*Transforming our World Through Design, Diversity and Education*
*G. Craddock et al. (Eds.)*


*doi:10.3233/978-1-61499-923-2-87*

# Making Learning Materials Accessible in Higher Education—Attitudes Among Technology Faculty Members

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**Abstract.** With the increasing popularity of digital technologies, more and more digital learning materials are available in education. However, making digital learning materials accessible to diverse students can be a challenging task. In higher education institutions, faculty members play a vital role in ensuring the accessibility of digital learning materials. This paper aims to provide a better understanding of the attitudes among faculty members towards this task by conducting a thematic analysis of 35 semi-structured interviews with computer science and engineering faculty members at four universities in Norway and Poland.

**Keywords.** learning materials, accessibility, higher education, thematic analysis

## 1. Introduction

The number of students with disabilities in higher education is increasing. Snyder and Dillow [1] estimated that individuals with disabilities constituted 11% of the college population in the US in 2011/2012, compared to 10% in 2007/2008. In the latest European Student Survey [2], an average of 18% of students in higher education reported having a disability (including chronic diseases).

In the European Disability Strategy 2010–2020 [3], education and training is one of eight priority areas; its aim is to promote equal access to quality education and lifelong learning. In 2018, Norway enacted a regulation connected to §18 of the Equality and Anti-Discrimination Act[2] which requires the universal design of learning platforms and digital learning materials[3]. In the US, Universal Design for Learning (UDL) [4] guidelines were included in the Higher Education Opportunity Act of 2008 [5].

Existing research has shown that accessibility barriers in learning platforms and learning materials prevent students from fully participating in higher education [6–8]. We argue that faculty members play a vital role in ensuring the accessibility of digital learning materials. However, the attitudes of faculty members towards these materials has not been sufficiently investigated. Published research on attitudes of faculty

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[2] https://lovdata.no/dokument/NLE/lov/2017-06-16-51
[3] Regulation on UD of ICT solutions, 2013 with changes in 2017 (in Norwegian): https://lovdata.no/dokument/SF/forskrift/2013-06-21-732

members towards students with disabilities and universal design in higher education are mostly quantitative studies [9–15]. The drawback of such studies is that they often do not adequately explain faculty members' attitudes.

As recent laws and regulations have focused on procurement, web accessibility and accessible learning platforms and digital learning materials, it is important to focus on faculty members' attitudes towards making learning materials accessible. This study aims to shed more light on this issue by carrying out interviews and thematic analysis. The results of this study will supplement previous quantitative studies by providing more insights into faculty attitudes and the challenges.

## 2. Methods

This study adopted a qualitative approach to understand the attitudes of faculty members. While previous quantitative studies have provided many insights into the attitudes of faculty members, they often oversimplify the complexities and experiences of individuals. For example, faculty members typically respond to questions using pre-defined categorical answers that do not allow them to clarify or communicate the finer subtleties and variations of their experiences. Qualitative methods, in contrast, allow the researcher to ask more general and open-ended questions that allow faculty members to tell their stories in their own words. Thus, the answers are more likely to reflect their thoughts, experiences, challenges and concerns more completely.

### *2.1. Participants and Data Collection*

Participants were primarily recruited through emails sent to computer science and engineering faculties. Black, Weinberg and Brodwin's [9] survey on attitudes and willingness to accommodate students with disabilities found that Colleges of Engineering, Computer Science, and Technology faculty had lower agreement ratings with statements regarding their comfort level with students with disabilities and showed more negative attitudes compared to faculty from other disciplines.

In Poland, 17 faculty members were recruited (1 female and 16 males), mainly from the computer science and electronic engineering departments. In Norway, 18 faculty members were recruited (5 females and 13 males), also mainly from computer science and complementary subjects. A semi-structured interview lasting from 8 to 36 minutes was conducted with each participant. All participants signed a consent form before being interviewed.

Participants were asked about their thoughts about and knowledge of laws, regulations and guidelines related to accessibility and universal design, their personal experiences, intentions and challenges with accommodating diverse students and implementing inclusion in higher education. At the time of this study, Poland did not have a national law or regulation concerning universal design or accessibility for all students. The participants from Poland were therefore asked whether they considered having such a law or regulation in their country would be useful. Norway had already implemented a law and regulations concerning universal design at the time the interviews took place, so participants from Norway were asked about their opinions on the usefulness of the existing law and regulations.

### 2.2. Data Analysis

All interviews were transcribed, and data were imported to Nvivo[4], a qualitative data analysis software. Transcripts were coded systematically, and initial codes were sorted into four main themes, as shown in Figure 1. The four main themes were attitude towards diverse people, general attitude towards inclusion, attitude towards law, and attitude towards taking care of diverse students and making learning materials accessible. These themes were then reviewed and discussed among the three researchers, who then determined four revised main themes and two subthemes (Figure 2): attitudes towards diverse students, general attitudes towards inclusion, attitudes towards laws and regulations and attitudes towards implementation, which included two subthemes: responsibility and necessity. After three iterations of reviewing, discussing and revising, the researchers settled on three main themes: attitudes towards student diversity and inclusion, attitudes towards laws and regulations related to accessibility and attitudes towards the implementation of accessible learning materials (Figure 3). Each of these themes has subthemes.

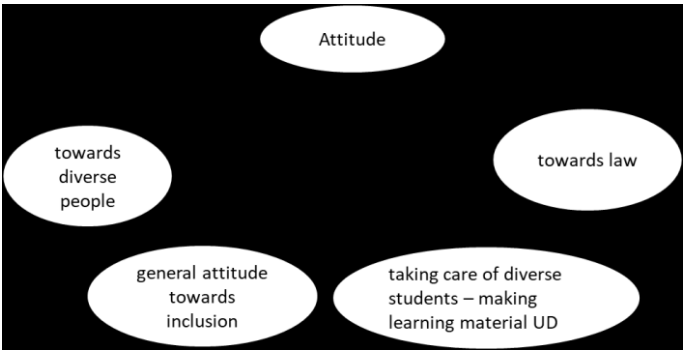


**Figure 1.** Initial four main themes, no subthemes.

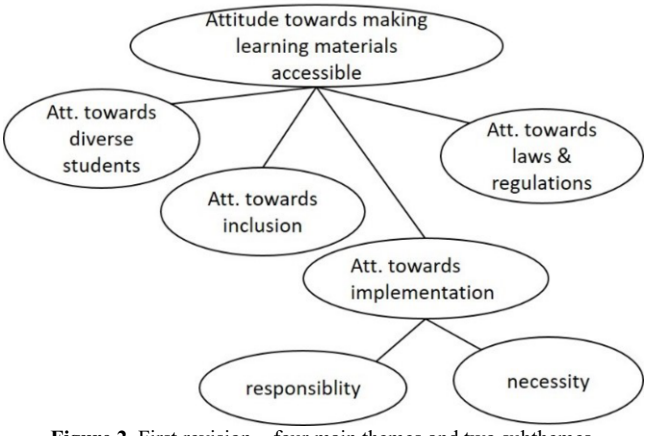


**Figure 2.** First revision—four main themes and two subthemes.

[4] Nvivo software, http://www.qsrinternational.com/nvivo/what-is-nvivo

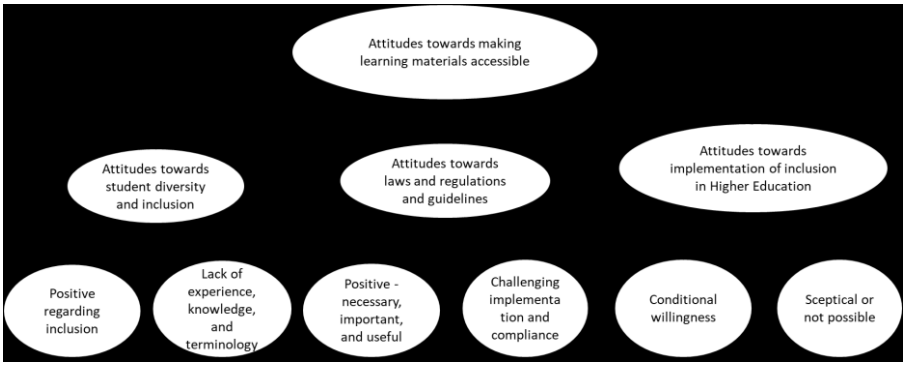


**Figure 3.** Final revision—three main themes.

## 3. Results

This section will describe the three main themes and their subthemes and exemplify them with quotations from the interviews.

### *3.1. Theme 1: Attitudes towards student diversity and inclusion*

Most faculty members seemed to view including diverse students in their courses positively. However, most had limited experience, little knowledge of assistive technologies and inadequate terminology when referring to students with disabilities. Many thought that students who are blind, partially sighted or have reduced motoric ability in hands and arms would find it difficult to participate in courses, especially practical courses with laboratory tasks. A few wondered whether they should advise such students to take other courses.

#### *3.1.1. Theme 1(a)—Positive towards inclusion*

Participants expressed generally positive attitudes towards student diversity and inclusion. When using these terms, most participants were referring to students with disabilities, but students with foreign language backgrounds and low Information and Communication Technology (ICT) skills were also included.

Some participants responded that no or little additional resources are required to teach disabled students. They said that students manage themselves or have other accommodations.

*"I wouldn't need to change much. I mean, only for very severe disabilities, like blindness …."*

Half of the participants reflected on possible solutions for including students with disabilities, and many believed that challenges could be solved as they occur. The teachers' most frequent attitude towards any problem solving was to ask the students themselves what accommodations they needed. A few, however, expressed the possibility of learning from experienced colleagues.

*"I would assume that for deaf persons, I think, most of the computer content is easily accessible. We don't need anything special unless we have, I don't know, video*

*instructions th[at] only just use captions—that would be it. For blind persons, it would be much more difficult because we would have to help them illuminate a lot of the visual interfaces and make the interfaces more easy to navigate."*

*"I suppose, I should be also more consistent of being communicative in both—written and oral implementation, because I tend to lean on the oral. So maybe I should write more in any case...for the hard of hearing it would be...would be helpful."*

*"…, if the student (blind) shows up, we have to find out how do we solve it."*

*"If they tell me they have a problem, I always try to help them out."*

*"I try to let people who have competence in how we do this, do it, and I just ask them what do I need to do."*

### *3.1.2. Theme 1(b)—Lack of experience, knowledge and appropriate terminology*

The participants' experience with diversity in student groups was rather limited. More than half of the participants seemed to lack experience in teaching students with disabilities, and some who had experience did not provide any accommodation in their learning materials.

*"Personally, I didn't meet any of these students, but I know in the other buildings there could be a few disabled students."*

*"I saw some disabled students at the university as well. However, I haven't met them personally, so I have no experience."*

*"The problem is that I didn't have any such students, so I'm not aware of the true barriers they could come across."*

Due to the lack of experience, some participants had incorrect assumptions and beliefs, especially towards students who are blind or deaf.

*"Blind people rather don't go for study with programming, yes? Because it's too hard for them, I think, it's my opinion."*

*"I think that It may be a problem with the…without seeing or…or hearing, yes. Because the courses are not…prepared for that, I think."*

*"if you have [a] seeing disability—that's an obvious challenge...I don't know. I suppose it wouldn't work at all."*

*"I wouldn't say blind because probably that will be a very hard task in some cases, to be able to study it at all."*

Some participants lacked appropriate terminology, such as using "*seeing disability*" to refer to people who are blind. Some used terminology that may be regarded as stigmatising. Mainly, the words created distance between "*them*" and "*us*". For example, "*this kind of people*" or "*such students*". When referring to disabilities, some used terms such as "*insufficiency*" and "*pathological*". One spoke of "*normal*" students, and another described a student as "*catastrophically disabled*".

### *3.2. Theme 2: Attitudes towards laws, regulations and guidelines*

A majority of the participants seemed to regard laws, regulations and guidelines as useful, important and even necessary, but some simultaneously expressed concern about how these may be implemented in practice and that there may be a lack of competence/knowledge or willingness to comply with legislation and guidelines. Some participants expressed an overall scepticism towards legislation and lawmakers in general, while other participants were unsure or neutral about questions concerning universal design and related legislation and guidelines.

### *3.2.1. Theme 2(a)—Positive: UD-legislation/regulation is necessary, important and useful*

Participants expressed an overall understanding of the necessity and importance of having laws and regulations in this area. Several participants expressed the opinion that legislation was important to ensure inclusion in society, and some also clearly expressed positive attitudes about this goal.

*"To adopt them for the widest possible groups of users, to ma[k]e them accessible to the widest possible groups of users. And from that point of view, it's really-really important..." [on adopting guidelines]*

*"information should be available to anyone. There is no question about that. It's not just a selective part of society that has to have access. They have to be accessible to anyone."*

Some participants expressed the opinion that legislation can foster awareness of the issues caused by lack of accessibility. Some also expressed the opinion that legislation is necessary to ensure equality and accessibility guidelines are actually implemented.

*"probably if there were no legislation, I would probably just skip it. Yes, I think it's […] important."*

*"politics, […], culture, ability, everything is—will differentiate us, so I feel that this is something that will kind of smudge that difference and—and that would help towards all kinds of equality."*

### *3.2.2. Theme 2(b)—Challenging implementation and compliance*

There were, however, also many participants who expressed concerns regarding challenges in the (practical) implementation of laws and regulations on software and ICT in general, as well as in producing software that it complies with the laws/regulations.

Some expressed concern that regulations and guidelines in general are difficult to comply with, indicating that this may be an aspect of the legislation or guideline (e.g., how clear or unclear it is.) There were also some expressions suggesting that people would find it hard or would be unwilling to abide by such a body of rules and that creating an effective law for universal design that people will comply with is close to impossible.

"*It's hard to implement a law which would react in real time and work and…solve universal problems because the law can create a concept of designing any kind of thing, but I'm not sure if this will work or be universal in the world…"*

*"The problem [with these regulations is] that sometimes they are difficult to comply with."*

*"But I don't know these guidelines, so I don't want to justify right now. I'm afraid it must be hard to stick by a set of rules which will help anybody. I think it's impossible."*

Some participants expressed concerns that complying with guidelines, laws and regulations may require significant additional work or time on the part of both developers and faculty members when it comes to digital learning materials, especially online content. Some opined that the usefulness/value of a law/regulation in this area might depend on the number of people using the materials.

*"I think that legislation would be good, but I don't have [the] time it will take to… to make it [work]."*

*"online content will require a lot of reworking to make everything fit the guidelines."*

*"I'm sceptical, and it's more work than actual…It would really depend on how many disabled persons we can expect to…want to use the material."*

Several participants indicated a lack of knowledge about the existing legislation and available guidelines in this area. Some also stated that there might be a general lack of awareness among people about the existence of such laws and guidelines and what the requirements are. They also expressed a belief in the need for competence when it comes to using the guidelines and how to make something universally designed or accessible, both digital learning materials and online contents. Overall, the participants that expressed a lack of knowledge or competence in this area also indicated some willingness to make an effort towards creating accessible learning materials. Some stated that they missed clear guidelines that they could follow to make their learning materials accessible.

*"I'm aware they exist, I'm not sure how… What are the actual rules and legalities, what are [the] guidelines, what are requirements by law? I'm not sure."*

*"Of course, it would be good to include such guidelines, but as I mentioned, people need to be aware of such guidelines, that such guidelines exist. And this is the problem."*

*"So, I think that [it's a] good thing to have legislation, but you can't have legislation without building competence. You need to know about th[ese] things. You need to go out and talk about them, encourage people and stuff like that."*

### *3.3.* Theme 3: Attitudes towards implementing inclusion in higher education

#### *3.3.1.* Theme 3(a): Conditional willingness

Nearly half of the participants expressed what we call "conditional willingness". They stated that they would consider aiming for inclusion in their courses if certain conditions were satisfied.

One of the conditions was that they needed to see the usefulness or necessity of making their course inclusive. For example, participants were willing to make an effort in implementation if they knew that there were students in the courses that needed accommodation.

*"Yes, of course. If I would have only… [known a] student that would need it for sure, I can spend more time to prepare… Or when I will have to create the new materials, I will just try to make it...universal design principle."*

*"I think you would just have to ask. I would not make my course in general, so that...every course could be taken by a blind student, and I think there are so few that allowed that, if the student shows up, we have to find out how do we solve it. "*

Another condition was that there would be available help or infrastructure. Participants were willing to contribute to inclusion in their courses, but others such as assistants, course designers or university infrastructure must be available or involved in making changes.

*"But, as far as I know, I think a lot of them have the right to a student assistant to be with them at all times. So, I guess I would have a conversation meeting with the three of them to kind of learn more and figure more about what— what do they need from me and—and how could I maybe—would just get feedback or suggestions about how to ease their experience as a student."*

*"If I get a student who is blind and would need help I guess I don't have to talk, eh? First, I would probably talk to the administration about how to help if you have any routines on it. If we don't have [any routines], I would actually talk to the student and [ask] what I can do for that student to be helpful to whatever he needs."*

*"I don't know how to…no, I don't…I just try to help from case to case. So, my attitude is that we should try to include all. But I don't have any. I try to let people who have competence in how we do this, do it, and I just ask them what do I need to do."*

*3.3.2.* Theme 3(b): Sceptical or not possible

More than half of the participants appeared sceptical or thought that implementation is not possible. Participants talked about not knowing any students who needed accommodation or worrying about the costs involved in making the learning materials in their courses inclusive.

*"If something has a high probability of being used by blind persons, then—yes, do that, especially public websites, government websites, things like that. But just for course materials, that would never…probably would never have a blind student. I would say it's too much time to waste on it… It may [not be] very politically correct."*

*"Honestly, no, because I haven't, I haven't had students with disabilities."*

*"I haven't really seen the need. Maybe I'm wrong, but for the moment I don't."*

Participants also talked about subject matter and class situations that did not allow for accommodation or made accommodation difficult. For example, some mentioned the equipment, software and activities in their courses and expressed concern that the lab or software tools used were not designed to be accessible or that the course activities were not suitable for students with disabilities.

*"In the case of this digital systems laboratory, it would be difficult."*

*"This device is not really intended to be operated by people with disabilities."*

*"It will be very hard when it comes to this software."*

*"It's quite difficult because my courses now are quite…quite practical, [it]…could be quite dangerous for people like this"*

In addition, quite a few participants did not believe that they carried part of the responsibility for implementing inclusion in higher education. They thought that the responsibility resided in the special section, student assistants or course designers; their job was to teach, and inclusion did not concern them.

*"It…didn't affect me, and [I] just knew that there was some special arrangement for these students. So… I…My job was to do the same…teaching."*

## 4. Discussion

This study found that attitudes among technology faculty varied depending on prior experiences with and knowledge of diverse students, awareness and knowledge of relevant laws and regulations and their requirements, and knowledge and skills on how to provide adequate accommodation and accessible learning materials.

Further, these findings reveal that education and training are vital to increase awareness and knowledge and decrease attitudinal barriers. This outcome confirms the findings from a number of quantitative studies, including Leyser and Greenberge [16], Brown, Welsh, Hill and Cipko [17], Black, Weinberg and Brodwin [9], and Murray, Lombardi, Wren and Keys [18]. The study by Brown, Welsh, Hill and Cipko [17]

found that teachers who received training had increased awareness of inclusion terminology compared to the control group. Our study also found a lack of adequate inclusion terminology among faculty members. For example, some participants referred to students with disabilities as "*seeing disabilities*", and "*this kind of people*". Murray, Lombardi, Wren and Keys [18] found that faculty who received prior training reported more positive attitudes towards students with disabilities and were more willing to accommodate them. However, despite the positive benefits associated with faculty training, findings from published research also indicate that most higher education institutions devote limited resources to faculty training in this area [13, 19]. A recent qualitative study on the experiences of students with disabilities in professional courses within higher education in Norway revealed a "lack of knowledge about disabilities and the time to work out solutions" among faculty members [20].

Therefore, although most of the participants in the study showed some understanding of universal design, they still held a traditional case-by-case approach for accommodation—students must first identify themselves as disabled, request specific accommodation and wait for accommodation to be implemented—rather than including accessibility considerations as an integral component of the pedagogical planning of courses and programs [20, 21].

## 5. Conclusion

This study identified the range of attitudes of faculty members in computer science and engineering in Poland and Norway towards making learning materials accessible in higher education. Attitudes impact judgements and behaviours [22]; thus, understanding the attitudes of faculty members has the potential to inform university policies and strategies to support the inclusion and accommodation of diverse students.

The faculty members had generally positive attitudes towards accommodating diverse students in their teaching and making digital learning materials accessible if necessary. Most were aware of the laws and regulations related to accessibility. However, many lacked experience with student diversity and utilised inadequate terminology when discussing diverse students. They also expressed scepticism about practical application and what we identified as "conditional willingness" due to lack of experience, know-how and infrastructure in their universities. Therefore, it is possible that the exclusion of students from courses and learning materials is not due to intentional discrimination but rather to a lack of knowledge, experience and support from the university on how to properly include diverse students by understanding their needs and the barriers they face and providing appropriate accommodations in advance.

In the UN Convention on the Rights of Persons with Disabilities[5], the importance of accessibility to education is emphasised in the Preamble[6]. Article 24 on Education emphasises (in points 4 and 5) the obligation of the States Parties to the Convention to ensure equal access to tertiary education (higher education), as well as to ensure actualisation of the right to education. One of the measures mentioned in point five of

[5] UN Convention on the Rights of People with Disabilities (CRPD), https://www.un.org/development/desa/disabilities/convention-on-the-rights-of-persons-with-disabilities.html

[6] Preamble, UN CRPD, https://www.un.org/development/desa/disabilities/convention-on-the-rights-of-persons-with-disabilities/preamble.html

Article 24[7] is the training of staff in disability awareness and "the use of appropriate augmentative and alternative modes, means and formats of communication, educational techniques and materials to support persons with disabilities". We argue that higher education institutions should have a policy on digital accessibility and allocate time and resources for faculty members to learn about inclusion and how to make learning materials accessible.

## References

[1] T. D. Snyder, and S. A. Dillow, *Digest of Educational Statistics 2013 (NCSE 2015-11)*, National Center for Educational Statistics, Institute of Educational Sciences, Washington, DC, 2015.
[2] K. Hauschildt, E. M. Vöglte, and C. Gwosć, " Social and Economic Conditions of Student Life in Europe. ," *Eurostudent VI 2016-2018 Synopsis of Indicators*, W. Bertelsmann Verlag GmbH & Co., 2018.
[3] European Commission, *European Disability Strategy 2010-2020*, Retrieved from http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:0636:FIN:en:PDF.
[4] D. H. Rose, W. S. Harbour, C. S. Johnston *et al.*, "Universal Design for Learning in Postsecondary Education: Reflections on Principles and their Application," *Journal of Postsecondary Education and Disability,* vol. 19, no. 2, pp. 135-151, 2006.
[5] Higher Education Opportunity Act. Retrieved from https://www.gpo.gov/fdsys/pkg/PLAW-110publ315/html/PLAW-110publ315.htm.
[6] M. Kent, "Disability and eLearning: Opportunities and Barriers," *Disability Studies Quarterly,* vol. 35, no. 1, 2015.
[7] D. Sachs, and N. Schreuer, "Inclusion of Students With Disabilities in Higher Education: Performance and Participation in Student Experiences," *Disability Studies Quarterly,* vol. 31, no. 2, 2011.
[8] J. Seale, "When digital capital is not enough: reconsidering the lives of disabled university students," *Learning Media and Technology,* vol. 38, no. 3, pp. 256-269, 2013.
[9] R. D. Black, L. A. Weinberg, and M. G. Brodwin, "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,* vol. 24, pp. 48-64, 2014.
[10] B. K. Dallas, and M. E. Sprong, "Assessing faculty attitudes toward universal design instructional techniques," *Journal of Applied Rehabilitation Counseling,* vol. 46, no. 4, pp. 18-28, 2015.
[11] J. K. Hartsoe, and S. R. Barclay, "Universal Design and Disability: Assessing Faculty Beliefs, Knowledge, and Confidence in Universal Design for Instruction," *Journal of Postsecondary Education and Disability,* vol. 30, no. 3, pp. 223-236, 2017.
[12] A. R. Lombardi, and C. Murray, "Measuring university faculty attitudes toward disability: Willingness to accommodate and adopt Universal Design principles," *Journal of Vocational Rehabilitation,* vol. 34, no. 1, pp. 43-56, 2011.
[13] A. Lombardi, C. Murray, and B. Dallas, "University Faculty Attitudes toward Disability and Inclusive Instruction: Comparing Two Institutions," *Journal of Postsecondary Education and Disability,* vol. 26, no. 3, pp. 221-232, 2013.
[14] A. R. Lombardi, C. Murray, and H. Gerdes, "College faculty and inclusive instruction: Self-reported attitudes and actions pertaining to Universal Design," *Journal of Diversity in Higher Education,* vol. 4, no. 4, pp. 250-261, 2011.
[15] A. Lombardi, and I. Sala-Bars, "An international examination of postsecondary faculty attitudes and actions toward inclusive
[16] instruction: Comparing the United States and Spain," in The 8th International Conference on Higher Education and Disability, Innsbruck, Austria, 2013.
[17] Y. Leyser, and G. L., "College Students with Disabilities in Teacher Education: Faculty Attitudes and Practices," *European Journal of Special Needs Education,* vol. 23, no. 3, pp. 237–251, 2008.
[18] K. S. Brown, L. A. Welsh, K. H. Hill *et al.*, "The efficacy of embedding special education instruction in teacher preparation programs in the United States," *Teaching and Teacher Education,* vol. 24, no. 8, pp. 2087-2094, 2008.

[7] Article 24, UN CRPD, https://www.un.org/development/desa/disabilities/convention-on-the-rights-of-persons-with-disabilities/article-24-education.html

[19] C. Murray, A. Lombardi, C. T. Wren *et al.*, "Associations between prior disability-focused training and disability-related attitudes and perceptions among university faculty," *Learning Disability Quarterly,* vol. 32, no. 2, pp. 87-100, 2009.
[20] K. Raue, and L. Lewis, "Students with disabilities at degree-granting postsecondary institutions. (NCES-2011-018)," U.S. Department of Education, National, Center for Education Statistics, 2011.
[21] E. Langørgen, and E. Magnus, "We are just ordinary people working hard to reach our goals! Disabled students participation in Norwegian higher education," *Disability and Society,* vol. 33, no. 4, pp. 598-617, 2018.
[22] P. Silver, A. Bourke, and K. C. Strehorn, "Universal Instructional Design in Higher Education: An Approach for Inclusion," *Equity & Excellence,* vol. 31, no. 2, pp. 47-51, 1998.
[23] R. E. Petty, D. T. Wegener, and L. R. Fabrigar, "Attitudes and attitude change," *Annual Review of Psychology,* vol. 48, pp. 609-647, 1997.