to understand and apply what they learn by providing opportunities to engage in authentic, meaningful tasks that mirror real-world challenges (Falkner & Stålbrandt, 2023; Mio et al., 2019).

Research indicates that SBL is highly effective in developing higher-order thinking skills, such as analysis, synthesis, and evaluation (Deniş Çeliker, 2020), which is essential for applying learning theories in professional contexts (Henderson, 2023). By presenting students with scenarios that require critical thinking and decision-making, SBL encourages active learning and deep engagement with course material (Falkner & Stålbrandt, 2023), aligning with constructivist principles that emphasize learning through experience and reflection (Martínez-Argüelles et al., 2022).

In addition to promoting engagement, SBL provides immediate feedback (Mamaki et al., 2023), which is crucial for developing metacognitive skills. Working through online scenarios provides iterative feedback that helps them reflect on their decisions and adjust their learning strategies accordingly (Henderson, 2023), enhancing understanding and building self-efficacy in applying theoretical knowledge in practical situations. The asynchronous nature of online SBL allows students to revisit scenarios multiple times, deepening their practical understanding through repeated reflection and practice (Henderson, 2023). The effectiveness of SBL in online education is further supported by studies that demonstrate its positive impact on student motivation and retention of complex concepts (Nguyen et al., 2023).

Implementing SBL in online education poses several challenges, including robust technological infrastructure and careful instructional design to simulate realistic scenarios effectively (Clark & Mayer, 2012). Unlike face-to-face settings where instructors can facilitate immediate feedback and adjust scenarios dynamically, online SBL relies heavily on well-designed digital tools to guide learners through complex scenarios independently (Zunic & Holenko Dlab, 2020). Technical issues like bandwidth, device compatibility, and accessibility can limit student participation in scenario-based activities, especially in asynchronous settings where feedback is often delayed. Additionally, the instructor’s role shifts significantly in online SBL, requiring detailed pre-planning to provide sufficient support and guidance without direct real-time interaction (Henderson, 2023).

UDL in Online Education

UDL is an inclusive learning framework that accommodates the diverse needs of all students, including those with disabilities, linguistic differences, and varying socio-economic backgrounds (Meyer et al., 2014). Developed by the Center for Applied Special Technology (CAST), UDL is grounded in three core principles: Multiple Means of Engagement, Multiple Means of Representation, and Multiple Means of Action and Expression (CAST, 2018). These principles guide the design of flexible learning environments that provide students with various options for accessing content, engaging with material, and demonstrating their knowledge (Garrad & Nolan, 2023). The instructor based the course redesign on the UDL 2.2 Guidelines (CAST, 2018). The recent UDL 3.0 revision (CAST, 2024a) now integrates asset-based approaches and learner identity while emphasizing collective learning and addressing systemic barriers (CAST, 2024b).

Multiple Means of Engagement focuses on providing students with choices that increase motivation and persistence (Taylor & Yuknis, 2023). This principle is particularly important in online education, where maintaining student engagement can be challenging (Bray et al., 2024). Technology plays a crucial role in supporting UDL principles in online settings by enabling engagement and representation formats tailored to varied learner preferences, which is especially important in sustaining engagement in asynchronous formats (Bray et al., 2024). By utilizing the UDL framework, instructors can design diverse engagement options, including interactive activities, discussions, and collaborative projects (Boothe et al., 2018), which help sustain students' interest in the course material (Damasevicius & Sidekerskiene, 2024) and enhance their self-efficacy in applying what they learn.

Multiple Means of Representation involves presenting information in diverse formats to accommodate different learning preferences and needs (Taylor & Yuknis, 2023). In online courses, this might include using videos, podcasts, readings, and interactive simulations to convey key concepts (Rogers & Gronseth, 2021). By ensuring that all students can access and comprehend the material, UDL supports the development of a deeper understanding of learning content and practical applications (Rao & Meo, 2016).

Multiple Means of Action and Expression offers students diverse methods to showcase their knowledge and abilities. This principle is especially valuable in online education, where students may have different strengths and challenges (Rao et al., 2014). By allowing students to choose how they express their understanding—whether through written assignments, presentations, or multimedia projects—UDL fosters a more inclusive learning environment that enhances self-efficacy.

Empirical evidence supports the effectiveness of UDL in online education (Garrad & Nolan, 2023). UDL-based strategies have been linked to improved outcomes such as increased participation, satisfaction, and self-efficacy (Rao et al., 2014). However, implementing UDL principles effectively in online settings presents several challenges, primarily due to resource constraints and the need for technological adaptability. Effective UDL application often requires significant time, faculty training, and supportive resources, with notable challenges such as the framework’s complexity, limited technology support, and budget restrictions (Kirsch & Luo, 2023). For instance, creating accessible video content with captions, audio transcripts, and visual alternatives requires technological resources and staff expertise, which may be limited in higher education institutions with constrained budgets (Brame, 2016). Despite these challenges, UDL’s focus on flexibility and inclusivity offers a promising framework for designing online courses that meet diverse learner needs (Boothe et al., 2018; Ismailov & Chiu, 2022).

Recent advancements in generative artificial intelligence (AI) tools offer promising solutions to these challenges (U.S. Department of Education, Office of Educational Technology, 2024). Automated captioning systems, AI-driven transcript generation, and tools for creating visual alternatives enable faster and more accurate development of accessible materials (Gibson, 2024; Safiya & Pandian, 2023). By enhancing operational efficiency and personalizing support services, AI technologies enable institutions to align more effectively with UDL’s emphasis on flexibility and inclusivity, improving accessibility and streamlining support for diverse learners (Vasquez et al., 2024).

Synergistic Effects of SBL and UDL in Online Courses

Mio et al. (2019) reported positive student feedback on developing problem-solving, critical thinking, and decision-making skills through scenario-based activities, alongside increased interest in real-world applications of lecture content. This supports the idea that integrating SBL and UDL in online education creates a powerful synergy that boosts student self-efficacy in applying learning in practical contexts. While SBL offers a framework for applying theoretical knowledge (Errington, 2010), UDL ensures accessibility, engagement, and comprehension for all students (Damasevicius & Sidekerskiene, 2024) through its flexible and inclusive design principles. UDL's adaptability is particularly effective when applied to online learning formats that leverage digital tools and multiple representation modes (Meyer et al., 2014). By utilizing multiple means of engagement, representation, and expression, UDL caters to the diverse needs of online learners, creating an environment where all students can succeed (Damasevicius & Sidekerskiene, 2024; Rao & Meo, 2016). Together, these approaches have the potential to create an inclusive and engaging learning environment that addresses the diverse needs of online learners.

While integrating SBL and UDL in online courses has clear benefits, combining these frameworks introduces specific challenges that must be addressed. For instance, designing scenarios that are both accessible and interactive can be complex, as it requires balancing the depth and realism of the scenarios with the accessibility needs of diverse learners. Additionally, supporting learners' cognitive load in complex scenarios while employing multiple means of engagement and representation requires iterative instructional design (Schmidt & Tawfik, 2022) that adapts to evolving needs within the broader learning context to prevent fatigue and disengagement.

Purpose and Research Questions

This study evaluates the effectiveness of integrating SBL and UDL principles in enhancing students' ability to apply learning theories in practical contexts. The research questions framing this study are: Research

- Question 1: How does the integration of SBL and UDL in the course redesign influence students' self-reported self-efficacy in applying learning theories in real-world contexts?
- Research Question 2: How do students perceive the effectiveness of SBL and UDL principles in helping them understand and apply learning theories?

Through this investigation, this study aims to provide empirical evidence on the impact of combining SBL and UDL strategies on students' self-efficacy in applying their learning and learning outcomes in the context of instructional design education.

Methods

Design Context

Offered within an asynchronous online format in the graduate Learning Design and Technology program at the teacher's college of a large southwestern university, the course aimed to enhance theoretical understanding through practical application. This redesign integrated SBL and UDL to enhance student engagement, accessibility, and the practical application of learning theories, mirroring the methodology applied in an earlier undergraduate digital learning theories course (Morgan, 2024). This approach allowed students to apply theoretical concepts in realistic, professional contexts actively, thus better preparing them for future instructional design roles. The success of the undergraduate course redesign provided the foundation for applying similar strategies in the graduate course to improve students' self-efficacy in applying learning theories in their professional practices and enhancing their overall learning experience. This continuity in design strategy allows for a consistent evaluation of how SBL and UDL principles can be effectively implemented across different academic levels to support the application of learning theories in real-world contexts.

The course instructor served as the primary content architect, collaborating closely with the instructional design team to ensure a seamless integration of new learning materials. An instructional designer utilized Articulate Rise 360, an e-learning authoring tool known for its user-friendly interface and compatibility with various learning management systems (Lau et al., 2024), to develop interactive scenarios tailored for graduate students. These scenarios were designed to facilitate the application of complex theoretical concepts to real-world professional contexts, aligning with best practices in scenario-based learning (Correia et al., 2021). The choice of Articulate Rise 360 was strategic, given its extensive character image library and the ability to produce responsive content accessible across different devices.

Another instructional designer collaborated with the team to integrate the revised course materials into the Canvas Learning Management System, ensuring all components functioned cohesively within the platform. Before implementation, the updated materials were thoroughly reviewed by the co-directors of the instructional design program. Their feedback was instrumental in refining the course content, guaranteeing that it met the rigorous academic standards expected at the graduate level.

The instructor applied an integrated Universal Design for Learning and Scenario-Based Learning design cycle (UDL & SBL DC) to the course redesign. Drawing on the UDL design cycle (Rao & Meo, 2016) to address learner variability, steps two through five incorporated Clark and Mayer’s (2012) scenario-based model. This approach supported diverse needs and fostered critical thinking through authentic scenarios and problem-solving skills. The UDL & SBL DC was systematically applied as follows:

1. Consider Learner Variability—The course design accounted for graduate students' diverse backgrounds and experiences, recognizing their varying levels of prior knowledge and professional experience.
2. Identify Clear Goals – The instructor defined precise learning objectives, considered the advanced knowledge and skills required at the graduate level, and developed task deliverables that reflected these expectations.

3. Develop Assessments – Assessments were crafted with the UDL guidelines in mind, providing multiple means for students to demonstrate mastery while addressing individual learning preferences.
4. Develop Flexible Methods and Materials—The course materials, which incorporate scenario elements such as trigger events, scenario data, and guided instruction, were designed to be adaptable and engaging, catering to different learning preferences.
5. Implement the UDL-Based Lesson – The course was launched with built-in opportunities for reflection and feedback, enabling continuous improvement and adaptation based on student input.
6. Reflect on and Revise the Course—After Implementation, the instructor and design team analyzed outcomes and feedback to make necessary revisions, ensuring the course remained effective and relevant.

Participants

This study's participants were students enrolled in a graduate-level learning theories course in the summer of 2024. After course grades were posted, 44 students were invited to participate. To qualify for participation, students needed to be at least 18 years old and enrolled in the course during the specified term. In total, 12 students completed the survey, resulting in a response rate of 27.3%. No demographic data were collected as part of this study.

Recruitment and Data Collection

Participants were recruited via an email invitation to all 44 students enrolled in the course. The email included a link to an online questionnaire hosted on QuestionPro, a survey platform accessible only through Single Sign-On (SSO). The survey link was accompanied by an informed consent form, which informed participants that clicking the "Next" button indicated their consent to participate. The Principal Investigator (PI) sent a follow-up reminder email the day before the survey was due to encourage participation. The survey remained open for responses until July 15, 2024.

Confidentiality was maintained throughout the study by using a non-tracking link for the survey, ensuring that participants' IP and email addresses were not recorded or linked to their responses. The survey was designed to be anonymous, and no personal identifiers were collected. The PI set up the consent information in QuestionPro, and participants were informed that they could exit the survey at any time without penalty. This study followed approved ethical standards and received institutional review board (IRB) approval from the research institution.

Survey Instrument

The researcher developed a survey of six closed-ended and two open-ended questions to assess students' perceptions of the effectiveness of SBL and UDL principles in the course. The closed-ended questions were measured on a 5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree." The open-ended questions allowed students to provide more detailed feedback on the course's design, specifically regarding the use of real-life scenarios

and the accessibility and inclusiveness of the course materials. The survey questions were as follows:

1. Using real-life scenarios in the course assignments increased my confidence in applying learning theories to real-world situations.
2. Scenario-based learning made it easier for me to understand the practical applications of learning theories.
3. The course made learning about learning theories interesting and enjoyable by offering choices related to assignment topics, encouraging collaboration through peer discussions, and creating a welcoming and respectful learning environment.
4. The course presented information through different formats, including videos, readings, and live sessions, incorporating various perspectives and identities. This approach made the content more accessible and relatable, enhancing my understanding and retention of the material.
5. The course offered a variety of ways for me to express what I learned, such as writing, presentations, and videos. It also offered support and tools that allowed me to communicate and perform tasks more effectively.
6. The combination of realistic scenarios and varied instructional methods helped me synthesize and apply learning theories more effectively than a traditional online approach (e.g., reading assignments, writing papers, answering discussion prompts).
7. Compared to a traditional online course, which primarily involves reading, writing, and discussion prompts, how did this course's incorporation of real-life situations and varied learning activities (such as diverse ways to communicate, express knowledge, and present information) enhance your understanding and practical application of learning theories?
8. Please provide any additional feedback you have about the use of scenarios, as well as the accessibility and inclusiveness of the course. What aspects did you find particularly effective or in need of improvement?

Note: The survey questions used 'confidence' to measure students' self-reported confidence in applying learning theories. For this study, 'confidence' is analyzed and discussed in terms of students' self-efficacy in applying learning theories, aligning with established research terminology.

Data Analysis

The six Likert-scale questions were analyzed using descriptive statistics, including frequency distributions, percentages, means, medians, modes, standard deviations, and ranges. The qualitative data analysis for survey questions 7 and 8 employed a thematic matrix to categorize and analyze participant responses. Recurring themes related to SBL and UDL were identified and sub-categorized into areas such as applying learning theories, engagement, practical learning, and course design. Comments were labeled with participant letters for traceability. This structured approach facilitated pattern identification, streamlined analysis, and provided a comprehensive overview of students' perceptions regarding SBL and UDL effectiveness.

Findings

Research Question 1

Descriptive Analysis. Integrating SBL and UDL within the course significantly enhanced students' self-reported self-efficacy in applying learning theories to real-world contexts. Quantitative analysis revealed that responses to survey question 1 ("Using real-life scenarios in the course assignments increased my confidence in applying learning theories to real-world situations") yielded a mean of 4.67 (SD = 0.49), with 66.67% of participants selecting "Strongly Agree." Similarly, survey question 6 ("The combination of realistic scenarios and varied instructional methods helped me synthesize and apply learning theories more effectively than a traditional online approach") had a mean of 4.67 (SD = 0.65), with 75.00% of participants indicating "Strongly Agree." Detailed response distributions and statistical measures are presented in Tables 1 and 2.

Table 1

Response Distribution for Survey Questions 1 and 6

Question Item	Strongly Agree %	Agree %	Neutral %	Disagree %	Strongly Disagree %
Q1) Using real-life scenarios in the course assignments increased my confidence in applying learning theories to real-world situations.	66.67%	33.33%	0.00%	0.00%	0.00%
Q6) The combination of realistic scenarios and varied instructional methods helped me synthesize and apply learning theories more effectively than a traditional online approach (e.g., reading assignments, writing papers, answering discussion prompts).	75%	16.67%	8.33%	0.00%	0.00%

Table 2

Central Tendency & Dispersion Measures for Survey Questions 1 and 6

Question	Mean	Median	Mode	Standard Deviation	Range

Q1	4.67	5.00	5.00	0.49 1.00
Q6	4.67	5.00	5.00	0.65 2.0

Qualitative Analysis. Qualitative data corroborated descriptive analysis findings, highlighting that students felt better equipped to apply theoretical knowledge practically. Specific participant comments supporting these findings are as follows:

- "Helped me to successfully apply the information I've learned to my life and future profession." (Participant A)
- "Using real-life scenarios helped me to better understand the different ways to apply the learning theories." (Participant B)
- "Made it much easier to see how I can apply these learning theories to real-life teaching." (Participant F)
- "Using real-life situations allowed me to envision how I can apply the theories directly to my current and future work." (Participant J)
- "Immediately applied the skills learned in the course into my own professional life." (Participant K)

These comments illustrate a direct link between the course's SBL and UDL strategies and the enhancement of students' self-efficacy in real-world applications.

Research Question 2

Descriptive Analysis. Students agreed that SBL and UDL principles enhanced their understanding and application of learning theories. Quantitative responses to Survey Question 2 ("Scenario-based learning made it easier for me to understand the practical applications of learning theories") showed a mean of 4.50 (SD = 0.80), with 66.67% of participants selecting "Strongly Agree." Additionally, survey questions three through five, which assessed various aspects of course design aligned with UDL principles, demonstrated strong positive responses, with means ranging from 4.33 to 4.5 and most participants endorsing "Strongly Agree." Tables 3 and 4 show response distributions and statistical measures for survey questions two through five.

Table 3

Response Distribution for Survey Questions Two Through Five

Question Item	Strongly Agree %	Agree %	Neutral %	Disagree %	Strongly Disagree %
Q2) Scenario-based learning made it easier for me to understand the practical	66.67%	16.67%	16.67%	0.00%	0.00%

applications of learning theories.					
Q3) The course made learning about learning theories interesting and enjoyable by offering choices related to assignment topics, encouraging collaboration through peer discussions, and creating a welcoming and respectful learning environment.	50.00%	33.33%	16.67%	0.00%	0.00%
Q4) The course presented information through different formats, including videos, readings, and live sessions, incorporating various perspectives and identities. This approach made the content more accessible and relatable, enhancing my understanding and retention of the material.	58.33%	33.33%	8.33%	0.00%	0.00%
Q5) The course offered a variety of ways for me to express what I learned, such as writing, presentations, and videos. It also offered support and tools that allowed me to communicate and perform tasks more effectively.	58.33%	33.33%	8.33%	0.00%	0.00%

Table 4

Central Tendency & Dispersion Measures for Survey Questions Two Through Five

Question	Mean	Median	Mode	Standard Deviation	Range
Q2	4.50	5.00	5.00	0.80	2.00
Q3	4.33	4.50	5.00	0.78	2.00

Q4	4.50	5.00	5.00	0.67	2.00
Q5	4.50	5.00	5.00	0.67	2.00

Qualitative Analysis. Thematic analysis of qualitative comments (Survey Questions 7 and 8) identified several key areas where SBL and UDL contributed to effective learning. Engagement and Motivation emerged as a significant factor, with participants expressing how the interactive elements of the course enhanced their interest and enthusiasm:

- "Real-life scenarios are more engaging and help generate new ideas." (Participant B)
- "It was more motivating, and allowed me to 'act out' the scenarios and realistically address them." (Participant C)

Learning and Immediate Feedback were highly valued by learners, emphasizing the benefits of interactive discussions and timely responses:

- "Discussions have been rewarding, and feedback has been immediate, which I value immensely." (Participant G)
- "Being able to discuss things with my group was nice. I also felt that I gained a better understanding by putting the learning to practical use." (Participant I)

The Effectiveness of Scenarios was another critical theme, highlighting how realistic scenarios facilitated deeper cognitive engagement and creativity:

- "Scenarios allow me to place myself in the situation so that I can create actions, responses, and appropriate elements." (Participant G)
- "The SparkyWave scenarios helped to make sure that I was thinking creatively in ways that would enhance my learning and teaching objectives." (Participant H)
- "Scenario-based allowed me to create and then review the rubric, which was very flexible." (Participant E)

The Use of Multimedia and Varied Activities enhanced learners' ability to express their understanding through diverse formats:

- "This course has allowed me to create and use different media to express my understanding." (Participant G)
- "I found that working with multimedia elements helped me to express my learning module objectives better." (Participant H)

Course Design and Inclusiveness were praised for fostering a supportive and connected learning environment:

- "This course was a great example of how to use the Universal Design for Learning." (Participant F)
- "I enjoyed the office hours via Zoom each week. Slack also improved the course by connecting us all and providing a space to create a community." (Participant A)

Clarity and Understanding of Course Objectives were noted as strengths, aiding students in grasping assignment goals and theoretical applications:

- "I was able to more quickly understand the objective of the assignment and requirements." (Participant E)
- "It was helpful to see concrete examples of how these theories can be applied." (Participant D)

However, participants also identified Areas for Improvement:

- "The least compelling aspect of the course was the group project." (Participant B)
- "Perhaps more simulated environments (however, there are many already)." (Participant C)
- "A major area of improvement would be a lesson on how to pick a learning theory without as much hand holding." (Participant D)

These insights highlight the strengths of incorporating SBL and UDL in course design and areas where further enhancements can be made to optimize the learning experience.

Discussion

Research Question 1

The high mean scores observed in the data highlight the critical role that these instructional strategies play in boosting students' self-efficacy in applying theoretical knowledge. This aligns with existing research, which emphasizes the effectiveness of SBL in promoting higher-order thinking skills and deep engagement through realistic, context-rich scenarios (Deniş Çeliker, 2020; Falkner & Stålbrandt, 2023). By immersing students in scenarios that mirror real-world challenges, SBL facilitates the practical application of theoretical knowledge, thereby increasing students' self-efficacy in their ability to apply what they have learned (Martínez-Argüelles et al., 2022; Nguyen et al., 2023). The qualitative feedback further supports this, with students frequently reporting that SBL helped them "act out" and realistically apply learning theories, directly contributing to their enhanced self-efficacy in a real-world application.

Similarly, UDL's impact on students' self-efficacy is consistent with previous studies that highlight UDL's effectiveness in creating inclusive learning environments tailored to diverse needs (Garrad & Nolan, 2023; Meyer et al., 2014). UDL's emphasis on providing multiple means of engagement, representation, and expression is particularly important in online education, where sustaining engagement can be challenging (Bray et al., 2024).

The findings of this study suggest that the inclusiveness and flexibility offered by UDL were highly valued by students, aligning with research that demonstrates UDL's role in fostering self-efficacy by accommodating diverse learning preferences and needs (Rao et al., 2014). Overall, the successful integration of SBL and UDL in the course redesign has significantly enhanced students' self-efficacy in applying learning theories in real-world settings.

An unexpected result was the low variability in student responses regarding the impact of SBL, with a notably high level of agreement among those who participated. While this uniformity suggests that the SBL components may have been broadly effective for those who responded, it is important to note the limited scope of the data. The relatively low

survey response rate and the absence of identifying information about the respondents make it difficult to confirm the extent to which these perceptions represent all student groups. Nonetheless, the consistency in positive feedback observed here aligns with the literature indicating that SBL can promote deep engagement and practical application through realistic scenarios (Clark & Mayer, 2012; Nguyen et al., 2023). Despite these limitations, the findings suggest that well-designed SBL activities can enhance learners' self-efficacy in applying learning theories, warranting further investigation into their applicability across a broader range of learning environments.

Despite confirming that integrating SBL and UDL enhances students' self-efficacy in applying learning theories effectively, challenges inherent in this integration were also observed. Implementing SBL in an asynchronous online setting limited the instructor's ability to ensure that students fully understand the context presented in the scenario before they take on the task it involves. Research indicates that clear instructions and scaffolding are essential in online scenario-based learning to support student comprehension and engagement with the scenario's context (Darabi et al., 2010). Additionally, developing interactive and accessible scenarios in SBL requires substantial strategic and advanced planning (Henderson, 2023), which, while initially demanding, can enhance long-term functionality and effectiveness by ensuring that activities remain meaningful and adaptable for diverse learners.

Research Question 2

The study's findings indicate that students perceive both SBL and UDL as highly effective in helping them understand and apply learning theories. This view aligns with current research emphasizing how SBL bridges the gap between theoretical knowledge and practical implementation by engaging students in authentic, real-world scenarios (Clark & Mayer, 2012; Falkner & Stålbrandt, 2023). The qualitative data from this study, where students frequently emphasized how scenarios helped them better grasp and apply learning theories, further supports the effectiveness of SBL in enhancing comprehension and the practical application of theoretical knowledge (Mio et al., 2019).

In addition to SBL, UDL was also perceived as highly effective by students, particularly in enhancing course accessibility and engagement. This finding aligns with research that underscores UDL's importance in creating flexible and inclusive learning environments that support diverse student needs (Garrad & Nolan, 2023; Rao & Meo, 2016). By providing multiple means of representation and expression, UDL ensures that all students can access and engage with course content in ways that resonate with their individual learning preferences and strengths (Taylor & Yuknis, 2023).

The positive feedback on UDL in quantitative and qualitative data suggests that UDL principles were effectively implemented in the course, contributing to students' understanding and application of learning theories. These results reinforce the notion that the combination of SBL and UDL creates a powerful instructional framework that not only supports engagement and accessibility but also enhances students' ability to transfer theoretical knowledge to practical contexts.

For Research Question 2, the response patterns indicated that while the surveyed students positively received UDL principles, there was less pronounced strong agreement on UDL-

related statements than on those related to SBL. Given the limited number of responses, it is not possible to draw definitive conclusions about any differences in impact. Nonetheless, this highlights an opportunity to more clearly communicate how UDL components are designed to enhance access, engagement, and the practical application of learning theories. Research underscores UDL's effectiveness in creating inclusive environments through Multiple Means of Engagement, Representation, and Action and Expression (Garrad & Nolan, 2023; Meyer et al., 2014). By making these principles more transparent, instructors can help learners recognize the value of UDL-based design elements and how they support a wide range of learning needs (Boothe et al., 2018; Rao & Meo, 2016).

Implications for Practice

Integrating Scenario-Based Learning (SBL) and Universal Design for Learning (UDL) offers compelling advantages for enhancing students' self-efficacy in applying theoretical knowledge. While SBL provides the framework for authentic application through context-rich scenarios (Falkner & Stålbrandt, 2023), UDL ensures these learning experiences are accessible and engaging for all students (Rao & Meo, 2016). To maximize effectiveness in asynchronous online settings, instructors should focus on strategic planning and development of interactive scenarios (Henderson, 2023), with particular attention to scaffolding that supports student comprehension of contextual elements (Darabi et al., 2010).

Implications for Future Course Revisions

Several targeted improvements can strengthen future iterations of the course. Group work can be restructured using Design Justice principles (Costanza-Chock, 2020), incorporating rotating roles (project manager, researcher, designer) to ensure equitable participation and clear accountability (Qu & Cross, 2024). Implementing structured checkpoints for progress updates and feedback can strengthen community engagement (Adesina et al., 2022).

To promote student autonomy while maintaining academic rigor, later course modules could allow students to select theories independently using a decision-making rubric (Johansen et al., 2023). Adding peer feedback on theory rationales in discussion forums fosters a community-centered environment that values diverse perspectives (Kerman et al., 2024), aligning with UDL 3.0's focus on collective learning and interdependence (CAST, 2024b).

Limitations and Future Research

A small sample size (n=12, 27.3% response rate) limits the generalizability of the findings, and relying on self-reported data may introduce biases. The limited number of participants means the results may not represent a broader student population, while self-selection and potential social desirability in responses could skew findings. These constraints indicate the need for future studies with larger, more diverse samples to confirm and expand upon the current insights into the effectiveness of SBL and UDL principles.

To build on these findings, future research should focus on three key areas. First, expanding the sample size would improve reliability and allow for more robust statistical analysis. Second, longitudinal studies could assess the long-term impact of SBL and UDL on student learning and self-efficacy in applying knowledge, both in subsequent courses and professional settings. Finally, replicating the study across various contexts would help determine the consistency of SBL and UDL principles' effectiveness, contributing to a broader understanding of how these instructional strategies can be optimized to enhance student learning in diverse environments.

Conclusion

This study examined how integrating SBL and UDL in an online graduate-level course affected students' self-efficacy in applying learning theories. Results showed that combining these approaches significantly enhanced students' confidence in applying theoretical concepts to real-world situations, with SBL providing context-rich scenarios for active engagement and UDL ensuring accessibility for diverse learners.

Furthermore, the insights from students' experiences and self-efficacy levels offer valuable guidance for online course design and teaching practices. Student feedback collected in this study informs the iterative process of refining online courses, ensuring that instructional strategies are aligned with learners' needs and preferences. By analyzing how students interact with SBL and UDL, instructional designers can create more responsive and adaptive online environments that cater to varied learning styles and requirements. This student-informed approach enhances the relevance and effectiveness of online education, leading to more meaningful and empowering learning experiences.

While limited by sample size and self-reported data, the findings suggest that integrating SBL and UDL offers a promising approach to instructional design that aligns with learner-centered, inclusive online education trends. These results encourage educators and instructional designers to adopt these strategies for enhancing student engagement, accessibility, and self-efficacy in online learning environments. By leveraging student feedback and self-efficacy measures, online courses can be continuously refined to better support diverse learner populations

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