Embracing Diversity and Accessibility: A Mixed Methods Study of the Impact of an Online Disability Awareness Program

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Abstract

Despite the critical role that faculty play in the success of students with disabilities in higher education, professional development for promoting the understanding of these students' needs and the employment of inclusive instructional strategies to enhance their success has been limited. To better assess the potential of the online environment as a context for professional development, this mixed methods study investigated the impact of an online disability awareness program designed to introduce college faculty to Universal Design for Instruction (UDI) principles. The study followed a sequential design consisting of two phases. In the first phase, 43 faculty members completed pre- and post-program surveys measuring attitudes toward and knowledge of students with disabilities. In the second phase, we conducted a thematic analysis of interviews with 10 faculty participants who completed the program one semester earlier. The quantitative and qualitative phases resulted in three convergent findings: participating in online professional development led to increased faculty knowledge, improved faculty attitudes, and the emergence of faculty confidence in applying UDI principles for better accessibility of course materials and content presentation. The results indicate that professional development programs in an online context are a promising means for providing faculty the support they need to enhance their teaching practices and promote inclusive learning environments.

Keywords:Higher education, online faculty professional development, students with disabilities, Universal Design for Instruction (UDI)

People with disabilities represent a major and growing segment of the general population (Brault, 2012). Postsecondary institutions have experienced a dramatic escalation in the admission of students with disabilities from 2.3% in 1978 to the most recent estimate of 11.3% of undergraduates reporting some type of disability (National Center for Education Statistics, 1999, 2008). About one third of young people with disabilities have taken at least some postsecondary classes within the first two years after they leave high school (Wagner, Newman, Cameto, Garza, & Levine, 2005). Alarmingly, these students still have a low rate of college persistence and completion; only 6% of Americans with disabilities ages 21 to 64 have earned a bachelor's degree (National Council on Disability, 2008). Postsecondary education provides a critical pathway for Americans to achieve upward mobility, and for individuals with disabilities a college education provides the means to achieve economic self-sufficiency and independence (Stodden & Dowrick, 2000).

With these facts in mind, members of the academic community must look for ways to reduce barriers to college success for this at-risk group. Although there are legal mandates for providing accommodations in higher education for students with disabilities (e.g., American Disabilities Act, Section 504 of the Rehabilitation Act), there is no universal policy regarding inclusion that all postsecondary institutions must enforce (Scott, McGuire, & Shaw, 2003). Explanations regarding the cause of the low retention and graduation rates for students with disabilities have often cited student deficiencies such as lack of self-determination as the main contributing factors; however, institutions must also consider the extent to which an unsupportive campus climate and poor instruction play a role (Katsiyannis, Zhang, Landmark, & Reber, 2009).

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Higher education can better enable faculty to effectively teach diverse students and provide an inclusive learning environment; however, this is especially challenging when faculty in higher education are rarely trained in pedagogy and are not required to receive professional development on instructional strategies for working with students with disabilities or other at-risk populations (Scott et al., 2003). Yet, a lack of understanding and cooperation from faculty has been identified as one of the most common institutional barriers encountered by students with disabilities in higher education (Barnard, Stevens, Siwatu, & Lan, 2008). Although faculty interactions play a pivotal role in the success of students with disabilities, many instructors lack an understanding of the needs of students with disabilities and of inclusive instructional strategies to enhance their success (Burgstahler & Moore, 2009; Vasek, 2005).

The purpose of the current study is to examine the effectiveness of an online disability awareness program for college faculty. This study examines how faculty knowledge and attitudes toward students with disabilities changed as a result of the program, and how faculty participants intended to apply their program learning to their teaching and interactions with students. To create a more welcoming and productive learning environment for all students, especially those with disabilities, professional development activities for faculty may be critical, yet there is limited research investigating this (Getzel & Finn, 2005). Such research can help to guide institutions in the creation and enhancement of faculty development programs with the goal to ultimately improve the success rates of at-risk student populations, such as those with disabilities.

Faculty Attitudes toward and Knowledge of Students with Disabilities

One of the major impediments to students with disabilities' success in higher education is faculty attitudes towards these students (Rao, 2004). Students with disabilities specifically identify negative encounters and lower academic expectations from college faculty as obstacles to their successful inclusion and involvement in higher education (Hong, 2015). Ginsberg and Schulte (2008) specifically identified a link between the type of attitude faculty had about disabilities and their respective instructional methods. Instructors who viewed a disability from a social constructivist point of view reported using more inclusive teaching practices than those who viewed students with disabilities as defective learners. A social constructivist viewpoint acknowledges that students with disabilities experience challenges that change with alterations in tasks, environments, and instructional methods and accepts that such students' needs are within the continuum of needs shared by all learners. Other research has also indicated that attitudes toward disability play an important role in faculty willingness to provide accommodations (Bourke, Strehorn, & Silver, 2000).

Lack of knowledge about disabilities or of inclusive teaching strategies may unduly influence faculty perceptions and result in stereotyping or fear of lowering academic quality standards. In particular, faculty have been found to have more negative attitudes toward psychiatric and attention disabilities than physical disabilities, which may be the result of less understanding of these specific disabilities (Hindes & Mather, 2007). Interestingly, Barnard et al. (2008) indicated that more positive diversity attitudes of faculty were associated with less positive attitudes toward persons with disabilities. Their findings suggest that faculty may not consider college students with disabilities a type of diversity, and, therefore, providing professional development which helps faculty to add disabilities into their concepts of diversity is important to encourage more inclusive attitudes.

Clearly, knowledge of disabilities is a critical factor to consider because students with disabilities may face negative attitudes and resistance to classroom accommodations from faculty who know little about disabilities (Zhang et al., 2010). Investigation of faculty knowledge has focused mostly on knowledge of legal requirements pertaining to students with disabilities in higher education, and some studies suggest that faculty in higher education have limited knowledge of disability laws (Vasek, 2005; Vogel, Holt, Sligar, & Leake, 2008). Studies examining the areas needed for professional development at higher education institutions have routinely indicated that faculty and staff need more opportunities to gain knowledge about disability and the best ways to create a more inclusive institutional environment. Indeed, lack of knowledge was the category most frequently cited as a problem in focus groups with student service personnel and students (Burgstahler & Moore, 2009). Similarly, research has found that faculty give high ratings to the importance of program content aimed at increasing knowledge of the needs of students with

disabilities and education on disability law and accommodations (Debrand & Salzberg, 2005), as well as topics on universal design instructional techniques (Cook, Hennessey, Cook, & Rumrill, 2007; Cook, Rumrill, & Tankersley, 2009). In sum, consensus indicates that programs designed to improve attitudes towards students with disabilities should increase knowledge of laws, student needs, and resources available, and should give practical ideas and applications for accommodative teaching strategies, such as universal design.

Universal Design for Instruction (UDI)

National research data identifies that approximately three out of four students with disabilities do not disclose their disabilities to their college's disability support office and consequently receive no support services or classroom accommodations (Newman et al., 2011). This means that instructors are probably unaware of the many students in their classes who struggle with learning issues. Valuing students' differences by using an inclusive teaching approach honors equity and fairness so that all students will benefit from an optimal learning environment, whether or not they have self-disclosed a disability. One paradigm for higher education instruction that offers a *proactive* approach to designing an inclusive classroom environment that accommodates the diversity of student learners without compromising academic standards and expectations is Universal Design for Instruction (UDI) (Scott & McGuire, 2005; Scott et al., 2003). The traditional approach to meet the needs of students with disabilities in higher education has centered on meeting the legal mandates for nondiscrimination and typically relies on retrofitting classroom instruction and assessment after students have provided documentation of their disability. Although this common approach eventually permits equitable access and ensures legal mandates of reasonable accommodations are met, these *after-the-fact* changes may conflict with instructors' normal pedagogy, creating frustration and concern over lowering of academic standards and providing unfair advantages to some students over others.

UDI traces its historical roots to the 1970s and 1980s when the concept of universal design appeared in the design of buildings and products that focused on making them usable by all people to the greatest extent possible (McGuire & Scott, 2006). UDI is an adaptation of the broader universal design principles originally used in architecture. UDI is defined as:

> an approach to instruction that anticipates diversity in learners as the norm and operates on the premise that the planning and delivery of instruction as well as the evaluation of learning can incorporate attributes that embrace heterogeneity of learners without compromising academic standards. (p. 22)

A variety of terms have been used in the literature to describe universal design principles including Universal Instructional Design (UID), Universal Design for Learning (UDL), and Universal Design for Instruction (UDI). For the purpose of clarity, the term UDI is used in this article to represent the main concepts from all three terms (UID, UDL, UDI).

UDI provides one of the most promising areas for professional faculty development because it promotes inclusive teaching practices by designing flexible learning materials and activities that recognize the differing skills of diverse learners (McGuire & Scott, 2006; Scott & McGuire, 2005; Scott et al., 2003). Incorporating UDI training into disability-focused professional development allows higher education not only to meet legal mandates for providing equal educational access for students with disabilities, but also to improve the learning environment for the growing number of diverse learners in higher education.

Faculty Professional Development

In a review of promising practices for improving the quality of higher education for students with disabilities, Izzo, Hertzfeld, Simmons-Reed, and Aaron (2001) noted the importance of providing on-site professional development for faculty, administrators, and staff to raise awareness of students with disabilities' needs and to increase the use of appropriate teaching strategies that benefit the success of all students, including those with and without disabilities. Several studies in the last decade have found that in-person, disability-awareness professional development sessions improve college professionals' attitudes, knowledge, and inclusiveness of students with disabilities (Cook et al., 2006; Murray, Lombardi, Wren, & Keys, 2009a; Murray Wren, Stevens, & Keys, 2009b; Rohland et al., 2003). Some researchers have chosen to provide such instruction in an on-line format (Burgstahler, 2007; Izzo, Murray, & Novak, 2008; Junco & Salter, 2004) with similar success in the improvement of participants' attitudes and/or knowledge.

A recent literature review examining empirically based research on UDI in postsecondary education acknowledged the need for more UDI studies that provide evidence-based effectiveness of college instructors' value and useful application of UDI professional development for promoting student success (Roberts, Park, Brown, & Cook, 2011). Two studies, not included in the review, have responded to the need for empirical evidence of UDI's beneficial effects on student learning (Davies, Schelly, & Spooner, 2013; Schelly, Davies, & Spooner, 2011). Both studies found that faculty who received professional development (five, one-hour training sessions) significantly increased their frequency of UDI application across the semester in all major areas (e.g., presenting material in multiple formats, making course materials more accessible).

Gaps in the Literature

Overall, the studies reviewed in the last section provided evidence that in-person faculty development programs can have positive associations with self-reported confidence in interacting with students with disabilities, increased self-report of knowledge on laws, types of disabilities, accommodations, and UDI, as well as increased positive attitudes toward students with disabilities. All of these studies have the advantage of providing lengthy, in-depth professional development covering a variety of important topics relating to students with disabilities (Cook et al., 2006; Murray et al., 2009a; Murray et al., 2009b; Rohland et al., 2003). Although in-person programs can be an effective way to convey such information, relying on in-person workshops can be very time consuming and costly to staff and may limit the number of faculty who can participate at any one given time or in a particular location. If online professional development could effectively produce positive outcomes, this may reduce costs and increase the opportunities for more faculty to participate. Only a few online faculty programs have addressed similar disability topics (Burgstahler, 2007; Izzo et al., 2008; Junco & Salter, 2004). Furthermore, the evaluation of knowledge in both in-person and online faculty development programs are limited by self-report, and to date, to the best of our knowledge, no published studies evaluating the effectiveness of a professional development program have employed a factual knowledge assessment.

A recent literature review on empirically based UDI research in postsecondary education expressed the necessity for more experimental designs and mixed methods approaches to assess the effectiveness of UDI training on college faculty (Roberts et al., 2011). Most studies focused on disability awareness for faculty in higher education have only investigated knowledge and attitude changes or measured student perceived changes to instructor teaching methods. Therefore, mixed methods research that has a qualitative component following up with faculty after program completion can provide essential information about the application of changes to teaching and better understand how faculty are impacted by professional development. In the current study, we attempted to fill these gaps by evaluating the impact of a disability awareness program on college faculty in an online context, using a factual measure of knowledge, and employing a mixed methods design to address application.

Research Questions

This study explored the following three research questions: (1) Does the online program improve faculty attitudes toward students with disabilities? (2) Does the online program increase faculty knowledge of students with disabilities and UDI principles? (3) Does the online program promote faculty confidence and willingness to apply UDI principles to their teaching?

Method

Study Design

This study was conducted using a sequential mixed methods research design, with a quantitative phase first and a subsequent qualitative phase. The quantitative phase was essential to provide numeric data to compare differences between participant attitudes and knowledge before and after program completion. The study then delved more deeply into this objective reality by exploring the subjective perspectives of the faculty members' lived experiences with their program learning in terms of how the program impacted their teaching practices and interactions with students. Thus, the breadth and depth of a mixed method design allowed for more holistic inferences and an opportunity for triangulation, context, and illustration through mutually corroborated findings (Teddlie & Tashakkori, 2009).

Sample

For the quantitative first phase of the study, all full- and part-time faculty at a public four-year institution in the western region of the U.S. were invited via email to participate. The institution has approximately 2,000 full-time and part-time faculty members, of which about half are female and about 30% identify as a minority ethnic group. The participant sample consisted of the 43 self-selected faculty members who completed the online program during the 2014-2015 academic year. The group's demographic characteristics were somewhat diverse in age, academic rank, and teaching experience (see Table 1). Additionally, 28 (65%) of the participants reported having at least one to two students with disabilities in their courses every semester and only 11 (26%) had taken any prior disability-related professional development. A purposive sample of 10 participants who completed the online program during the fall 2014 semester was chosen for qualitative interviewing (see Table 2). These 10 were selected to represent maximum variation in demographic characteristics of the first phase sample. Interviewees were randomly assigned a state pseudonym so as to protect confidentiality; however, each faculty member gave permission for disclosing his/her college discipline.

Program

The online disability awareness program was designed by the college's disABILITY Task Force to assist faculty in understanding the needs of students with disabilities and applying the principles of UDI to course materials and activities to enhance their teaching. The task force members represented a collaboration of faculty and staff experts from a variety of disciplines (primarily education, nursing, and psychology), the faculty development center, and the disability support services office. The online program was housed on the college's learning management system and consisted of three modules, each made up of text-, audio-, and video-based materials that faculty had continued access to as resources. Each module took approximately one to two hours to complete. Module 1 addressed an introduction to higher education disability laws, campus services, accommodation policies, and characteristics of disabilities. The primary objective of the first module was to help increase faculty awareness and understanding of the wide array of disabilities represented within the campus student body, as well as the related laws and accommodations that guide faculty support of these students. This module also contained videos of students with disabilities describing their experiences at the university. Module 2 covered UDI principles and provided examples of teaching strategies and activities that encouraged multiple methods of presenting course material, engaging students, and assessing course outcomes. This module included video content of faculty from various colleges describing and presenting UDI techniques within the classroom. Module 3 provided information on how to create accessible instructional materials, such as syllabi, lecture presentations, and PDF documents. The third module incorporated videos displaying how to create accessible documents for both PC and Mac platforms.

Quantitative Measures

The two outcome variables in this study were faculty attitudes toward students with disabilities and faculty knowledge of students with disabilities. Faculty attitudes were measured using the Interaction with Disabled Persons Scale (Gething & Wheeler, 1992), which has been validated in numerous other research studies. This instrument assesses one's discomfort level in interacting with individuals with disabilities. For the current sample, the Cronbach's alpha was .77 for the pretest and .74 for the posttest.

Faculty knowledge in this study was defined as a faculty member's factual, fundamental knowledge of disability laws, disability characteristics, accommodation policies, universal design for instruction, and accessibility of electronic materials, as addressed in the online program. A 40-item objective knowledge instrument was developed to assess participants' knowledge of the specific content taught in all three modules of the online disability awareness program. It was given twice, once before program completion (pretest) and once after program completion (posttest). Content validity of the knowledge instrument was established by having several college faculty and staff experts from the special education department, the faculty development center, and the disability support services office review its items for clarity, relevance, and comprehensiveness. Internal consistency reliability was determined after pretest administration of the survey. Cronbach's alpha at pretest was .89, indicating good homogeneity among the items (Teddlie & Tashakkori, 2009).

On the pretest, demographic information was also collected about the participants. On the posttest, par-

ticipants were asked to provide a self-rating of their confidence in their understanding and ability to apply the eight major areas addressed by the online program: disability laws, legal definition of disability, UDI, faculty responsibilities, making adequate accommodations, creating accessible documents, types of campus services available, and finding additional support. For each item, participants indicated their level of confidence on a 5-point Likert scale from strongly agree to strongly disagree.

Qualitative Analysis Procedure

This study's qualitative data analysis phase was guided by Braun and Clarke's (2006) six-step approach for analyzing qualitative data using a thematic analysis method. As recommended by Ryan and Bernard (2003), the entire process was completed in collaboration by the two researchers in order to achieve triangulation and increased confidence that developed themes are valid. In the first step, the researchers familiarized themselves with the data by reading interview transcripts, making notes, and jotting down initial ideas for coding. Secondly, a deductive-inductive category construction approach was used, developing some initial codes directly from the interview questions related to the overall research questions, and also developing some codes inductively by reading over the transcripts, looking for reoccurring and interesting ideas that could form potential themes. Once thematic categories were created and defined, the researchers independently coded the excerpts and interrater reliability was calculated. Cohen's kappa was then calculated for each of the four major coding categories: .79 (motivation), .80 (program impact), .91 (barriers), and .92 (faculty responsibility), indicating satisfactory reliability (Burla et al., 2008). Any discrepancies in agreement between coders were resolved through consensus, after reviewing the code definition and the individual excerpt. The latter steps of the text analysis encompassed refining themes, which resulted in collapsing some coded material and integrating some categories together.

Results

Both quantitative and qualitative methods were used to address each of three research questions. Qualitative themes emerged relating to each question. With regard to quantitative analyses, the first two research questions addressed changes in attitudes and knowledge from pretest to posttest using paired sample t-tests along with Cohen's d effect size to determine significant differences and estimate the effect of the online program. For the third research question, descriptive statistics were used to summarize faculty confidence in applying program learning. Results for each research question are presented below.

Research Question 1: Does the program improve faculty attitudes toward students with disabilities?

Among the 43 faculty participants completing the Online Disability Awareness Program, there was a statistically significant difference between the two mean attitude scores, pretest attitude ($M = 3.06$, $SD = .54$) and posttest attitude ($M = 2.82$, $SD = .47$), $t(42) = 3.90$, $p < .01$, $d = .47$. The results indicated that participants reported less discomfort interacting with people with disabilities after completing the program compared to before the program. Further, Cohen's value of .47 suggested a moderate effect.

The thematic analysis of the qualitative interview data identified an attitudes theme of better awareness of diverse student perspectives and learning needs. This theme included faculty reflecting on their interpersonal interactions with students. All 10 faculty members interviewed expressed an awareness of being more sensitive, respectful, and observant of students with disabilities and the necessity of responding thoughtfully to diverse student needs. For example, Professor Colorado, a part-time instructor in the College of Arts with more than twenty-one years of teaching experience, communicated a strong belief that faculty need to be cognizant and vigilant of the diversity of students in the classroom:

> I think college professors need to be aware of who their students are, and I think that we do have a responsibility to teach everyone to their capacity, to their ability. It's hard in big classes to be able to discern and know what people need. But I have come across a lot of students that I thought really needed to be evaluated. They were not doing well in my class, and to not do well in my class is really hard because I feel like I really set up the parameters for them to succeed. And then I do try and approach those students.

Professor Hawaii, a tenured professor with more than twenty-one years of teaching experience, shared a similar sentiment of being aware of diverse student

needs. He said "Instructors should monitor their teaching approach and strategies to allow for all students to achieve to the best of their ability. And cut them a little slack when they need it."

Several faculty mentioned that the videos in which students with disabilities shared their experiences prompted them examine their own exchanges with students. Professor Kansas, a tenured faculty in Education, stated:

> I don't have students that have identified as having any disabilities, and there are none that have physical disabilities that I can readily identify. The videos, I think what they demonstrate is there were some students sort of speaking at the subtleties of the differences in interactions, and that to me made me more aware, or made me think about what sorts of interactions I have with individuals that may be impacted by a disability that I don't know about.

Finally, about half of the faculty reported that the program increased their awareness of campus resources for students with disabilities and facilitated their ability to more proactively connect students to these resources than they had in the past. For example, Professor Louisiana stated, "I had never consulted with somebody at DSS [Disability Support Services office] before in regards to a student. This is first semester I had so that may have been in the background for me, like, oh, I can consult with them."

Research Question 2: Does the program increase faculty knowledge of students with disabilities and UDL principles?

For the knowledge survey, a total score was calculated by summing the number of items correctly answered out of 40. Participants' total knowledge score was found to significantly increase from the pretest (M = 22.51, SD = 7.48) to the posttest administration (M = 36.09, SD = 2.42), $t(43) = -12.19$, $p < .01$, $d = 2.44$. This same significant pattern of increased knowledge was also found for all three modules individually (see Table 3). The effect sizes for all knowledge mean differences (total and each of the three modules) suggest large effects ($d > .80$).

The thematic analysis of the qualitative interview data identified a knowledge theme of enhanced learning. All 10 of the faculty members interviewed reported learning new terminology and concepts and filling in gaps in their knowledge. For example, when Professor Alaska, a tenured faculty with many years of teaching and administrative experiences, was asked to identify any significant concepts or skills she learned from the program, she responded:

> Video two, the disability classifications and descriptions, I found that very powerful. Now some of that I kind of knew, so it just filled in gaps for me. I actually often do professional development presentations to international audiences on the categories of disabilities, but this just really filled it in. I love module two from an instructional perspective, and the universal design for instruction, oddly enough, I wasn't familiar with it at all. So it was new, and of course, what I was happy about was that I was naturally doing many of the UDI things.

Another experienced professor with many years of teaching, Professor Nevada, described enriching his knowledge and also reinforcing some of the things he currently does that he never realized were universal design teaching strategies. He shared:

> It solidified some ideas -- I've been doing some things and didn't know what they were. …I'd been using a lot of them so it wasn't new. Yeah, the multimodal presentation. The term "graphic organizers," I was not familiar with that terminology even though I was using them all over the place.

Research Question 3: Does the program promote faculty confidence and willingness to apply UDI principles to their teaching?

Participants rated their confidence as a result of their learning in the program for eight areas. Overall, a majority of participants reported being confident or very confident in their learning for all eight major areas addressed in the program (> 86% agreed or strongly agreed for all items). The highest learning confidence area was in locating needed support; 79% of the participants strongly agreed that they "can find additional support at this university when students with disabilities are having difficulties in [their] course." None of the participants indicated a lack of confidence (disagree or strongly disagree rating) for any of the topics.

Two themes emerged in regard to the impact of the program on educational practices. The first was application and appreciation of UDI strategies and the second was identification of barriers to implementing UDI.

Application and appreciation of UDI. All faculty recognized the usefulness of UDI strategies and how the application of those strategies enhances the effectiveness of their teaching and promotes increased student learning. As Alaska stated, "what's good for a student who has a disability is good for any student." Faculty described that UDI practices are beneficial for all students, particularly those with different learning styles or different ability levels, or who are English second-language learners (ESL). For example, Professor Delaware, a full-time lecturer in the College of Health and Human Development, noted the importance of adding captions to her videos and recorded lectures, as they can be "replayed over and over again" for the benefit of student learning and are valuable for ESL students because they "learn the text-based stuff first, maybe even before the language piece." Professor Louisiana, another full-time lecturer in the same college, also observed the benefits of UDI:

> To everyone really, to students, to faculty. I feel like it really enriches the classroom experience when you have diversity, and so being able to have, you know, that Universal Design where you get these different perspectives. And in our classes there's a lot of discussion and personal sharing and reflections, so students really do get to hear from each other and learn from each other, so I think it really benefits the whole class.

The program inspired a majority of the interviewed faculty to reflect upon their pedagogy in terms of what UDI strategies they were already using and what was working well or could be improved. This reflection led to ideas for changes to be made in their current classes. Professor Louisiana, a full-time lecturer with over ten years of experience, illustrated this when she said:

> I'm trying to look at my other classes. I do try to mix things up. I can see in my development class that maybe I could do more of that in that class. In that class there's just a lot of information, it's a very content, heavy class, so I do weave in little vignettes and little discussion and reflecting on your own experience and remembering your own development and trying to be creative, but it is a lot of lecture and discussion. So that class maybe I could think about different ways to engage the class and present information.

Others identified exciting new activities they planned to try as a result of learning about UDI. Professor Idaho, a part-time instructor, was motivated to consider a new course activity:

> I've been wanting to play with something new, especially for my multi-cultural women class, [by] having the students create their stories and offering them digitally. But I hadn't really thought of it as applied to promoting, like greater accessibility in the classroom and targeting different kinds of learners, and so that was really, really nice.

An even more significant realization occurred with Professor Kansas, a tenure-track faculty, who modified a classroom activity to offer alternative methods of expression:

> I have students write letters to each other every week and that's a way for me to understand how they're understanding the material. And the purpose of the letters, I ask them to reflect with each other, to have a dialogue, how their readings apply to their professional practice. And last term I felt like it really didn't work really well; people really weren't being very reflective. You know here's a student who doesn't speak up in class and I've had conversations with him in speaking up in class, and mostly because what I read here, I want him to say out loud -- I think he knows he has something important, I think he just can't really [express it aloud] -- I'm glad that I gave him an alternative route to express himself and it also gives me an alternative way to assess his understanding, whereas if I didn't have this assignment, I would say he was disengaged.

Notably, seven out of the 10 faculty made actual changes to their course materials to make them accessible, such as increasing the font size of their PowerPoint slides to be more readable by a larger audience, ensuring their syllabi met accessibility standards, and adding alternative text to pictures and figures. Professor Florida shared that the online program has "totally changed the ways I use Microsoft Word. I use

headings now for everything, and they make everything so much easier for me and for other people, let alone students with disabilities."

Although appreciation of UDI strategies translated into action for the majority of interviewed faculty, some had not yet implemented planned changes into their courses and materials. Professor Florida, a new tenure-track faculty, noted, "It's still a reflection piece." She further shared that although she added a kinesthetic component to her library instruction sessions to ensure different modes of presentation, she still intended to put captions on videos, add notes to posted PowerPoint slides, and check accessibility on materials.

Barriers to implementing UDI strategies. This theme encompassed three types of barriers that faculty anticipated or encountered with regard to implementing UDI principles. One of the major obstacles reported was lack of time and resources. Many faculty identified that they haven't had time to implement all the changes they wanted to make to their teaching practices or course materials. For instance, Professor Michigan expressed concern over time and access to transcription services for captioning lengthy recorded lectures, especially in regard to the desire to constantly keep course materials current, "It's a little tricky because some of those slides are being updated all the time." Furthermore, seasoned faculty member Professor Hawaii shared that specific UDI teaching strategies and examples from the program's videos had given him ideas for things to try in class; however, he hadn't implemented them yet due to his huge workload and university leadership roles.

Concerns and confusion with implementation was another identified barrier. Several faculty acknowledged they had concerns over equity, course redesign issues, or confusion with technology that resulted in an obstacle to implementing some UDI strategies. Professor Michigan shared his concern about equity when he said:

> I think it's like anything, you just have to be a sensitive instructor and it's not just students with disabilities, it's with all the life circumstances that our students present, and trying to be accommodating, obviously within reason; you don't want to go to the other extreme, which may be perceived as unfair by other students. So that's sometimes a balance, but I think professors can do this without running into those kinds of fairness or equity issues from the other end of it.

Professor Nevada worried whether UDI activities might take time away from course content and how to effectively implement UDI strategies in large size classes:

> But time away from content is a huge concern for me. This is my super ego yelling at me. I'd have to cut out content, and I'm so torn, there isn't enough time to present what I want to. What am I going to cut out? But I'm increasingly seeing the value in this.

Also, two faculty expressed confusion as an obstacle to implementation of all they wanted to do. For example, Professor Colorado shared that she was still unclear about how to insert alternative text for figures or pictures. Even though uncertainty could be an obstacle to making immediate changes, it was evident that faculty members felt confident that they could overcome this if given support and more time to reflect.

The last barrier was faculty resistance to UDI implementation. A few faculty members admitted that they weren't likely to be motivated to make changes until they experienced an immediate need from students with disabilities in their courses. Professor Hawaii illustrated this issue when he explained that he hadn't made his course syllabus accessible yet as there hadn't been a specific request or need for it by students in his class; however, he had downloaded many of the program resources to revisit at another time. When Professor Louisiana was asked if there had been any changes to her teaching as a result of her program learning, she replied:

> Not yet. I think I'm in the early stages of thinking about that and what I can do differently. I don't know if I'm sort of more reactive about it when I have a student in the class who has a disability, then am I more conscious of, okay, what do I need to do differently and how do I need to do this to make sure that student is getting what they need, that they're not missing anything that the other students are getting.

Additionally, Professor Alaska noted that some faculty may be resistant to UDI based on their cultural perspectives:

> Well, in international faculty audiences, they don't do as much. They don't care as much about

issues of students with special needs, so I would say that's been one of the barriers. They don't necessarily expect students who have disabilities to come to college. Even in Japan, which is a first world country, they don't attend to the needs of their students with disabilities in the K-12 environment like we do. So that is the biggest barrier.

Discussion

Overall, the quantitative and qualitative results demonstrated convergent findings for our three research questions. The first convergent finding supported that the online program improved faculty attitudes toward students with disabilities, and this increase is in line with past research on the effectiveness of professional development programs for changing faculty attitudes (Junco & Salter, 2004; Murray et al., 2009a; Murray et al., 2009b). The fact that the attitude scores were fairly positive at the beginning may be indicative of the self-selected sample of faculty who were willing to take part in the program. However, the significant positive increase in attitudes is encouraging given that the program was online and fairly brief. The positive change found in this study was comparable in degree of change in attitudes to that seen in intensive week-long programs (e.g., Cook et al., 2006).

Furthermore, the qualitative results greatly elaborated upon the ways in which faculty attitudes were impacted by their program learning, beyond the quantitative change in attitude scores. Consistent with a social constructivist point of view, all 10 faculty members interviewed confirmed being more aware of student perspectives and the vital importance of being proactive and observant of student needs as a result of the program. This is especially important given that approximately 75% of students with disabilities choose not to self-disclose their disability to their higher education institution and consequently receive no support services or classroom accommodations (Newman et al., 2011). Additionally, interviewed faculty members recognized the richness that students with disabilities can add to the classroom learning environment by having them share their experiences and unique strengths, bringing better awareness of the assets that every individual brings to the classroom. The adoption of social constructivist attitudes by faculty would facilitate UDI practices of creating an inclusive instructional climate and community of learners. Faculty members' better awareness of the student perspective and sensitivity toward diversity enhances their ability to make personal connections with students and build a classroom atmosphere in which students feel respected, engaged, and motivated to make contributions to their own learning experience.

A second convergent finding supported that the online program increased faculty knowledge. The pretest knowledge results from Module 1 indicated that faculty were fairly familiar with their legal responsibilities and campus resources in serving students with disabilities, since participants answered 73% of these items correctly on average. Despite this, faculty knowledge significantly increased from pretest to posttest for each of the three module content areas and total knowledge scores. Additionally, the effect sizes for these knowledge changes were very large, supporting a strong, positive impact of the program for increasing faculty knowledge on disability characteristics, legal issues, campus support services, UDI strategies, and making course materials accessible. The improvement of faculty knowledge in areas of UDI strategies and accessibility should equip them with the skill base to make changes in their classroom that facilitate an optimal learning environment for all students.

Finally, our third convergent finding related to the impact of the online program on faculty confidence and application. This study found that disability-focused professional development led to high confidence scale scores, with 86% or more of the faculty rating themselves as confident in all eight topics addressed. Moreover, the qualitative findings indicated that this confidence translated into changes in faculty teaching strategies and materials. Seven out of 10 faculty made actual changes to their course materials to make them accessible and faculty emphasized how the program helped them to make tangible changes to their teaching to incorporate UDI principles, such as presenting their course concepts in multiple modalities, adding assignments that gave students alternative ways of expressing themselves, and trying new methods of classroom engagement. Application changes to teaching have primarily been investigated following more intensive, in-person programs (Davies et al., 2013; Schelly et al., 2011). The fact that many faculty had already made changes to their teaching after completing this relatively brief program provides encouraging evidence for the powerful impact of online professional development experiences for improving education.

Although faculty interviewed reported making many actual changes to their teaching and course materials only one semester after completing the online program, they also indicated many potential changes they still wanted to make. A majority expressed that the program prompted them to engage in meaningful reflection on their practices and to consider their own areas of strengths and weaknesses in teaching. Unfortunately, some indicated barriers that affected the immediate implementation of changes to their practices including a lack of time and resources, confusion with technology, and concerns about losing content coverage in their courses if new activities were added. These barriers have been echoed by faculty in other research on professional development (Taylor & Znajda, 2015). Nevertheless, the faculty participants expressed confidence that these obstacles could be overcome if given more time. Additionally, those implementing professional development on UDI are cautioned to keep in mind that faculty resistance was indicated as a barrier to implementation of change. Some faculty may be unmotivated to adopt UDI principles or may be reluctant to make changes until this is a need or a request by a student with a disability. Such attitudes may reflect a conventional deficit perspective that UDI is attempting to overcome (Ginsberg & Schulte, 2008). To potentially reduce such attitudes, it is important for programs to help faculty understand how UDI can enhance their personal effectiveness as a teacher and help them recognize the important role they can have in improving student success outcomes.

Limitations and Future Research

Findings from this study must be interpreted within the context of the small, self-selected sample of faculty who completed the program. Future research should attempt to include a larger representation of faculty in the college campus in terms of departments, gender, ethnicity, etc. to achieve more generalizable results. Additionally, it is recommended that future research expand beyond the context of one campus because every campus has its own unique student population and faculty culture, and program effectiveness may differ by institution. In general, there is a need for assessment of professional development effectiveness (Cook et al., 2006; Davies et al, 2013; Schelly et al., 2011). More studies should continue to measure changes in actual knowledge instead of just self-report of learning and conduct qualitative research to better understand how faculty incorporate their professional development learning into their teaching practices and interactions with students. However, next steps for assessing application of knowledge should include longitudinal studies that track changes to teaching practices over time, as many faculty in this study expressed time as a barrier to implementing immediate changes and proposed future changes they would be making. In order to more comprehensively assess how UDI changes impact students' learning and experiences, observation of classroom teaching and student reports of their perceptions of faculty before and after program participation would provide triangulation of the program's effects. Researchers could also collect products such as syllabi, assignments, and student performance measures (e.g., number of students who finish the course, grades) as further evidence of the impact of program learning on faculty and students. The inclusion of a control or comparison group in this research would further increase the confidence that the effects found are due to professional development participation rather than other extraneous factors (Davies et al., 2013).

Conclusion

Despite the significant growth of students with disabilities in higher education, these students continue to experience low rates of persistence, retention, and graduation. A lack of understanding and cooperation from college faculty has been identified as one of the most common institutional barriers to the success of students with disabilities. Universal design for instruction (UDI) has been proposed as a model for good teaching and for guiding faculty in being responsive to the needs of diverse learners. This study demonstrates that four to six hours of online professional development can lead to improvements in attitudes toward students with disabilities, as well as increased knowledge and application of UDI strategies and accessibility techniques. Meaningful faculty development that is well-designed and convenient is beneficial to improving instructor effectiveness and must be part of the student success equation as faculty are integral to the college's mission of student learning and development. An institution's commitment to an equitable, inclusive, and just learning environment is strengthened when faculty have the knowledge and skills to facilitate integration and success of all students, especially those with disabilities or other diverse learning needs.

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Table 1

Faculty Participant Demographic Characteristics (N = 43) in Quantitative Phase

Variables	N	%
Gender		
Female	37	86.0
Male	6	14.0
Ethnicity		
Asian/Pacific Islander	2	4.7
Black/African American	2	4.7
Hispanic/Latino	11	25.5
White/European American	28	65.1
Age		
20-29	4	9.3
30-39	11	25.5
40-49	13	30.3
50-59	8	18.6
60-69	4	9.3
70+	3	7.0
Academic Rank		
Part-time lecturer	14	32.6
Full-time lecturer	9	20.9
Tenure-track professor	8	18.6
Tenured professor	12	27.9
College Affiliation		
Arts	2	4.7
Education	10	23.2
Health and Human Development	21	48.8
Humanities and Social Sciences	7	16.3
Other	3	7.0
Years Teaching		
1-5	12	27.9
6-10	12	27.9
11-15	10	23.2
16-20	3	7.0
21+	6	14.0

Table 2

Interview Participant Demographics (N = 10)

Name	Gender	Ethnicity	Age	College	Academic Rank	Years Teaching	Disability Exposure
Alaska	F	White	50-59	Educ	T	21+	S, T
Colorado	F	White	50-59	Arts	PT	21+	S
Delaware	F	White	60-69	HHD	FT	11-15	T
Florida	F	White	30-39	Library	TT	1-5	None
Hawaii	M	White	70+	Educ	T	21+	S
Idaho	F	Latina	40-49	HSS	PT	11-15	S
Kansas	F	Latina	40-49	Educ	TT	6-10	None
Louisiana	F	Asian/PI	40-49	HHD	FT	11-15	S
Michigan	M	White	40-49	HHD	T	6-10	S
Nevada	M	White	50-59	HSS	PT	21+	S

Note. Educ = College of Education; Arts = College of the Arts; HHD = College of Health and Human Development; HSS = College of Humanities and Social Sciences; T = tenured; TT = tenure-track; FT = full-time lecturer; PT = part-time lecturer; S = regularly has students with disabilities in courses; T = prior training/ professional development related to students with disabilities.

Table 3

Pretest and Posttest Differences in Knowledge Scores

	Pretest		Posttest			
	M	*SD*	*M*	*SD*	*t*-test	Cohen *d*
Total Knowledge	22.51	7.48	36.09	2.42	-12.19*	2.44
Module 1 (19 items)	13.70	3.22	17.86	1.06	-8.78*	1.74
Module 2¬ (11 items)	5.00	3.03	9.77	1.21	-9.62*	2.07
Module 3 (10 items)	3.81	2.72	8.47	1.12	-10.25*	2.24

Note. *Significant at the $p < .01$ level.