

Adopting and Applying the Universal Design for Learning Principles in Online Courses

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The Universal Design for Learning (UDL) principles suggest that providing learners multiple means for engagement, representation, and action and expression will help learners become purposeful and motivated, resourceful and knowledgeable, and strategic and goal-directed (CAST, 2018). The purpose of this study was to explore the challenges and opportunities of adopting UDL principles for online course design using the decision-making process as the theoretical framework as defined by the Diffusion of Innovation theory (Rogers, 2003). Seven online faculty were interviewed regarding the challenges and opportunities that hindered or helped their decision to adopt the UDL principles in online course design. Additionally, three faculty participants volunteered course materials as examples of how they applied UDL principles. Results highlight ways institutions of higher education can promote faculty adoption of UDL principles for online course design.

Introduction

Online courses and programs have a firm footing and continued growth in higher education. According to Allen and Seaman (2017), distance education served more than six million learners in the fall of 2015, which was a 3.9% increase in one year. Furthermore, approximately 30% of all learners enrolled in higher education took at least one online course, and of those, more than 80% were undergraduate learners (Allen & Seaman, 2017). Since online courses and programs are serving more substantial numbers of learners, there is a need to understand how to make online courses applicable and productive for a broad population of diverse learners with various needs.

The Universal Design for Learning (UDL) framework optimizes learning experiences for all learners, regardless of instructional medium, based upon research of how learning occurs (CAST, 2018). Three main principles comprise the framework: (1) multiple means of representation, (2) engagement, and (3) action and expression. The principles encourage and define ways to allow learners to interact with the multiple types of content and various ways to interact with the instructor and each other (see Table 1). Additionally, the principles encourage faculty and designers to provide learners to express content mastery in various ways when appropriate. Three more specific guidelines within each principle dictate ways to operationalize UDL in practice.

Table 1

A Description of UDL Principles and Guidelines

Guidelines	Description
Principle 1: Providing Multiple Means of Representation	
1: Perception	Alternatives for auditory and visual information or offering ways of customizing the display of information
2: Language, mathematical expressions, and symbols	Clarifying vocabulary, symbols, syntax, and structure; promoting understanding across languages
3: Comprehension	Activating or supplying background knowledge; highlighting patterns, critical features, big ideas and relationships; guiding information processing and visualization
Principle 2: Providing Multiple Means of Action & Expression	
4: Physical Action	Varying the methods for response and navigation; optimizing access to tools and assistive technologies
5: Expression and Communication	Using multiple media for communication; using multiple tools for construction and composition; building fluencies with graduated levels of support for practice
6: Executive Functions	Guiding appropriate goal setting; supporting planning and strategy development; facilitating the management of information and resources; enhancing capacity for monitoring progress
Principle 3: Providing Multiple Means of Engagement	
7: Recruiting Interest	Optimizing individual choice, autonomy; relevance, value, and authenticity; minimize threats and distractions
8: Sustaining Effort and Persistence	Heighten salience of goals and objectives; vary demands and resources to optimize challenge; fostering collaboration and community and increasing mastery-oriented feedback
9: Self-regulation	Promoting expectations and believes that optimize motivation; facilitating personal coping skills; developing self-assessment and reflection

Note. Adapted from “Universal Design for Learning guidelines version 2.2.” by CAST, 2018, (<http://udlguidelines.cast.org/>)

The Diffusion of Innovation (DOI) theory provides a framework to guide the adoption of an innovation within an organization to increase the odds of success (Rogers, 2003). In this study, the innovation is the adoption of the UDL guidelines for online course design in higher education institutions. The theory defines five key elements in diffusion: (a) the innovation, (b) adopters, (c) communication channels, (d) time, and (e) the social system. This study aims to gain insight into UDL guidelines' adoption through the lens of the DOI theory.

Literature Review

UDL

The UDL framework relies on a combination of neuroscience and educational research (CAST, 2018; Ostrowski et al., 2017). It provides a proactive way to plan for all learners' success, which negates the need to retrofit content when learners with differing abilities arrive in an online course. Applying the UDL framework requires shifting from the traditional rigid approach of instructional planning to a more flexible learner-centered, individual approach (Al-Azawei et al., 2016).

Research suggests that applying UDL principles and guidelines support learning (Capp, 2020) in both the K-12 (Brand et al., 2012; Ok et al., 2017) and higher education (Rao et al., 2014) environments. UDL aims to produce purposeful, motivated, resourceful, knowledgeable, strategic, and goal-directed learners. The principles give guidelines to provide options that empower learners to control the learning process and allow self-expression. Lepp and Fierke (2017) found that learners had more positive learning experiences when allowed to develop learning goals and influence the course outcomes, followed by reflection attainment of those goals and outcomes. Additionally, Smith (2012) applied the UDL framework to a graduate research methods course and found a positive relationship between learner interest and engagement. However, while these studies all point to UDL implementation benefits, some faculty find the UDL principles and guidelines challenging to put into practice due to the complexity of the framework (Edyburn, 2010). There is a need for additional professional development opportunities and examples to understand the application of the framework.

UDL in Online Learning

Research on UDL has recently gained momentum within an online learning environment due to increased demand for online courses. Designing and developing online

instruction is a time-intensive process, and retrofitting content to suit the needs of diverse learners becomes more complicated than traditional instruction. Therefore, applying the UDL framework to consider diverse learners' needs during the initial design and development phase can save time and resources

Multiple studies report benefits for learners. He (2014) designed an online education course based on the UDL framework. Learners reported higher confidence and self-efficacy for online learning and interest in teaching online in the future. Rao and Tanners (2011) created an online course with the UDL framework as a guide. They found that 92% of learners who participated reported value in the course delivery. Similar findings exist in graduate courses. For example, after designing a course using UDL principles, 83% of graduate learners reported that a choice in assignments positively impacted course completion and success (Engleman & Schmidt, 2007). More recently, Scott et al. (2015) explored learner perceptions of three online courses designed with UDL principles and found positive impacts on learner perceptions of learning.

Despite these positive examples of applying UDL in online learning environments, many online instructors remain unfamiliar with UDL principles. Still, others who are, sometimes choose not to implement them in their courses. Westine et al. (2019) found that approximately 72% of online-teaching faculty at a large southeastern university were familiar with at least one UDL principle. However, only 38-60% claimed to implement UDL in their online course - depending on which guideline. The least implemented guideline was language, mathematical expression, and symbols. The most implemented guideline was expression and communication. Research demonstrates a need to examine the faculty decision-making process to adopt UDL for online course design.

Scott and McGuire (2017) suggest that Rogers' (2003) DOI theory is a useful strategy for studying UDL adoption within an online learning context. According to Scott and McGuire (2017), DOI theory elements support the UDL implementation process through four specific areas: time and decision-making, time and individual innovativeness, time and rate of adoption by the field, and communication channels and social systems.

Theoretical Framework

Rogers' (2003) DOI theory explains how, why, and at what rate innovations spread within a social system. The decision process has five stages: knowledge, persuasion, decision, implementation, and confirmation, which can be influenced by various factors: (a) the attributes of the innovation, (b) time, and (c) communication channels. The first stage is *knowledge* - when an individual learns of an innovation through various communication channels

within the social system. The second stage, *persuasion*, is when individuals form positive or negative attitudes towards the innovation based upon knowledge gained. There are five characteristics of innovations: relative advantage, compatibility, complexity, trialability, and observability. For an individual to feel persuaded to use an instructional innovation, the innovation should have a clear advantage and be compatible with the current adopter's practice. *Decision* is the third stage where an individual makes a clear decision to adopt or not adopt the innovation, which influences the rest of the decision process stages. The *implementation* stage, the fourth stage, is when the individual puts the innovation to use in practice. The final stage is *confirmation* - when the individual decides that this innovation helps the adopter reach desired goals.

Purpose of Study

Multiple studies have shown that UDL within face-to-face classrooms is efficient and productive resulting in higher achievement (Al-Azawei et al., 2016; Capp, 2020). Furthermore, UDL is drawing increased attention as a framework to promote electronic content accessibility and making instruction more inclusive (Al-Azawei et al., 2016). However, significant gaps in the adoption of UDL in online learning environments suggest more research is needed to understand the faculty decision process to adopt UDL guidelines for online course design.

The present research study extends a survey research effort (Westine et al., 2019) which quantified the level of knowledge and implementation of UDL principles within an online learning environment at a large southeastern university. In that study, the authors surveyed approximately 150 online instructors to gauge familiarity with and implementation and use of the UDL guidelines. Additionally, the survey determined instructor interest in learning more about each UDL guideline. In this follow-up study, the researchers conduct qualitative interviews of select survey participants and perform a content analysis of online course materials volunteered by a subset of the interviewees implementing at least one UDL guideline. The goal was to gain practical examples to inform training in applying UDL guidelines in online course design to ensure effective learning for all.

Therefore, the purpose of the current research effort is to identify the influences on faculty's decision-making process at various stages of adopting the UDL principles to guide their online course design. Results will inform higher education institutions on the challenges and opportunities that faculty experience during adoption decisions and inform future practices to facilitate more widespread implementation of UDL in online course design. The research questions are:

1. What opportunities and challenges influence faculty with prior knowledge of UDL principles to adopt these principles to design online class(es)?
2. How have faculty applied UDL guidelines in their online classes to adhere to the UDL principles of providing multiple forms of engagement, representation, and action and expression?

Methods

Research Design

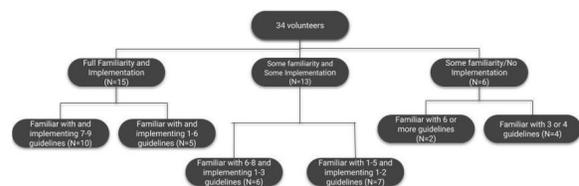
This research study is a case study of a bounded system (Merriam, 2009), which is defined as Merriam (2009) as the object of study using descriptive techniques. The bounded system were online instructors at a large southeastern university with familiarity of UDL principles. Online instructors with familiarity of UDL principles were interviewed about their decision to adopt and implement UDL strategies. Elements of phenomenology were used to study how the UDL framework is implemented within online instruction through the lens of the decision-making process as defined in the DOI theory (Merriam, 2009). The research design explored how the system was implemented and the goal was to analyze instructional decisions made by online instructors. The design utilizes the DOI framework as a coding system and draws codes from the work of Scott and McGuire (2017) using a deductive coding method.

Participants

Interview participants were purposefully selected from Westine et al. (2019) survey respondents who provided information on UDL implementation and indicated a willingness to engage in follow-up interviews. Thirty-four survey participants volunteered for interviews. As shown in Figure 1, the researchers created mutually exclusive groups based on their level of implementation of known UDL guidelines.

Figure 1

Mutually Exclusive Groups of Interviewee Volunteers



The first group, *full familiarity and implementation of UDL guidelines*, was the largest group and was composed of participants who reported implementation of each

guideline for which they were familiar. The next group, *some familiarity and some implementation* of known UDL guidelines, captured participants who were familiar with some or all UDL guidelines but chose to implement a subset of the known guidelines. The *some familiarity and no implementation* group signified individuals that knew of at least one UDL guideline but did not implement any. This was the smallest group. The seven interview participants were two tenured faculty, one tenure track faculty, two clinical faculty, and two lecturers.

A random number generator selected three participants from each category to invite for interviews. Of the nine invited participants, seven responded and agreed to a meeting: two from the full implementation group, two from the mixed implementation group, and three from the no implementation group.

Data Collection

The researchers conducted semi-structured interviews, which consisted of nine questions regarding the decision to adopt UDL principles for online course design (See Appendix). The conversations were recorded and transcribed. The research team carefully reviewed and edited the transcriptions to ensure accuracy. The four participants who implemented UDL guidelines were invited to provide content samples. Three participants agreed and provided various artifacts, including assignment descriptions, syllabi, and access to online learning system courses. Two of these participants were in the full implementation group, and one was in the mixed implementation group. The research team reviewed the materials to identify examples.

Data Analysis

The transcriptions were uploaded into NVivo 12 software and coded. The predetermined codes are based on the work of Scott and McGuire (2017). Two research team members thoroughly read and coded sentences within the interview transcripts separately. To ensure validity, the coders met after coding the second, fifth, and seventh interviews to compare codes and arrive at a consensus. Table 2 displays examples of coded passages.

Table 2

Examples of Codes

Codes	Quotes	Explanation
Decision Process: knowledge and awareness	I think part of it has been through searching to see what our best practices in education, particularly online education, to see what's going to be the best way to reach the students, what's going to be the best way to get them engaged in the courses, to help them achieve their goals.	This quote describes how the faculty gained knowledge and awareness of UDL.
Decision Process: knowledge and awareness & formal social system	I did it on my own but what I did is it, I typed it with my annual (evaluation). We have an annual evaluation to create teaching, service and research goals for each year and so I typed that into my teaching goal. I found it was a good way to objectively know there I was going to be improving my teaching rather than setting out on my own and thinking "Oh this will be a good year" or "this would be a good conference to go to".	This quote describes that faculty gained knowledge and awareness of UDL on their own and how they relied on a formal social system to guide their knowledge goals.

Results

Research Question 1

To answer research question one, "What opportunities and challenges influence faculty with prior knowledge of UDL principles to adopt these principles to design online class(es)?" We examined the data for opportunities and challenges of adoption through each stage of the decision making process. The results are organized by each stage of the decision-making process, discussing opportunities and challenges found within each stage.

Adopting UDL Principles

The stages of the innovation decision process guide the presentation of the findings and include enabling factors and existing barriers to adoption experienced by the participants. Much of the conversations centered on the knowledge and awareness and the persuasion stages of the decision process, highlighting the importance that faculty place on initial exposure to UDL principles, training, and what helped persuade UDL implementation.

Knowledge and Awareness

Knowledge of UDL is linked most clearly to communications. Interviewees frequently mentioned professional development training as to where they learned about UDL, highlighting the role of interpersonal communications. Although not specific to UDL, Quality Matters (QM) training emerged as a source of information related to UDL (QualityMatters.org, 2020). Interviewees also referenced the Center for Teaching and Learning (CTL) at the university as an interpersonal communications source about QM and other teaching resources. One respondent found the training sessions with CTL were too few and not personalized enough. This respondent also noted a lack of an online component, which created a barrier to accessing CTL training, mainly since online faculty are not frequently on campus. The lecturers also highlighted this lack of a connection concerning communication. They noted the likelihood of missing information in department meetings due to not being required to attend, not having strong near peer relationships with departmental faculty, and an inability to be on campus to access CTL and other resources.

Exploring the nature of how participants learned about UDL, the researchers saw a variety of responses. One interviewee raised the issue of a lack of education and pedagogy training for graduate faculty and the role this plays in the knowledge of UDL. Relatedly, another interviewee described their search process that led to the UDL framework. Yet, one respondent mentioned the original survey in the initial wave of research as a first concrete exposure to the UDL framework.

The constraint mentioned most was time to learn about UDL. Multiple respondents noted the value of formal structures to help manage this time. Supporting this concept was the notion that there are "...so many initiatives in this college, that it's really hard... because we have meetings, and we've been revising our programs." One respondent emphasized that it was useful to have CTL support learning strategically across a week in pieces rather than all at once within a training while designing a course. Another faculty described setting goals for learning about UDL in annual evaluations to prioritize learning. These examples highlight the need for a clear strategic initiative towards UDL from the organization to prioritize UDL.

Persuasion

Participants stated that they were persuaded to adopt UDL principles due to the perceived overlap between innovation characteristics with their current position and the support of various communication channels. For instance, one participant mentioned that the framework promotes good teaching practice, so it was not hard to persuade them to adopt. Similarly, another participant

noted a belief that UDL would improve learner engagement, which meant it would assist with more effective teaching and learning.

With the participant pool, mass media such as the CAST website's research, interpersonal communication through workshops offered at the university via CTL, and near peers such as encouraging colleagues within departments influenced persuasion. Participants vocalized trying to persuade others to adopt UDL standards. For example, one participant highlighted the importance of persuading colleagues by offering a workshop for faculty within the college. Through this workshop, the participant became a resource for faculty to ask for advice - essentially becoming the near peer for colleagues.

Conversely, faculty barriers to adopting UDL principles included a lack of time or incentives to redesign an online course with UDL principles, organizational or leadership support, and specific resources or examples that helped understand how the UDL principles directly applied to particular disciplines. Participants expressed knowledge of existing resources but cited not having the time or motivation to explore those resources as the primary barrier. Incentives and administrative support were noted as a possible way to help create time and motivation for faculty to examine existing resources for ideas to implement UDL principles. Additionally, participants suggested a need for better examples. In particular, gleaning examples from faculty within the institution can make more personalized, pertinent resources more readily available.

Decision, Implementation, and Confirmation

The final three stages of the innovation decision process were less represented in the data since many participants had not moved past the persuasion stage. Therefore, the combined results appear in this section. The data suggested that collecting learner feedback, both formally and informally throughout the course, can provide multiple opportunities for confirmation about the decision to adopt UDL principles. No specific barriers emerged in the decision or confirmation phase. However, barriers did surface in the implementation phase. Participants expressed a lack of knowledge of how to allow and uniformly assess learners expressing mastery in various ways efficiently. Inheriting a course that was designed by someone else and did not include UDL principles also presented challenges for adopting the UDL principles. Technological barriers were also mentioned, such as the institution frequently changing the learning management system causing the faculty hesitation to redesign existing content.

Research Question 2

To answer research question two, “How have faculty applied UDL guidelines in their online classes to adhere to the UDL principles of providing multiple forms of engagement, representation, and action and expression?” a content analysis was conducted to examine how each faculty were using the guidelines within their online course. The examples are presented organized by guideline.

Application Examples of UDL in Online Contexts

In response to the need for more illustrative demonstrations, several examples are presented below to illustrate how faculty are applying UDL in their classes. For context before viewing examples, it is helpful first to understand a bit of each participant's teaching background that provided material. Participant 1 is a lecturer in the College of Liberal Arts and works as a full-time instructor at a nearby community college, teaching various online courses in the humanities. Participant 2 teaches face-to-face and online graduate courses in the College of Education. Participant 3 teaches several online courses in the College of Arts and Sciences based in the area of science, technology, engineering, and mathematics (STEM).

Examples for Principle 1: Multiple Means of Action and Expression

Participant 1 incorporated learner choice of products into assignments. They indicated that, “trying to let them present their ideas in as many possible ways as I can, particularly if the class is not a writing-intensive course, there is no reason that they need to write me an essay at the end.” For example, in one assignment, twelve characters were listed from the referenced literature and learners were asked to pick three to focus on for the assignment. Within the same assignment, learners chose two or three questions from seven options to write responses. Additionally, a final online discussion assignment required learners to synthesize topics. For this assignment, students decided and showcased knowledge gained in the format of their choosing. Learners could choose to create videos, presentations, or playlists of songs to show mastery of concepts on an assignment.

Examples for Principle 2: Multiple Means of Engagement

Participant 2 assigned a sizable final project in smaller stages to create more opportunities for revision and feedback. One phase of the final project included a peer review, which gave learners ownership and accountability

for themselves and each other in addition to multiple opportunities to interact with each other and the instructor.

Participant 1 engaged learners using group assignments completed via discussion boards with a different group leader for each assignment. Learners chose group members and projects were evaluated by a rubric that included lead learner responsibilities and teammates' roles. This rotation of duties allowed learners to frequently interact with various classmates in different roles and the instructor around various tasks throughout the semester.

Examples for Principle 3: Multiple Means of Representation

Participant 2 expressed that the face-to-face classroom enhanced the ability to accommodate various learners that each holds unique ideologies and diverse perspectives. Still, it became more challenging to accommodate in an online setting. Explicitly thinking about these diversities when planning the online course was essential to ensure accommodations for all learners. Participant 2 provided various videos, podcasts, or readings that engage learners when it was time to start a new topic or new module.

Participant 1 requested learners to report which instructional methods were or were not effective at least twice during the course. This information assisted in adjusting instructional methods or providing supplemental materials. By seeking the learner's perspective multiple times, Participant 1 was able to adapt to match preferences and monitor progress.

Participant 3 initially assessed learner ability levels to determine the most appropriate instructional methods. The goal was to build confidence in learner abilities early in the semester to lessen anxiety. Therefore, privacy was valued with feedback and communication. An online course provided more opportunity to discuss assignments in private via email or phone conversations, which allowed for more personalized instruction aimed at the specific needs of individual learners.

Discussion

This study's results bring some practical insight into how higher education institutions can influence faculty decisions to adopt UDL principles and some examples used to implement the UDL guidelines online. First, to increase knowledge and awareness, institutional leadership could identify and promote faculty's priorities and incentives to create time to learn and motivation to adopt. Time was a barrier mentioned by all participants. That aligns with Moriarty (2007), who evaluated barriers

to faculty adopting UDL for online course design and found that technology and pedagogical competence, along with time, were critical barriers. Singleton (2017) also found faculty lack of time and lack of leadership emphasis as barriers to adoption. However, once the course design is established with UDL guidelines implemented, it could save faculty planning time and allow more time to focus on facilitation. Therefore, the significant time commitment is before course delivery. This concept is supported by Freeman (2013), who examined time requirements to develop and teach online courses and found evidence that teaching an online course the second and third time becomes about as time-consuming as teaching a face-to-face course the second and third time.

Once establishing priorities, incentives, and motivation to overcome barriers is accomplished, then a centralized pedagogy training center such as CTL could play an essential role in promotion and training. Given that participants highlighted CTL as a valuable information source and a need to connect concepts to teaching practices, incorporating targeted examples within CTL training on UDL would allow for fruitful discussions on implementation ideas to other courses. These discussions, in turn, would increase community engagement regarding UDL. Training interventions have been proven effective for implementing UDL (Davies et al., 2013). Singleton et al. (2019) suggest that strategies should be more prescriptive. Perhaps targeted communications that included training with context-specific best practices and examples would be beneficial. In addition, more diverse training options that included multiple modes and access for part-time faculty could be helpful and model inclusiveness for distance faculty. These suggestions align with Hromalik, Myhill, and Carr (2020), who designed and implemented UDL training for community college faculty and provided insights for successful practice. For example, they suggest offering a multiday academy or a brief workshop presentation as a primer to garner interest rather than providing a series of individual workshops throughout the academic year. The authors also emphasized the importance of modeling UDL practices within the training.

Persuasion to adopt can be promoted through interpersonal and near peer relationship channels in addition to mass media communications. The DOI theory recommends targeting some innovative faculty in various departments to adopt and use UDL principles in online courses, which could serve as near peers to help persuade additional faculty to join and provide context-based examples for their colleagues (Rogers, 2003). This concept was highlighted in faculty conversations. They mentioned they benefited from a near peer relationship or that they served as a near peer in their college.

Organizations can create opportunities to persuade faculty to adopt UDL principles in online course designs through mass media and interpersonal communications. The channels provide avenues to promote the organization's goals, give support, and resources/examples that are in context, so faculty can see how it applies to their fields and courses. This practice aligns with the recommendation of Singleton et al. (2019). They investigated perceptions of instructional designers implementing UDL in which the faculty and instructional designers (ID) relationship was a theme of importance, mainly since the faculty relied heavily on the IDs for ideas. For fields that have limited knowledge of teaching theory, providing training to fill that gap would be beneficial.

Once persuasion is achieved, proper implementation is a crucial element of the decision-making process. For instance, Lombardi, Murray, and Gerdes (2011) evaluated faculty perceptions of UDL versus their action and found there was a discrepancy as to what faculty reported and implemented. This result also appeared in our conversations with faculty as at least one participant reported familiarity with UDL in the initial survey but then stated in the interview that the survey was the first time they had more formally seen the principles. Faculty peers can influence and share ideas to foster proper implementation. Perhaps learning communities could be established to encourage faculty to share ideas. Departments could promote new ideas or critical reminders through emails or workshops to maintain fidelity. Departments or colleges could also provide incentives to faculty interested in learning and applying UDL principles, such as a course release or additional compensation to increase motivation. Given that several experienced faculty noted overlaps of UDL with good teaching practices in general, emphasizing these incentives with newer faculty who are investing in building up teaching capacity may be a productive avenue. These recommendations align with Serrano-Johnson (2020), who examined leadership practices that would support UDL adoption within a community college setting and recommended providing professional development, supportive leadership and encouragement, and building community around effective implementation practices.

Finally, faculty who know and are implementing UDL principles will move through the decision-making process to the final stage of confirmation (Scott & McGuire, 2017). At this stage, the department and faculty can continue to research to show the importance and successes of UDL principles in online course design. It is essential at this stage that other peers, who may be laggards of the implementation process as identified by Roger (2003), are aware of the positive results and then start to see the effects of UDL. Instructors that have been

using the implementation from the beginning can serve as a strategic resource to help address the gap in knowledge and strengthen the implementation of UDL across the institution. These recommendations align with Moore et al. (2018) who defined five levels of implementation for UDL in higher education: pre-implementation through university level implementation. Through the levels peer support and success were emphasized by participants as influences for adoption.

Limitations

This research was limited to one sizable Southeastern university and a small intentional sample of seven online instructors. This university has experienced several LMS transitions over time, which makes results less generalizable to all institutions. Instructors were not incentivized and indicated a willingness to participate in follow-up interviews. However, all did mention their desire to have more training on this topic of online instructional design and UDL. A small lottery incentive of online instructional tools (valued at approximately \$100) was provided to one randomly chosen interview participant. Additionally, some of these instructors may have, in the past, received a monetary stipend, training, and instructional design support to design their online courses. While this may not skew the data, it could be a factor in the participants' overall positive experience.

Conclusion

The purpose of this research was to explore the faculty experience of adopting UDL into online course designs. Results point to the need to grow communication and training surrounding UDL such that other instructors can improve instructional designs to have more inclusive courses. Faculty interviews highlight several valuable development opportunities aligned with the UDL guidelines as well as barriers to implementation.

This research underscores the importance of educating faculty about UDL principles and the value of adopting UDL principles for online course design to increase teaching quality and, therefore, satisfaction for the instructor and all learners (Chen et al., 2018). Additionally, while UDL adoption will undoubtedly increase the accessibility of the content, it can also prevent the need for retrofitting course designs for learners with disabilities Rogers-Shaw et al. (2017). For institutions to create a sustained implementation of UDL, leadership would need to buy in and instill accountability measures.

Important needs still reside in the areas of knowledge generation and persuasion. By studying the experiences of individuals who implemented UDL, faculty can begin a

different narrative surrounding UDL toward promoting increased communication and proactive teaching enhancement. Expansion of strategic practices that promote UDL guidelines and contribute to the diffusion of innovation within the higher education context is needed. Future UDL training should prioritize specific UDL guidelines that align with quality teaching to minimize the marginal time and resource investment required of faculty.

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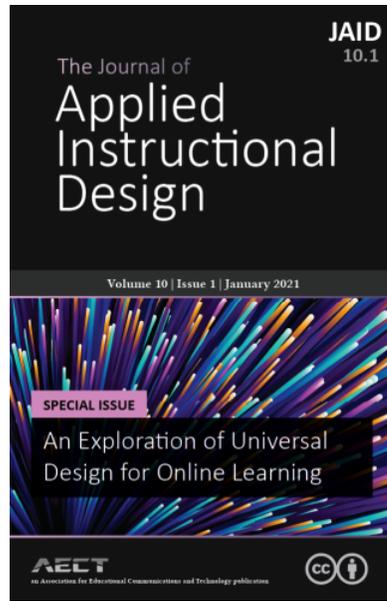
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Appendix

Interview Questions

1. How did you become familiar with the UDL principles and guidelines?
2. Please describe the context in which you teach?
3. Please describe your interest and use of Universal Design for Learning within that context.
4. What influenced you to decide to use any of the UDL guidelines?
5. What influenced you to decide NOT to use any of the UDL guidelines?
6. What do you think would influence you or other faculty in deciding to use the UDL guidelines?
7. Have you received feedback on the efforts you have made to implement UDL?
8. Do you have any implementation examples that you would be willing to share with the research team?
9. May we have access to your courses to collect implementation examples, or will you provide the research team with some?



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