

# INFORMATION AND COMMUNICATION TECHNOLOGIES AND INCLUSIVE TEACHING: PERCEPTIONS AND ATTITUDES OF FUTURE EARLY CHILDHOOD AND PRIMARY EDUCATION TEACHERS

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## Abstract

*This research analysed future teachers' perceptions and attitudes towards the use of Information and Communication Technologies (ICTs) in the development of inclusive educational practices. Adopting a quantitative research approach, data were collected through an ad hoc questionnaire administered to fourth-year early childhood education and primary education degree students from the Catholic University of Murcia (UCAM), southeast Spain (n=231). Results revealed favourable perceptions towards ICT use in the classroom, with students viewing these resources as contributing to their professional development and improving digital competence. Furthermore, they report how ICTs present didactic opportunities for the development of the teaching-learning process when working with learners with specific educational support needs. Lastly, the research highlights statistically significant differences in future teachers' perceptions towards the implications of ICT for teaching when developing inclusive educational processes as well as in their attitudes towards professional development and the training needs required for supporting learners with special educational needs. These differences are appreciated between early childhood education degree students and their primary education peers, the latter reporting more favourable assessments.*

**Keywords:** *information and communication technologies, future teachers, educational inclusion, early childhood education, primary education.*

## Introduction

Today, our society finds itself immersed in a process of transformation brought on by advances in the use of Information and Communication Technologies (hereinafter, ICTs), which not only provide people with knowledge but also promote economic, social and cultural progress. In the school context, these types of resources deliver tools that encourage the learner's all-round development and their full and active participation in the environment in which they move. This approach undoubtedly helps to improve the teaching-learning process, which has a positive impact on the learner.

Thus, Information and Communication Technologies offer new opportunities for promoting knowledge building, enabling users to navigate a virtual world unlimited by time and place (Ballew, Omoto & Winter, 2015). These are tools geared towards developing learners' key competences and creating spaces for interaction and information sharing (Albion, 2008; Carvalho & Morais, 2011; Livingstone, 2012), by producing knowledge quickly and easily and subsequently publishing and diffusing the acquired information (Bottentuit & Coutinho, 2008; Coutinho & Alves, 2010; Parker & Chao, 2007).

This emphasises the importance of integrating technology into the teaching process in order to improve learning for all learners (Alper & Goggin, 2017; Ghaleb, 2014; Khetarpal, 2015). As such, ICTs demand major changes to ensure a sustainable future for educational practices, as they are central to the new teaching-learning approaches that engage learners, teachers and curricula on an interconnected stage mediated by these tools. It refers to technologies that have signaled a methodological renewal, facilitating teaching, increasing learner participation and motivation, as well as improving access to know-how, resources, information and more besides (Domingo & Marqués, 2011; Hollier, 2017; Lucena, 2016).

Furthermore, the current education system continues to show its commitment to developing a teaching model based on the concept of inclusive education, which sees diversity as both a challenge and an opportunity to enrich the learner's learning experience (UNESCO, 2008). Schools that take an inclusive approach are places where sustainable development is encouraged through everyone learning and getting involved (Booth & Ainscow, 2011).

In this context, ICTs contribute to the development of inclusive educational practices involving learners that have specific educational support needs (Istemic & Bagon, 2014; Wallace & Georgina, 2014). These tools encourage inclusion initiatives and the role they play in improved learning (Moss, Hay, Deppeler, Asley & Pattinson, 2007; Parker & Chao, 2007), being among the best tools that the education system has at its disposal to address diversity (Cámara, Díaz & Ortega, 2017). What is more, they respond to one of the goals inherent in Education for Sustainable Development, focused on ensuring quality-driven, inclusive and equitable education while also promoting lifelong learning opportunities for all. Thus, access to compulsory education helps society to develop, with educational equality being responsible for safeguarding the effectiveness of education systems not only to secure economic growth but also to attain social equality (Gao et al., 2016).

Various research studies (Bouck, Doughty, Flanagan, Szwed & Bassette, 2010; Homero, Tejedor & Calvo, 2017; Pegalajar & Colmenero, 2014) describe the opportunities opened up by these tools when it comes to building inclusive education for learners with educational needs. Highlights include:

- 1) Helping learners to overcome the limitations imposed by their learning disability.
- 2) Promoting learner independence, adapting to the learners' needs and individual demands.
- 3) Providing immediate feedback.
- 4) Encouraging communication and dialogue between these types of learners and their peers and teachers.
- 5) Saving time in learners' skills acquisition and capacity building.
- 6) Promoting diagnosis and assessment in learners with educational needs.
- 7) Supporting a multisensorial training and communication model.
- 8) Promoting individualised instruction for learners.
- 9) Encouraging autonomy and independence for these individuals.
- 10) Preventing marginalisation that can make it impossible to access these tools.
- 11) Facilitating social and labour insertion for learners with specific difficulties.
- 12) Performing and repeating exercises and activities.
- 13) Promoting scientific and cultural understanding in learners with educational needs.
- 14) Reducing feelings of academic and personal failure.
- 15) Serving as excellent reality simulators.

From this standpoint, attitudes are a key factor for the development of best practices in diversity-related contexts (Cavas, Cavas, Karaoglan & Kisla, 2009; Sipilä, 2010). Various research projects including those undertaken by Prendes & Gutiérrez (2013) and Suárez, Almerich, Gargallo & Aliaga (2013) report on how teachers demonstrate positive attitudes towards ICTs, although they are unsure about how to incorporate them into the teaching-learning process from a didactic perspective. On their part, Bozdagan & Özen (2014) and Roblizo &

Cózar (2015) report favourable assessments on the high frequency of ICT use among student teachers.

However, one of the root causes behind student teachers' negative attitudes towards ICT use stems from shortcomings in training; this constitutes a barrier that prevents these resources from being successfully introduced in the classroom setting (Hew & Brush, 2007; Mueller, Wood, Willoughby, Ross & Specht, 2008). In this sense, Tello & Cascales (2015), Morales & Llorente (2016) and De la Rosa (2016) call attention to teachers' lack of training and knowledge regarding the different types of technological resources that they can use to support learners with learning disabilities, as well as the opportunities they offer and their functions. Other authors such as Liu (2011), Yusof, Gnanamalar, Low & Aziz (2014), Altinay & Altinay (2015) and Vladimirovna & Sergeevna (2015) point to a lack of teacher-directed training on how to use ICTs to successfully teach in the area of Special Education. Furthermore, Fernández (2017) confirms inadequate training of undergraduate teaching students with regard to applying ICTs in supporting individuals with learning disabilities, irrespective of the university they are studying at or the degree they are taking.

Hence, teachers do not necessarily need to be experts in ICT; however, they should acquire the basic skills throughout their initial training and professional development that allow them to appropriately use these tools in the school setting. What is more, they should be familiar with novel learning methods based on resources of this kind as well as with the procedure for selecting appropriate tools with which to achieve learning goals in a context of educational sustainability (Ertmer & Ottenbreit, 2010).

From this perspective, Fernández & Rodríguez (2017) argue that teachers need training that includes enough knowledge about materials, software, websites and other tools capable of supporting the application of strategies and adaptations, the development of accessible institutions, and the creation of learning environments depending on the socio-educational context, the teachers' requirements and the learners' characteristics and needs. Thus, digital competence development implies acquiring critical thinking skills and mastering different languages and the use of ICTs as information, communication and knowledge production conduits (Gewerc & Montero, 2015). Their training should also be centred around encouraging positive attitudes and effectively transferring information to learners (Gegenfurtner, 2011).

Against this backdrop, the following research question needs to be answered: what perceptions and attitudes do future teachers have about the use of ICTs when addressing diversity in an inclusive school context? Developing a high-quality, initial teacher-training process is considered a priority when it comes to implementing teaching-learning processes grounded in the concept of inclusion. Thus, one of the main challenges that universities face is to rethink the curriculum, which requires active engagement from managers, teachers, learners and all other members of the university community (Brito, Rodríguez & Aparicio, 2018). Furthermore, teachers must get involved in their own ongoing training in order to acquire the concepts needed to better plan and manage their activities, thus contributing to the learners' comprehensive, all-round training (Brito, Rodríguez & Aparicio, 2018).

## Methodology of Research

### *General Background*

This research focused on analysing future teachers' perceptions and attitudes towards the use of ICTs for the development of inclusive educational practices. Thus, and more specifically, it sought to respond to the following specific objectives:

- 1) Examine the attitudes held by future early childhood and primary education teachers towards the didactic opportunities that ICTs deliver when it comes to learners with special educational needs.

- 2) Analyse future teachers' professional development and training needs that will enable them to implement ICTs in an 'attention to diversity' setting.
- 3) Determine the degree of correspondence between future teachers' perceptions of the implications ICTs have for inclusive learning, professional development and educational practices.
- 4) Verify whether statistically significant differences exist in student teachers' perceptions towards ICTs when it comes to diversity according to their degree programme: early childhood education or primary education from the Catholic University of Murcia.

### *Sample*

The research target population comprised fourth-year early childhood education and primary education degree students from the Catholic University of Murcia (southeast Spain). Participants were selected using a simple random sampling method, assigning those students who completed the data collection instrument (n=231) to the sample. To calculate the participant sample, the formula for population size less than 100,000 with a confidence level of 95% and a maximum error of estimate no greater than 4% was used, entirely ensuring its representativeness.

Sample distribution by sociodemographic variables chosen for research was 79.1% men and 20.9% women. Ages were around the 25-years mark (85.1%), with 14.9% of students aged 26 and over. Students studying for a degree in early childhood education accounted for 52.2% of the sample and 48.0% were primary education students. In terms of depth of knowledge and command of basic ICT tools, 54.7% of students considered their level 'good', 43.9% as 'average' and 1.4% described it as 'bad'. Furthermore, 52.0% denied ever receiving specific training in ICT use in the area of inclusive education, whereas 48.0% reported availing of this training.

### *Instrument and Procedures*

An 'ad hoc' questionnaire was developed for the purpose of the research (Pegalajar, 2015). This Likert-type measure elicited responses ranging from 1 (completely disagree) to 4 (completely agree), covering 35 items grouped under four core dimensions:

- 1) Dimension 1. Didactic implications of ICTs for inclusive education based on an analysis of the didactic opportunities that these resources offer in the teaching-learning process involving learners with educational needs (13 items).
- 2) Dimension 2. Teachers' professional development in ICTs, examining their perceptions and training needs for implementing ICT use in the classroom (10 items).
- 3) Dimension 3. Teachers' attitudes towards inclusion using ICTs, examining their perceptions of inclusive education and working with learners that have specific educational support needs using these types of tools (7 items).
- 4) Dimension 4. Inclusive teaching practice using ICTs, focused on an analysis of the teacher's role in addressing diversity in the classroom using these resources (6 items).

This instrument met all quality criteria; a panel of experts verified content validity and a pilot trial was conducted during the 2014-15 academic year. Expert opinion was obtained by selecting ten lecturers specialising in Didactics and School Planning from different Spanish universities with extensive teaching and research experience. In this case, they were asked to give an overall assessment of the questionnaire as well as of each item, rating on a scale of 0 to 10 not only each item's degree of belonging for the research purpose (content), where 0 signifies 'not at all applicable' and 10 'highly applicable', but also the items' level of accuracy

and suitability in terms of their definition and wording (form). The experts' evaluations showed that most items were correct and content appropriate in terms of comprehension and writing for the questionnaire recipients.

The instrument's construct validity was tested by administering the questionnaire to a sample of fourth-year early childhood education and primary education degree students from the Catholic University of Murcia. The pilot trial gave a KMO sampling adequacy index of .933, and Bartlett's test of sphericity was 3376.884 ( $p=.0001$ ). Furthermore, a Varimax-rotated principal component analysis revealed a convergence of four factors that explained 51.96% of the total variance. The reliability analysis performed using Cronbach's alpha gave a value of .952, and when this method was applied to both halves (split-half testing), appropriate scores were obtained: the value for the first part was .908 and for the second part .917.

Academic managers and coordinators of the early childhood and primary education degree programmes at the Catholic University of Murcia gave the green light for questionnaire application, agreeing to take part in the research by facilitating access to the sample for data collection purposes. The questionnaire was administered to each student individually, who received the instructions needed to complete it correctly. The research team assured that the data collected would remain anonymous and confidential at all times.

#### *Data Analysis*

An analysis of the collected data was performed using the IBM SPSS Statistics software package (version 23), carrying out statistical analyses with a significance level of  $p<.05$ . Thus, descriptive statistics (via mean and standard deviation analysis), as well as the Pearson correlation coefficient, were used to identify the degree of correspondence between the scale's factors and also between those items considered of interest according to the research aim. Lastly, a Student's t-test (comparison of means) was conducted with the aim of demonstrating the existence or not of statistically significant differences between the factors of the scale and the sociodemographic variable 'student's degree'.

#### **Results of Research**

Students studying early childhood and primary education at the Catholic University of Murcia displayed favourable perceptions towards the use of ICTs for developing inclusive educational practices (see Table 1).

Thus, the highest scores were obtained for the dimension 'Teachers' professional development in ICTs ( $M=3.31$ ;  $SD=.49$ ), examining future teachers' perceptions and training needs for implementing ICTs in the classroom. Similarly, the respondents reported how ICT use opens up new channels of communication and collaborative work among student teachers, welcoming reflective and inquiry-based practice into the classroom. What is more, it calls upon specific teacher training, contributing to their professional development and improving digital competence, among other aspects.

The perceptions held by future teachers of early childhood and primary education were also favourable in relation to the didactic opportunities that these resources offer in the teaching-learning process of learners with specific educational support needs ( $M=3.13$ ;  $SD=.46$ ). The respondents viewed ICTs as tools that encourage learner motivation and active participation towards learning, facilitating family-school coordination while also enabling access to information, aligning activities to the learners' individual characteristics, and developing teacher-learner assessment and feedback processes, applicable to all areas and learning content, among other aspects.

Favourable results were also obtained when questioning the teacher's role in supporting diversity in the classroom through the use of ICTs ( $M=3.05$ ;  $SD=.48$ ). The research participants seemed to agree that ICTs are easy tools to use to properly address diversity, and which require

the input of a coordinated team responsible for implementing them in the classroom and more dedication and effort from teachers. ICTs pave the way for an individualised teaching which, in turn, offers greater flexibility and promotes psycho-pedagogical diagnosis and assessment in learners with educational needs.

Lastly, the dimension that yielded the least favourable ratings by respondents was that related to an analysis of teachers' perceptions of inclusive education and working with learners that have specific needs through the use of ICT resources (M=2.77; SD=.40). The student teachers acknowledged that ICTs are a useful support tool in the teaching-learning process, which encourages creativity and teaching innovation and responds to the educational needs of learners by adopting inclusive processes. ICT use in the classroom helps to develop better attention to diversity, representing an opportunity for improved performance and effective education in learners with educational needs.

**Table 1. Descriptive analysis of data.**

Dimension	N	M	SD
Professional development	224	3.31	.49
Didactic implications	219	3.13	.46
Teaching practice	217	3.05	.48
Teacher attitude	222	2.77	.40

The correspondence between the dimensions in the scale (Table 2) showed that the greatest correlations occurred between future teachers' perceptions of the didactic opportunities that ICTs offer learners with educational needs and the analysis of inclusive educational practice using these types of resources (r=.732). Similarly, a correlation was observed between perceptions about the didactic opportunities offered by ICTs and teacher attitude towards inclusion regarding learners with specific educational support needs (r=.716) as well as ICT involvement in teachers' professional development (r=.710).

Furthermore, reciprocity was shown to exist between future teachers' training perceptions regarding ICT implementation in the classroom and the analysis of teaching practice to address diversity (r=.675); the analysis of diversity-oriented classroom practice and teacher attitude towards inclusive education (r=.665); and lastly future teachers' training perceptions regarding ICT implementation in the classroom and their attitudes towards inclusion (r=.638).

**Table 2. Correlations between the different dimensions of the scale.**

	r			
	F1. Didactic implications	F2. Professional development	F3. Teacher attitude	F4. Teaching practice
F1. Didactic implications	1	.710**	.716**	.732**
F2. Professional development	.710**	1	.638**	.675**
F3. Teacher attitude	.716**	.638**	1	.665**
F4. Teaching practice	.732**	.675**	.665**	1

\*\* Significance level <.05

Correlations between some of the most significant variables according to the research aim were analysed, namely: ICTs welcome reflective and inquiry-based teaching practice into the classroom (V8); they require more dedication and effort from teachers (V9); they better ensure learner diversity (V10); and they facilitate family-school coordination (V13).

As can be seen in Table 3, the results revealed that the greatest correlations were considering how ICTs welcome reflective and inquiry-based teaching practice into the classroom while their implementation requires more dedication and effort from teachers ( $r=.418$ ). Likewise, correlations were found in student teachers' perceptions when questioning how ICTs require more dedication and effort from teachers while also better assisting learners with specific educational support needs ( $r=.368$ ). Notable correlations include the opportunities that ICTs offer when developing reflective and inquiry-based teaching practice in the teaching-learning process and improved attention to learner diversity ( $r=.353$ ).

**Table 3. Correlations among the most significant items.**

	V13: ICTs facilitate family-school coordination	V8: ICTs welcome reflective and inquiry-based teaching practice into the classroom	V10: ICTs better ensure learner diversity	V9: ICTs require more dedication and effort from teachers
V13	1	.314**	.315**	.205**
V8	.314**	1	.353**	.418**
V10	.315**	.353**	1	.368**
V9	.205**	.418**	.368**	1

Lastly, and with reference to the sociodemographic variable 'student's degree', and the different dimensions that define future teachers' perceptions towards ICT use for the development of inclusive teaching practices, statistically significant differences were found for some of the dimensions after applying the Student's t-test.

Table 4 shows these statistically significant differences as corresponding to Dimension 1, 'Didactic implications of ICTs for inclusive education' ( $t(215)=1.941$ ,  $p=.016$ ) and Dimension 2, 'Teachers' professional development in ICTs' ( $t(220)=4.561$ ,  $p=.034$ ). Thus, the results indicate how primary education degree students show greater perceptions towards the didactic opportunities that these types of resources offer when developing the teaching-learning process involving learners with specific educational support needs. In turn, students enrolled on this degree programme also reported better ratings than their early childhood education peers in professional development and identifying the training needs necessary to implement ICTs in the inclusive context.

**Table 4. Means and Standard Deviations by the sociodemographic variable 'degree' (T-test).**

Dimension	Degree		T
	Early Childhood Ed. M(SD)	Primary Ed. M(SD)	
Didactic implications	3.12(.39)	3.14(.53)	.016*
Professional development	3.28(.58)	3.33(.39)	.034*
Teacher attitude	2.72(.38)	2.81(.43)	.144
Teaching practice	3.02(.44)	3.09(.52)	.565

However, no statistically significant differences were observed in students' ratings when questioning their attitudes towards inclusion using ICTs ( $t(218)=2.152$ ,  $p=.144$ ) or in the analysis of the teacher's role when responding to diversity ( $t(214)=1.331$ ,  $p=.565$ ).

## Discussion

This research has allowed us to identify the perceptions and attitudes of future early childhood and primary education teachers towards the use of ICTs in the development of inclusive educational practices. Our aim was to analyse their perceptions towards the use of these tools in the classroom once they had received initial basis training that enables them to teach in a professional capacity within an educational context. Thus, we decided to examine their attitudes and training needs before entering the job market in order to identify possible shortcomings and/or limitations that the curricula corresponding to these degree programmes may present and which could adversely impact on the use of these tools for successfully addressing learner diversity.

The results obtained reveal favourable perceptions towards ICT use in the classroom, where these resources are seen to contribute to future teachers' professional development and improved digital competence. As such, their positive attitudes towards ICT use for developing inclusive education are conditioned by the appropriate training received. These findings correlate with those reported by Hew & Brush (2007) and Mueller et al. (2008), who pointed to a direct relationship between teachers' negative attitudes towards ICT use and training deficiencies. In contrast, Liu (2011), Yusof et al. (2014), Altinay & Altinay (2015), Tello & Cascales (2015), Vladimirovna & Sergeevna (2015), Morales & Llorente (2016) and De la Rosa (2016) point to a lack of teacher training and knowledge regarding the types of technological resources that can be used in the context of attention to diversity.

The participating early childhood and primary education degree students argue how ICTs are resources that offer didactic opportunities when it comes to developing the teaching-learning process aimed at learners with specific educational support needs. Furthermore, they understand that ICT implementation in the classroom requires not only a coordinated teaching team but also more dedication and effort. Thus, various research projects (Bouck et al., 2010; Homero, Tejedor & Calvo, 2017; Pegalajar & Colmenero, 2014) describe the didactic potential of ICTs in the context of attention to diversity, highlighting the importance of overcoming the limitations that learners with educational needs have and adapting the teaching-learning process to their individual characteristics.

Future teachers also agree that ICTs constitute a teaching support tool in the teaching-learning process, paving the way for educational creativity and innovation. These results match with those obtained in research undertaken by Prendes & Gutiérrez (2013) and Suárez et al.



(2013), who reported on teachers' positive attitudes towards ICTs despite feeling unsure about how to incorporate them into the teaching-learning process from a didactic perspective.

Moreover, a correlation is observed between those questionnaire dimensions used in this research and which refer to the implications of ICTs for developing inclusive education, teachers' professional development, teacher attitude towards inclusion that encompasses ICTs, and an analysis of inclusive teaching practice using these types of resources. In addition, the research reveals reciprocity among teachers' perceptions about the opportunities that ICTs offer as a tool that welcomes reflective and inquiry-based teaching practice into the classroom. This calls for more dedication and effort by teachers, helping to better assist learners with specific educational support needs and facilitating family-school coordination, among other aspects.

Another notable finding is the presence of statistically significant differences in teachers' perceptions towards the didactic implications of ICTs for developing inclusive educational process, as well as their attitudes towards professional development and the training needs necessary for their implementation when working with learners with educational needs. These differences are found between early childhood and primary education degree students, with the latter demonstrating more favourable assessments. These findings contradict those of Fernández (2017), who highlights the little training student teachers have, regardless of the university they study at and their degree programme.

From this perspective, an analysis of the established curriculum for students across both degree programmes should be conducted, highlighting some of the most salient differences in relation to the study aim of this research. Thus, and in the context of the Catholic University of Murcia (UCAM, 2018), only one subject directly related to ICT use in the early childhood education degree programme is offered. This subject is entitled 'New Technologies applied to Early Childhood Education' with a teaching load of 6 ECTS credits. This core subject seeks to introduce students to the knowledge and use of different educational resources during the early childhood education stage, making them aware of the importance attached to promoting media literacy in learners from the early years of schooling. Thus, initial training for future teachers should facilitate the acquisition of basic skills that enable these tools to be used effectively and successfully in the school context; furthermore, student teachers should receive specific training centred around new learning methods as well as the proper procedure for selecting tools according to the to-be-achieved learning goals (Ertmer & Ottenbreit, 2010). The subject covering ICTs included in the early childhood education degree study plan ties in with other main subjects in the curriculum, for example, 'Resources and Materials in Children's Education' and 'Planning, Development and Management of Teaching', although neither subject addresses specific ICT training from an inclusive standpoint. The curriculum established for the UCAM primary education degree programme offers no subjects that specifically cover ICTs. Students are introduced to cross-disciplinary content through subjects such as 'Developmental Disorders and Learning Difficulties', 'Diversity and Intercultural Awareness' and 'Specific Educational Needs', the latter belonging to the Therapeutic Pedagogy degree.

## Conclusions

Future teachers show favourable attitudes and perceptions towards the use of ICT-based tools in an inclusive education context. This opens up a new horizon for improving the Spanish education system and attention to diversity, as it provides resources and teaching aids with enormous potential for enhancing learners' learning, namely those with specific educational support needs. These tools help to overcome disability-related constraints; offer immediate feedback on how the learning process is developing; enable communication and access to information; improve learner autonomy and independence, etc.

Furthermore, it is clearly important to adapt teaching practices to ongoing social demands and changes. In the current climate, our society is witnessing a process of change on an economic, social and cultural level characterised by the emergence of ICTs, among other

aspects. Thus, the importance and interest attached to using these tools in a school setting is not because of their technical and aesthetic qualities but because of the potentialities they possess when it comes to improving the teaching-learning process for learners with specific educational support needs.

These are resources that have been created outside of school walls and which continue to evolve at a rather fast pace, making it difficult to implement them in the educational setting. The perceptions and attitudes that teachers may show towards them are also constantly changing. However, teachers undoubtedly need to receive specific training on how to use them and more should be done to develop learners' digital skills and competencies. What is more, education authorities need to step up their financial commitment to provide schools with these types of tools.

To summarise, education professionals must take responsibility to understand the reality that teachers face in their professional development to make improvements that pave the way for quality-driven, inclusive education capable of responding to the characteristics of learners with educational needs. Therefore, improving education should be the priority, one that is designed to develop their capabilities to the full and encourage greater autonomy that enables learners to perform better in the context in which they study and learn.

In terms of possible limitations of this research, the questionnaire was the only data collection tool used, meaning that it could potentially cause social desirability bias and sincerity problems among respondents. Regarding research implications, we plan to expand the sample to include early childhood and primary education degree students from other universities, both public and private. We would also consider contrasting future teachers' perceptions of ICT use in the development of inclusive educational practices with the use of qualitative research methodologies centred around organising interviews and/or discussion groups.

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## References

- Albion, P. R. (2008). Web 2.0 in teacher education: two imperatives for action. *Computers in the Schools*, 25 (3), 181-198. DOI. 10.1080/07380560802368173Pioi
- Alper, M., & Goggin, G. (2017). Digital technology and rights in the lives of children with disabilities. *New Media & Society*, 19 (5), 726-740. DOI: 10.1177/1461444816686323.
- Altınay A., & Altınay, Z. (2015). Examination on ICT integration into Special Education Schools for Developing Countries. *The Turkish Online Journal of Educational Technology*, 14 (3), 70-72.
- Ballew, M. T., Omoto, A. M., & Winter, P. L. (2015). Using Web 2.0 and social media technologies to foster proenvironmental action. *Sustainability*, 7, 10620–10648. DOI:10.3390/su70810620.
- Booth, T., & Ainscow, M. (2011). *Index for inclusion. Developing learning and participation in school*. Bristol, CSIE.
- Bottentuit, J. B., & Coutinho, C. P. (2008). Wikis em Educação: potencialidades e contextos de utilização [Wikis in education: Potentialities in contexts of use]. En A.A. Carvalho (coord.). *Actas do Encontro sobre Web 2.0* (pp. 336-340). Braga: CIED.
- Bouck, C. E., Doughty, T. T., Flanagan, S. M., Szwed, K., & Bassette, L. (2010). Es la más poderosa pluma? Utilizando Pentop computadoras para mejorar los estudiantes secundarios "escrito [Is it the most powerful pen? Using Pentop computers to improve high school students "written]. *Diario de Tecnología de la Educación Especial*, 25, 33-47.
- Bozdogan, D., & Özen, R. (2014). Use of ICT technologies and factors affecting pre-service ELT teachers' perceived ICT self-efficacy. *TOJET: The Turkish Online Journal of Educational Technology*, 13 (2), 186-196.

- Brito, R. M., Rodríguez, C., & Aparicio, J. L. (2018). Sustainability in teaching: An evaluation of university teachers and students. *Sustainability*, 10 (2), 439. DOI: 10.3390/su10020439.
- Cámara, A. M., Díaz, E. M., & Ortega, J. M. (2017). Aprendizaje-Servicio en la Universidad: ayudando a la escuela a atender a la diversidad a través de las TIC [Learning-service in the university: Helping the school to attend to diversity through ICT]. *Bordón*, 69 (3), 1-15. DOI: 10.13042/Bordon.2017.51320.
- Carvalho, L., & Morais, E. (2011). *Aprender com as TIC* [Learning with ICTs]. Conferencia Ibérica em inovação na educação com TIC (pp. 453-454). Bragança: Instituto Politécnico de Bragança.
- Cavas, B., Cavas, P., Karaoglan, B., & Kisla, T. (2009). A study on science teachers' attitudes toward information and communication technologies in education. *TOJET: The Turkish Online Journal of Educational Technology*, 8 (2), 20-32.
- Coutinho, C. P., & Alves, M. (2010). Educação e sociedade da aprendizagem: um olhar sobre o potencial educativo da internet [Education in the learning society: An overview over the educational potential of the internet]. *Revista de Formação e Inovação Educativa Universitaria*, 3 (4), 206-225.
- De la Rosa, L. (2016). La voz de las personas con discapacidad en la formación inicial de docentes [People suffering from disability's voice in the initial teacher's training]. *International Journal of Educational Research and Innovation*, 5, 160-169.
- Domingo, M., & Marquès, P. (2011). Aulas 2.0 y uso de las TIC en la práctica docente [Classroom 2.0 experiences and building on the use of ICT in teaching]. *Comunicar*, 37, 169-175. DOI: 10.3916/C37-2011-03-09.
- Ertmer, P. A., & Ottenbreit, A. T. (2010). Teacher technology change: How knowledge, confidence, beliefs and culture intersect. *Journal of Research on Technology in Education*, 42 (3), 255-284.
- Fernández, J. M., & Rodríguez, A. (2017). TIC y diversidad funcional: conocimiento del profesorado [ICT and functional diversity: Knowledge of the teaching staff]. *European Journal of Investigation in Health, Psychology and Education*, 7 (3), 157-175.
- Fernández, J. M. (2017). Investigación sobre las TIC aplicadas a personas con discapacidad. Formación inicial del profesorado de Educación Primaria [Investigation on ICT applied to people with disabilities. Initial training of Primary Education teachers]. *International Journal of Educational Research and Innovation*, 9, 215-264.
- Gao, Y., He, Q., Liu, Y., Zhang, L., Wang, H., & Cai, E. (2016). Imbalance in spatial accessibility to primary and secondary schools in China: Guidance for education sustainability. *Sustainability*, 8 (12), 1236. DOI: 10.3390/su8121236.
- Gegenfurtner, A. (2011). Motivation and transfer in professional training: A meta-analysis of the moderating effects of knowledge type, instruction, and assessment conditions. *Educational Research Review*, 6, 153-168. DOI: 10.1016/j.edurev.2011.04.001.
- Gewerc, A., & Montero, L. (2015). Conocimiento profesional y competencia digital en la formación del profesorado. El caso del Grado de Maestro en Educación Primaria [Professional knowledge and digital competency in teacher education. The case of elementary teacher education degree]. *Revista Latinoamericana de Tecnología Educativa*, 14 (1), 31-43. DOI: <http://dx.doi.org/10.17398/1695-288X.14.1.31>.
- Ghaleb, A. (2014). Assistive technology in special education and the universal design for learning. *The Turkish online Journal of Educational Technology*, 13 (2), 18-23.
- Hew, K. F., & Brush, T. (2007). Integrating technology into K-12 teaching and learning: current knowledge gaps and recommendations for future research. *Educational Technology Research Development*, 55 (3), 227-243.
- Hollier, S. (2017). *Technology, education and access: A "fair go" for people with disabilities*. Personal communication in 14<sup>th</sup> International Web for All Conference, W4A.
- Homero, G., Tejedor, F. J., & Calvo, M. I. (2017). Meta-análisis sobre el efecto del software educativo en alumnos con necesidades educativas especiales [Meta-analysis in the effect of educative software on students with special educational needs]. *Revista de Investigación Educativa*, 35 (1), 35-52.
- Istemic, A., & Bagon, S. (2014). ICT-supported learning for inclusion of people with special needs: Review of seven educational technology journals. *British Journal of Educational Technology*, 45 (2), 202-230.
- Khetarpal, A. (2015). Information and Communication Technology (ICT) and disability. *Review of Market Integration*, 6 (1), 96-103.

- Liu, S. H. (2011). Un modelo multivariado de factores que influyen en el uso de Tecnología por futuros profesores durante la Práctica Enseñanza [ICT and disability. Knowledge of the teachers of primary education in Andalusia]. *Tecnología para la Educación y Sociedad*, 15 (4), 137-149.
- Livingstone, S. (2012). Critical reflections on the benefits of ICT in education. *Oxford Review of Education*, 38 (1), 9-24. DOI: 10.1080 / 03054985.2011.577938.
- Lucena, I. V. (2016). La aplicación de las TIC y la evaluación por competencias en el Grado en Derecho [Application of ICT and evaluation for competences in the Degree in Law]. *International Journal of Educational Research and Innovation*, 5, 42-54.
- Morales, P. T., & Llorente, M. C. (2016). Formación inicial del profesorado en el uso de Tecnologías de la Información y la Comunicación (TIC) para la educación del discapacitado [Initial teacher training in the use of information and communications technology (ICT) for education of the disabled]. *Digital Education Review*, 30, 123-134.
- Moss, J., Hay, T., Deppeler, J., Asley, L., & Pattison, K. (2007). Student researchers in the middle: Using visual images to make sense of inclusive educations. Special issue: International Images Inclusion. *Journal of Research in Special Education Needs*, 7 (1), 46-54. DOI: 0.1111 / j.1471-3802.2007.00080.x.
- Mueller, J., Wood, E., Willoughby, T., Ross, C., & Specht, J. (2008). Identifying discriminating variables between teachers who fully integrate computers and teachers with limited integration. *Computers & Education*, 51 (4), 1523-1537. DOI: 10.1016/j.compedu.2008.02.003.
- Parker, K. R., & Chao, J. T. (2007). Wiki as a teaching tool. *Interdisciplinary Journal of Knowledge and Learning Objects*, 3, 57-72.
- Pegalajar, M. C. (2015). Diseño y validación de un cuestionario sobre percepciones de futuros docentes hacia las TIC para el desarrollo de prácticas inclusivas [Design and validation of a questionnaire on Perceptions of future teachers towards ICTs for Development inclusive practices]. *Pixel-Bit. Revista de Medios y Educación*, 47, 89-104. DOI: <http://www.redalyc.org/articulo.oa?id=36841180006>.
- Pegalajar, M. C., & Colmenero, M. J. (2014). Estudio piloto sobre el uso de las redes sociales en jóvenes con discapacidad intelectual [Pilot study on the use of social networks in young people with intellectual disabilities]. *Revista Electrónica de Tecnología Educativa*, 48. Available online: [http://edutec.rediris.es/Revelec2/Revelec48/n48\\_Pegalajar\\_Colmenero.html](http://edutec.rediris.es/Revelec2/Revelec48/n48_Pegalajar_Colmenero.html) (accessed on 17/01/2018).
- Prendes, M. P., & Gutiérrez, I. (2013). Competencias tecnológicas del profesorado en las universidades españolas [Technological competences of teachers in Spanish Universities]. *Revista de Educación*, 361, 196-222. DOI: 10-4438/1988-592X-RE-2011-361-140.
- Roblizo, M. J., & Cózar, R. (2015). Usos y competencias en TIC en los futuros maestros de Educación Infantil y Primaria: hacia una alfabetización tecnológica real para docentes [ICT skills and uses of would-be primary and pre-school teachers: towards a real technological literacy for educators]. *Pixel-Bit. Revista de Medios y Educación*, 47, 23-39. DOI: <http://dx.doi.org/10.12795/pixelbit.2015.i47.02>.
- Sipilä, K. (2010). The impact of laptop provision on teacher attitudes towards ICT. *Technology, Pedagogy and Education*, 19 (1), 13-16.
- Suárez, J. M., Almerich, G., Gargallo, B., & Aliaga, F. (2013). Las competencias del profesorado en TIC: estructura básica [The competencies of teachers in ICT: Basic structure]. *Educación XXI*, 16 (1), 39-62. DOI: 10.5944/educXX1.16.1.716.
- Tello, I., & Cascales, A. (2015). Las TIC y las necesidades específicas de apoyo educativo: análisis de las competencias TIC en los docentes [ICT and special educational needs: analysis of ICT skills teachers]. *Revista Iberoamericana de la Educación digital*, 18 (2), 355-383.
- UNESCO (2008) *La educación inclusiva. El camino hacia el futuro*. Paris: UNESCO. Retrieved from: [http://www.ibe.unesco.org/fileadmin/user\\_upload/Policy\\_Dialogue/48th\\_ICE/CONFINTED\\_48-3\\_Spanish.pdf](http://www.ibe.unesco.org/fileadmin/user_upload/Policy_Dialogue/48th_ICE/CONFINTED_48-3_Spanish.pdf) (accessed on 20/01/2018).
- UCAM (2018). *Plan de estudios del Grado en Educación Primaria* [Curriculum in the Primary Education Degree]. Retrieved from: <http://www.ucam.edu/estudios/grados/primaria-presencial/plan-de-estudios> (accessed on 10/01/2018).
- UCAM (2018). *Plan de estudios del Grado en Educación Infantil* [Curriculum in Early Childhood Education Degree]. Retrieved from: <http://www.ucam.edu/estudios/grados/infantil-presencial/plan-de-estudios> (accessed on 10/01/2018).

- Vladimirovna, S. & Sergeevna, O. (2015). Features of the Information and Communication Technology Application by the Subjects of Special Education. *International Education Studies*, 8 (6), DOI:10.5539/ies.v8n6p162.
- Wallace, T., & Georgina, D. (2014). *Preparing special education teachers to use educational technology to enhance student learning*. In 11th International Conference on Cognition and Exploratory Learning in Digital Age.
- Yusof, A. M., Gnanamalar, E., Daniel, S., Low, W., & Aziz, K. (2014). Teachers' perception of mobile edutainment for special needs learners: The Malaysian case. *International Journal of Inclusive Education*, 18 (2), 1237-1246. DOI: 10.1080/13603116.2014.885595.

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