Original Research

Self-perception of learning basic skills in the use of information and communications technology in university students with intellectual disabilities

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Abstract

Educational transformation in the university environment requires updating the basic skills of all university students to the educational moment in which they find themselves. This study aimed to determine the basic skills in the use of information and communications technology that were identified as known, both conceptually and procedurally, in 15 university students with intellectual disabilities. To ascertain the importance of digital skills and information and communications technology tools, a descriptive, cross-sectional, pre-post study was conducted. Descriptive results and statistical analyses are presented with a t-test for independent samples for the variables with a normal distribution, assuming a hypothesis that the post values would be greater than those obtained pre. It was confirmed that there is an increase in the perceived procedural knowledge and skills in different digital tools based on participants' self-perception ($p < 0.0001$).

Keywords

competencies, information and communications technology, intellectual disability, self-perception

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Introduction

We are at a remarkable moment at the national and international levels in the definition, conceptualisation, and identification of support for people with intellectual disabilities (ID).

An emerging trend is associated with the shared vision in the definition of intellectual disabilities, especially the diagnostic criteria, and the planning of individualised support needed and linked to models/approaches that seek to understand and identify the singularities to be considered for this precise process. On the contrary, it is established that intellectual disabilities must be conceived today from an approach that prioritises the user as any other individual in our society (Verdugo & Martín, 2002). In this direction, the need to determine preventive measures for deficiencies and intensification of personalised support required by people with disabilities has progressed such that this approach is framed in the national plan for the healthy well-being of people with disabilities 2022–2026.

The definition of intellectual disabilities cannot be understood without the contributions of the following: the American Association on Intellectual and Developmental Disabilities (AAIDD), Schalock, Luckasson, and Tassé, (Schalock et al., 2021b), Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition DSM-5 (Guha, 2014), and International Classification of Diseases 11th Revision CID-11 (Association, 2018). Since the publication of AAIDD, it has been established that it is necessary to make a correct definition, diagnosis, and classification, and establish the support systems of persons with intellectual disabilities (Schalock et al., 2021b). Specifically, it was confirmed that this new definition was needed, mainly owing to the following: (1) the paradigm shift to the multidimensional and socio-ecological nature of intellectual disabilities, and (2) the holistic approach to limitations in human functioning, the role of individualised supports, the critical role played by professional responsibility and clinical judgment in the diagnosis, classification, and planning of support and the importance of disability policies and practices to be result-oriented (Verdugo and Navas, 2021).

Echavarría and Tirapu (Echavarria-Ramirez & Tirapu-Ustarroz, 2021) defined intellectual disabilities as "a neurodevelopmental condition that is characterised by a deficit at the cognitive level and functional alterations in the adaptive behaviour of people that occur during their development" Schalock, Luckasson, and Tassé (Schalock et al., 2021a) highlight the relevance of significant limitations in intellectual functioning and adaptive behaviour throughout the development period.

The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, (DSM-5) specifies the criteria that allow the diagnosis to be made:

1. Impairments in intellectual functions, such as reasoning, problem-solving, planning, abstract thinking, judgment, academic learning, and experiential learning, as verified by clinical assessment and individualised standardised intelligence tests.
2. Deficiencies in adaptive behaviour, which cause failure to comply with developmental and sociocultural standards for personal autonomy and social responsibility. Without ongoing support, adaptive deficits limit functioning in one or more activities of daily living, such as communication, social participation, and independent living in multiple settings.
3. Onset of intellectual and adaptive deficiencies during the development period.

In all cases, the coexistence of these three interrelated criteria is mandatory to diagnose intellectual disabilities. intellectual disabilities, also designated as intellectual developmental disorder, is a disorder that begins in the developmental period and includes limitations of intellectual

functioning as well as adaptive behaviour in the conceptual, social, and practical domains (Guha, 2014). It is thus defined with regard to the significant limitations in intellectual functioning and adaptive behaviour, directing its origin towards the individuals' development period. Thus, limitations in functioning must be considered within the context of typical community settings, considering the individuals' age and culture. Consequently, it is necessary to correctly assess cultural, linguistic, communicative, sensory, motor, and behavioural factors (Alexopoulou et al., 2021).

Intellectual disability is a changing, dynamic concept and circumstance resulting from the individual-environment multifactorial and multidimensional interaction. Studies on intellectual disabilities have increased significantly in recent decades, largely driven by the progressive incorporation into the different spheres of society in an increasingly normalised and inclusive manner.

One of these areas is the university environment which, as a space for research and training, is a natural ally of entities dedicated to intervention aimed at people with intellectual disabilities. In their daily work, the entities of the sector detect the new realities that emerge among individuals with intellectual disabilities (access to information and communications technology, physical and mental health, adequate preparation for working life, etc.). The university contributes to the scientific approach by contrasting these needs, generating explanatory models, validating intervention practices, and providing spaces for training, reflection, and innovation.

The recent incorporation of young university students with intellectual disabilities in the Spanish university environment entails a path of inclusion. It has considerably increased the academic offer of training proposals in the higher education space (universities). These are subsidised and financed training initiatives (this year, 31 universities nationwide) that develop the UNIVERSITY ("Universidad y Discapacidad", 2014) program simultaneously in public and private universities. ONCE Foundation, with the collaboration of the European Social Fund, has launched a university training program aimed at young people with intellectual, developmental, and autism spectrum disabilities, where they have the opportunity to access the university and achieve their degree in socio-labour skills, which allows them optimal training to access employment and promote their autonomy and personal development. The program is developed in universities countrywide through an annual call, and all universities and young people with ID between 18 and 30 years old enrolled in the national youth guarantee system can participate (ONCE Foundation, 2023).

The expectation is that, in a few years, the active participation of people with intellectual disabilities in universities will be something familiar and normalised, and will not only pertain to some experiences (Izuzquiza & Rodríguez, 2015). Therefore, it is an exceptional pedagogical opportunity. This situation facilitates the staging factors intertwined with the design, management, and assessment of the implantation in vulnerable groups and the educational opportunities experienced in new learning spaces.

Thus, the "digital skills of the 21st century" is an emerging topic of educational research, and hence, it is possible to classify these skills as emerging digital skills because they represent the emergence of a construct supported by digital technology (Pérez et al., 2020).

The working group of the Observatory of Cognitive Accessibility of Full Inclusion Madrid (Madrid, 2021, p. 202) affirms that "many of the people with intellectual disabilities do not have training in basic digital skills" (p. 6) and one of the groups that usually turn out to be "invisible" in research on communications and new technologies is people with intellectual disabilities (Gutiérrez & Martorell, 2011). Through a study they concluded, "it can be noted that the behaviour patterns of people with intellectual disability in relation to new information and communications technology, in general terms, are close to those of the general population. Striking differences can only be observed in specific aspects. In some cases, these differences can be directly attributed to intellectual

disabilities. However, it is also necessary to consider a possible stigma effect acting on the people who surround the individual with intellectual disabilities, which can motivate discriminatory behaviours" (p. 173).

From this perspective, analysing the basic skills in the use of information and communications technology becomes an opportunity to assess the extent to which the learning of digital skills in vulnerable groups, and specifically, in persons with intellectual disabilities in university settings, needs to be programmed.

For this reason, prioritising the allocation of time and effort to detect the training needs associated with the development of digital skills, along with appropriate support for persons with intellectual disabilities in a university environment, is more than ever necessary. In this way, it will be possible to respond to situations such as the current one, with a learning space that is inclusive so that everyone can achieve their maximum performance.

Apparently, it is relevant based on the analysis of the pedagogical competent, to consider the potentialities and needs of each one of the students with intellectual disabilities to adjust the contents of the curriculum. For this, it must be considered that essential and desired learning is forged through the practice of the content taught (Montero Díaz, 2021). This need was addressed by proposing the following specific objectives for this study:

1. Analysis of auto-perceived improvement in conceptual knowledge of the text editor, spreadsheet, presentation software, and social network.
2. Increased procedural knowledge after the designed training plan.

Conceptual framework and regulations

Advances in regulatory frameworks have led to new conceptions of disabilities. García (García Rodríguez, 2020) states that "it is important to accept diversity as an essential reference to combat inequalities, respecting the difficulties and strengths of the other person as a fundamental axis of coexistence"(p. 77). Thus, the students can grow and experience change as people immersed in a plural and democratic society of which everyone is a part (Moriña, 2017).

The evolution, identification of needs, and analysis of basic skills associated with the training demands necessary to care for people with intellectual disabilities have changed in the last half of the 20th century. These changes were evidenced by the reformulation of educational policies reflected in various enactments that modified the legislative framework. In addition, actions related to accessibility, digital literacy attention measures, and those associated with the implementation of regulatory frameworks seek to strengthen the development of mechanisms capable of responding to strategies and plans focused on digital inclusion (García-Prieto, 2016). "Literacy can mean overcoming accessibility barriers to information and communication technology (ICT) for people with functional diversity, favouring participation, equal opportunities, and social inclusion processes for this group" (Bonilla del Río & Sánchez Calero, 2022 p.67).

In this sense, the World Forum on Education implemented new proposals to create the Agenda for Education 2030 and its convenient framework for action, the Incheon Declaration (UNESCO, 2015) and the Report of Monitoring of the Sustainable Development Goals (Morales, 2015). The proposed challenge is to guarantee an inclusive, equitable, and quality education by promoting learning opportunities that encompass human and social diversity (Luzón Trujillo & Sevilla Moreno, 2015). Likewise, the International Convention on the Rights of Persons with Disabilities (approved by the General Assembly of the United Nations (Assembly, 2006) was the first

international treaty on human rights. Among the first treaties ratified by the European Union (EU) was one related to inclusive education, which was approved by Spain in 2008.

This panorama of plurality and democracy reveals a trajectory of more than 25 years of development in policies and regulations for educational inclusion, employability, and social insertion, in which the incorporation of information and communications technology is increasingly included in curricular projects (García Rodríguez et al., 2020).

Although social and educational changes have been gradual, it is imperative to highlight innovative employability and social inclusion initiatives in public and private academic institutions in Spain. According to Palazón, Gómez and Gómez-Gallego (de los Cobos et al., 2011), in the last decade, universities have been progressing in their lines of action from the university level (which is the least standardised) to promote the idea that students with disabilities have the opportunity to study in their faculties. Universities are committed to continuously train students with functional diversity from an educational innovation perspective (Lopez-Bastias et al., 2020) and digital transformation to favour certain personal areas, such as preparation and acquisition of skills for the transition to labour inclusion, efficiency, and similar conditions.

It should be noted that people with intellectual disabilities are at risk of exclusion. It can be observed how individuals with intellectual disabilities must make a more significant effort to overcome their limitations to avoid the risk of exclusion or maladjustment to the rate of development of that progress. In effect, the so-called digital divide is worrying in this sector of the population, and specifically, in people with intellectual disabilities (Luque & Rodríguez, 2006; Sánchez Montoya, 2002). It is worth mentioning that there is a growing interest (even from the legislative sphere) to address the protection measures that must be considered. Organic Law 8/2021 of 4 June, on the comprehensive protection of children and adolescents against violence, identifies that "children and adolescents with disabilities are susceptible and vulnerable subjects to this type of violence, exposed to its effects in an aggravated way and with greater difficulties for access, on equal opportunities, to the exercise of their rights". Thus, information and communications technologies have become another element to consider when trying to overcome the barriers to learning and participation of people with disabilities. It is concluded that in addition to the required protection and accessibility measures, some "pedagogical mediation" is necessary for the training environment (Arrieta-Casasola, 2019).

Exposure to information and communications technology means putting a response at the service of the social integration of young people with disabilities, seeking equal opportunities, informed and safe inclusion, and expressing, for example, concerns related to training needs and attention that must be given to all perspectives and needs that are likely to be considered. Thus, this law affirms that "the design of training actions must consider all gender perspectives, specific needs of minors with disabilities, with a diverse racial, ethnic or national origin, in a situation of economic disadvantage, minors of age belonging to the Lesbian Gay Transexual Bisexual Intersexual (LGTBI) community or with any other option or sexual orientation and gender identity and unaccompanied minors" (Law 8/2021).

Basic skills in the use of information and communications technology and intellectual disability

In the educational context, there are technological means and resources that can be used in pedagogical mediation strategies; they are "necessary tools for mobilisation, reading, writing, activities of daily life [...] the uses are infinite, and the ICTs are not far behind in their usefulness"

(Echeverría Sáenz, 2011) which are opportunities aimed at the population with disabilities in training and socio-labour environments.

According to Colom (Colom, 2020), in the educational context, we must respond to the digital gap caused by disabilities. The digital gap in education refers to the need for more access to training that puts students in contact with essential digital tools and skills. In addition, other gaps deserve attention, such as the use gap, which indicates that the capacity to develop digitally must be improved. Therefore, learning basic skills in the use of information and communications technology must be favoured by a planned and controlled proposal that allows the person to anticipate, decide, and verify. A combination of knowledge, abilities, skills, and attitudes is necessary to access, analyse, evaluate, critically reflect, create, and act in four different areas of literature: technological, informational, multimedia, and communicative (Esteve Mon & Gisbert Cervera, 2013).

Studies on the digital skills of university students are limited, and those related to the use of ICT for subjects with disabilities are scarcer (Cabero-Almenara et al., 2016). However, scientific literature identifies the importance of using digital tools as a means of learning and achieving greater autonomy in Intellectually Disabled Persons. It has been proven that the development of digital skills leads to greater autonomy and that greater freedom has an indisputable correlation with improving the quality of life of individuals with intellectual disabilities. Many studies have affirmed that autonomy and functional capacity are positively correlated with quality of life (Duran et al., 2008; Lobo et al., 2014).

In the same way, it is essential to point out that "the use of information and communications technology is not the final objective, but a means of supporting individual learning opportunities" (Watkins, 2013). Therefore, it is necessary to reflect on their functionality in work carried out in educational environments, including the university.

The application of information and communications technology as an essential factor for the development of accessible training environments and the promotion of adaptive skills that lead to greater autonomy, responds to the characteristics, desires, and interests of the students by promoting the quality of pedagogical processes (Víquez-Alfaro et al., 2019).

Armas (Armas-Alba & Alonso-Rodríguez, 2022) confirmed that information and communications technologies are essential tools to respond to the training needs of students with Special Needs and that it is necessary to improve the skills of teachers and students in the use of information and communications technology.

Therefore, it is recognised that digital skills in the classroom should be started as soon as possible and should not be seen as something restricted because this helps the development of other cognitive, social, emotional, and personal skills. This opens the door to new research in the field of technologies and virtual environments in teaching and learning processes, that is, how, when, and where the full development of students with intellectual disabilities can be better promoted (García Rodríguez et al., 2020).

Methodology

The research aimed to determine the basic information and communications technology skills a group of university students with disabilities pursuing their university degree had and assess if there were improvements after their training. This was a descriptive, cross-sectional, pre-post study.

Sample

According to the report of people with disabilities administratively recognised (OED, s. f.) (Subdirectorate of Planning, 2019), between the ages of 18 and 35 in Spain, there are 224,708 people with a diagnosed disability of 33% or more. Taking a heterogeneity of 99% (understanding heterogeneity as the diversity of the universe and considering that to access training, there is a prior selection of access), a margin of error of 5% and a confidence level of 94%, we must achieve n=15 to be considered a significant sample.

Fifteen university students with intellectual disabilities participated in this study, achieving a statistically significant population. The sample comprises 60% men and 40% women, aged between 18 and 28, with a mean age of 21. Twelve had a diagnosis associated with intellectual disabilities of 13% (diagnosed as mild), with another three students diagnosed with other degrees or other identified disabilities, such as developmental disorders.

Regarding students' previous training, only (13.33%) have underwent some university training programs, most of which were Special Modality Professional Programs.

Data collection instrument

The questionnaire was an instrument for evaluating digital skills for adolescents at social risk. It is considered a valid instrument because of its ability to assess the most used digital skills with the arrival of digitisation. It is aimed at adolescents at risk of social exclusion. It can be administered to similar groups within formal education and is sensitive to the changes and dynamics of the information society, as is the case for young university students with intellectual disabilities.

It is a closed questionnaire consisting of six sections with several items, configuring an instrument for evaluating skills, knowledge, and competencies in computer science, social networks, the use of video consoles, television, etc.

The questionnaire selected sections corresponding to personal data, knowledge and use of text programs, calculation programs, presentations, social networks, and Internet use. The differences between the number of dimensions and items selected for this study are shown in Table 1.

Table 1. Sections and number of items.

Sections and items from the original questionnaire.	Sections and items from the questionnaire used.
1. Personal information (3 items)	1. Gender, age and current level of studies (3 items)
2. General information. Technological devices) (12 items)	2. Knowledge on applications (1 item)
3. Usage of digital devices (65 items)	
4. Usage of multi-platform applications (79 items)	3. Software for text editing (7 items)
	4. Software to create spreadsheets (8 items)
	5. Software for presentations (11 items)
5. Information and communications in the net (48 items)	6. Information and communications in the net (7 items)
6. Attitude towards the information and communications technology (14 items)	

Source: Adapted from Carrera Farran et al. (2011)

As shown in Tables 1 and 2, we identified the items that aligned with the study objectives by dimension and section. The initial questionnaire with 205 items for the proposal used was reduced from six to five categories, and the 205 items in the original questionnaire were reduced to 37 items in the applied questionnaire (in addition, there were also three items for personal data).

The items and numbers identified as essential in the questionnaire are listed in Table 2.

The same conceptual and procedural elements identified as evaluable were the elements developed in the training plan of 36 training hours specified as the curriculum of the university program's information and communications technology subject.

The measurement instrument was chosen owing to its relevance, reliability, and the process of construction and content validation. The original device used for its confirmation, the expert judgment validation method, is divided into two groups. The judges had to evaluate the instrument's items through a validation questionnaire containing a conceptual scale that allowed them to assess the level of univocity and relevance of each item. Obtaining a uniqueness index (iU) and a relevance index (IP) based on one was what allowed the responses to be weighted. Each item was validated one by one.

The research team for the significant adaptation of the instrument selected a committee of experts divided into three groups, thus forming an interdisciplinary team. The first group, made up of two judges, was comprised of university professors specialising in psychology and a group of vulnerable people. The second group comprised university professors from the Faculty of Education specialising in ICT and University. And the third group includes professors from the health faculty who are experts in mental health.

Following the same process for validating the adapted instrument, it was analysed item by item, and not by blocks. Following the function defined by Carrera (Carrera Farran et al., 2011) for calculating the univocity and membership index based on 1 to be assessed by the judges, the content validity was verified.

The adaptation of the instrument in this significant way has been validated, question by question and not by blocks, offering the following results in terms of reliability and validity indices.

Cronbach's alpha internal consistency coefficient was used to measure the reliability of the evaluation instrument, analysing the test in a unidimensional way, that is, by integrating all the items that the test consists of. Including all the things that make up the evaluation instrument, a Cronbach's alpha of 0.806 was obtained, which is an excellent indicator of internal consistency (Cho & Kim, 2015). Cronbach's Coefficient Alpha: Well-Known but Poorly Understood. Organizational Research Methods, 18(2), 207).

Several accessibility adaptations were made considering the population under study, including the transformation of instructions for easy reading and inclusion of visual support in the type of response expected. In addition, each of these sections was complemented with pictograms to facilitate the understanding of possible answers, such as an increase in the size of the letter in the printed version so that universal accessibility measures are established for this group.

The questionnaire was based on a 5-point Likert scale and the responses ranged from 5="yes and I would know how to explain it" to 1="I did not know it". In the "online" version, the Microsoft Forms program is used in which each participant increases and adapts the size. In line with the validation of the instrument, the original conceptual objective was maintained to influence the self-perception of competence of the respondents regarding the items. In addition, response scales with pictograms were completed for each option. The final questionnaire, under the Creative Commons licence, can be found in Annex I (Data).

All families gave their informed consent when the participating students did not have recognised legal capacity, together with verbal consent, and signed assent by each student before participating.

Table 2. Categories, sections and items of the questionnaire.

Dimension	Section	Items from the original questionnaire (Carrera Farran et al., 2011)	Questionnaire used
Personal information	1	3 items - Age - gender - Current level of studies	Same questions in same order.
General information	2	Usage of technological devices - Personal computer - Laptop - Phone - PDA - Video or music player - Console (Play Station, Xbox)	
Usage of digital devices	3	7 items - Able to perform the actions and applications. - Knowledge on computers. - Knowledge on mobile phones. - Knowledge on photo and video cameras. - Knowledge on music and video players. - Knowledge on television	1 item included. (Knowledge on applications)
Usage of multi-platform applications	4	10 items - What to do in different situations. - Knowledge on web surfing. - Text editing software. - Spreadsheet software. - Multimedia presentation software. - Software to design calendars, posters… - Database management software. - Software for picture and photography editing. - Software to listen to music. - Video editing software. -	3 items were selected. - Text editing software. - Spreadsheet software. - Multimedia presentation software.
Information and communications in the web.	5	3 items - Knowledge on web search. - Communication with other people. - Knowledge on social networks.	1 item is selected. - Knowledge on social networks.
Attitudes towards the information and communications technology before	6	3 items: - Responses to different situations	Not included.

Those who did not need the permission of their families marked the support to participate in this research. This study was designed following the ethical standards recognised by the Declaration of Helsinki and complied with the EEC Good Clinical Practice recommendations and current Spanish regulations governing research in human beings.

Students were provided with a link to participate in the survey. Their reception was ensured, and the process was repeated after training. The evaluators were the same at both instances.

Before starting the course on the use of information and communications technology, it was ensured that all students completed the questionnaire within 30 minutes. The pre-questionnaire data collection was conducted in January 2022. Subsequently, training in office automation and social networks took place in nine sessions of four hours each on alternate days during the two months of training. The data were collected at the end of February using a post-questionnaire survey.

Results

A questionnaire was used as a data collection instrument on the first and last days of the training plan. To analyse the time spent completing the questionnaire on the day of the pre-test evaluation, the time spent on its execution was measured in person by 14 of the 15 students in class. Of the 14 students, 13 answered the questionnaire online and one in printed format because of problems with the Wi-Fi connection. On the last day, when the post-test questionnaire was used again, 14 students were present in class and one student followed the course online. On this occasion, 15 responses were obtained.

Considering the time required to complete the questionnaire, Table 2 shows that the response time for the same questionnaire was reduced by 19.7%.

Table 3 presents the results obtained when the general pre- and post-questionnaire values were compared.

Regarding the objective of analysing the improvement in the knowledge of the text editor, spreadsheet, presentation program, and social networks, the averages in the indices show the values shown in Table 3. An increase in all deals was observed in the post-test indices. The results were analysed using the values obtained in the four sections identified as evaluable (text editor, spreadsheet, presentation program, social networks, and the Internet). The results are presented in Table 4.

The results show a moderate increase of 12–14% in the most common programs, such as text editors or social networks, with a slight self-perceived dominance in the program for making presentations (PowerPoint). A significant jump can be observed in the scores associated with spreadsheet, where an improvement of 25% in the knowledge acquired was perceived.

Regarding the increase in the knowledge imparted to the participants after the designed training plan, if we compare the answers for each of the four sections evaluated (text editor, spreadsheet, program presentations, and social networks and the internet), it can be affirmed that an increase in values was observed between those obtained in the questionnaires applied at the beginning and those obtained at the end as shown in the pre-post indices of the different sections in Table 5.

Table 3. Time used to fill in the questionnaire.

	Average Pre	Average Post	Difference
Time	00:09:53	00:07:56	00:01:57

A t-test was performed assuming a hypothesis that the post values would be greater than those obtained in the pre-test; this hypothesis receives a $p<0.001$ as shown in Table 6 and hence, it is significant and confirms that the training is perceived as effective in increasing knowledge of the participants regarding the use of information and communications technology. (Table 7)

Table 4. Descriptive values of the pre-post study.

	Pre-Index	Post index
N	33	33
Average	0.650	0.807
Median	0.657	0.813
Standard deviation	0.105	0.0805
Minimum	0.446	0.627
Max	0.843	0.960

Table 5. Average difference of values obtained in the sections.

	Previous average	Average Post	Difference	%
Text editor	0,76593407	0,89034014	0,12440607	12%
Spreadsheet	0,56964286	0,815	0,24535714	25%
Presentation software	0,62747253	0,76528139	0,13780886	14%
Social networks and internet	0,66185243	0,77904762	0,11719519	12%

Table 6. Pre-post index of the different sections.

	Pre text editor	Post text editor	Pre spreadsheet	Post Spreadsheet	Pre presentation	Post presentation	Pre internet and social networks	Post internet and social networks
Average	0.766	0.890	0.570	0.815	0.627	0.765	0.662	0.779
Median	0.800	0.893	0.586	0.813	0.600	0.773	0.671	0.813
Standard deviation	0.0652	0.0552	0.0765	0.0491	0.105	0.0767	0.0614	0.0811
Minimum	0.662	0.787	0.457	0.760	0.446	0.627	0.585	0.667
Maximum	0.843	0.960	0.671	0.907	0.786	0.880	0.757	0.880

Table 7. T-test for samples.

			Statistics	Difference	P
Pre index	Post index	T Student's	-11.9	32.0	< .001

Note. $H_a\ \mu_{Measure\ 1\ -\ Measure\ 2} < 0$.

Regarding whether there is a more excellent self-perceived knowledge after the training plan, the type of response was based on a value index on a Likert scale ranging from 1 to 5, where 1="I did not know it" and 5="yes, and I would know how to explain it"; an increase from 0.32 in the pre-test to an index of 0.45 in the post-test was noted.

Discussion and conclusions

Digital skills should be introduced in classrooms as early as possible. They should not be seen as something restricted as it helps develop other cognitive, social, emotional, and personal skills. This opens the door to new research in the field of technologies and virtual environments in teaching and learning processes, that is, how, when, and where the full development of students with intellectual disabilities can be better promoted (Rodríguez Herrero et al., 2020).

The rapid educational adaptation to the virtual environment has forced teachers and students to practice skills that, in some instances, were acquired at a basic level (Rodríguez Herrero et al., 2020). In this context, the present study facilitates the results obtained from an instrument identified to collect self-perceptions of knowledge about using and managing information and communications technology.

Carrera (Carrera Farran et al., 2011) defined the selected instrument as a conceptual scale that required respondents' personal self-perception. Specifically, for university students with intellectual disabilities, it is essential that they express their self-perception of competence. In this sense, the instrument required both adaptation and visual support to transfer the type of response and prioritise sections (subsections and items).

The students in this study identified what information and communications networks they use and know. They also claim to have improved after training; they were able to differentiate and identify purposes as well as their characteristics, in line with the study conducted by Ainara Zubillaga (Alba Pastor & Zubillaga del Río, 2012), in which an exciting element named utility is analysed in young university students with some type of disability. They provided answers such as "they serve to improve their access to teaching materials" or "they offer them more learning experiences without the barriers of face-to-face classes".

Thus, the 15 students surveyed in this study perceived improvement, beyond the conceptual and procedural, in the post-test evaluation after the training process. Several authors (Mampaso Desbrow et al., 2020) have previously shown that self-perception with the degree of well-being in the virtual university environment seems to need to meet standards of quality and rigor similar to those offered in the face-to-face modality. Therefore, it is not enough to analyse its accessibility and the instrumental nature of training in the virtual space (p. 151). It is also imperative to advance the study of the development of information and communications technology competencies and the competencies for the inclusive education of teachers in training; it represents a source of knowledge of great value to guide training towards the desired inclusive school and knowledge society (Espejo et al., 2017).

Regarding the use of programs and social networks, Sánchez, García, & Cedeño (Sánchez et al., 2021) found the following exceptions: (1) in the item on the use of Microsoft Excel, the middle reaches 2.82, the lowest value being related to the fact that the use of Excel is more focused on more specific uses; (2) while the use of Microsoft Word has the highest mean response (4.06), and therefore, it is what the participants with intellectual disabilities use the most. Likewise, in a study referenced in terms of applications, Kumin & Schoenbrodt (Kumin & Schoenbrodt, 2015) reported that 42.7% used MS Word for word processing, and 16.8% used PowerPoint. Only 7% used Excel, and 46.2% used social media.

Contrarily, the study finding that all the participants perceived the increase in knowledge with the use of ICT as effective and that there is more excellent self-perceived knowledge after the training plan could be related to the fact that the people with intellectual disabilities need to rely on the use of ICT to perform daily activities effectively. For this reason, learning and increasing knowledge in the use of ICT is perceived satisfactorily, as evidenced by various investigations performed both nationally and internationally. For example, Alexopoulou, Batsou and Drigas (2021) consider that learning is facilitated by using ICT since students with intellectual disabilities can have equal access to innovative programs, curricula, and classroom participation. In addition, the training and education programs provided through ICT seem to substantially and permanently impact the quality of their lives, ultimately leading to their social and labour inclusion.

Similarly, in another study, participants described how ICTs opened the door to possibilities in their lives: ICTs provided a way to connect with other people, a means to pursue personal interests, and a tool to organise daily life (Barlott et al., 2020).

Numerous studies have shown the advantages of using information and communications technologies for people with intellectual disabilities. These benefits include the improvement of their daily functions and literacy, the extension of social networks, the improvement of independence and quality of life, and the facilitation of empowerment (Davies et al., 2002; Furniss et al., 2001; Lancioni et al., 1999; Renblad, 2003; Standen et al., 2001; Woodward & Rieth, 1997).

Undoubtedly, we are at a time when training initiatives in university settings for persons with intellectual disabilities are increasing, and proposals showing their effectiveness are required. In the training of basic skills for using information and communications technology, emphasis should be placed on the skills and abilities that students can develop and not on their limitations, producing a framework in which students can learn to manage their difficulties (Luque & Rodríguez, 2006; Rodríguez et al., 2020). Their self-perception must be considered and they must be active subjects in the process so that their self-perception can be regarded in the classroom or research. Regarding the instrument applied and the adjustment made to the number of items and selected dimensions, it is of interest to include in future research, a section on attitudes towards information and communications technology, with a more significant number of items, given the lack of specific questionnaires linked to this particular aspect in a vulnerable population. Future research could contrast the validity and purpose of the proposed instrument and specifically analyse students' attitudes towards these competencies.

Additionally, future studies could be expanded by analysing intrinsic and extrinsic motivation together, the use of digital technology to support learning, how they complement the studies of students with intellectual disabilities, and the perception they have about technology in line with what was identified in the study conducted by Ramírez Mera and Barragán López in 2018.

To conclude, it is essential to highlight that several of these young people will be incorporated into the labour market shortly. Currently, the work environment demands new qualities and knowledge from recent university graduates, including digital skills, and there is a lack of research on students' self-perception of learning basic skills in the use of ICT (Pérez et al., 2020). ICT training for people with intellectual disabilities helps them maximise the benefits of information technology through computers (Li-Tsang et al., 2007). Moreover, to address the digital divide and the need for ICT use among people with disabilities, specially designed and adapted ICT training programs must be developed (Li-Tsang et al., 2005) with the aim of increasing basic ICT skills among people with intellectual disabilities.

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Supplemental Material

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