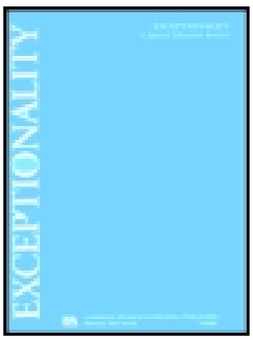

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ABSTRACT

This article is based on a previous Spanish study, which aimed to analyze the existence of barriers and aid for 44 students with disabilities enrolled at University. A qualitative methodology was used to collect data. The results analyze both the support and the obstacles provided by new technologies, the opinion students have of technologies in education, and how they affect their academic lives. Some of the training requirements of the faculty members regarding the pedagogical use of these technologies are also described. The conclusions display the university as an institution with potential for improvement, where certain technological limitations persist, thus leading one to believe that as an institution, it must exercise self-criticism and implement measures to facilitate an inclusive education.

Introduction

A significant number of universities have included the principles of inclusive education in their agendas and policies. It is necessary to incorporate inclusive practices in Higher Education (HE) (Claiborne, Cornforth, Gibson, & Smith, 2010; Foreman, Dempsey, Robinson, & Manning, 2001; Hopkins, 2011; Jacklin, Robinson, O'Meara, & Harris, 2007; Moriña, López, & Molina, 2015; Prowse, 2009). This model accepts the need for a quality educational response for all students by eliminating barriers that cause exclusion, but within a framework of justice and equality (Lawrence-Brown & Sapon-Shevin, 2013).

In Spain, there are approximately 22,000 students with a disability registered at the university. One ongoing reality of universities in Spain—as in other international contexts—is the growing number of such students (Hadjikakou & Hartas, 2008; Sakız & Sarıcal, 2017). This fact could be explained by legislative changes regarding disability and HE. Noteworthy legislation includes the 2006 Convention on the Rights of Persons with Disabilities and the 1992 Disability Discrimination Act in Australia as well as the Americans with Disabilities Act, passed in 1990 in the United States. Other important laws are the 1995 Disability Discrimination Act passed in the United Kingdom, the Special Educational Needs and Disability Act of 2001, and the 2005 Disability Discrimination Act. In Spain, this right has also been legislated by Royal Decree 1/2013 regarding the rights of people with disabilities and their social inclusion. In the case of the university, the current Organic Law 4/2007 for Universities specifically mentions the inclusion of people with disabilities to guarantee equal opportunities and nondiscrimination. Other elements that support this reality include the incorporation of inclusive educational principles into all university policies and practices, the creation of support offices for these students, the use of Information and Communication Technologies (ICT), and the incorporation of accessible programs and computer services.

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When it comes to students with disabilities, studies reveal that inclusion contributes to building a better university (Moriña, 2017; Shaw, 2009). This is because it obliges universities to introduce improvements in order to respond proactively to student needs. Further, it has been concluded that the changes implemented for university students with a disability benefit the entire student body (Powney, 2002; Shaw, 2009; Warren, 2002). As stated by Ferni and Henning (2006), good teaching principles are relevant for all.

Based on the experiences of students with disabilities at the university, the research results in a variety of countries indicated that experiences of these students are not always positive. The university system is one of the less inclusive institutions for students with disabilities, both regarding initial access to courses and in terms of encouraging them to remain there for the time required to complete their degree (Fuller, Bradley, & Healey, 2004; Moswela & Mukhopadhyay, 2011; Nielsen, 2001; Richardson, 2009; Riddell & Weedon, 2014; Ryan & Struhs, 2004; Seale, 2017; Shevlin, Kenny, & Mcneela, 2004). As these studies explain, despite the existence of anti-discrimination legislation, this specific student body encounters significant barriers that hinder their participation and learning process. Participation in HE environments is, in many cases, limited by inaccessible curriculum, the negative attitudes of the faculty members and architectural barriers (Ferni & Henning, 2006; Oliver & Barnes, 2010). Adams and Holland (2006) explained that students with a disability face additional barriers that become visible when they decide to further their education beyond legally established minimal requirements. In some cases, their HE experiences differ from the "typical" university experience due to additional obstacles and challenges they must overcome (rigid curricula, refusal to make reasonable adjustments and non-accessible materials, among others). Some of these challenges are marked by the negative perception that students have about their own disability (Roberts, Crittenden, & Crittenden, 2011). Consequently, these students state that they have to work harder than others because in addition to managing their own disability they have to study (Seale, Georgeson, Mamas, & Swain, 2015).

The new educational model—whether in Spain or abroad—many universities are building is an awareness of the need to invest and develop technologies for learning and knowledge. In fact, there is growing evidence that most universities use emerging technologies (technological platforms, digital whiteboards, etc.) combined with on-site and virtual teaching (Roberts et al., 2011). In the case of students with a disability, many studies confirm that ICTs (e.g., tools as JAWS, Windows eyes and Braille notes for test taking, essay writing and note taking) favor their inclusion (Hadjikakou & Hartas, 2008; Pearson & Koppi, 2006; Seale, 2006; Wang, 2014).

The predominating educational discourse seen in scientific literature concerning technology and disability focuses on the idea that ICTs are resources that generate real access situations for an inclusive education, both in virtual and in-class environments. Specifically, e-learning (electronic learning) and m-learning (mobile learning) could surpass obstacles and create opportunities that facilitate inclusive and balanced education (Seale, 2006). Both types of learning benefit students, for example, by providing them with opportunities to customize their learning process and offering a greater degree of flexibility, since they do not have to actually be present in the classroom in order to engage in different learning activities. This new framework, deduced from the underlying pedagogical model from technologies for education, appears as an opportunity for people with disabilities to access education, thus responding to their needs and demands. This is a more adequate way to overcome the obstacles encountered in traditional learning systems (Freire, Linhalis, Bianchini, Fortes, & Pimentel, 2010).

One must recognize the importance of these new environments that motivate resistance among both university instructors and students who are not prepared for the technological change (Van Jaarsveldt & Ndeya-Ndereya, 2015). In many university contexts, technology is used little while in other cases, it is employed inadequately. Therefore, it is necessary to pursue the appropriateness of using ICTs in HE and the help that such resources offer students with disabilities. In the specific context of e-learning, it is considered enriching and beneficial, both for the curriculum and students

with disabilities, especially in those cases where physical presence is complex (Forman, Nyatanga, & Rich, 2002; Pearson & Koppi, 2006; Seale, 2006).

In many cases, the inaccessible designs of technological resources and environments hinder the full participation of students (Seale et al., 2015). Thus, in the studies by Burgstahler, Corrigan, and McCarter (2004) and Claiborne and colleagues (2010), they all indicated that even when these university students obtained the necessary technical aid, this was not always sufficient. The students pointed out the constant barriers that they have to face. As an example, they pointed out a lack of accessibility to websites and virtual resources or failure to use the digital white board, even if there was one in the classroom.

An additional difficulty, apart from the need for accessibility to technological resources, is the fact that the teaching staff, in many cases, is not trained to use such resources. In other cases, when these resources are provided, they are left unused. Several studies have reported that this lack of training on behalf of the faculty could become a methodological obstacle and a significant educational barrier for students (Claiborne et al., 2010). Along this same line, the success of other methods with specific accessibility tools for students with disabilities, as some studies indicate, not only depends upon their technical nature (Freire et al., 2010) but also on pedagogical factors (Seale & Cooper, 2010).

These findings lead us to think that it is not enough to have technological resources at the university, but that it is essential for instructors to be trained and willing to use them. Moreover, the implementation of these resources should be based on accessibility and universal design, as this is a learning opportunity for all. Accessibility must be considered in the learning design process (Burgstahler et al., 2004). In fact, the United Nations Convention on the Rights of Persons with Disabilities (2006) has contemplated that universal design and accessibility is a fundamental principle for people's quality of life.

Universal accessibility, as described by Powell (2013) or Watchorn, Larkin, Ang, and Hitch (2013), is the condition that environments, processes, goods, products, and services must meet. The same holds true for objects, instruments, tools, and equipment, which must be understandable, usable, and practicable for everyone to offer easy-to-use and safe conditions and in a way that is as independent and natural as possible. In this sense, the idea of "designing for all" is presupposed. If we adopt this idea, both products and environments must be designed to be used by everyone, with no need for adaption or specific design (Connell et al., 1997; Mace, 1997; Preiser & Smith, 2011).

This idea is extrapolated into the universal learning design, which as Powell (2013) explained, is a viewpoint that focuses on teaching, learning, and other relative processes, such as assessment. Assessment is fundamental, both in research within the learning processes as well as with ICTs, to respond to the various individuals when learning. From the very beginning, a universally designed syllabus is calculated to try and satisfy the educational needs of a greater number of students, thus making it unnecessary to invest in costly changes in the general curriculum once it has been designed "for some."

Last, it is noteworthy to consider that the universal learning design is not applied only to the case of students with disabilities. Rather, it extends to the entire student body. In this regard, Fuller and colleagues (2009) and Pliner and Johnson (2004) verified that the measures taken for the former benefit the latter.

Methodological design

This study is part of a larger research project funded by Spain's Ministry of Economy and Competitiveness titled, "University Barriers and Aids Identified by Students with Disabilities" (ref. EDU 2010–16264). This four-year study (2011–2015) is being undertaken by a research team comprised of University of Seville faculty members from various areas and fields of knowledge (Education Sciences, Economic Sciences, Health Sciences and Experimental Sciences).

Objective

The objective of this research is to study the barriers and aid that students with disabilities identify when accessing the university, as they study and their final results. This work focuses on analyzing the technological resource supports and obstacles that university students with disabilities identified in university classrooms.

Participants

Forty-four students with some type of disability participated in the study, all of whom were registered at the university. These students ranged from 19 to 59 years of age with a median age of 24 years. Of these, half were men and the other half were women. Twenty-five percent of them were in their first year of undergraduate studies, 16% were in their second year, 25% in their third year, 14% in their fourth year, and 9% in their fifth. The rest were postgraduate students in official Master's Degree programs. Finally, their disabilities, as cataloged by this university, corresponded to 38% with physical disabilities, 15% with psychological disabilities,[1] 36% with sensory disabilities, and 11% had some type of health-related issues (asthma, degenerative diseases).

Data collection

A qualitative methodology was used to collect data over a period of three years. Four data collection instruments were used: focus groups, lifeline[2] (visual descriptions of an individual's life events in chronological order), focus interviews (interviews focusing on critical incidents in a person's life), self-reports (this is a document in which the actual participant in the research narrates, in first person, what he/she considers most significant to the topic under study: his/her university life history), and interviews with other participants.

Data analysis

All of the information collected from the participants was compared using a structural analysis (Riessman, 2008) based on a system of categories and codes as proposal by Miles and Huberman (1994). The MaxQDA10 data analysis program was used.

Ethical considerations

All participants provided informed, written consent to participate in the study. Participants were guaranteed anonymity and confidentiality of all information provided. All participants were informed that they were free to withdraw at any point in the study, in which case, their data would not be taken into consideration for the analysis and all information would be eliminated. Another aspect contemplated referred to their co-participation in the research process. All students were invited to participate in the decision-making of the actual research process (i.e., negotiating all the different phases, reviewing the transcribed data and participating in the compilation of the resulting reports). Thus, they all participated in the design of the instruments used to collect the data and in the analysis. For example, in the interview with other informants, the students themselves decided who we should interview in order to gain a more comprehensive overview of their entire university experience. It was also the students themselves who decided upon and drafted the questions we asked them about their academic life.

[1]For example, at the university studied, students with ADHD are included in the group of those with psychological disabilities. However, at this same university, those with learning difficulties are not considered to have a disability, and are not therefore included in the statistics.

[2]For further information on this technique, consult Berens (2011).

Results

This section of the article presents the results about the technological aid and barriers as identified by university students with disabilities. These topics were naturally categorized based on student responses regarding the use of ICTs in HE. In the analysis, the perceptions of the students regarding the conception they have about educational technology is covered, as well as the use of said technology and how it affects their academic lives. The role of university instructors and their efforts with educational technology is then reviewed, as well as how they use this technology to face the every-day educational needs of their students with disabilities. Later, some of the training needs for the pedagogical use of technologies in the classroom are described. Finally, the university is shown as a potentially improvable environment where certain technological limitations and aids coexist.

Educational technology to guarantee learning

Students participating in this study recognized the potential of educational technologies and praised the multiple possibilities that these resources offer. For example, the most commonly-used ICT tool was the Blackboard technology platform, along with office software programs for compiling study materials and class presentations. Students also reported using the digital blackboard on occasions. Nevertheless, they criticized the way in which these technologies were used by the faculty members, as well as the experienced-based classes designed with such technology. Consequently, instructors have a functional and utilitarian concept of these didactic resources despite the fact that real hands-on-experience with them could be improved greatly.

> *"I must point out the relevance that new technologies have for people with disabilities. In my case, if it weren't for them, I could neither study nor work" RSE8, Social-Economic Science.*

In general, students expressed a positive opinion towards the fact that their subjects were backed by technological resources. They emphasized that these resources favored their inclusion at the university. In the wider sense, such resources were considered very helpful as they facilitated and contributed to improving their learning experience. Precisely, one of the implications derived from the use of educational technologies in the classroom is that it motivated students more and they paid greater attention to learning the subjects.

A clear image of teaching in the cloudy reflection of educational technology

University students with disabilities indicated that technological barriers arose in diverse ways. Given the importance of technology in the learning process of these students, two difficulties were identified by participants in relation to faculty members. The first is a lack of knowledge among faculty regarding the needs of students with disabilities, which prevents them from making effective use of educational technology. The second is attributed to a lack, and in some cases inexistence, of pedagogical training in technology.

Regarding the first of the problems identified, the faculty's academic activity in the field of educational technology was not oriented towards students with disabilities. This was not only evidenced in the syllabus that hardly included any reference to diversity. It was also notorious the way in which technological resources were used. The above indicated that the teaching practice was stagnated in a traditional teaching concept in which students with disabilities were, by nature, an unknown figure.

> *Well, I started out really excited, but when I got into computer science, I ended up being traumatized and disheartened because I realized that I could never do what the others did. But for the most part, due to visual inconveniences, I was unable to follow the subjects in class" RS5, Social-Economic Science.*

The lack of attention and the indifference towards this issue led to serious consequences for accessibility in technology. A lack of concern and commitment toward students with disabilities was a breeding ground for the predominance of traditional methodology; this being a generalized custom of providing downloadable study material without adapting it to minimal requirements of the new visual environments for quality education.

> *If a university has created something as important as virtual learning, then it has to be aware of its accessibility to everyone, including blind students, because it is very important. […]…I, however, have spent a lot of time saying 'let's see if I can get in here or there,' because I really didn't know if it was a computer problem or maybe I didn't read something, or I didn't know where something was" RSE8, Social-Economic Science.*

This idea goes hand in hand with another basic problem, which is linked to the lack of concern on behalf of academic staff to receive the necessary training to be updated and current about how to use technologies to improve diversity-oriented teaching and learning. Many students thought that it was a matter of investing time, in addition to the actual preparation demanded by certain class materials, which was of little interest to the faculty.

> *So, I actually have it at College as well but I run into that too, but nobody uses it and the university instructor say that no, so much virtual teaching… that I am (the instructor) not willing to constantly be taking training courses. Hey, there are solutions! The problem is that I understand that it is dreadful to have to learn it, but what for you is the slightest effort, for me it is my life. For me, it is a matter of being able or not being able to attain my objectives. The thing is that they believe—that is the feeling I get—that we ask for the sake of asking. I'm not asking for the sake of it; I'm asking because I can't (do it)" RTE4, Experimental Sciences.*

Similarly, there is a clear and growing need for training willing educators, with good judgment, to participate in the review of spaces and materials that need to be adapted in an effort to provide specific and guaranteed responses. It is commonplace to find class notes, activities and exams with inaccessible formats for certain software usually used by students, even when available for downloading.

> *They don't even meet up to standards, and let's not talk about implementing something new. But for example, in terms of platform subjects, in virtual teaching where a visor appears, then a document in pdf; you put it in there, the student can't download it, but you can't do anything else either, and it is visible in really small font—RTE8, Experimental. Sciences*

In practice, from the students' point of view, accessibility was understood in its most primary sense, equaling it to the term "availability." However, availability of material—in some cases poorly organized—does not mean that the student can effectively and efficiently use it. That is why students with disabilities usually take charge of the task of making the material truly accessible. This fact translated into tremendous amounts of time and efforts being invested in inaccessible technology.

One of the consequences derived from this type of technological barrier was the search for immediate solutions using non-technological alternative resources. The first and most important of such resources was the support of a group of classmates. Another resource mentioned by students with visual disabilities was the library; although this failed to quickly solve the problems associated with reading paper publications—for their own ease, they usually scanned the material digitally—at least it covered the need to have study contents.

> *Because I was unable to surpass the objectives well. I've had to seek out other help, from classmates, from…the truth is that I shouldn't have had to look for them—RSP3, Social-Education Science*

The need for training in the technical and pedagogical use of technology

The reality of education is highly complex and on occasions, training is critical to transform unfavorable situations into appropriate solutions. One of the barriers generating major controversy refers to the training of academic staff. Specifically, in this study, based on the comments of the participating students, most of the problems identified originated in insufficient preparation on

behalf of the faculty. This could be corrected with training that focuses on skills and a command of technological-pedagogical knowledge of contents for good teaching practices. Improved training of university instructors would minimize the efforts exerted by students with disabilities. It is understood that the barriers detected impact the entire student body, although their effects are adverse and potentially greater among students with disabilities. Therefore, academic staff would be required to have technical and pedagogical training to achieve inclusive teaching.

> *In my case, for example, I greatly appreciate the instructor who uses various methods to get the learning message across. If I, for example, have greater visual memory, then I can take advantage of it. If I have greater auditive memory, well then I exploit it. If I am emailed different exercises that help me see the subject differently than how it is presented in the book, I appreciate that. I appreciate the instructor who wants learning to reach the student, not the type that says 'I go to my class, bore them with the details, and I'm off'.—RCS1, Health Sciences*

Nonetheless, cases of instructors who were examples of good educational technology practices were also found. They were innovative in methodological terms, while satisfactorily solving multiple environments with technology. For example, some faculty members sent students class notes by email on request, held online tutorials so that the student did not have to travel and developed accessible materials.

> *There was one instructor who had more training in ICTs and who helped me more than any other instructor. When he learned about my difficulty, he made sure that before presenting any topic in class he made it available to me, i.e. he sent me his notes beforehand by email. He also took the time to adapt the materials so that my computer program would be compatible with them and I could read them without any problem. And he did all this almost right from the start of the year, so I could make the most of all his classes.—RH6, Humanities*

In terms of using educational technology, most of the academic staff based their training proposals on technological learning platforms. Nevertheless, some used more than one and on occasion, how these were used was quite questionable. Not all students were aware of their faculty having used technological tools. Thus, their use of technology was very elemental.

In general, participation and interaction aimed at the social construction of knowledge were not fostered in the environments generated using technological resources. The limited use of certain communication tools (online forum and chat) making up technological platforms and a lack of protocols oriented toward the effective use of said platforms are another problem. It was one of the many consequences associated with the idea that the teaching model would remain anchored in traditional educational focuses.

There were also cases of subjects where an interactive use of the platform was restrained. While members of the faculty hardly used the communication tools integrated into the platform (forums, wikis, chats, etc.), it did facilitate the interaction among classmates and their instructors. When used, students debated the amount of time dedicated to reading the messages received and then drafting their own contributions. In this sense, the work uploaded onto the platform failed to supplement face-to-face class time; rather, it demanded greater dedication on behalf of the student. At the end of the day, it translated into more work than they desired.

> *The instructors incorporated interaction with forums, with activities that are sent through platform. In addition to the fact that you have to go to class, if you now have to keep an eye on the virtual teaching for nine subjects and each subject has a forum, on any given day, you're sent thirty messages, and they send an activity, you have to spend half of the day on the virtual platform.—RTE4, Experimental Sciences*

Another cause, indicated by those studying technological barriers, was linked to a lack of didactic orientation that reinforces an integrated methodology with the platforms. The full integration of educational technologies in the classroom was not a defined reality. Very few university instructors offered practices in which technological resources were part of the syllabus and used as an authentic pedagogical resource. For many students, virtual teaching was nothing more than a ruse that added no real value to face-to-face learning. Its presence only served to develop inappropriate practices that

simply helped instructors to justify the use of technology within a context where such resources signified the possibility of innovating.

> *They teach; they say go to the virtual subject, go to such-and-such a place, or do what you have to do… and they send the exam and the finished work or whatever. But then, really, it's not used; there is no dialog on the subject blog… Only three subjects while studying my degree used the virtual platform—RH2, Humanities*

In other academic activities, such as tutoring, for example, another problem identified was the fact that faculty did not make use of communication technologies to respond to queries posed by students with disabilities in accordance with a more flexible timetable and with no space-related limitations. Considering the potential of technology and its benefits for teaching, tutoring continued to be neglected.

This lack of commitment, as explained previously, was perceived by students with disabilities in faculty members, who felt that this was not a vehicle to attend, counsel and solve certain difficulties and demands linked to the disability of their students. With the odd exception, the easiest solution for university instructors continued to be the usage of platforms to transmit contents and documents, more than generating an integrated space for significant and collaborative learning.

Tearing down institutional barriers to open accessible learning routes

For the most part, the barriers identified at the university were found in various environments. Among the technological resources with a greater specific weight for students, the university virtual platform continued to be assessed as scarcely accessible. For the most part, the information presented by the instructors was exempt of format and designs catering to the specific needs of these students, in addition to functioning poorly. There was no greater intention than to provide and publish downloadable study materials. In this sense, following simple parameters would be recommended; for example, materials need to be more textual and less graphic so that the reading program for those with a vision disability could be used properly.

One of the barriers identified by participants was related to the way in which information and materials are presented on the platform. The use of the platform requires a period of adaptation to enable students to become used to the environment and gradually gain mastery in it. The University was advised to contact other institutions, such as the ONCE (Spain National Organization for the Blind), to receive help in the area of accessibility for certain virtual environments at the university.

Lastly, computerizing university services and the subsequent user-friendly procedure to request, process and receive quality services was a reality seen as an advantage for students in comparison with the situation 20 years ago. At the same time, the university website was used by students to keep abreast of new developments and events. This resource was greatly appreciated due to the fact that it was adequately accessible.

> *When I began classes at the university […] Internet was just starting and I noticed it, but today, I notice it much more. And the aid that I see is not provided by the university, but rather aid in the form of training, in the degree of technological advances, which is so great in comparison with what it was 20 years ago. That has been such a giant step forward and it is much easier for me. That is what is allowing me to advance—RSP1, Social-Education Science*

In summary, although many of the student responses were critical regarding the use of ICTs, the types of aid and assistance given at the university, the technological advances, the incorporation and integration of university spaces and activities as well as the progressive improvement of training about how to use these resources has increased and improved the possibilities. Learning results are *normalizing* special situations and achieving the gradual *inclusion* of this student group.

Conclusions and discussion

Thanks to the narrative of students with disabilities, the study allows us to deepen into the knowledge of practices that the faculty is developing with technology as an educational resource. In the end, we can contemplate these facts to respond to the shortcomings and needs—especially from the viewpoint of training—that hinder the educational inclusion process at the university.

Most of the studies reviewed versed on the profound and complex framework of challenges that university instructors face when responding to students' educational needs (Forman et al., 2002; Hadjikakou & Hartas, 2008; Pearson & Koppi, 2006; Seale, 2006). This work examined the basic problems affecting the learning of students with disabilities. Their learning problems are a consequence of educational conceptions and the methodological practices used by the faculty. Likewise, this article explored these problems from the perspective of the university and the response it is providing.

As Getzel and Thoma (2008) stated, adapting to the university environment presents challenges for all students. However, for students with disabilities, the responsibility of handling the negative impact of their disability coupled with the academic work to be undertaken translates into a unique set of challenges. Obviously, people with disabilities require adequate measures. It is significant that among the suggestions proposed by these university students, there are no differences based on either the type of disability or the degree. Nevertheless, there are exceptions, such as the students with a visual disability who insisted that technical resources and technologies in the classroom could favor their inclusion: training to use the digital whiteboards, specific IT programs or the use of e-learning. In general, the needs and recommendations of all participants are the same. Likewise, we believe that many of these proposals would be seconded by the rest of the student body. However, the key idea upon which we must continue to work is that there are no solutions to all disabilities with a single technology. This is especially true in the case of students with visual disabilities, whose difficulties are accentuated and have to count on adapted technologies.

Although it is true that technologies have reduced many of the specific situations faced by students with disabilities, we must recognize that new options have arisen with educational technologies that are far from problem-free. Within the university scope, and as other studies have concluded (Forman et al., 2002; Pearson & Koppi, 2006; Seale, 2006), students with disabilities indicate that they have a favorable conception of technology and the benefits they can attain from using it. At the same time, they recognize that its applicability does entail certain difficulties. Even so, the aids and advantages provided by technologies to facilitate their learning process acquire special value in the light of numerous and specific barriers.

Furthermore, the technology available at the university and its use in response to the needs of this student group is still in its embryonic phase. In fact, the continuity of traditional educational focuses in the classroom and virtual teaching continue to be one of the main causes that reduce the potential use of technological resources in education. In this situation, adequate training of instructors is another relevant factor when promoting inclusive practices that satisfactorily influence learning among students with disabilities. Designing learning experiences adapted to specific pedagogies requires the academic staff to have the precise knowledge that allows them to efficiently and effectively use ICTs in a given learning context. In this regard, the work by Koehler and Mishra (2009) contributes basic theories for the integration of ICT through techno-pedagogical knowledge of content. This knowledge integrates pedagogical techniques to creatively use technology to teach content, knowledge of learning difficulties and how technologies could help solve some of the problems that students encounter. Thus, it is crucial that specific training programs be designed to meet the professional development of instructors to acquire knowledge and the pedagogical skills that allow them to integrate and conveniently use ICTs with their students with disabilities. More specifically, it is a matter of learning and knowing how to adapt environments and study materials to be accessible.

The relationship between accessibility and technology emphasizes some of the obstacles for inclusion in education. Our results show that using ICT improves the learning experiences of a large number of students, although at the same time, it could become a barrier for those with disabilities if these are not adequately adapted. On many occasions, the inaccessible design of resources and the technological environment hinder the full participation of the student body (Seale et al., 2015). There is research that sustains the importance of proposing a series of principles for inclusive practices in higher education —where not only how the content of such resources is to be presented, but also how it should be designed— are developed and incorporated (Hockings, Brett, & Terentjevs, 2012). We agree with Ferni and Henning (2006) in that this topic has major repercussions and the actions launched to improve these students' learning will affect the rest of their colleagues. Good practices in teaching are relevant for all students. As Tinklin, Riddell, and Wilson (2004) stated, students with disabilities could be a challenge for the university, not only in terms of achieving physical access to buildings, but also in a wider sense, having access to their syllabus, a proper teaching and learning process and an adequate assessment.

At another level, the need for greater awareness on behalf of the university regarding the problems that directly affect the learning of these students is noteworthy. In general, technology has tangibly improved many university services, although within key contexts for students with disabilities, classrooms, virtual learning platforms and the benefits of ICT fail to emerge. The inconveniences are more visible, which is a millstone for their adequate use. This is due to the fact that even today, new technologies co-exist with conventional resources. Work, such as that by Meyen (2015), could pave the way within the scope of educational change by showing the impact that ICT should have to improve the personalization of learning.

In the light of the panorama described, we are a long way from the inclusive teaching model sought out by university education. In this day and age, universities are faced with complex challenges that must be overcome. Nevertheless, none of the barriers analyzed seem to be insurmountable. There are even solutions to accessibility barriers in which the digital gap progressively increases the differences among students. The voices of students with disabilities have expressed their growing interest in university instructors becoming better prepared in the field of technology. It is equally important that the university nurtures understanding regarding the complexity of student diversity among its faculty, whose traditional pedagogy, in many cases, fails to maximize learning. For this, attention must be paid and the resources and services provided to guarantee that the inclusion process responds to the educational needs of these students. If we truly seek to overcome these challenges, it is the university which must promote greater awareness and advance in the improvement of technological skills, as well as in meeting the standards of accessibility without sacrificing the meticulousness and dynamics of the syllabus.

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