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ASSESSMENT OF DIGITAL COMPETENCIES OF UNDERGRADUATE STUDENTS OF EARLY CHILDHOOD EDUCATION GRADE

Miguel-Ángel Fernández-Jiménez (a)*, Leticia Concepción Velasco Martínez (b)
*Corresponding author

(a) Universidad de Málaga, Av. Bulevar Louis Pasteur 25, 29010, Málaga, España, mafjimenez@uma.es
(b) Universidad de Málaga, Av. Bulevar Louis Pasteur 25, 29010, Málaga, España, letvelmar@uma.es

Abstract

The Information Society in which we find ourselves in, characterized by the widespread use of Information and Communication Technologies (ICT) in almost every area of our lives, requires new skills from people. Many studies speak of teacher training in ICT, the acquisition of these skills and the need to promote initial teacher training in this area This study analyzes the perception of digital competences among students of the Bachelor's Degree in Early Childhood Education at a university teaching classroom based courses (University of Malaga), and in another that offers online courses (International University of La Rioja). To this end, the "Questionnaire for the Study of the Digital Competence of Higher Education Students (CDAES)" was used as an instrument to assess the degree of self-perception of digital competence shown by Education university students. The questionnaire was applied to a sample of 164 students. The results show the degree of digital competence that students have –in comparative terms – in aspects such as technological literacy, information research and processing, critical thinking, problem solving and decision making, communication and collaboration, digital citizenship and creativity and innovation.

Keywords: Digital competencies, digital literacy, early childhood education degree, higher education, students.

1. Introduction

We are currently immersed in the so-called Information and Knowledge Society, which is mainly characterized by the use of ICTs in all areas of our lives, including the educational context. Thus, it is necessary to acquire and develop a series of digital competencies in order to be able to face up to the new advances and challenges that are taking place every day (Hayes, 2010).

The Information Society may be defined as a stage of social development characterized by the ability of its members to instantly obtain, share and process any information by telematic means, from any place and in their preferred way (as cited in Cabero, 2007).

However, finding a definition that includes all the elements and variables that are part of digital competence is not easy (Gisbert and Esteve, 2011). The OECD (2003) has already established that digital literacy goes beyond the mere fact of knowing how to operate a computer and speaks of the need to develop skills to be able to handle the large volume of information we have access to and to assess the relevance and reliability of what we are looking for on the net.

Digital competence, as defined by the European Commission (2007), is one of the eight key competences that all "people need for their personal fulfilment and development, as well as for active citizenship, social inclusion and employment" (p. 3). It also states that "digital competence implies the safe and critical use of information society technologies (IST) for work, leisure and communication" (p. 7). Core competencies within this key competence include "the use of computers to obtain, evaluate, store, produce, present and exchange information, and communicate and participate in collaborative networks over the Internet" (p. 7).

Cabero, Llorente & Marín (2011, p. 73), see digital competence as "a conceptual framework for accessing, analyzing, evaluating and creating messages in a variety of forms, ranging from print and audio-visual ones such as videos, to the Internet and multimedia", and add that it is not only a question of knowing how to use technological tools, but also of thinking digitally.

Other authors speak of digital competence variables. Prendes, Castañeda, & Gutiérrez (2010) believe that every teacher competent in ICT should master at least five areas that are related to each other: pedagogy, knowledge of social, ethical and legal aspects related to the use of ICT in teaching, skills in ICT-based school management, the use of ICT focused on teachers' professional development and technical knowledge.

Krumsvik, on the other hand, develops a three-level model that would be made up of basic digital skills, didactic competence with ICT and lifelong learning strategies (Cózar & Roblizo, 2014).

The International Society for Technology in Education (ISTE), which is an international institution regarded as a worldwide benchmark in competence and technological skills standards thanks to their NETS project (National Educational Technology Standards), aims at the promotion of technology in the educational field at three levels: teachers, students and managers. One of its programs is the planning of ICT skills for students, which sets out six variables: ICT operation and concept (related to the correct understanding of ICT concepts, systems and functioning), information research and management (based on the application of digital tools to obtain, evaluate and manage information), critical thinking, problem solving and decision making (concerning the skills to plan and conduct research, solve problems and make decisions using the appropriate tools and resources), communication and collaboration (related to

the appropriate use of applications to communicate and work collaboratively), digital citizenship (related to students' understanding of human, cultural and social issues related to ICT) and, finally, creativity and innovation (related to the construction and development of knowledge and innovative products and processes using ICT) (ISTE, 2007).

2. Problem Statement

Education is the primary vehicle for the acquisition of these skills and thus avoid a larger digital divide. Universities should not isolate themselves or remain on the fringes of today's society, ignoring the possibilities that information and communication technologies can bring them (Dede, 2005).

Gisbert and Esteve (2011) state that students arrive at university in many cases without the optimal level of digital competence. In view of this, it is essential to develop and design training and accreditation processes that help demonstrate digital competence level if the best professionals are to be trained so that they are able to develop in conformity with the technological needs of our society today.

Digital teaching skills have become one of the basic skills that any teacher in the 21st century should have, which is why it is necessary to train current and future teachers in this subject (Cózar and Roblizo, 2014; Tejada and Pozos, 2018; Centeno and Cubo, 2013; Esteve and Gisbert, 2013; Esteve, 2015; Gutiérrez, Cabero, & Estrada, 2017; Gisbert, González, & Esteve, 2016; Carrera and Coiduras, 2012; Hall, Atkins, & Fraser, 2014; Krumsvik, 2009, 2012; Castañeda, Esteve, & Adell, 2018; Tejada and Pozos, 2018).

It is essential to train university students to adapt to an increasingly complex and globalized world, with a large volume of information to be managed, and where they must make use of technological tools that are advancing at a dizzying rate (Gisbert, Espuny, & González, 2012).

This is why it is necessary to investigate the digital skills of students who will become teachers in the future.

3. Research Questions

Bearing in mind all that has been said in the previous sections, we must ask ourselves the following questions: What is the perception of digital competences of the students of the Bachelor's Degree in Early Childhood Education at a university that offers classroom-based courses and another that offers online courses? Are there differences between the digital competences of Early Childhood Education students at a classroom-based university course and at one offering online courses?

The model proposed by the International Society for Technology in Education (ISTE) on digital competence and its six variables mentioned in the introductory section of this document will be used to answer these questions.

4. Purpose of the Study

The general objective of this research is to analyze and compare the perception that students of two Bachelor's degrees in Early Childhood Education programs have of their digital competence, one program being classroom based and the other based on online learning.

The specific objectives of this study are as follows:

- To assess perception of the different variables of digital competence among students at a Bachelor's Degree in Early Childhood Education course at a classroom- based university.
    - To analyze their competence in relation to the operation and conceptualization of information and communication technologies.
    - To find out their perception of competence in information search and processing.
    - To obtain information about the competence related to critical thinking, problem solving and decision making.
    - To study the competence related to communication and collaboration.
    - To find out the perception of their competence in digital citizenship.
    - To obtain information on creativity and innovation competence.
- To assess perception of the different variables of digital competence among students at a Bachelor's Degree in Early Childhood Education course at a distance learning university.
    - To analyze their competence in relation to the operation and conceptualization of information and communication technologies.
    - To find out their perception of competence in information search and processing.
    - To obtain information about the competence related to critical thinking, problem solving and decision making.
    - To study the competence related to communication and collaboration.
    - To find out the perception of their competence in digital citizenship.
    - To obtain information on creativity and innovation competence.

To compare students' perceptions of the two modes of study in relation to the different variables of their digital competence.

5. Research Methods

This section will set out the sample of students who participated in this study, the method used in the research and the instrument used to assess the students' perception of their own digital competences.

5.1. Participants

The sample consisted of a total of 164 students, of whom 79 (48.17%) were from the University of Malaga and 85 (51.83%) from the International University of La Rioja.

5.2. Method

A quantitative methodological approach was used to carry out the research with a non-experimental design contrasting the data by means of descriptive and correlational studies.

The participants who were selected after an intentional non-probabilistic sampling were students of the first year of the Degree in Early Childhood Education at the University of Malaga and of the second year of the Degree in Early Childhood Education at the International University of La Rioja.

5.3. Measuring instrument

The collection of information was carried out online through the "Questionnaire for the study of the Digital Competence of Higher Education Students (CDAES)" (Gutiérrez, Cabero, & Estrada, 2017), an instrument that allows the evaluation of the degree of self-perception of digital competence shown by university Education students.

As its authors conclude after their study, its psychometric characteristics make the CDAES a reliable instrument (.96 Cronbach's alpha) and valid for collecting information on the digital competence of university students (Gutiérrez, Cabero and Estrada, 2017).

The questionnaire consists of 44 Likert-scale items with 10 answer options on a scale from 1 to 10 on the degree of students' technological competence. Thus, a value of 1 would refer to the student feeling completely ineffective in the carrying out of the item presented, and the 10 value to the complete mastery of it.

In short, the instrument "allows us to know what students on the Childhood and Primary teaching degree courses know and are capable of doing in order to learn effectively and live productively in an increasingly digital world" (Gutiérrez, Cabero and Estrada, 2017, p. 7) taking as a reference point the indicators proposed in the NETS Project (ISTE, 2007).

5.4. Analysis of the data collected

Once the data were collected, parametric and descriptive analyses were carried out to compare two independent samples using the t-student test. The quality of the variances was tested through this parametric test and Levene's test. SPSS Statistics V22.0 was used to carry out the analyses.

6. Findings

The socio-demographic data analyzed show that the majority of students who responded to the questionnaire were women (97.56%), and the sample was representative of the gender bias usually found on this course, with the great majority of the students being women.

The age range is 18-42 years old, with the highest percentage (67.68%) being students between 18 and 23 years old, and 23.78% of the total being 19 years old.

As for the study variables, the students as a whole showed medium-high scores, values that are very similar in each and every one of them, as seen in Table 1. Those related to ICT operation and concepts and digital citizenship – in that order – produced the best results. With regard to the former, students showed a medium-high level of understanding and use of information and communication technology systems, the selection and effective and productive use of applications, research and problem solving in systems and applications and the transfer of existing knowledge to the learning of new information and communication technologies. Likewise, and taking into account the digital citizenship variable in which they present the same level as the one described above, the learners promoted and practiced the safe, legal and responsible use of information and ICTs, had a positive attitude to the use of these technologies to support collaboration, learning and productivity and were capable of exercising leadership for digital citizenship.

By contrast, the critical thinking, problem solving and decision making variables received the lowest score from students, showing a slightly lower level than the rest of the variables in terms of identifying and defining real problems and meaningful questions to investigate, plan and manage the activities needed to develop a solution or complete a project, analyze data to identify solutions and/or make informed decisions, and using multiple processes and diverse perspectives.

Table 01. Descriptive results of the variables studied

Variables	N	Minimum	Maximum	Mean	Standard deviation
ICT functions and concepts	164	2,62	10,00	7,77	1,22
Information search and processing	164	1,50	10,00	7,50	1,38
Critical thinking, problem solving and decision making	164	2,00	10,00	7,13	1,44
Communication and collaboration	164	2,11	10,00	7,07	1,50
Digital citizenship	164	2,20	10,00	7,75	1,33
Creativity and innovation	164	2,00	10,00	7,34	1,40
Valid N	164				

A parametric analysis was carried out using the t-Student test to compare the two groups of students. The results reveal that there are significant differences in the five last variables studied, while in the first variable the difference does not seem significant.

The first variable (ICT functions and concepts) does not show significant differences between the two groups with t=-1.52, with 157.94 df ρ =0.13 (University of Malaga students had 7.62 mean and a 1.26 standard deviation and International University of La Rioja students had a 7.90 mean and a 1.16 standard deviation).

In relation to the second variable (information search and processing), significant differences can be observed. Students at the University of Malaga had lower competence (mean=7.50 and standard deviation=1.60) than those at the International University of La Rioja (mean=7.51 and standard deviation=1.13) with t=-0.74, with 162 df ρ=0.94.

With regard to the third variable (critical thinking, problem solving and decision making), students at the University of Malaga (mean=7.18 and standard deviation=1.77) had lower competence than those at the International University of La Rioja (mean=7.09 and standard deviation=1.06) with t=0.39, with 162 df ρ =0.69.

An analysis of the fourth variable (Communication and collaboration) shows that students at the University of Malaga (mean=7.27 and standard deviation=1.67) had lower competence than students at the International University of La Rioja (mean=6.89 and standard deviation=1.31) with t=1.60, with 162 df ρ =0.11.

In terms of the fifth variable (Digital citizenship), students at the University of Malaga (mean=7.68 and standard deviation=1.63) showed lower competence than those at the International University of La Rioja (mean=7.81 and standard deviation=1.00) with t=-06.60, with 162 df ρ=0.53.

With regard to the last variable (Creativity and innovation), it is worth noting that students at the University of Malaga (mean=7.45 and standard deviation=1.73) achieved a lower degree of competence

than those at the International University of La Rioja (mean=7.24 and standard deviation=0.99) with t=0.95, with 162 df ρ=0.34.

7. Conclusion

The results mentioned in the previous section lead to conclude that students from both universities show high mean values in all the variables of the study, and this may be due to a series of factors. One of them, as Cózar and Roblizo (2014) conclude in their research, could be that young people aged 20-24 years old have grown up with the new technologies, and have been able to adapt to the permanent advances and rapid changes that have taken place. In this regard, it should be taken into account that the bulk of the students were 18- 23 years old.

Likewise, this research shows that there are differences between the two groups of students in five of the six variables studied, reflecting a higher level of digital competence in those who study at the International University of La Rioja. This University offers its classes online, which could mean that students must have greater digital competence to deal with their degree studies, unlike those at the University of Malaga, which teach its courses on site.

This study shows that although future early childhood teachers may have some shortcomings in terms of digital competence, as some studies (Cabezas, Casillas, & Pinto, 2014; Cózar & Roblizo, 2014), among others, conclude students' perception of their own ICT skills is quite optimal and appropriate.

Acknowledgments

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