University Faculty Attitudes and Actions toward Universal Design: A Literature Review

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The purpose of this literature review was to examine postsecondary education (PSE) faculty's attitudes toward and applications of universal design (UD) in their classes. After a comprehensive search and screening process, we identified 14 studies that met the inclusion criteria. Results of the review revealed factors that influenced faculty's attitudes toward and applications of UD. Some of the studies showed a gap between having a positive attitude toward UD and the actual applications of it. Findings of the review seem to suggest that certain training activities would help develop faculty's interest and competencies for applying UD in their classes. This review also provided discussions and implications of applying UD in PSE settings.

Keywords: Post-secondary education, disability, university faculty, universal design

Recently, the number of students with disabilities attending postsecondary education (PSE) has risen. As many as 19% of undergraduates reported having a disability (National Center for Education Statistics, 2019). Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 paved the way for students with disabilities to receive PSE. In today's society, individuals with disabilities participating in PSE are viewed as representing diversity and inclusion. However, research shows that students with disabilities have encountered challenges in adjusting to the PSE environment (e.g., Lindsay et al., 2018; Redpath et al., 2013).

One of the major challenges students with disabilities face is identifying appropriate services or academic accommodations. In PSE, once students with disabilities are otherwise qualified to attend a program, the PSE institution is required to provide them with reasonable accommodations (ADA Amendments, 2008; Rehabilitation Act, 1973).

However, due to the differences in regulations between secondary education and PSE, students with disabilities in PSE must take the responsibility to self-disclose their disabilities and apply for academic accommodations (Madaus & Shaw, 2006). Once students get approval for accommodations from the campus disability services office, receiving accommodations is not automatic. The student must still talk with their instructors to facilitate the necessary accommodations.

The disclosure process could place students at a disadvantage and result in several issues. The first issue is related to stigma and discrimination. Studies identified barriers to the application and utilization of disability supports by students with disabilities in PSE (Dowrick et al., 2005; Lyman et al., 2016). For example, students with disabilities feared potential negative social reactions from professors and peers, causing hesitation in utilizing accommodations. The phenomenon is even more evident for students with hidden disabilities, such as a learning disability, because instructors tend to overlook their needs (Moriña, 2017). The second issue students with disabilities in PSE experience is a lack of knowledge of available supports (Redpath et al., 2013). Students with disabilities may not realize their needs for accommodations, or they may lack the knowledge regarding eligibility and the documentation requirements needed to access these accommodations. Third, students may be reluctant to disclose their disabilities in order to access accommodations and may choose to use their own means to deal with academic challenges (Lyman et al., 2016). Consequently, they might risk failing classes. The fourth issue is associated with self-determination skills. Yamamoto, Stodden, and Folk (2014) stated that individuals with disabilities have fewer opportunities to practice self-determination skills. Thus, these individuals may not possess the skills to advocate for themselves. Gil (2007) also highlighted the importance of self-advocacy for students with disabilities prior to the implementation of their post-secondary career plan. One way to help students with disabilities enhance their roles as self-advocates is learning their rights and responsibilities.

Another challenge that students with disabilities face in acquiring accommodations is the lack of understanding and cooperation from faculty who have concerns over providing accommodations in their classes. Scott, McGuire, and Shaw (2003) stated that although most faculty are the experts in their specific areas, pedagogy or effective instructional strategies are not accentuated in their professional careers. Due to the lack of training in instructional practices, faculty may not have the adequate knowledge to provide appropriate accommodations. Without training in providing accommodations for students with disabilities, college instructors have understandable concerns that they will be asked to modify instruction and compromise the course standard (Lombardi, Murray, & Gerdes, 2011). These concerns hinder faculty from properly providing accommodations for students with disabilities.

Since the process of applying for accommodations can be challenging to both students and instructors, some university stakeholders are considering other alternatives to support students with disabilities. In recent years, the concept of universal design (UD) has drawn considerable interest among university faculty and the PSE research community. The Higher Education Opportunity Act emphasizes the value of UD and considers UD a “scientifically valid framework for guiding educational practice.” Centre for

Excellence in Universal Design (2014) defines UD as "*the design and composition of an environment so that it can be accessed, understood and used to the greatest extent possible by all people regardless of their age, size, ability or disability.*"

Scholars have developed two UD primary models and applied these models in the education field. Universal Design for Instruction (UDI) is a model pertaining to instructional practices. Scott, McGuire, and Shaw (2003) proposed nine primary principles for UDI: equitable use, flexibility in use, simple and intuitive, perceptible information, tolerance for error, low physical effort, size and space for approach and use, a community of learners, and instructional climate. The other model is Universal Design for learning (UDL), which focuses on learners' learning experience, includes three principles: multiple means of representation, multiple means of expression, and multiple means of engagement (Meyer & Rose, 1998). Principles from UD models ensure every learner can benefit from the whole environment. The proactive nature of UD creates a more tolerant learning atmosphere in classrooms that addresses the various needs of all students. Pliner and Johnson (2004) showed that UD is an effective approach to promote inclusion for diverse learners. Consequently, university stakeholders have adopted UD as one of the ways to include and support diverse students, particularly those who are historically under-represented in higher education. By doing so, the need for accommodations is minimized (Dallas & Sprong, 2015; Lombardi & Murry, 2011).

Previous research investigated and discussed how faculty or instructors created a UD-based curriculum and instruction (e.g., Rao et al., 2014; Roberts et al., 2011). In PSE settings, for example, studies showed that preservice teachers can learn to design a lesson plan by incorporating UD principles (Mcguire-Schwartz & Arndt, 2007; Spooner et al., 2007). In another example, Rose et al. (2006) employed multiple means to represent instruction, including traditional lectures, providing sign language interpreters, and videotaping each lecture and placing the video on a website. Rose et al. also asked some students to take notes and displayed these notes to every student. Sharing lecture notes facilitates collaborations and discussions among students. Students recreate and organize what they have learned in class, making the learning process more personally relatable and helping them to interact with the course content.

Faculty can also benefit from using UD principles. Rose et al. (2006) indicated that faculty and instructors have strengths and weaknesses; UD provides "choices" for instructional methods. They can choose the way they are more comfortable interacting with and teaching students. Supporters of UD have suggested that PSE faculty should be required to take a leadership role in the applications of UD principles (Dallas et al., 2016).

University faculty play an important role in the applications of UD. A clear understanding of faculty's attitudes toward and applications of UD will help plan training opportunities for college instructors and learn their barriers when applying UD principles. Studies used a researcher-designed instrument to investigate faculty's attitudes and actions toward UD principles (e.g., Dallas et al., 2016). These studies explored factors that influenced faculty's attitudes and actions toward UD principles. Some of the studies found a gap between attitudes and actual applications. For example, due to the lack of experiences and knowledge of applying UD, even though faculty considered the applications important,

their actual applications were low. In order to address the gap, these studies suggested certain training activities or approaches that would help faculty apply UD in their classes.

Our study examined the current state of research that investigated PSE faculty's attitudes and actions toward UD by conducting a systematic review of the literature. In this study, we used UD to refer to UDL or UDI, because principles from both models are relevant and similar. The primary purpose of this study was to review literature regarding faculty's attitudes and actions toward the applications of UD principles in PSE. The secondary purpose of this study was to investigate implications for faculty training opportunities. The research questions for this study were: (a) what factors influenced faculty's attitudes and actions toward applications of UD principles? (b) did a gap exist between the attitude and action responses? and (c) what suggestions did the literature imply for UD-based training opportunities for faculty?

Method

Search Procedures

We used a literature search process derived from Booth, Sutton, and Papaioannou (2016). The literature search process helped validate the search results and was comprised of five stages. First, initial search of the literature: We searched existing reviews, learned about the UD-related existing research, and found two existing reviews which gave us insight into determining the databases and key search terms (Rao et al., 2014; Roberts et al., 2011). Second, conduct search: We used four databases to search by using the identified search terms. Third, bibliography search: In addition to searching databases, we also searched the articles by the reference lists of all papers for additional studies that we did not find in online databases. Fourth, verification: We revised the searching process after discussion with an expert. Fifth, documentation: We documented the details and made notes with the inclusion and exclusion criteria when determining useful studies during the search process.

We used EBSCOHost to conduct the literature search using the following databases: PsycINFO, Education Full Text (EBSCO), Psychology and Behavioral Sciences Collection and ERIC. We included primary keywords to generate results targeted to "*participants"* (e.g., faculty, professors, instructor, college teachers), "*UD models"* (e.g., universal design for learning, universal instructional design, universal design of instruction, and universal design), and "*context"* (e.g., college, university, postsecondary education); in addition to the primary keywords, we used the following secondary keywords: disabilities, or students with disabilities. The search terms generated 216 articles across the databases. In the first round, we screened articles by reading the title and abstract to exclude the studies that did not meet the inclusion criteria. In the second round, we skimmed through the text if necessary.

Screening: Inclusion and Exclusion Criteria

We selected studies for review based on the following four inclusion criteria. First, study participants had to be faculty, instructors, or college teachers in higher education, such as research professors and clinical professors in four-year universities or a community college. To gather more in-depth results, teaching assistants (TAs) could be participants as well. Second, the dependent variable had to present faculty's attitudes or actions toward applications of UD principles. Third, the selected studies had to use an instrument which included UD models or principles. Fourth, the studies had to be written in English and published in peer-reviewed journals.

We applied three exclusion criteria in selection of studies. First, we excluded those studies that only included students or disability service providers as participants. Second, we excluded studies that used traditional accommodations rather than using UD models or principles as a framework to design their instrument because the instrument was not appropriate for this study. Third, we excluded studies whose purposes did not align with purpose of this study; that was studies investigated intervention effects by incorporating different UD models into instruction and did not particularly explore faculty's attitudes toward these UD models.

After two rounds of the screening process, we identified 14 studies that met the inclusion criteria. We used these articles to analyze faculty's attitudes and actions toward applications of UD principles.

Coding and Interrater Reliability

Two raters coded the 14 articles. The coding table consisted of the following categories: including research methods, participants, selected instruments, results, discussions and implications. We checked interrater reliability using a three-phase process. The first phase was coding training. In this training phase, the raters coded one article together, discussed the coding process, and then the raters reached consensus about the definition of each category. The definitions are as follows: (a) research methods: the design and strategy used to implement a research plan. (b) participants: persons who took part in research, only including number of participants and specifying a context if authors conducted their studies across different settings. (c) selected instruments: tools authors used in research to collect data. (d) results: faculty's attitudes and actions toward applications of UD principles (including factors and a perceived gap between attitudes and actions). (e) discussions and implications: suggestions for faculty training opportunities. Second, the raters coded three articles independently and checked interrater reliability using the following formula: the number of agreements divided by the total number of agreements plus disagreements then multiplied by 100. This process allowed us to check whether both raters had recorded the same information from the studies. In the second phase, if there were discrepancies on selected passages or information from studies, the raters resolved it by discussing the definition of each category and the selected passages again to reach an agreement on the information from the studies. In the third phase, the raters continued to code the remaining 10 articles and discuss the discrepancies if necessary. After completing the coding process, the first

author, who is one of the raters, organized the coding table and checked each category to ensure the information was correct. The average interrater agreement was 86%. The inconsistences lay in the part of discussion and implications. Both raters agreed that most of the studies discussed the necessity of disability-related training for faculty, however, they had extracted different information about the development of disability-related training. After several discussions and reading the passages again, the raters broadened the definition for discussions and implications in order to get rich details noting how service providers can develop an effective disability-related training experience for college teachers.

Results

Table 1 includes a summary of studies that have addressed faculty's attitudes and actions toward applications of UD principles. It also includes a summary of suggestions for faculty training opportunities.

The Factors Influencing Faculty's Attitudes and Actions

The findings of these studies identified the following factors that influenced faculty's attitudes and actions toward applications of UD principles: age, ethnicity, academic rank, and gender. For example, Gawronski, Kuk, and Lombardi (2016) showed that respondents who were 35-44 years old and of European heritage had a slightly higher tendency to implement UD principles. Non-tenured faculty demonstrated more willingness to provide UD-based instruction (e.g., Lombardi et al., 2011). Hartsoe and Barclay (2017) demonstrated that female faculty were more likely to adopt UD principles. Academic discipline also influenced faculty's attitudes and actions. For example, Lombardi and Murray (2011) found that faculty in the College of Business and Architecture were more likely to minimize instructional barriers and make course materials accessible. Similarly, Dallas, Upton, and Sprong (2014) found that faculty from the College of Applied Sciences and Art and Mass Communication and Media Arts had more positive attitudes toward the UD principles. Some studies identified a university setting as an influencing factor. Lombardi, Vukovic, and Sala-Bars (2015) investigated faculty's attitudes toward UD-based and inclusive instructions across three countries. This study showed that a university context had an influence on attitudes and actions toward inclusive instruction strategies. Similarly, Lombardi, Murray, and Dallas (2013) also discovered that different university environments resulted in significant differences. However, Dallas et al. (2016) did not find any differences among different universities. Experiences of teaching or interacting with individuals with disabilities also resulted in differences in attitudes and actions of using the principles (e.g., Black et al., 2014).

In addition, previous disability-related training played a crucial role in shaping faculty's attitudes and actions toward applications of UD principles. Many studies showed that regardless of the amount of the training hours, faculty who had disability-related training were more likely to incorporate UD principles in their instructions and consequently had more positive attitudes toward UD (e.g., Lombardi & Murray, 2011). Although studies did not explicitly define the training topics, training can provide disability-related knowledge, inclusive teaching strategies and information regarding UD principles and guidelines.

Attitudes and Actions toward the Applications of UD Principles

From the synthesis of these research studies, the findings on attitudes and actual actions were mixed. For example, in Dallas et al. (2016), the study presented consistent results on attitudes and actions dimensions, meaning that faculty who had positive attitudes toward inclusive strategies were more likely to embed these practices into instruction. LaRocco and Wilken (2013) found that faculty were nonusers of the practices, and the stage of concern focused on learning the new strategies. Faculty were also uncertain about whether they had the abilities to perform these strategies.

Even faculty who expressed positive attitudes toward applications of UD-based practices reported the actual implementations were limited on some of the subscales (Lombardi et al., 2011). They also found counterintuitive results on some subscales, showing that faculty were adopting the inclusive teaching strategies based on UD principles even when they did not have positive attitudes toward these principles. Similarly, Lombardi et al. (2015) noticed a gap between attitudes and actual applications of UD principles, especially from faculty in American and Spanish universities. Cook, Rumrill, and Tankersley (2009) found that faculty considered UD principles important, but did not implement them fully in the classroom. West, Novak, and Mueller (2016) also noted inconsistent attitudes and actions in some subscales.

Suggestions for Training Development

Some studies demonstrated the need for disability-related training. For example, in the Cook et al. study (2009), faculty rated the UD principles important but did not have enough knowledge on how to implement these principles in classrooms. LaRocco and Wilken (2013) found that faculty did not use UD principles even though they believed these innovative UD-based practices might enhance their preparation for instruction. These researchers further suggested that training could enhance instructors' confidence to implement UD-based practices. Izzo, Murray, and Novak (2008) conducted focus groups to investigate the use of UD principles by faculty. Participants expressed that they were frustrated with the barriers and challenges that impeded them from addressing the learning needs of diverse learners, and 27% of the participants indicated that they were interested in attending UD principle trainings.

Another reason why disability-related training should introduce UD principles is that faculty considered that some UD-based practices may either compromise course standards or require numerous modifications of instruction and resources. Dallas et al. (2016) found that some faculty were hesitant toward some UD-based practices while they were in favor of others. For example, some faculty were willing to provide a minor accommodation if the accommodation did not take more time and resources to prepare. Faculty also had a concern that certain specific practices such as assessment adjustments might compromise course standards. To reduce these concerns and increase faculty's willingness to implement UD principles, it is necessary to provide faculty with disability awareness training including the introduction of UD principles.

Studies also suggested ways to develop disability-related training. For example, service providers, who plan training development for faculty, can use an instrument or a survey to identify the needed topics. The instrument can serve as a self-assessment for instructors to examine their instruction (e.g., Lombardi et al., 2015). Other suggestions include: collaborations between service providers and academic departments to enhance the effectiveness of training (e.g., West et al., 2016), inviting students with disabilities to be co-presenters in training (e.g., Dallas & Sprong, 2015), and delivering training in multiple ways such as a workshop and printed materials. Service providers can also embed various scenarios in their training that exemplifies the process of applying UD-based practices (Lombardi et al., 2013).

Discussion

UD is a revolutionary paradigm that changes how college students use campus resources (Block et al., 2006). This review revealed that multiple factors played important roles in influencing faculty's attitudes and actions toward applications of UD. Among these factors, previous disability-related training had a tremendous impact on how faculty perceived UD principles. Murray, Lombardi, Seely, and Gerdes (2014) demonstrated the effectiveness of short-term training to improve faculty's self-efficacy. They conducted a four-day disability-focused training covering a wide range of topics including universal design principles. At the end of the training, faculty were more confident to apply inclusive instructional strategies and support students with disabilities.

However, many post-secondary stakeholders do not know how to develop a training program. We organized the following steps from the synthesis of research studies. First, before developing a professional training, service providers can use an instrument or a survey to evaluate faculty's attitudes and experiences regarding embedding UD principles into instruction. It is also important to explain the direct or indirect links between effective teaching strategies and students' academic performance. Item-level scores or subscale scores on the measurement can give insight into the strengths and weaknesses of faculty in certain areas. Due to the diverse backgrounds of faculty, it is a good idea to consider faculty demographic characteristics when selecting applicable training topics for a specific faculty group. Second, the training should focus on practical steps of implementing UD principles. Sometimes, faculty may be willing to apply these principles, but are unsure how to do it without compromising course standards (Cook et al., 2009). In light of this concern, Ouellett (2004) suggested faculty start by identifying major course components and expectations for students. By doing so, course standards will not be compromised and students will benefit from knowing the course expectations upfront. Third, a collaborative model can be used to implement training. For example, students with disabilities can be co-presenters and share how their disabilities affect the learning process, and how UD principles can meet diverse learning needs. Gawronski et al. (2016) found the comparison of perspectives between faculty and students led to a clear pattern of the essential training topics. Black et al. (2014) also found a gap between the faculty's and students' attitudes toward instructional strategies derived from UD principles, which strengthens the need to include students' learning experiences as one of the considerations when developing a training opportunity for faculty. Another example is the

collaboration between various campus units and academic departments. At Texas A&M University, the Center on Disability and Development, the Department of Disability Resources, and the Center for Teaching Excellence have collaboratively offered disability awareness workshops to campus communities. A collaborative model brings together resources for a more diverse training experience for participants. Fourth, disability-related training can be delivered in different ways (Lombardi et al., 2011), such as workshops, courses, books, articles, websites, and brochures, which are all useful methods to disseminate information and give faculty options to gain knowledge without influencing their tight schedules. Although the steps to develop a UD-based training program are not comprehensive, equipping faculty members with extensive knowledge of UD will allow postsecondary education institutions to become more inclusive. The application of UD principles in postsecondary education settings will allow diverse learners to reach their goals and realize their potential.

In addition to faculty, similar training can be offered for all students, including students with disabilities. Self-determination should be one of the foci in the training. Due to the differences between secondary education and PSE, students in higher education have the responsibility to gain a better understanding of their learning. When teaching students with disabilities to speak up for themselves, we suggest using a self-determination model such as Field and Hoffman's (2015) Action Model for Self-Determination. This model consists of five steps: Know Yourself and Your Context, Value Yourself, Plan, Act, and Experience Outcomes and Learn. Once students learn the UD principles and practices, they can apply these principles and practices into real life of advocating for themselves. First, students understand their disability and its impact on their learning (Know Yourself and Your Context). Second, through learning UD principles and practices, students consider and indicate which practices are most applicable to them. Every student is unique and should consider practices that are more applicable to them (Value Yourself). Third, students make a plan to discuss these practices with their instructors (Plan). Fourth, students use self-advocacy and communication skills to communicate these practices with instructors (Act). Fifth, if instructors agree to implement these practices, students can assess how UDL practices help them learn more efficiently (Experience Outcomes and Learn).

Most studies used researcher-designed instruments addressing multiple facets of disability-related knowledge and law, while very few studies used a survey solely based on a UD model. Some studies investigated faculty's attitudes and actions toward providing accommodations. Although UD principles and accommodations seem to overlap to a certain extent, the spirit of universal design and accommodations are quite different. Block et al. (2006) expressed that the idea of providing accommodations can be replaced with a UD model. Other studies also suggested that the concept of applying UD is different from providing accommodations (e.g., West et al., 2016). In addition, Pliner and Johnson (2004) suggested UD transforms teaching practices to create an inclusive learning classroom. Postsecondary education opens its doors to welcome diverse learners, which results in changing student demographics and characteristics. Hence, research instruments, which measure faculty's perspectives and opinions toward inclusive instructional practices, should be developed by presenting UD models only (Hartsoe & Barclay, 2017). For example, Schelly, Davies, and Spooner (2011) developed a survey

based on the three UD principles (multiple means of representation, expression, and engagement) to investigate students' perceptions of faculty implementations of UDL principles in classrooms. Among UD educational models, UDI is suggested to be primarily applied in postsecondary education settings (Pliner & Johnson, 2004; Black et al., 2014). If an instrument focuses on UDI principles, it facilitates the understanding of how faculty view these practices and the specific practices that faculty feel difficult to perform. Moreover, the instrument can serve as guidelines for faculty to implement UD principles in their instruction.

Through this review study, we concluded the following differences between accommodations and UD. First, proactive versus reactive: UD adopts different methods to engage diverse students in learning before knowing their needs (proactive); accommodations are provided after knowing students' needs (reactive). Second, all diverse learners (including students with disabilities) versus students with disabilities only: All diverse learners can benefit from UD-based approaches; only students with disabilities can benefit from accommodations. Third, non-disclosure versus disclosure: By applying UD principles in classrooms, the needs for disclosure decrease because student needs are already accommodated; whereas, if no UD principles are applied in classrooms, students with disabilities need to disclose their disabilities and identify their needs. Fourth, stepping out versus staying in the box: For UD users, they try to step out of the box and use innovative teaching methods when designing curriculum; for non-UD users, they tend to keep the same teaching methods while making accommodations to respond to the needs from students with disabilities. Fifth, two-way versus one-way communication: Universal design emphasizes interactions in classrooms between students and instructors and creates a positive classroom climate; accommodations, on the other hand, create one-way communication by having students with disabilities discuss the needed accommodations with instructors.

Limitations and Implication for Future research

This study had several limitations. First, the study results were not comprehensive because we only reviewed 14 studies. Future literature reviews should include more studies to provide a much richer and more realistic picture. Second, the literature we have found mainly used survey methodology to collect data. Although we obtained a clear pattern of the attitudes and actions toward UD principles through survey research, future researchers will be more likely to acquire a deeper understanding through studies that used different research methods. Third, our review presented a basic investigation of faculty's attitudes and actions toward UD; however, focus group or one-on-one interview research is needed to obtain richer information about implementations of UD principles. Scott, Loewen, Funckes, and Kroeger (2003) suggested that future research look into the following questions before exploring the effect of applications of UD-based practices: Does UD help students with disabilities decrease reliance on others? Does UD change the way service providers provide accommodations? How do UD-based practices impact the student learning process? Finally, Black et al. (2014) demonstrate a gap between faculty and student perspectives toward teaching strategies used. We recommend future researchers use different data collection instruments for faculty and students. In this way,

direct comparison can be made between faculty and student perspectives in order to bridge the gap between what students need and what faculty can offer.

References

Black, R. D., Weinberg, L. A., & Brodwin, M. G. (2014). Universal design for instruction and learning: A pilot study of faculty instructional methods and attitudes related to students with disabilities in higher education. *Exceptionality Education International*, *24*, 48-64.

Block, L. S., Loewen, G., & Kroeger, S. (2006). Acknowledging and transforming disabling environments in higher education: AHEAD's role. *Journal of Postsecondary Education and Disability*, *19*, 117-123.

Booth, A., Sutton, A., & Papaioannou, D. (2016). *Systematic approaches to a successful literature review*. 2nd. Edition, Sage.

Centre for Excellence in Universal Design (2014). *What is Universal Design*. Retrieved from http://universaldesign.ie/What-is-Universal-Design/

Cook, L., Rumrill, P. D., & Tankersley, M. (2009). Priorities and understanding of faculty members regarding college students with disabilities. *International Journal of Teaching and Learning in Higher Education*, *21*, 84-96.

Dallas, B. K., & Sprong, M. E. (2015). Assessing faculty attitudes toward universal design instructional techniques. *Journal of Applied Rehabilitation Counseling*, *46*, 18-28.

Dallas, B. K., Sprong, M. E., & Kluesner, B. K. (2016). *Multiuniversity comparison of faculty attitudes and use of universal design instructional techniques. Rehabilitation Research, Policy, and Education, 30*, 148-160.

Dallas, B. K., Upton, T. D., & Sprong, M. E. (2014). Post-secondary faculty attitudes toward inclusive teaching strategies. *Journal of Rehabilitation, 80*, 12-20.

Dowrick, P. W., Anderson, J., Heyer, K., & Acosta, J. (2005). Postsecondary education across the USA: Experiences of adults with disabilities. *Journal of Vocational Rehabilitation*, *22*, 41-47.

Field, S. and Hoffman, A. (2015). An action model for self-determination. Retrieved from https://www.beselfdetermined.com/

Gawronski, M., Kuk, L., & Lombardi, A. L. (2016). Inclusive instruction: Perceptions of community college faculty and students pertaining to universal design. *Journal of Postsecondary Education & Disability, 29*, 331-347.

Gil, L. A. (2007). Bridging the transition gap from high school to college. *Teaching Exceptional Children, 40*, 12-15.

Hartsoe, J. K., & Barclay, S. R. (2017). Universal design and disability: Assessing faculty beliefs, knowledge, and confidence in universal design for instruction. *Journal of Postsecondary Education & Disability, 30*, 223-236.

Izzo, M. V., Murray, A., & Novak, J. (2008). The faculty perspective on universal design for learning. *Journal of Postsecondary Education and Disability*, *21*, 60-72.

LaRocco, D. J., & Wilken, D. S. (2013). Universal design for learning: University faculty stages of concerns and levels of use. A faculty action-research project. *Current Issues in Education, 16*, 1-14.

Lindsay, S., Cagliostro, E., & Carafa, G. (2018). A systematic review of barriers and facilitators of disability disclosure and accommodations for youth in post-

secondary education. *International Journal of Disability, Development and Education, 65*, 526-556.

Lombardi, A., & Murray, C. (2011). Measuring university faculty attitudes toward disability: Willingness to accommodate and adopt universal design principles. *Journal of Vocational Rehabilitation*, *34*, 43-56.

Lombardi, A., Murray, C., & Dallas, B. (2013). University faculty attitudes toward disability and inclusive instruction: Comparing two institutions. *Journal of Postsecondary Education and Disability, 26*, 221-232.

Lombardi, A. R., Murray, C., & Gerdes, H. (2011). College faculty and inclusive instruction: Self-reported attitudes and actions pertaining to universal design. *Journal of Diversity in Higher Education, 4*, 250-261.

Lombardi, A., Vukovic, B., & Sala-Bars, I. (2015). International comparisons of inclusive instruction among college faculty in Spain, Canada, and the United States. *Journal of Postsecondary Education and Disability*, *28*, 447-460.

Lyman, M., Beecher, M. E., Griner, D., Brooks, M., Call, J., & Jackson, A. (2016). What keeps students with disabilities from using accommodations in postsecondary education? A qualitative review. *Journal of Postsecondary Education and Disability, 29*, 131-140.

Madaus, J. W., & Shaw, S. F. (2006). The impact of the idea 2004 on transition to college for students with learning disabilities. *Learning Disabilities Research & Practice (Wiley-Blackwell)*, *21*, 273-281. doi:10.1111/j.1540-5826.2006.00223.x

McGuire-Schwartz, M. E., & Arndt, J. S. (2007). Transforming universal design for learning in early childhood teacher education from college classroom to early childhood classroom. *Journal of Early Childhood Teacher Education, 28*, 127-139.

Meyer, A., & Rose, D. H. (1998). *Learning to read in the computer age*. Brookline.

Moriña, A. (2017). Inclusive education in higher education: Challenges and opportunities. *European Journal of Special Needs Education*, *32*, 3-17. doi:10.1080/08856257.2016.1254964

Murray, C., Lombardi, A., Seely, J. R., & Gerdes, H. (2014). Effects of an intensive disability-focused training experience on university faculty self-efficacy. *Journal of Postsecondary Education and Disability, 27*, 179-193.

National Center for Education Statistics. (2019). Table 311.10. *Digest of Education Statistics, 2017 (NCES 2018-070)*. Retrieved from https://nces.ed.gov/fastfacts/display.asp?id=60

Ouellett, M. (2004). Faculty development and universal instructional design. *Equity and Excellence in Education*, *37*, 135-144.

Pliner, S. M., & Johnson, J. R. (2004). Historical, theoretical, and foundational principles of universal instructional design in higher education. *Equity and Excellence in Education*, *37,* 105-113.

Rao, K., Ok, M. W., & Bryant, B. R. (2014). A review of research on universal design educational models. *Remedial and Special Education*, *35*, 153-166.

Redpath, J., Kearney, P., Nicholl, P., Mulvenna, M., Wallace, J., & Martin, S. (2013). A qualitative study of the lived experiences of disabled post-transition students in higher education institutions in Northern Ireland. *Studies in Higher Education, 38,* 1334-1350.

Roberts, K. D., Park H. J., Brown, S., & Cook, B. (2011). Universal design for instruction

in postsecondary education: A systematic review of empirically based articles. *Journal of Postsecondary Education & Disability*, *24*, 5–15.

Rose, D. H., Harbour, W. S., Johnston, C. S., Daley, S. G., & Abarbanell, L. (2006). Universal design for learning in postsecondary education: Reflections on principles and their application. Journal of Postsecondary Education and Disability, 19, 135–151.

Schelly, C. L., Davies, P. L., & Spooner, C. L. (2011) Student perceptions of faculty implementation of universal design for learning. *Journal of Postsecondary Education & Disability, 24*, 17–30.

Scott, S. S., Loewen, G., Funckes, C., & Kroeger, S. (2003). Implementing universal design in higher education: Moving beyond the built environment. *Journal of Postsecondary Education and Disability*, *16*, 78–89.

Scott, S. S., Mc Guire, J. M., & Shaw, S. F. (2003). Universal design for instruction: A new paradigm for adult instruction in postsecondary education. *Remedial and Special Education*, *24*, 369–379.

Spooner, F., Baker, J. N., Harris, A. A., Delzell, L. A., & Browder, D. M. (2007). Effects of training in universal design for learning on lesson plan development. *Remedial & Special Education, 28*, 108–116.

West, E. A., Novak, D., & Mueller, C. (2016). Inclusive instructional practices used and their perceived importance by instructors. *Journal of Postsecondary Education and Disability, 29*, 363–374.

Yamamoto, K. K., Stodden, R. A., & Folk, E. D. R. (2014). Inclusive postsecondary education: Reimagining the transition trajectories of vocational rehabilitation clients with intellectual disabilities. *Journal of Vocational Rehabilitation, 40*, 59–71.

Table 1. Summary of the included articles

Title	Method & Participants	Instruments	Results	Discussion & Applications
Black, Weinberg, and Brodwin (2014)	Research method: Survey methodology Participants: 73 faculty members	• The format was based on a survey developed by Izzo, Murray, and Novak (2008). • Survey items included: Faculty characteristics, disability familiarity and attitudes and familiarity with universal design. • Survey response: Some items' response indicated attitudes; others indicated actions.	• Factors influencing attitudes toward instructional methods and universal design: Affiliated college, experience of teaching students with disabilities.	• Developing training opportunities may increase faculty knowledge and experiences with teaching students with disabilities.
Cook, Rumrill & Tankersley (2009)	Research method: Survey methodology Participants: 307 faculty members from 8-campus universities	*Faculty Priorities and Understanding Regarding College Students with Disabilities Scale* • Subscales: Legal issues, UDI, characteristics of specific disabilities, accommodations-willingness, accommodations, policy, and disability etiquette. • Survey response: Importance (attitudes) and agreement (actions).	The result related to UDL: • High-importance and high-agreement: Having high expectations for all students/making learning environment accessible. • High-importance and low-agreement: Being experienced with assistive technology/using different format to present materials/making course content easily understood/organizing course content/promoting reciprocal interaction in classrooms.	• A gap between attitudes and actual actions provided insight into the development of disability-related training. University faculty members were not proficient at implementing specific instructional practices based on UDI.
Dallas, Upton, & Sprong (2014)	Research method: Survey methodology Participants: 381 faculty members	*Inclusive Teaching Strategies Inventory* (ITSI) • Subscales: Multiple Means of Presentation/ Inclusive Lecture Strategies/Accommodations. • Survey response: Attitudes.	• Factors influencing attitudes toward Multiple Means of Presentation: Affiliated college and training experience.	• Service provider can use the information from the survey results to develop disability-related training. • Service providers can determine the training topics by investigating different demographic backgrounds of faculty.

Table 1. Summary of the included articles (continued)

Title	Method & Participants	Instruments	Results	Discussion & Applications
Dallas and Sprong (2015)	Research method: Survey methodology Participants: 397 faculty members	*Inclusive Teaching Strategies Inventory* (ITSI) • Subscales: Disability Laws and Concepts/Inclusive Lecture Strategies/ Accommodations/ Inclusive Assessment/Accessible Course Materials/ Inclusive Classroom, and/Course Modifications. • Survey response: Attitudes.	• Factors influencing attitudes: Number of students with disabilities taught, years of teaching experience, previous disability training.	• When designing professional training for faculty, service providers can use an instrument first, review the subscale scores and decide the training content. • Training sessions may start with an introduction of UD, focus on practical action steps and include students with disabilities as co-presenters. • Service providers can work with teaching experts or faculty to develop training sessions.
Dallas, Sprong, and Kluesner (2016)	Research method: Survey methodology Participants: 208 faculty members at university 1, 115 faculty members at university 2, and 99 faculty members at university 3	*Inclusive Teaching Strategies Inventory* (ITSI) • Subscales: Disability Laws and Concepts/Inclusive Lecture Strategies/ Accommodations/Campus Resources/Inclusive Assessment/Accessible Course Materials/Inclusive Classroom/Course Modifications. • Survey response: Attitudes and actions.	• Previous disability-related training positively affected attitudes and actions. • Faculty with positive attitudes toward inclusive teaching strategies are more willing to embed these practices into instruction. • There was no difference among the three universities.	• Faculty should be informed of training opportunities on different disability-related issues including UD-based practices. • The inconsistencies between actions and attitudes responses indicated that major changes are considered hard to fully implement, due to limited time, resources, knowledge and support. • Instructors review UD principles before implementation and make changes based on students' feedback.

Table 1. Summary of the included articles (continued)

Title	Method & Participants	Instruments	Results	Discussion & Applications
Gawronski, Kuk, and Lombardi (2016)	Research method: Survey methodology Participants: 179 faculty members	*Inclusive Teaching Strategies Inventory* (ITSI) • Subscale: Accommodation/ /Accessible Course Materials/Course Modifications/ Inclusive Lecture Strategies/Inclusive Classroom/Inclusive Assessment. • Survey response: Attitudes and actions.	• Factors influencing actions: Age and ethnicity. • Mixed results between attitudes and actions.	• It is necessary to know the barriers faculty encountered. • The comparison of the results between faculty and students generated a clear pattern in understanding the quality of education received by students and the needed training topics for faculty.
Hartsoe and Barclay (2017)	Research method: Survey methodology Participants: 179 faculty members	*Inclusive Teaching Strategies Inventory* (ITSI) • Subscale under three domains: Inclusive Classroom Strategies/Inclusive Lecture Strategies/ Accommodations/ Course Modifications/ Inclusive Assessment/ Accessible Course Materials/Disability Law/Campus Resources. • Survey response: One response to indicate their beliefs, confidence and knowledge.	• Factors influencing the results: Faculty ranking and gender.	• Service providers can provide training on UDI principles to help faculty expand the knowledge in UDI areas. Graduate program can promote UD strategies and encourage graduate students, who might be faculty, to use UDI in college teaching.

Table 1. Summary of the included articles (continued)

Title	Method & Participants	Instruments	Results	Discussion & Applications
Izzo, Murray, and Novak (2008)	Research method: Survey methodology and focus group Participants: 271 faculty members and teaching assistants	• Survey-22 questions regarding training topics and attitudes of teaching students with disabilities and using UD instructional practices. • Survey response: Some items' response indicated attitudes; others indicated actions. • Focus group topics: Experiences with students with disabilities/information requested by faculty or TA about disability and accommodations/perspectives about instructional practices/ other suggestions for enhancing learning experiences for students.	• 27% respondents stated that they wanted training on UDL. • Instructional methods used by respondents: 84% lecture, 71% class discussion and 66% critical thinking or problem-solving activities. • Themes from the results of focus groups: (a) uncertainty about handling the learning needs from a diverse student body, (b) instructional strategies used by TA and faculty to support students, (c) the need for training and technical assistance.	• Faculty and TA expressed needs for training on UDL topics. On-demand training is one of the options. • Some effective strategies have been identified. The strategies that have been suggested are related to UD concepts.
LaRocco and Wilken (2013)	Research method: Action research Participants: 46 faculty members	*CBAM (the Concerns Based Adoption Model)* • 18 questions. Questions were developed based on the three UDL principles and the nine guidelines. • Survey response: Stages of concern and levels of actions.	• More than half of the respondents reported that their stage of concern was how an innovative teaching strategy affects their preparation of a course. And their levels of actions were at an orientation level, meaning that they were nonusers of UDL.	• Disability-related training should help faculty understand why they need to learn effective teaching strategies and make a connection between classroom performance and teaching strategies.
Lombardi and Murray (2011)	Research method: Survey methodology Participants: 289 faculty members	*ExCel* • Subscales: Fairness in Providing Accommodations/ Knowledge of Law/ Adjustment of Course/ Minimizing Barriers/Campus Resources/Willingness to Invest Time/Accessibility of Course Materials/ Performance Expectations. • Survey response: Attitudes.	• Factors influencing faculty attitudes: Gender, professional rank, affiliated college, and prior training experiences.	• Service providers can use an instrument to investigate the areas of weaknesses and strengths of faculty and decide the needed topic in disability-related training. • An instrument can serve as a self-assessment for faculty to improve their teaching skills.

Table 1. Summary of the included articles (continued)

Title	Method & Participants	Instruments	Results	Discussion & Applications
Lombardi, Murray, and Dallas (2013)	Research method: Survey methodology Participants: 381 faculty members at university 1; 231 faculty members at university 2	*Inclusive Teaching Strategies Inventory* (ITSI) • Subscales: Accommodations/Accessible Course Materials/Course Modifications/Inclusive Lecture Strategies/Inclusive Classroom/Inclusive Assessment/Disability Laws and Concepts. • Survey response: Attitudes.	• Factors influencing faculty attitudes: Gender, different university contexts and prior training experiences.	• Training opportunities and resources can be disseminated through more and less intensive training. • An instrument can be served as a pre- and post-assessment to see the effect of a training opportunity. • Scenarios can be used as examples to guide faculty to implement strategies in a specific situation. • Service providers can collaborate with academic departments to design the faulty training program and provide faculty with incentives to join a training opportunity.

Lombardi, Murray, and Gerdes (2011)	Research method: Survey methodology Participants: 233 faculty members	*Inclusive Teaching Strategies Inventory* (ITSI) • Subscales: Multiple Means of Presentation/ Inclusive Lecture Strategies/ Accommodations/Campus Resources/Inclusive Assessment/Accessible Course Materials. • Survey response: Attitudes and actions.	• Comparison of attitudes and actions: Most faculty who reported positive attitudes toward instructional practices also implemented actions. Two subscales were exceptions: Accommodations and Inclusive Assessment. • Factors influencing attitudes: Gender, teaching status, and disability-related training, personal experience with people with disabilities. • Factors influencing actions: Gender and training opportunity.	• Faculty may consider the major modifications as compromising the integrity and standards of courses. • Disability-related training could be delivered in different ways, such as workshops, newsletters, website tools, and resources.

Table 1. Summary of the included articles (continued)

Title	Method & Participants	Instruments	Results	Discussion & Applications
Lombardi, Vukovic, and Sala-Bars (2015)	Research method: Survey methodology Participants: 231 faculty members at a single university in the U.S. 315 faculty members at a single university in Canada. 649 faculty members across 76 public and private universities in Spain.	*Inclusive Teaching Strategies Inventory* (ITSI) • Subscales: Accommodations/Accessible Course Materials/Course Modifications/Inclusive Lecture Strategies/Inclusive Classroom/Inclusive Assessment/Disability Laws and Concepts. • Survey response: Attitudes and actions.	Different results among the three countries: • The university in Canada had consistent results in attitudes and actions. • The universities in Spain and the U.S. had inconsistent results, meaning that faculty had high positive attitudes, but low actions in practices.	• An instrument, such as ITSI, can serve as a self-assessment to gain feedback from results. • Service providers can use an instrument prior to the planning of disability-related training.
West, Novak, and Mueller (2016)	Research method: Survey methodology Participants: 52 faculty members of college of education.	*Inclusive Teaching Strategies Inventory* (ITSI) • Subscales: Accommodations/ Accessible Course Materials/ Inclusive Lecture Strategies/ Inclusive Assessment/ Campus Resources/ Multiple Means of Presentation. • Survey response: Attitudes and actions.	• Inconsistent results in attitudes and actions responses: Actions over attitudes: Inclusive Lecture Strategies and Accessible Course Materials Attitudes over actions: Multiple Means of Presentation, Accommodations and Inclusive Assessment.	• Disability-related training may improve instructors' confidence and willingness to apply these vital instructional practices. • The concepts of UDL and accommodations are different and UDL should be more emphasized. • Services providers and instructors should collaborate to facilitate services. • Technology should be highlighted in the training processes.