The Effects of Professional Development on Universal Design for Instruction on Faculty Perception and Practice

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Abstract

The authors conducted professional development (PD) for university personnel, focused on Universal Design for Instruction (UDI), over three days during a summer institute. The UDI-focused PD provided 20 hours of training across six content areas: (a) UDI, (b) accessible distance education and assistive technology, (c) student and faculty rights and responsibilities, (d) disability culture, (e) hidden disabilities, and (f) multiculturalism and disability. During the semester following the PD, a qualitative follow-up study was conducted to investigate faculty's implementation of UDI principles and strategies. Four individual faculty cases were analyzed to investigate the ways in which faculty applied UDI principles and strategies. Then, the cases were compared to detect patterns, and identify themes that explain variation in faculty's UDI implementation (Patton, 2015; Stake, 2000, 2006). Three interrelated themes emerged as potential factors influencing faculty's level of UDI implementation: the extent to which faculty (a) conceptualize UDI as an ongoing endeavor (versus a finite, achievable state); (b) engage in self-reflection; and (c) internalize a social model of disability. Implications for practice are discussed.

Keywords: Universal design for instruction, UDI, faculty professional development, case studies, cross case analysis

The postsecondary student population is becoming more diverse, reflecting an increase in historically underrepresented students, including students with disabilities (SWD). For instance, approximately 11.1% of undergraduate students report a disability. Of these students reporting disabilities, 42% are from culturally and linguistically diverse backgrounds and 6.9% are veterans (National Center for Educational Statistics, 2013). Although rates of enrollment of SWD are on the rise, low postsecondary completion rates among SWD remains a serious concern. For instance, only 34% of SWD enrolled in four-year colleges completed their degrees within eight years of high school graduation, compared to 51% of their peers (Newman et al., 2011). Improving postsecondary retention and completion rates among underrepresented students has become a national priority. Ensuring underrepresented students' postsecondary success requires a transformation of postsecondary curricula, pedagogical practices, and institutional culture (Block, Loewen, & Kroeger, 2006; Pliner & Johnson, 2004). Thus, stakeholders are calling upon colleges and universities to provide innovative instruction that is both accessible and responsive to diverse learners, including SWD (Burgstahler, 2008; Ouellett, 2004). Universal Design for Instruction (UDI) is a framework with promise to help accomplish this aim, through the design of instructional environments that are responsive to a broad range of student strengths and abilities.

Literature Review

Universal Design Concept

The concept of Universal Design (UD) first emerged in architecture, in response to changes in federal legislation brought about by the barrier free and disability rights movements (Story, Mueller, & Mace, 1998). Coined by Ronald Mace, the concept holds that the design of physical environments, products, and communications should anticipate the needs

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of all potential users - regardless of age or ability - and seamlessly integrate accessibility into all aspects of design and planning (Center for Universal Design, 1997). By planning for human diversity in abilities for cognition, vision, hearing, speech, body function, and mobility, the designer maximizes usability for a broad spectrum of potential users (Story et al., 1998). Seven principles guide the UD of physical environments: (a) equitable use, (b) flexibility in use, (c) simple and intuitive use, (d) perceptible information, (e) tolerance for error, (f) low physical effort, and (g) size and space for approach and use (Center for Universal Design, 1997).

UD in Postsecondary Education

In postsecondary educational settings, the concept of UD also extends to student services, curriculum design, and pedagogical practice (Higbee, 2009). Since the late 1990's, educational researchers have elaborated frameworks for infusing the principles of UD into educational practice. Prominent frameworks include Universal Instructional Design ([UID]; Silver, Bourke, & Strehorn, 1998) , Universal Design for Learning ([UDL]; Rose & Meyer, 2000), and Universal Design for Instruction ([UDI]; Scott, McGuire, & Shaw, 2001). Although distinguished by different theoretical assumptions and therefore practices, these frameworks share a common intellectual history and shared goal of promoting accessible curricula and inclusive pedagogies (Orr & Hammig, 2009). While the authors recognize the strengths of each UD framework, the framework selected for use in the present study is Universal Design for Instruction (UDI). Based on prior collaborations with faculty, the researchers anticipated that faculty would feel motivated to utilize a UD model and UD resources specifically designed for a faculty audience. The UDI framework was developed and elaborated for use in higher education, and UDI developers actively maintain a UDI website designed for a faculty audience.

UDI offers a pedagogical framework through which faculty reflect on their instructional practice and proactively design and implement more inclusive curricula and pedagogies. A central premise of UDI is that the "planning and delivery of instruction, as well as the evaluation of student learning outcomes can incorporate inclusive attributes that anticipate diversity in learners without compromising academic standards" (McGuire, Scott, & Shaw, 2006, p. 169). Following a review of the literature on best practices for SWD and in postsecondary education, Scott, McGuire, and Shaw (2001) adapted the Center for Universal Design's UD principles to postsecondary instruction, and also added two principles. The nine principles of UDI include: (a) equitable use, (b) flexibility in use, (c) simple and intuitive, (d) perceptible information, (e) tolerance for error, (f) low physical effort, (g) size and space for approach and use, (h) a community of learners, and (i) instructional climate.

Need for UD-Focused Professional Development

The relevance of UD to postsecondary education has received considerable support over the past decade. For instance, in order to improve SWD's rates of postsecondary retention and completion, the 2008 Reauthorization of the Higher Education Opportunity Act (HEOA) calls for the development of innovative teaching methods, strategies, and curricula consistent with UD principles. However, in order to actualize the application of UD principles in postsecondary classrooms, faculty need professional development (PD). Cook, Rumrill, and Tankersley (2009) surveyed 307 university faculty regarding their instructional priorities and behaviors, and found that UDI practices are not widely implemented. Specifically, respondents identified knowledge of assistive technology, responsiveness to diverse learning styles and abilities, and the provision of course materials in varied formats, as areas of weakness among faculty. In addition, the National Center for Education Statistics (2011) surveyed 1,600 degree-granting postsecondary institutions and found that only 46% of institutions were providing regular faculty training on accessible instruction. In the survey, approximately 52% of respondents identified limited staff resources for faculty training as a barrier to implementing UD (Raue & Lewis, 2011).

Effects of UD-Focused PD on Instructional Practice

Roberts, Satlykgylyjova, and Park (2015) conducted a review of the peer-reviewed literature from 2000 through 2014 and identified 19 research articles focusing on the application of UD principles (e.g., UID, UDL, and UDI) in postsecondary instruction. The majority of studies examined students' perceptions of faculty practice. Results indicated a significant positive association between UD training for instructors and the application of UD principles in participating instructors' courses. Of the 19 studies, two investigated faculty's experiences with UDI implementation. Zhang (2005) examined the effects of

UD-focused PD for in-service teachers, pre-service teachers, and college faculty. Through a case study of participant feedback, he found that participants recognized the benefits of UDI and the need to adapt their teaching methods in ways that respond to student diversity. Moon, Utsching, Todd, and Bozzorg (2011) examined faculty experiences with UD implementation. Through a content analysis of faculty journal reflections, Moon et al. identified three broad categories of faculty participants in the UD-focused PD: enthusiasts, skeptics, and incremental adopters.

The present study extends this research on UD implementation through qualitative case studies of four faculty who participated in a UDI- focused PD. We conducted and analyzed four faculty cases to investigate the rich and dynamic nature of faculty learning as a result of implementing UDI principles and strategies during the semester following the PD. We also conducted a cross case analysis to examine and explain the variation in UDI implementation across faculty. The following research questions guided the qualitative inquiry:

1. In what ways did faculty apply UDI principles and strategies during the semester following the PD?
2. What patterns and themes might explain variation in UDI implementation across faculty?

Methods

Setting

The PD and case studies were conducted at a diverse four-year university in the Pacific. During that academic year, enrollment included approximately 20,000 students, of whom approximately 13,000 were undergraduates, 14,000 attended full time, and 2,800 were Pell grant recipients. By race, the majority of students were identified as Asian, followed by Caucasian and Pacific Islander. Approximately 4% of the student body received services from the campus Disability Services Office (DSO) (personal communication, DSO personnel, January 9, 2013).

UDI-Focused PD

The first authors conducted UDI-focused PD in the context of disability studies for three consecutive days during the summer on a university campus. Critical features of the UDI-focused PD included (a) an interdisciplinary curriculum and (b) opportunities for faculty to participate in collaborative learning.

Interdisciplinary curriculum. The PD provided 20 hours of training across six content areas: (a) UDI, (b) accessible distance education and assistive technology, (c) student and faculty rights and responsibilities, (d) disability culture, (e) hidden disabilities, and (f) multiculturalism and disability. These content areas are described in the Appendix. Out of the 20 PD hours, six and one-half hours covered content on UDI. Two and one-half hours were dedicated to faculty training on UDI, including the design of universally accessible distance education. Four additional hours integrated UDI and the design of universally accessible online courses with related content (e.g., characteristics of SWD and UDI access strategies).

Specifically, the UDI curriculum highlighted the guiding principles of UDI (Scott et al., 2001) and emphasized that UDI seeks to enhance student opportunities to successfully meet academic standards, without compromising the integrity of those standards. The curriculum presented the UDI framework and shared strategies that improve information access (e.g., converting print or PDF documents to electronic text) as well as pedagogical strategies consistent with each UDI principle (e.g., use of the pause procedure, frequent feedback, rubrics, and peer collaboration). To facilitate participants' future use of UDI, the curriculum included links to UDI resources as well as guided notes and graphic organizer templates that can be easily adapted for use in postsecondary classes. The UDI focal area concluded with a cautionary reminder that UDI does not replace or diminish SWD's legal entitlement to reasonable accommodations. Next, the design of universally accessible distance education courses was examined in light of laws relevant to online course offerings and U.S. Office of Civil Rights (OCR) guidance. Through vignettes illustrating the experiences of four SWD participating in online courses, the curriculum highlighted assistive technologies that provide high- and low-tech solutions enabling equitable online communications and access. The presenter also challenged participants to design distance education courses that fulfill the spirit of the OCR guidance.

Collaborative learning. Since faculty learning is socially and culturally mediated (Kelly, 2006; Vygotsky, 1978), the PD actively engaged faculty in learning new practices and included opportunities for peer collaboration (Borko, 2004; Desimone, 2011). The PD engaged faculty learning through faculty self-reflection, guided discussions, panel discussions (both support service provider and student panels), and collaborative work on culminating projects.

Sampling Procedure

Recruited through campus-wide advertisements, 16 faculty and staff participated in the PD during the summer. After the PD, all faculty participants were asked to participate in the follow up case study for one full semester, and seven faculty agreed. From the seven follow-up study participants, purposive sampling was used to select cases thought to bring about in-depth understanding about faculty implementation of UDI, both individually and through case comparison (Teddlie & Yu, 2007). Through purposive sampling, this study sought to (a) include cases that reflect diversity in faculty gender, ethnicity, academic discipline, and disability experience; (b) select cases that would be information-rich, and (3) select cases that would be sampled along a continuum of UDI implementation (Patton, 2015). Based on these considerations, four cases comprise this study.

Participant Characteristics

The four faculty participants consisted of two female and two male faculty; two social science, one science, and one health science faculty. Data from the faculty pre-survey indicate that one faculty was novice, and three faculty were experienced in instructing SWD. At registration for the PD, three participants reported that they did not currently apply the principles of UDI in the design of their courses, and one faculty reported that he did.

Data Collection Procedure

Data collection instruments were developed by the first two authors in collaboration with the PD instructors to ensure content validity. Pre- and post-surveys were administered to faculty immediately before and after participation in the PD. Faculty pre- and post- interviews were conducted at the beginning and end of the semester following the PD.

Instruments

Faculty PD pre- and post- surveys. The faculty pre-survey collected background data, including faculty's gender and discipline, previous experience applying principles of UD to course design, and previous experience instructing SWD. Both the pre- and post- surveys collected data on faculty's perceived comfort in instructing SWD, familiarity with accommodations, and professional skills in instructing SWD. Pre-PD to post-PD change on these indicators is reported in Table 1.

Faculty pre- and post- interview protocols. The pre-interview consisted of five open-ended questions on motivation to participate in the PD and this case study; perceptions of gains from the PD; plans for implementing what they learned at the PD, including UDI; and academic expectations toward students with and without disabilities. The post-interview consisted of 10 open-ended questions on achievement of plans to implement content learned at the PD, including UDI; resources and challenges in the use of the UDI; provision of accommodations; change in competence, skills, and attitudes in instructing SWD; and reflection. Each interview took about 50 minutes and was tape-recorded with the participant's permission. Each tape-recorded interview was fully transcribed for analysis.

Data Analysis Procedure

To investigate the rich and dynamic nature of faculty learning as a result of implementing UDI principles and strategies during the semester following the PD, we analyzed individual cases of the four faculty (research question 1). Findings from the individual case studies are presented in Result 1. Next, we conducted a cross case analysis to detect patterns and identify themes that explain variation in UDI implementation across faculty (research question 2) (Patton, 2015; Stake, 2000, 2006). Findings from the cross case analysis are presented in Result 2.

Result 1 from the Individual Case Studies

Kim

Background. Kim is an experienced full time social science faculty at the four-year university. At registration for the PD, Kim described herself as "very comfortable" in addressing the needs of SWD and diverse learners, and rated her familiarity with SWD's accommodations as "good." She "mostly agreed" that she holds professional skills needed to make her courses accessible to all students. Her motivation to participate in the PD included wanting to know more about prevalent disabilities, keep up to date on current issues, learn about campus resources for SWD, and gain knowledge and experiences that she can share with other faculty.

Following the PD, Kim described her familiarity with SWD's accommodations as excellent, she "mostly agreed" that she holds the professional skills needed to make her courses accessible to all students,

and she reported she was "very comfortable" in addressing the needs of SWD's and diverse learners. Kim expressed her intent to adopt 51% to 75% of the PD strategies into her instructional practice.

Plans to apply UDI. Kim reported that the UDI pedagogical strategies presented in the PD were ones she was already implementing in her classrooms: "What was good about the workshops is that it affirmed what I was doing was on the right track." Her description of her plans to apply UDI were exceptionally detailed and suggested a sophisticated understanding of UDI as a means to enhance access, and as a pedagogical practice.

Access strategies. Kim applied UDI principles to improve students' access to course materials and content. She reported posting electronic copies of handouts on the course website "in case students misplaced [them]" and uploaded a variety of class materials (i.e., video clips, photographs, images, poems, texts, audio files) to the course website, in order to facilitate equitable student access. In doing so, she applied UDI Principle 1, Equitable Use, in that course materials were readily available online, and students who required electronic copies of handouts were not singled out. She also applied UDI Principle 5, Tolerance for Error. Kim planned for individual differences in organizational skills, executive functioning, and pace of learning. For videos viewed during class time, Kim provided students with a written record of the title, call number, and campus library through which they may view the video again. In doing so, she applied UDI principle 3, Simple and Intuitive Use. Similarly, she reported eliminating complexity by conveying course goals, expectations, and objectives in the course syllabus.

Pedagogical strategies. The majority of UDI strategies reported by Kim were pedagogical in nature. She reported using different kinds of media (i.e., videos, photos, cartoon illustrations, poems, text) as a means to engage students in critical reflection and analysis of course content. Students analyzed these artifacts during lectures, discussions, and exams. For example, to prompt students to "think critically visually, as opposed to simply only in text" she asked students to analyze photographs and cartoon illustrations. She also utilized both audio and textual pathways to engage students' analysis of social phenomena. During class time, students analyzed music samples and poems read aloud. For example, she recounted that students listened to music clips while viewing the lyrics via the overhead projector: "I had them listen to it twice. One was to have them focus on how she's saying it . . . and also listen to how she sang it, as a way to help them analyze the text in light of the readings." She also provided opportunities for class discussion, as a means for "students to think better orally through dialogue and engagement." These examples demonstrate the application of UDI Principle 2, Flexibility in Use. By creating varied learning opportunities, she offered students opportunities to learn and demonstrate their understandings in ways aligned with their diverse strengths.

Kim also articulated UDI principles when describing her class participation requirement. To encourage student participation, she invited students to share their thinking in whole class, in small groups, and in student pairs. By promoting peer collaboration and sharing, she applied UDI principle 8, Community of Learners. In addition to spontaneous participation in class discussions, Kim allowed students to prepare reflections in advance, to share during class discussions. This class participation option anticipates individual differences in the ability to spontaneously formulate or express ideas aloud. "So they kind of need some time to kind of digest, so I give them this option…and this is also very good for foreign students." These practices demonstrate Tolerance for Error (principle 5) by planning for individual differences in students' rates of thinking and verbal expression.

Overall Kim's UDI practice is highly sophisticated, and demonstrates significant forethought. In describing her UDI practices, Kim explicitly verbalized the kinds of student thinking and learning she sought to elicit through her curriculum. In addition, her rationales for implementing UDI practices attended to ways in which UDI principles enhance student thinking and learning, and anticipate individual differences in learning, cognition, and executive functioning. Still, unanticipated access barriers did arise. For instance, during lab sections taught by teaching assistants, Kim was unsure of how to promote equitable participation opportunities without breaking confidentiality: "I wasn't really sure about how to go about having them write down their analysis along with the other students without singling them out…I could have asked the students with the learning disabilities to come to me and tell me orally, but then I would have not been able to maintain their confidentiality because…I would have had to tell the lab leaders what the student had said." She also described

an instance in which a SWD needed more time on an exam, but did not wish to take the exam in segregated setting. Wanting to maintain the student's confidentiality, Kim sought to find a solution. She announced to the few remaining test-takers that "students would get one point deduction for every minute they go over the exam time" then addressed the SWD's accommodation privately: "and when he came up I told him he didn't have the point deduction because of his disability."

Ron

Background. Ron is a health sciences faculty at the four-year university. He reported several experiences providing instruction to diverse learners, including SWD. At registration for the PD, he rated his familiarity with SWD's accommodation needs as "good." He "somewhat agreed" that he holds professional skills needed to make his courses accessible to all students, and described himself as "somewhat comfortable" in addressing the needs of SWD's and diverse learners. Ron's self-reported motivation to participate in the PD included interest in the PD content and in specific disability populations. He reported that he did not currently apply universal design principles to course design, but he did express a keen interest in, and commitment to the needs of individuals with disabilities.

Following the PD, Ron "mostly agreed" that he holds the professional skills needed to make his courses accessible to all students, and he continued to describe his familiarity with SWD's accommodation needs as "good." Ron expressed his intent to adopt 51% to 75% of the PD strategies in his classroom practice.

Plans to apply UDI. When asked about his plans to apply UDI in his classroom, Ron indicated his desire to share information about the university's disabilities studies certificate program with his graduate students, "making students aware of the program itself."

Access strategies. Ron reported applying UDI strategies to support students' access to curriculum materials. He reported creating and providing electronic copies of tables and charts displayed in class. In providing tables and charts in electronic format, he sought to apply UDI Principle 1, Equitable Use: all students may access materials, irrespective of hearing ability, note-taking ability, or ability to maintain sustained attention (Scott et al., 2003). Ron's rationale for using electronic format invoked UDI Principle 6, Low Physical Effort. He sought to minimize non-essential effort, allowing greater student focus on learning: "I send that to them electronically, because frequently…they spend a lot of time writing the whole thing down. And I would rather them get the conceptual aspects of the figure or the table."

Pedagogical strategies. Ron also views UDI as a pedagogical approach to promote universal access to curriculum and instruction. For Ron, creating an inclusive learning environment involves "a change in the way [instruction] is done." In his experience, adopting UDI did not require radical change: "it's just more along the lines of just modifying what I've been doing thus far." Ron highlighted the value of UDI as a pedagogical approach to improve student learning and intellectual engagement: "Students don't respond well to just lecturing…you got to involve them more …and adapting your teaching this way is definitely a method to do it." Towards this aim he reported including classroom activities and modules that prompt students to "take the learning and actually apply it with real information." He also reported frequent use of figures and images in his PowerPoint presentations, and strategically selecting images that "help describe or provide a better description of whatever concept we're discussing." In these examples, he consciously varied his instruction to promote diverse means of learning and experiencing knowledge – a practice consistent with UDI Principle 2, Flexibility in Use.

Although Ron reported applying a small number of UDI strategies, overall Ron perceives UDI as "something good" that he will continue to use. He also actively pursued growth in his UDI practice, by including UDI as a domain to evaluate his performance through end of semester course evaluations: "I specifically ask in the evaluations things related to how the material are presented, use of assistive technology." By actively seeking out an external means to evaluate his UDI performance, Ron demonstrates personal agency and motivation to achieve his goal of inclusive instructional practice.

Joseph

Background. Joseph is a fairly new science faculty at the four-year university. Prior to the PD, he attended a half-day workshop pertaining to SWD. Yet, he reported few experiences providing instruction to diverse learners, including SWD. At registration for the PD, Joseph rated his familiarity with SWD's accommodation needs as "good." He "mostly agreed" that he holds professional skills to make his courses

accessible to all students, and described himself as "very comfortable" in addressing the needs of SWD's and diverse learners. Joseph's self-reported motivation to participate in the PD included interest in learning new instructional methods to help students with learning or physical disabilities. Joseph reported that he currently applied universal design principles to course design.

Following the PD, Joseph "mostly agreed" that he holds the professional skills to make his courses accessible to all students, he rated his familiarity with SWD's accommodation needs as "good," and he reported he was "somewhat comfortable" in addressing the needs of SWD's and diverse learners. He expressed intent to adopt more than 75% of the PD strategies in his classroom practice.

Plans to apply UDI. In describing his plans to apply UDI during the semester, Joseph listed UDI strategies that promote student access to the curriculum. These strategies included providing a welcoming disability access statement in his course syllabus, providing advance electronic copies of handouts, and speaking audibly and clearly.

Access strategies. Joseph applied UDI principles to augment the accessibility of course content, using strategies he found "suitable for [his] class." He sought to create a Welcoming Climate (UDI Principle 9), through inclusion of a disability access statement in his course syllabus. He also applied UDI Principle 1, Equitable Use, to maximize student access to his course materials. For instance, Joseph expressed a conscious effort to speak loudly, slowly, and clearly: "I try to speak loud, to speak slow…repeat things many, many times…for this class I have a very small lecture hall…but if needed, I would use the microphone." He reported use of large fonts in his PowerPoint presentations, and email distribution of electronic handouts that summarize the content to be covered during class: "I send it in PDF format, and you can…you know make it much larger or smaller." His rationale for distributing advance, electronic course materials invoked the UDI principles of Low Physical Effort (Principle 6) and Tolerance for Error (Principle 5): "And that is not only for them to be able to pay more attention in class and write less, but also for people that might have problems taking their time to understand what is written…to get the concepts." Principle 6 seeks to minimize physical and cognitive effort so students can attend to instruction, while Principle 5 plans for individual differences in "student learning pace and prerequisite skills" (Scott et al., 2003).

Pedagogical strategies. Joseph applied several UDI pedagogical strategies during the semester, and informally surveyed students regarding their learning preferences. For instance, he reported use of, and student preference for, guided notes. Guided notes are handouts that guide students through a lecture by deleting key facts, concepts and relationships from a lecture outline. A UDI strategy presented during the PD, guided notes aim to reduce the physical and cognitive demands of note-taking. Joseph's rationale for using guided notes is aligned with UDI Principle 6, Low Physical Effort: "I had removed some words of important terms so they would write something, and that would keep their attention."

Joseph also reported embedding thought questions within his PowerPoint presentations in order to engaged students' thinking about course content. He combined these thought questions with a class response system (e.g., clickers) to assess student understanding. By incorporating these thought questions and classroom response system, Joseph created opportunities to identify and address student misconceptions and gaps in understanding. This practice is consistent with UDI Principle 5, Tolerance for Error, in that he planned for individual differences in learning pace and skill, and created opportunities for frequent formative feedback (Scott et al., 2003). Outside of class, Joseph offered online assignments that prompt students to apply their learning, and self-assess their understanding. For instance, his students could apply their learning through graded online assignments. He explained that these graded online assignments benefit students who have difficulty demonstrating content mastery through the closed book, timed tests, including SWD: "[T]o be able to do homework at home with the notes, with the books…then they have all the time in the world to do one assignment." Joseph's rationale for the online graded assignments is consistent with UDI Principles 2 (Flexibility in Use) and 5 (Tolerance for Error) in that graded online assignments offer variation in the methods of student assessment, and anticipate variation in student learning pace. At the end of each unit, Joseph also offered optional, ungraded online practice questions "just for refreshing the material." Such practice questions create opportunities for student self-assessment. He reported that his students appreciate these opportunities for practice and that students inquired "what else can I do to learn more and to fix more of the material in my head."

Overall, Joseph conceptualizes UDI as an approach which does not require extensive changes to curriculum and instruction: "[Y]ou know, it's a slight modification of what you usually do, right?" He also views UDI as a design approach which ultimately benefits all students: "So [UDI] is things that you can think of, designed only for people with learning disabilities or physical disabilities, but at the end, help everybody pretty much." Joseph reported that he did not encounter challenges when implementing UDI in his undergraduate classes, and expressed satisfaction with his level of implementation: "I have a pretty good idea of pretty much everything…and there's nothing that I would've done and I didn't, because I didn't know how to do it." He also vocalized willingness to respond to student needs, "I'm very open to anything that a student might need." For instance, during the pre-interview he expressed commitment to equitable access for students with vision- or hearing-related accommodation needs: "If you want me to use the microphone I will use it. If you want me to, um I don't know, make my font type larger I will do it." However, it does seem that for Joseph, student responsiveness has limits. For instance, during post-interview he reported that a large number of students fared poorly on the first two exams, and that such students requested additional graded assignments so they could "pick up" their grades. Joseph expressed unwillingness to provide this concession, emphasizing the importance of self-regulation: "And I would say, 'I'm not going to do that, you are adults and you should study for yourself.' So I think a big problem is that the students, at least at this level, you know, they are not used to being responsible of their own efforts." Joseph's strong sentiment is aligned with UDI principle 9 (Instructional Climate), in that he holds high academic expectations for all students. However, UDI also seeks optimize all students' abilities to meet high academic standards through the application of UDI principles and inclusive instructional practices.

Anita

Background. Anita is an experienced full time faculty at the four-year university in a social science discipline. At registration for the PD, she described herself as "somewhat comfortable" in addressing the needs of SWD's and diverse learners, and rated her familiarity with SWD's accommodation needs as "good." She "mostly agreed" that she holds professional skills to make her courses accessible to all students. Her motivation to participate in the PD was to obtain the latest information on SWD in higher education.

Following the PD, Anita described her familiarity with SWD's accommodation needs as excellent, she "definitely" agreed that she holds the professional skills to make her courses accessible to all students, and she reported she was "somewhat comfortable" in addressing the needs of SWD's and diverse learners. Anita expressed her intent to adopt more than 75% of the PD strategies into her instructional practice.

Plans to apply UDI. Anita reported that the PD offered her a first experience with UDI: "I've been to lots of workshops about better teaching, but I have not heard [of] universal design…So that concept was very interesting to me…it was brand new." She also shared that the concept of UDI is aligned with her beliefs about quality teaching: "I do believe that I should teach all students, as if, well as individuals. So, whether or not identified as diverse or disabled, I believe [I] should teach better." Anita viewed participation in the follow up study as an opportunity to extend her learning: "[T]here's so much in this notebook, and in the institute. I want a chance to try to apply what I've learned and to participate, and if I participated in the study that would give me a little more push to, you know, be aware and apply." Anita's plans to apply UDI included specific access and pedagogical strategies covered in the PD.

Access strategies. During the semester following the PD, Anita reported applying UDI strategies to support students' access to curriculum materials and course content. She reported that, as a result of the PD, she became more aware of access issues affecting students with visual, auditory, or learning differences: "I've become more aware of large print, and the necessity for reading what's already shown." Using large print and reading lecture slides aloud are access strategies, covered during the PD, that apply the UDI principles of Equitable Use (Principle 1) and Perceptible Information (Principle 4). She reported that prior to the PD, she had not considered reading her lecture slides aloud: "I used to think that, um, if I showed it to you, you could read it and why should I repeat…I thought it was sort of redundant." Yet, use of UDI access strategies became more salient as a result of student feedback during the follow up semester. For instance, one student asked, "would you please read what's up there? Because I can't see what's up there." Anita reported thinking "oh yes, I learned that" following this student's request. She also reported great-

er interest and attention to student needs: "I'm trying to listen more carefully when students make requests …trying to be more careful about what I'm hearing from the students in terms of instructional materials." For instance, Anita also reported noticing that one student had glossed through requirements for a course assignment, thereby losing points. Rather than viewing this oversight as a student shortcoming, she interpreted this student's experience through the lens of UDI. In response, she began announcing course deadlines and assignments "in more than one way and more than one place." Presenting information about course requirements in more than one location (e.g., in class announcements, on the course website) is an application of UDI Principle 3, Simple and Intuitive Use. Simple and Intuitive communication of course requirements take into account individual differences in experience, language skills, attention, and executive functioning (UDI Online Project, 2009). Overall, Anita reported greater awareness of access issues and strategies during the semester following the PD: "I'm just being more aware of, you know, the size of the information, the organization of the information, reading it out loud and reading it audibly, not turning to the blackboard when I'm reading." However, not all of Anita's UDI plans were actualized. For instance, although she wanted to locate open source videos that included closed captioning, her search efforts were met with limited success. She was though, pleased to locate a textbook for purchase that includes closed captioning of online video content.

Pedagogical strategies. Anita shared that in her teaching experience, identified students with disabilities rarely make requests for accommodations. Anita reported the goal of creating a welcoming climate for diverse learners (UDI Principle 9). Towards this aim, she reported being "more active in notifying all students that they could inquire and ask and get services." In addition, Anita sought to create a more welcoming and inclusive climate by disclosing her own accommodation needs: "I disclosed to my students that I have a hearing issue and a sight issue. And I've never done that before. But I got a lot of encouragement from the workshop…that [it] might be helpful."

Anita also reported creating graphic organizers, by following a template presented in the PD: "I used the graphic organizer three times. That was one of the recommended ways to make material more available." Anita's rationale for using graphic organizers invoked UDI Principle 2, Flexibility in Use: "[T]he idea of trying to illustrate what needed to be done in more than one way was quite, was fascinating to me." UDI Principle 2 holds that flexibility and choice in methods of use is a way to anticipate and respond to diversity in students' abilities. Anita also planned for diverse learners by making course content available using multimedia (e.g., videos). She anticipated that students would be self-directed, and make use of those resources best aligned with their learning preferences: "So I try to vary it up, but I expect the students to take charge and use the variety of ways." She also applied UDI Principle 2 by varying the means by which students synthesize knowledge and demonstrate understanding: "One assignment is a real technical ten-page paper, another one is a very creative one-page vignette of a person, written in poetry or prose… in any language." In doing so, Anita's students are able to capitalize on their strengths (e.g., expository or narrative writing), while gaining practice in both genres. Anita also provided choice in how classroom assessments would be weighted: "They can take the quizzes and no midterm, the quizzes and no final or they can take both and get the better of the two grades. So I built in choices, so I think the student has more control." Providing student choice in how classroom assessments will be weighted is an application of UDI Principle 5, Tolerance for Error. Tolerance for Error involves planning for individual differences in experience, academic preparation, and pace of learning (UDI Online, 2009). Flexibly weighting students' classroom assessments appears aligned with Anita's own beliefs about student assessment: "I don't consider the quizzes as life and death…cause I just think that [a quiz] is not a great way to learn, but it is a good way to insist on reviewing the materials." She also demonstrated Tolerance for Error (UDI Principle 5) by including optional service learning opportunities as a means to earn extra credit: "I offered extra credit to three sections of one class to work with [the] Center on Disability Studies, and one student actually did." Anita's motivation was not limited to the goal of creating multiple pathways to student success. Her stated rationale was to promote the concept of inclusion: "everybody should…try to be aware of being more open and inclusive."

Although Anita demonstrated a high level of UDI implementation, she nonetheless described her professional skills to facilitate curriculum access as an area of potential growth: "In terms of instructional materials, I am a little bit more aware of the appro-

priateness of the materials, but I've got a long way to go." She appears to conceptualize universal design as a dynamic, ongoing process, rather than a static state of UDI achievement. Overall, Anita conceptualized UDI principles and strategies as a means to advance her current level of professional skills: "[I]n general, what I'm doing is extending my teaching methods based on what I learned." She also evidenced critical reflection on the relative success of her efforts to adopt UDI strategies during the semester following the PD. Regarding the extent to which she achieved her plans to apply UDI, she replied, "How well did I achieve my plan? I'd say, okay…only, cause I'd like to do better." She views the integration of UDI principles and strategies as an ongoing endeavor that cannot be achieved in a single semester: "you know there's always room for improvement… I think that universal design is still pretty much a mystery to me." Still she envisioned an upper limit on the amount of effort she is willing to dedicate to Universal Design: "[I]f I'm going to pursue the universal design and stay curious about it…it will have at least a two year history with me. After that I would have to have a reason to continue."

Result 2: Cross Case Analysis

Differences in Levels of UDI Implementation

Taken together, the four faculty applied eight of the nine UDI principles during the semester following the UDI-focused PD. Based on faculty self-report, the most commonly applied UDI principles included Flexibility in Use, Simple and Intuitive Use, and Tolerance for Error (i.e., Principles 2, 3, and 5). Less frequently applied were Equitable Use, Perceptible Information, Low Physical Effort, Community of Learners, and Welcoming Climate (i.e., Principles 1, 4, 6, 8, and 9). Of the four faculty, none reported applying UDI principle 7, Size and Space for Approach and Use. The degree of UDI implementation differs across the four faculty. Each of the faculty reported adopting UDI strategies presented during the PD (e.g., use of the pause procedure, guided notes, and electronic handouts). However, please note the study did not objectively examine whether these access strategies effectively increased equitable access (e.g., we did not verify whether faculty's electronic handouts were compatible with screen readers). Each faculty also reported applying UDI principles in at least one novel way. For instance, Anita assigned both expository and creative writing compositions to capitalize on student strengths (UDI principle 2, Flexibility in Use). However, Kim's approach to UDI implementation stands out as qualitatively different from the other three faculty cases, in that her UDI practice was exceptionally innovative and well-integrated. Kim applied UDI principles across the domains of curriculum, instruction, and student assessment, and she layered multiple UDI strategies within a single classroom activity. For instance, Kim presented music lyrics and poems both visually and aurally, utilized these artistic media as a vehicle through which students engaged with concepts presented in the course readings, and asked students to discuss the media orally. Thus, it can be said that faculty's level of implementation ranged from adopting UDI strategies presented during the PD, to innovating instruction based upon UDI principles.

Reasons for Different Levels of UDI Implementation

Through cross-case analysis, three interrelated themes emerged as potential factors, which may explain qualitative differences in faculty's level of UDI implementation. These themes include: (a) UDI conceptualization, (b) faculty self-reflection, and (c) internalization of a social model of disability.

UDI conceptualization. UDI principles provide a lens through which faculty design or redesign their instruction. Mcguire, Scott, and Shaw (2006) describe UDI as "a framework to guide faculty in reflective practice, rather than as a rigid procedure or prescription for instruction" (p. 169). Thus, UDI can be understood as a framework that guides ongoing curriculum development and improvement. Findings from the cross case analysis suggest differences in the extent to which faculty conceptualize the UDI as an ongoing endeavor. For instance, Joseph expressed satisfaction with his level of UDI implementation and seems to conceptualize UDI as a finite, achievable state: "I have a pretty good idea of pretty much everything…there's nothing that I would've done and I didn't, because I didn't know how to do it." In contrast, Anita viewed the integration of UDI principles and strategies as an ongoing endeavor: "you know there's always room for improvement", while Ron included UDI as a domain to evaluate his performance in end of semester course evaluations, suggesting pursuit of growth in his UDI practice.

Faculty self-reflection. Within the UDI framework, reflective practice is a vehicle through which

instructional improvement is actualized. Faculty reflection was evidenced by each of the four faculty to some degree. For instance, during the post interview Anita reported a goal of "listen[ing] more carefully when students make requests." Although faculty evidenced self-reflection, their reflections did not always lead to faculty to identify opportunities to apply UDI. At times, their reflections revealed missed opportunities to apply UDI principles. For instance, Kim reflected on how well she was able to differentiate an in-class writing assessment without breaching confidentiality. Kim reported: "I wasn't really sure about how to go about having them write down their analysis along with the other students without singling them out." Although Kim considered different options to facilitate equitable participation, she did not apply a UDI strategy in this case. One UDI approach may have been to provide all students an opportunity to revise their drafts as a take home assignment. Kim also described an instance in which a SWD needed more time, yet did not wish to take an exam in segregated setting. To maintain the student's confidentiality, Kim announced that "students would get one point deduction for every minute they go over the exam time." Then, she addressed the SWD's accommodation privately: "and when he came up I told him he didn't have the point deduction because of his disability." An alternative approach to maintain student confidentiality may have been to privately inform the student in advance (i.e., explain that SWDs would not be penalized for extended time) or to apply UDI Principle 5 (Tolerance for Error) by removing the extended time penalty for all students.

Joseph also reflected on his instructional decision-making, without identifying a missed opportunity to apply UDI principles. He reported that many of his students fared poorly on the first two exams, and that these students requested additional graded assignments so they could "pick up" their grades. Although he seemed to acknowledge that students might exit high school ill-prepared for the demands of college, Joseph expressed unwillingness to provide the additional graded assignments. One may view this scenario as a missed opportunity to apply UDI principles 2 (Flexibility in Use) and 5 (Tolerance for Error). Applications of these UDI principles could include assigning less "weight" to the first exam, providing students an opportunity to retake a parallel form of the exam (then average the two exam scores), and/or providing additional or optional assignments that measure mastery of the same course content, using different means.

Internalization of a social model of disability. Implicit within the UDI framework is a social model of disability, which holds that disability is a social construct arising as a result of disabling environments (i.e., environments that are not fully usable by, or inclusive of all potential users) (Block et al., 2006). Thus, educational environments can be disabling for students with documented disabilities as well as for diverse learners without documented disabilities. A social model of disability is different from a medical model of disability. Individuals who internalize a medical model of disability typically identify the individual as the source of the disabling condition (rather than the existence of a disabling environment). In contrast, individuals who internalize a social model of disability perceive a social responsibility on the part of those "with power to affect change in that environment, and not the person with a disability" (Block et al., 2006, p. 117). Therefore, the extent to which faculty internalize a social model of disability may be a factor influencing UDI implementation.

In discussing their UDI practice, all four faculty respondents occasionally used language characteristic of medical model thinking (e.g., helping SWD, abilities, SWD's needs). However, results from the cross case analysis also suggest differences in the extent to which the four faculty internalized a social model of disability. For instance, Kim anticipated that some students take more time to formulate their ideas. Rather than view this as an individual shortcoming, Kim included a class participation option anticipating individual differences in the ability to spontaneously formulate or express ideas aloud. She allowed students the option of preparing reflections in advance, and then sharing these reflections during in-class discussions: "So they kind of need some time to kind of digest, so I give them this option." Similarly, Anita's responses in post-interview suggest internalization of a social model of disability. For instance, when she observed that one student had glossed through requirements for a course assignment leading to lost points, she did not fault the student for haste or carelessness. Rather, she sought to change the classroom environment to make sure course requirements were conveyed in a simple and intuitive manner: she began announcing course deadlines and assignments "in more than one way and more than one place." In contrast, Joseph elected not to apply UDI principles, after

observing that a large number of students performed poorly on the first two exams. Although Joseph recognized that some first year students are ill-prepared for the demands of college ("[students] are not used to be responsible of their own efforts"), he was unwilling to grant students' requests for additional assignments so they could "pick up" their grades. He reported: "And I would say, I'm not going to do that, you are adults and you should study for yourself." In Joseph's view, the locus of the problem was found within the student; he did not perceive a social responsibility to plan for individual differences in study skills or college readiness.

Summary

The purpose of the follow up study was to investigate the ways in which faculty applied UDI principles and strategies during the semester following the PD (i.e., individual case studies), and to detect patterns, then identify themes that might explain variation in UDI implementation across faculty (i.e., cross case analysis). The individual case studies showed the rich and dynamic nature of faculty learning as they applied UDI principles during the fall semester. The cross case analysis found qualitative differences in UDI implementation. Faculty's level of implementation ranged from adopting UDI strategies presented during the PD, to innovating instruction based upon UDI principles. Three interrelated themes emerged as potential factors influencing faculty's level of UDI implementation. These themes include the extent to which faculty: (a) conceptualize UDI as an ongoing endeavor (versus a finite, achievable state), (b) engage in self-reflection, and (c) internalize a social model of disability.

Implications

Although it should be noted that the themes cannot explain all variation in faculty UDI implementation, findings from the individual case studies, and emergent themes from the cross case analysis reveal important implications for research and practice. First, UDI can be understood as a framework that guides ongoing curriculum development and improvement. Findings from the present study revealed differences in the extent to which the faculty conceptualize UDI as an ongoing endeavor (versus a finite, achievable state). When planning future UDI focused PD, the concept of ongoing instructional improvement is important to emphasize. One approach that may support faculty progress toward comprehensive instructional innovation is to identify short and long term UDI goals, with support from a PD facilitator or mentor. Faculty goals for ongoing instructional improvement can focus on inclusive pedagogical practices (e.g., including alternative assessment options) or can be grounded in concrete access strategies (e.g., learning how to use filters to find closed-captioned videos in libraries or on YouTube).

In addition, within the UDI framework, reflective practice is understood as a primary vehicle through which instructional improvement is actualized. Findings from the present study support this view. Faculty reflection on UDI practice and students' experiences was evidenced by each of the four faculty to some, albeit varying, degree. Nonetheless, faculty reflection revealed missed opportunities to apply UDI principles. Thus, faculty may benefit from a UDI-focused PD that is dynamic, ongoing, and embedded within their day to day professional experiences and social interactions (Desimone, 2009). To promote faculty reflection, ongoing PD activities might include mentoring, coaching, lesson study, peer observations, and virtual coaching (Croft, Coggshall, Dolan, & Powers, 2010).

Findings from the present study also suggest that internalization of the social model of disability may be a factor influencing UDI implementation. This finding is consistent with theory (see Block et al., 2006). Investigating whether internalization of the social model of disability is related to the quality of UDI implementation may be an important area for a further study. For instance, internalization of the social model of disability may be a construct of interest within surveys that assess faculty attitudes towards, or willingness to apply UDI. In addition, although participating faculty gained exposure to the social and medical models of disability during the multiculturalism and disability module of the UDI focused PD, more explicit connections between the social model of disability and UDI implementation may be warranted. During the faculty interviews, all four faculty respondents occasionally used language characteristic of medical model thinking (e.g., helping SWD, abilities, SWD's needs). However, this finding may reflect the presence of these terms in the wording of our faculty survey instrument, the UDI principles themselves, and the UD literature. Greater attention to perpetuating a counter-narrative to the

"needs" and "abilities" discourse may be an important feature of future UDI-focused PD. For instance, a future UDI-focused PD might ask faculty to analyze vignettes that illuminate the relationships among language, medical model versus social model thinking, and instructional decision-making. Faculty pre- and post-survey items can also be designed to reflect this discursive focus, by focusing on inclusive instruction, knowledge of access barriers faced by SWD, and gaining professional skills for removing barriers to full participation.

Limitations

Of the 16 faculty who participated in the PD, seven volunteered to participate in both the PD and the follow-up study. Of these seven faculty participants, four cases were purposefully selected for information richness. The cases were qualitatively analyzed to generate in-depth understandings of phenomena. However, findings from this small sample of faculty are not empirically generalizable to the general postsecondary faculty population (Patton, 2015); the general university population may include faculty who are less motivated to learn about UDI, accessibility, and disability issues. In addition, the faculty participants in the follow-up study were aware that they would be interviewed at the end of the semester. The act of participating in the follow-up study may have increased faculty motivation to apply UDI, and therefore influenced instructional behavior. Thus, findings from the present study are not be generalizable to faculty who are not actively engaged in performance evaluation or progress monitoring activities. In addition, it is important to note that the faculty pre- and post-surveys used in this study mirrored the "individual needs" language found in the UDI and UDL literature at the time the study was conducted. The use of this language in faculty pre- and post- survey may have normalized faculty use of the terms "needs" and "abilities" during faculty interviews. For future research, the authors will revise our faculty survey questions in order to focus attention on the presence of learning and access "barriers", rather than the presence of students learning and access "needs."

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Table 1

Characteristics of the Case Study Participants

Participant	Gender	Discipline	Knowledge of UDI Before the PD	Experience in Meeting SWD's Needs Before the PD	Change in Comfort in Meeting SWD's Needs After the PD	Change in Familiarity with Accommodations After the PD	Change in Professional Skills in Instructing SWD After the PD
Kim	F	Social Science	N	Few	+	-	0
					Very Comfortable	Excellent	Mostly Agree
Ron	M	Health Science	N	Many	-	0	+
					-	Good	Mostly Agree
Joseph	M	Natural Science	Y	Few	-	0	0
					Somewhat Comfortable	Good	Mostly Agree
Anita	F	Social Science	N	Many	0	+	+
					Somewhat Comfortable	Excellent	Definitely Agree

Note. The criteria used to categorize the faculty by their previous experience with SWD are (1) the number of SWD one has worked with and (2) the number of accommodations one has provided to SWD. Change in comfort, familiarity with accommodations, and professional skills were assessed by comparing participants' pre-post survey responses, in which participants self-rated their levels using a four-point scale. "+" indicates increase after the PD; "0," no change after the PD; and "-," decrease after the PD. Faculty post-PD levels of comfort, familiarity, and professional skills are reported.

Appendix

Description of PD Content Areas

(a) Universal Design for Instruction. The UDI curriculum highlighted the guiding principles of UDI (Scott, McGuire, & Shaw, 2001) and shared UDI strategies. To facilitate participants' future use of UDI, the curriculum included links to UDI resources and examples of graphic organizers and guided notes that can be easily adapted for novel contexts. The UDI focal area concluded with a cautionary reminder that UDI does not replace or diminish SWD's legal entitlement to reasonable accommodations.

(b) Accessible Distance Education and Assistive Technology. This module introduced case studies of four students with disabilities participating in online courses. Through an exploration of these case studies, the module highlighted laws specific to online course offerings and explored high- and low- tech solutions enabling equitable online communications and access. At the close of the presentation, participants discussed the relevance of accessible distance education in their own educational practice.

(c) Student and Faculty Rights and Responsibilities. This module reviewed disability rights laws relevant to higher education and situated the provision of reasonable accommodations within federal mandates for equal opportunities for SWD participation in higher education.

(d) Disability Culture. This module utilized poetry and powerful vignettes to engage participants' reflection on individuals with disabilities' shared history of oppression and resilience. The curriculum honored the experience of disability as a part of individuals' identities and provided an alternative model through which participants might understand student and faculty rights and responsibilities in higher education.

(e) Hidden Disabilities. Participants gained insight into the nature, prevalence, and manifestations of the most common hidden disabilities among adolescent and adult populations (i.e., LD, ADHD, psychiatric disorders). The curriculum directly addressed myths and prejudicial attitudes towards highly stigmatized hidden disabilities (e.g. psychiatric and learning) and prompted participants to consider how prejudicial attitudes effectively undermine the Americans with Disabilities Act. Participants explored educational barriers affecting students with hidden disabilities in tandem with practical solutions and recommended educational supports.

(f) Multiculturalism and Disability. This module began by locating disability within the framework of diversity. The presenter introduced the social model of disability and offered participants an opportunity to reflect on the physical and attitudinal barriers to full participation in higher education.