Revista Innova Educación

ORIGINAL ARTICLE

Digital competence in the context of COVID 19: a view from education

Competencias digitales en el contexto COVID 19: una mirada desde la educación

Competências digitais no contexto do COVID 19: uma visão a partir da educação

Dariel Díaz-Arce[1]

Universidad Politécnica Salesiana-Unidad Educativa Santana, Cuenca – Quito, Ecuador

https://orcid.org/0000-0002-5952-9916

ddiaza3@est.ups.edu.ec (correspondence)

Efraín Loyola-Illescas

Universidad Politécnica Salesiana, Cuenca – Quito, Ecuador

https://orcid.org/0000-0002-3881-7353

eloyola@ups.edu.ec

ABSTRACT. This work aimed to carry out a review on the state of the art of teaching and student digital competencies in the current context of COVID 19. A documentary search was carried out in the Scopus, Web of Science, Scielo, and Redalyc databases, selecting the articles with specific inclusion and exclusion criteria. As a result, it was observed that this topic has an important need in the current context of the pandemic, due to its deficiencies in the educational field. Likewise, the differences of this concept with others such as information literacy and digital literacy are shown considering their areas of study, as well as the dimensions and standards for their implementation and evaluation. Evidence is provided of the importance of the digital divide to achieve them, and of how they can be developed from different strategies such as the Inverted Classroom. The studies consulted suggest that this model could be ideal in the context of current education.

RESUMEN. Esta investigación tuvo como objetivo la implementación de un Proyecto de Educación para la Paz (PEP) en un aula de primer grado de una escuela primaria ubicada en San Cristóbal de las Casas, Chiapas, México. La intervención promovió un conjunto de competencias prosociales en estudiantes, docentes y familias; para ello se desarrollaron estrategias universales y focalizadas. Se utilizó un enfoque mixto, con evaluaciones antes y después. Se recolectó información mediante la investigación-

[1] Teacher at the Santana Educational Unit, Ecuador.

acción-participativa. Algunos hallazgos indican que los PEP sistemáticos en el aula disminuyen la violencia y fortalecen la prosociabilidad. Hubo una reducción en el índice de violencia escolar de 1.12 a 1.10 y un aumento en la prosociabilidad estudiantil de 3.34 a 3.70. Las estrategias incidieron favorablemente en el mantenimiento de un clima escolar de cordialidad, mayor empatía, asertividad, mejor manejo de emociones y aumento en las redes de amistad.

RESUMO. Esta pesquisa teve como objetivo implementar um Projeto de Educação para a Paz (PEP) em uma sala de aula do primeiro ano de uma escola primária localizada em San Cristóbal de las Casas, Chiapas, México. A intervenção promoveu um conjunto de competências pró-sociais em alunos, professores e famílias; para isso, foram desenvolvidas estratégias universais e focadas. Foi utilizada uma abordagem mista, com avaliações antes e depois. As informações foram coletadas por meio de pesquisa-ação participativa. Algumas descobertas indicam que os PEPs sistemáticos na sala de aula diminuem a violência e fortalecem a prosociabilidade. Houve redução do índice de violência escolar de 1,12 para 1,10 e aumento da prosociabilidade dos alunos de 3,34 para 3,70. As estratégias afetaram favoravelmente a manutenção de um clima escolar de cordialidade, maior empatia, assertividade, melhor gestão das emoções e aumento das redes de amizade.

1. INTRODUCTION

Today it is almost impossible to separate the development of countries and nations from digital information and communication technologies (ICT). In this sense, smart electronic devices, computers and hyperconnectivity are at the top of the world market at such a level that they are perceived as one more basic need, especially in the labor, social and individual fields. For this reason, it is becoming increasingly important to develop basic skills and competencies for the safe and efficient management of the potential they possess; in other words, it is necessary to literate society in this increasingly universal digital language (Ocaña-Fernández et al., 2020; Sánchez-Caballé et al., 2020).

Until a few years ago, those who had literally grown up in the age of digital technologies were recognized as digital natives. In this way, it was believed that they understood the digital language better and therefore had greater competencies in this regard. However, experience shows that being immersed in a digitized society does not ensure the acquisition, by themselves, the basic skills for the proper handling of these tools, and that most of the work on this subject lack an empirical foundation that support them (Acosta-Silva, 2017). In this sense, it is where educational systems play a fundamental role, promoting their development through education and training programs, either as part of a subject or in a transversal way, both in teachers and students. (Cabero-Almenara & Palacios-Rodríguez, 2020; Henriquez-Coronel et al., 2018).

Although it seems a recent topic, the digital competences of teachers and students have been discussed in the literature within different concepts for several decades, related to the increasing use of digital technology and learning using computers, until the implementation of didactics and more complex pedagogical models. Since then, research has resulted in the need to raise these competencies in students to improve their academic performance and as skills for their future life and as a professional (Lucas, 2019; Slavova & Garov, 2019). Likewise, its inclusive role is highlighted through the insertion of children and young people from different contexts and educational needs, pointing not only to their academic performance, but also their motivation.

(Formichella et al., 2020; López Núñez et al., 2020). Teaching competences from their professional, technological and pedagogical fields have a significant impact on this (Sánchez-Caballé et al., 2020).

Currently, the issue of digital skills is of special significance in the context of the COVID-19 pandemic, since classes had to move towards Virtuality and where face-to-face meetings are becoming less and less frequent (Sá & Serpa, 2020). In this area, the United Nations Organization estimates that approximately 1.5 billion students were affected by this situation, exacerbating differences in the educational sphere. At the same time, it suggests that education systems must urgently take a step towards "(…) progressive systems that provide quality education for all as a way to achieve the Sustainable Development Goals. This requires investments in digital literacy and infrastructure, as well as strengthening links between the formal and informal sectors of education." (ONU, 2020). Other organizations at the regional level agree with this, reaffirming that in Latin America and the Caribbean there is also evidence of an important digital divide for students and teachers, which has an impact on quality and although countless measures are implemented to counteract it (CEPAL & UNESCO, 2020).

Coupled with the above, recent studies reveal that the issue of digital skills is a priority for both students and teachers, becoming one of the most important challenges for education systems and its contribution to the development of a knowledge society (Gómez-García et al., 2020; Sánchez-Caballé et al., 2020). In this case, there is a need for digital literacy that links schools with society, improving the acquisition of digital skills for collaborative learning, autonomy, effective communication, ethics and digital citizenship (Dias-Trindade et al., 2020; Domingo-Coscolla et al., 2020). This not only contributes to the development of skills for continuous learning, but it can also help to break down communication and integration barriers between families and the school. (Maciá Bordalba & Garreta Bochaca, 2018).

Some experimental and quasi-experimental results suggest that one of the most promising pedagogical models to develop these skills is the Flipped Classroom. Its foundations are in an active and collaborative learning, in which the student participates as the main actor in their learning, and the teacher is more like a facilitator or mediator (Gómez-García et al., 2020). There are multiple investigations that support this approach, even using different methodological designs, educational settings and tools for obtaining primary data (Koelling & Townsend, 2019; Sosa Díaz & Palau Martín, 2018; Tagge, 2018). This is especially relevant considering that it can also raise student academic performance, satisfaction and motivation (Espada et al., 2020; Hinojo Lucena et al., 2019). Despite the above, there are multiple factors that can reduce the effectiveness of this methodology, one of the most important being the current undeniable digital divide.

Due to all the above, the general objective of this work is to review the current state of teacher-student digital skills and how to promote them in the context of education in Latin America and other regions and their importance during the COVID 19 pandemic. Likewise, the specific objectives include the following:

1. Differentiate the concepts of digital competences from other similar and interrelated ones such as digital literacy and information literacy, their areas and dimensions of work.

Dariel Díaz-Arce; Efraín Loyola-Illescas

2. Reflect on the educational impact that the digital divide has on the development of digital skills in the face of the new educational landscape imposed by COVID 19.
3. Review the current state of teaching and student digital skills, considering their strengths and weaknesses in Latin America and other countries.
4. Describe the usefulness of different strategies to develop digital skills in students, emphasizing the model of the Flipped Classroom.

2. METHOD

A documentary review of the state of the art of digital competences was carried out, using the Scopus and Web of Science, Scielo and Redalyc databases. The keywords used were: *"Digital Skills", "Digital competence", "Digital literacy", "Information literacy", "Teacher digital competences", "Student digital competences", "Flipped Classroom", "DigCompEdu", "Digital competences framework",* later their translations into Spanish were also sought: "Habilidades digitales", "Competencias digitales", "Alfabetización digital", "Alfabetización informacional", "Competencia digital docente", "Competencia digital estudiantil", "Aula Invertida", DigcompEdu y "Marco de competencias digitales".

The selection was made according to the type of study and context carried out, with the following inclusion criteria: all research articles, bibliographic reviews and systematic reviews, which contain at least one of the keywords and are from the last 5 years. A few articles from works published more time ago were included given their relevance for understanding and arguing the subject. As exclusion criteria: articles that only mentioned the term and did not develop it were discarded. In addition, documents that were found to be duplicated in the different databases analyzed, or that did not contribute anything new to the central topic of the research or that came from less reliable sources, were eliminated. Similarly, articles that could not be accessed in full format even after writing to the authors for a copy were discarded.

In this way, the work was developed in five sections: *Digital competences, digital and information literacy: intertwined concepts*, where an approach is made to differentiate related concepts; *The digital divide before the "COVID 19 Era" in Latin America and the teacher and student digital skills*, where a reflection is made on the issue of the digital divide before and during the pandemic and its possible impact on education from the analysis of the digital skills; *The teaching digital competences* and another of *the student digital competences*, where the concept and the current state of the same in different contexts, including the Latin American one; It closes with a section on *How to promote digital skills in students in the current context?*, where different strategies are described to promote digital skills, emphasizing the pedagogical and methodological model of the Flipped Classroom.

3. RESULTS AND DISCUSSION

Digital competences, digital literacy and information literacy: intertwined concepts.

There is a significant heterogeneity of terms that include, to a greater or lesser degree, the competencies and abilities for a society immersed in the new Information and Communication Technologies (ICT). In this case, three of the most frequent in Western literature and that are

directly related to the field of education are Digital Literacy, Digital Competences and Information Literacy (Kolle, 2017; Sánchez-Caballé et al., 2020).

Despite the above, and that the terms not only have different origins, there is a diversity of criteria towards a specific definition of them, creating confusion in the scientific and academic field. In this case, their conceptualization acquires a different connotation if they are defined from the design of policies for their promotion, or from scientific research (Spante et al., 2018). It is also noted that to some extent they complement each other, perhaps due to the fact that until now there is no consensus on what are the basic digital competencies or skills that people must develop for a true digital information and knowledge society.

According to some, the term information literacy or alfabetización informacional in its Spanish version, emerged in the mid-70's of the last century, coined by the researcher Paul Zurkowski. Despite this, the term continues to appear confusing in some publications, the translation for Spanish-speaking countries is still debated, as well as its conceptual definition. (Vidal Ledo et al., 2016).

With the advent of ICT and the massification of access to information and online resources, the term literacy has taken on another dimension, moving from the ability to read and write to other more complex ones to function in a digitized society, promoting development economic, social and cultural of nations. If to this is added that the information could be understood as "(…) the set of organized and contextualized data; that are transmitted in the process of social communication; and that once assimilated, they allow the solution of problems, decision-making, the reduction of uncertainty" (Pozo-Jara, 2017), we could refer literally that information literacy is related to the basic skills to access information in different formats and with practical utility for people. However, as is to be expected, this definition is very limited for the current economic, socio-cultural and educational sphere, as will be seen below.

One of the simplest definitions for this concept was provided by the *American Library Association* (ALA) in 1989, stating that an information literate person "(…) must be able to recognize when they need information and have the ability to locate, evaluate and use it effectively" (Cited by: Sturges & Gastinger, 2012). Likewise, the *Declaration of Alexandria* of 2005, in the framework of the colloquium on the subject between the *National Forum on Information Literacy* and UNESCO, concludes that information literacy is vital to develop lifelong learning, and that in addition to what is proposed by ALA, people must also be able to "effectively create information to achieve their personal, social, occupational and educational goals" (Cited by: Pinto & Uribe-Tirado, 2017).

Other organizations such as the *Chartered Institute of Library and Information Professionals (CILIP)* in 2004 maintain the basis of the previous concepts. However, they argue that it is also necessary to know "when and why information is needed, where to find it, and how to evaluate it, use it and communicate it in an ethical manner" (cited by Vidal Ledo et al., 2016). This same organization for the year 2018 adds that the term is much broader, involving the judicious interpretation of the information, integrating competencies, qualities and critical thinking

and awareness skills, as well as the way it is used from the field not only ethical but also political (Sales, 2020).

In addition to the above, information literacy does not include only the written information that we find on the web, but also the printed media, spoken discourse, images, audios, videos, among other forms. Therefore, it is not an independent concept, but involves or relates to other literacies such as *digital literacy*, *academic literacy,* and media *literacy*, among others (Sales, 2020). This then implies a high degree of competencies and skills for the effective management of information as a form of individual and collective knowledge.

In this case, in the review of the subject carried out by Slavova and Garov (2019) it is summarized that since the beginning of the XXI century in countries such as Australia and New Zealand, standards or skills more focused on achieving information literate people were created. These standards are aimed at the design of national policies for the acquisition, understanding and implementation of information literacy by citizens, including the following points:

- Recognize the needs and the extent to which the information is required.
- Access information in an efficient way.
- Critically evaluate the information found and the sources of origin.
- Classify, store, manipulate, reformulate the information collected or generated.
- Incorporate the selected information into your basic knowledge.
- Use information effectively to learn, create new knowledge, solve problems, make decisions.
- Understand the economic, legal, social, political and cultural aspects of the use of information.
- Access and use the information ethically and legally.
- Use information and knowledge to participate with social and civic responsibility.
- Experience information literacy as part of independent and lifelong learning.

In summary, information literacy refers to all the skills and aptitudes that allow a person to effectively and ethically manage their information needs, even if it is in different formats or needs the use of technological resources for its location and access. In this way, it must incorporate criteria to recognize and critically and consciously evaluate the information requirements, as well as design the most efficient strategies for the search, location, identification, retrieval, interpretation and evaluation of the most reliable and adequate sources, which are They will be used to give added value in the solution of an individual or collective problem.

The foregoing is in accordance with the update carried out by the European Commission on the Framework for Digital Competences for Citizens (*The Digital Competence Framework for Citizens - DigComp 2.1*). This consensus not only indicates that information literacy is closely intertwined with digital skills, but also that to achieve it a person must: identify the need for information, navigate, search, filter data, information and digital content; create and update custom search strategies; critically and comparatively evaluate the reliability of sources; organize, store and retrieve information, data and content in digital environments (Carretero et al.,

2017). Therefore, from this perspective, digital competences include information literacy in part, with the exception that the latter not only refers to digital information, but also to printed and verbal information as previously mentioned.

Expanding on the foregoing, the term Digital Competition is relatively recent, with its origins located since 2010 in continental Europe and later in other regions, such as Latin America and the United States. For an initial approach to its meaning, one could start with the words that make it up. In this case, the Royal Spanish Academy (RAE) refers to "competence" as "Expertise, aptitude or suitability to do something or intervene in a specific matter." (RAE, 2014). If to this is added that "digital" could refer to communication and computing, access to the Internet or other platforms (Carrillo-García et al., 2018), then, it could be defined that a digitally competent person is one who can handle ICT. However, digital skills are much more than simple expertise in the management of computer programs and equipment and digital communication.

In this context, the concept of digital competence is multidimensional, which encompasses a set of interrelated skills and attitudes that encompass technical, informational, content creation, media, communication, problem solving, as well as making of strategic and ethical decisions. With the above, it can be seen that this term encompasses more than simple technological skills, since it also focuses on acquiring a critical and safe position regarding the use of ICT in student, professional, leisure life, among others (Cabero-Almenara & Palacios-Rodríguez, 2020; Sánchez-Caballé et al., 2020; Spante et al., 2018). Lucas, (2019) agrees with this, who also states that these skills and attitudes, similar to those required for information literacy, are essential for social inclusion, active and conscious civic participation, and for intelligent, competitive and sustainable of today's society. For this reason, it could be said that digital skills refer to a concept in constant renewal and improvement, having to adapt and evolve at the same time as ICTs progress, which also helps the socio-cultural and economic development of humanity.

Due to the ever-changing nature of today's technologies, it is difficult to define what are the basic competencies that should be promoted in citizens, since they can change in short periods of time. For this reason, some organizations update their digital competence frameworks more and more frequently. In this case, at the European level, the *Digital Competence Framework for Citizens-DigComp* has been updated on several occasions, which has been extended to other more specific areas such as education (*DigCompEdu*), organizations (*DigCompOrg*) and consumers (*DigCompConsumers*). In its most recent version (*DigComp. 2.1*), it highlights five areas of competence and 21 general digital competencies for society. These areas are: 1. *Information and data literacy*; 2. Communication and Collaboration (*Communication and collaboration)*; 3. *Digital content creation*; 4. *Safety*; 5. *Problem solving*. Likewise, the competencies involved with each of these areas are summarized in Table 1 (Carretero et al., 2017)

Table 1. *Digital areas and competencies according to DigComp 2.1.*

Area	Competences
Information and data literacy	- Browse, search, filter data, information and digital content. - Evaluate data, information and digital content. - Manage data, information and digital content.

Communication and collaboration	- Interact with others through digital technologies. - Share through digital technologies. - Get involved in society through digital technologies. - Collaborate through digital technologies. - Digital label (Netiquette) - Management of digital identity.
Creation of digital content	- Development of digital content. - Integrate and rework digital content. - Copyright and licenses. - Programming.
Security	- Device protection. - Protection of personal data and privacy. - Protect health and well-being. - Protect the environment.
Problem solving	- Solve technical problems. - Identify technological needs and responses - Use technologies creatively. - Identify gaps in digital skills.

Source: (Carretero et al., 2017).

On the other hand, the Digital Competences Framework adopted by *Québec's Ministère de l'Éducation et de l'Enseignement Supérieur*, Canada, also has as vision an integration and optimal use of digital technologies to promote the success of citizens through skills that promote their development and maintenance of lifelong learning. In this way, they define more specifically digital skills as the skills required for a creative, critical and appropriate use of digital technologies in various areas such as learning, work, recreation, and inclusion or participation in society. It is also added that a digitally competent person can adapt to technological innovations, critically evaluate these technologies and adopt and implement those that are useful personally and socially, for which 12 key dimensions are proposed that are summarized in Figure 1 (Karsenti et al., 2020)

Figura 1. *Dimensions of the digital competences of Québec's Ministère de l'Éducation et de l'Enseignement Supérieur.*

Source: Karsenti et al., (2020)

Dariel Díaz-Arce; Efraín Loyola-Illescas

As can be seen, there are multiple connections between the dimensions proposed by the European Commission with respect to those developed in Canada. However, in the second approach, the development of an ethical and technologically competent citizenship is placed at the core of all dimensions, around which all the others revolve in a close relationship with each other. In the same way, the inclusion of informational competences helps to understand the importance and relationship of digital competences with information literacy.

Finally, the term Digital Literacy is another that tends to blend in with the previously mentioned literature. According to Spante et al. (2018) this term was introduced at the end of the 90's of the last century by Gi lster, who would define it as the ability to understand and use information in multiple formats of a wide range of fonts when presented through computers. As can be seen, this conceptualization is very similar to that of information literacy, based on the fact of the effective use of information.

Since that time and with the development of ICT, the concept of digital literacy also evolved, agregándosele both the cognitive abilities and skills (Mishra et to the., 2017). Thus, the original definition is slightly modified by Chan et al. (2017) who indicate that it refers to the "ability to understand and use information in multiple formats with an emphasis on critical thinking rather than communication skills. And the information". Added to this is the attempt to differentiate the concepts of information literacy and digital literacy by Machin-Mastromatteo (2012), who summarizes that the former refers to the individual's ability to handle information in general, while the latter refers to it focuses more on the handling of electronic devices (hardware and software). This author refers that it should be spoken more in the plural as literacies (*literacies*) which would include both digital and information literacy.

For his part, Tang and Chaw (2016) uses n a broader definition, in which it indicates that digital literacy refers to the knowledge, attitudes and abilities of people to use digital tools and facilities. This use would be made in order to "identify, access, manage, integrate, evaluate, analyze and synthesize digital resources, build new knowledge, create media expressions and communicate with others." That is why it is argued that this concept in its development does not privilege technology over knowledge, but has focused mainly on the acquisition of digital skills, the development of digital cognitive models and the inclusion of digital cultures and practices (Yépez-Reyes, 2018).

All of the above supports the approach s of Spante et to the (2018) and Coldwell-Neilson (2017) who indicate the lack of precision in the definitions of these concepts. This becomes more noticeable when they are taken to the educational context, specifically to the skills and competencies of teachers to face a teaching-learning process of their students in an effervescent world of technologies of all kinds and scope. In the Latin American context, it must also be added the significant digital divide faced not only by teachers from different institutions and countries, but also by students themselves, which significantly limits access to ICT and the internet, and therefore it delays the development of literate and competent people for an information and communication society.

That is why the study of the concepts discussed here should be approached according to the context of the specific situations of that person's life, in which constructive social action and reflection on their process of acquiring skills and competence for a true society is possible. inclusive digital. This can be summarized in a more direct way, although not without biases : information literacy is responsible for equipping people with skills for efficient, creative and ethical management of information; digital literacy for its part focuses on the skills for the management of ICT to be included in that information society for what includes the first and other types of digital literacies; while digital competences focus more on understanding the global dimensions of these technologies and their transforming potential of society, thus including the different types of digital literacies.

 - The digital divide before the "COVID 19 Era" in Latin America and teacher and student digital skills.

The impact of COVID 19 in the spheres of Public Health and the Economy of the countries is indisputable and has been widely disseminated by different media worldwide. However, another very important and less analyzed crisis is the one that develops in the educational field, in which this pandemic is inserted as a factor that further aggravates the significant digital and educational gap that already exists (García Fernández et al., 2020; Lloyd, 2020; Rodicio-García et al., 2020).

In this sense, the proposals made by the UN (2020) and ECLAC & UNESCO (2020) to address this emergency are focused on an investment to improve access to digital resources and to promote educational practices that fundamentally take into account activities in line and distance. Two important observations could be made to this proposal: given the current and looming economic crisis, it is difficult to achieve a commitment from governments to make significant investments aimed at solving or at least mitigating the problem of this digital divide that has been going on for years. without solving; Likewise, an investment that only considers rapid and superficial literacy, aimed more at achieving basic technical skills without developing digital skills in both teachers and students, and that also does not include pedagogical or didactic innovations, could have very little impact. Even so, the response of many educational administrations was to move classes towards virtuality, sometimes without considering the access of students, teachers, families and institutions to information and communication technologies, nor the pedagogical preparation of teachers to design and plan their meaningful activities in a totally different environment than the one they were used to with their students.

According to Mendoza-Ruano and Caldera-Serrano (2014), the term digital divide refers to a complex phenomenon that must be seen as a new dimension or extension of social and historical gaps, associated with power relations, and other factors such as economic, geographic, educational, gender and age, among others. In this way, this problem manifests itself in the form of inequalities between people, communities or countries regarding access and use of ICT and the Internet. This term also involves the fact of digital illiteracy, referring to the fact that although they have access to these technologies, they do not know how to use it. In the Latin American context, this problem is very notable in several of its countries, as will be seen below.

In Mexico, for example, before the pandemic a national survey indicated that only 45% had a computer and only 53% had access to the internet at home. These differences were considered significant if the area where the person lived, because if it was urban, 73% had internet access *vs* 40% in rural areas (INEGI, 2018). For its part in Ecuador, a national survey carried out just before the health crisis showed that only 40.6% of households had at least one computer or tablet, as well as 45.5% of them had internet access (56.1% urban areas vs. 21.6% in rural areas), with 59.2% of people using this service. To this is added that only 41% of those surveyed over the age of 5 used a computer in the last 12 months before the pandemic, also with significant differences by place of residence. Likewise, only 59.9% have an activated telephone, of which 76.8% is a Smartphone. All this is coupled with a digital illiteracy of 11.4% of the general population, which reaches 20.0% in rural areas (National Multipurpose Household Survey Technical Team, 2020).

A different panorama from the previous ones is observed in Chile and Argentina before the pandemic, countries in which more than 80 % of households declared they had access to the internet, more than 90% mobile phones or Smartphone and close to 60% a personal computer (INDEC, 2020; *IX Internet Access and Use Survey*, 2017). All these data also contrast with those observed in other countries such as Spain, where before the pandemic 91.4% of students had access to the internet through their mobile phone and 80.9% did so through a personal computer. These values rose to 96.7% and 83.6% respectively during the pandemic (Rodicio-García et al., 2020).

What has been stated in figures so far, could be understood as that the digital divide only refers to access to technology, the internet and its management. However, this gap is also manifested in the poor development of the necessary skills to include people in a true information and technology society. In this way, the author considers that "functional digital illiterate" people could be observed, since it is not enough to have been born in the age of the internet and know how to manipulate ICT for some personal benefit, but it also requires skills for its management efficient, inclusive and transformative of society. And it is precisely here that educators play a crucial role (Fernández-Cruz & Fernández-Díaz, 2016; Gisbert Cervera et al., 2016).

- Teaching digital skills.

Teaching digital competences could be defined as the set of knowledge, skills and attitudes necessary to use ICT as educational resources integrated into their teaching and learning practice (Cabero-Almenara & Palacios-Rodríguez, 2020; Solís de Ovando Calderón & Jara Jara, 2019). This also leads to a pedagogical and didactic change in teaching practice, where the teacher, faced with such an overwhelming amount of information, must go from a transmitter of knowledge to a facilitator of access, selection, evaluation and transformation of it by the student. In this way, a competent teacher would be the one who integrates knowledge with a triple focus into his educational practice: disciplinary, pedagogical and technological. Thus, encyclopedic knowledge is not enough, it must also be able to design the best didactic and pedagogical strategies to achieve the learning objectives, including technological resources that facilitate and enhance them (Gisbert Cervera et al., 2016).

Defining what digital teaching competencies are is not an easy task either, which is why some organizations such as UNESCO refer to it on multiple occasions, developing documents and guidelines for educational institutions that are not yet very clear on what they should know. teachers on the use of ICT in today's educational world. In this sense, an improvement in educational practice is proposed not only by raising the digital skills of teachers, but also by combining them with pedagogical, organizational and curricular innovations. In this way, it is also committed to a quality of teaching through the development of psychological and educational skills, vocational and leadership skills, as well as collaborative and cooperative skills. This would help to motivate in students the so-called 21st century skills, which are critical and creative thinking, communication and collaboration. To this is added the proposal of a professional teaching practice around six important aspects: 1. Understanding the role of ICT in educational policies, 2. Curriculum and evaluation, 3. Pedagogy, 4. Application of digital skills, 5. Organization and Administration, 6. Professional learning of teachers. To do this, it proposes three successive levels of development in each of these issues (Figure 2) (UNESCO, 2019).

First level: Acquisition of knowledge; where the teacher becomes digitally literate, becoming familiar with basic ICT skills and their use in the educational field, within national policies and priorities. In this case, the skills achieved are applied to enhance teaching using ICT in a standard classroom.

Second level: Deepening of knowledge; In this case, the teacher is able to apply the policies and knowledge achieved in ICT skills to promote the solution of complex problems through professional collaborative groups and networks. All this focused on the integral development of the students.

Third level: Creation of knowledge; where the teacher is shown with high-level competencies that allow them to innovate to model and manage their own educational practice, promoting a political and social transformation through the curricular development of knowledge society competencies.

Figure 2. *The Framework of Teaching Competences in ICT.*
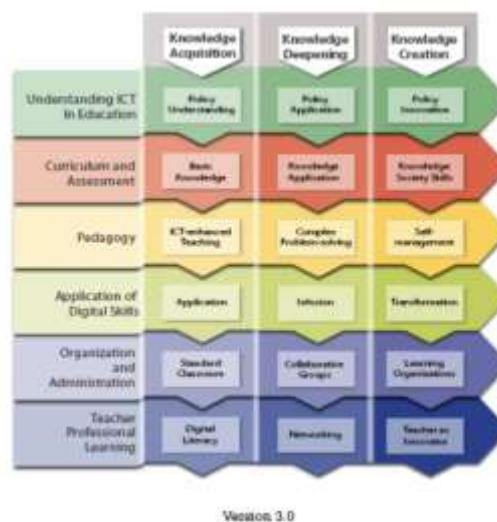
Source: *Image adapted form UNESCO (2019)*

*Dariel Díaz-Arce; Efraín Loyola-Illescas*

It should be noted that, although the above concepts are a guide for the implementation of professional development strategies for teachers in digital skills, they are very general and must be contextualized to the national or local realities where they want to implement. This should integrate not only educational policies, but also investments in infrastructure and continuous training systems and improvement of the quality of teaching. Considering the above, there have been other alternatives to the proposal of UNESCO, one of the most striking of the European Commission. In this case, in 2017 the European Framework of Digital Competence of Teachers or also known as *DigComEdu was published.* In this case, 22 teaching digital competencies are presented in a more specific way, organized into six closely related areas, those that respond to the professional and pedagogical competencies of the teacher and those that focus on students. These areas are summarized below and shown in Figure 3 (Cabero-Almenara & Palacios-Rodríguez, 2020; Caena & Redecker, 2019):

1. Personal Engagement (Professional Engagement): this includes skills on the efficient and appropriate use of technology, taking advantage of the opportunities offered by communication and collaboration with colleagues, parents and students, for more effective digital learning. In addition, it frames the capacity of teachers to reflect individually, collectively and critically on their teaching practices and their digital teaching strategies. This would allow to develop continuous improvements to the educational process.

2. Digital Resources: related to how the teacher can select, create, modify and distribute digital resources for their educational practice. This also includes the safe handling and protection of personal data, as well as respect for copyright rules.

3. Digital pedagogy (Teaching and Learning): considers the different stages of the teaching-learning process to design, plan and implement digital technologies with an educational objective. It promotes the use of ICT in collaborative and self-regulated learning processes, accompanying this process with adequate guidance and support measures.

4. Evaluation and feedback (Assessment): focuses on how to use digital tools, resources and strategies for the evaluation, monitoring and timely feedback of student performance, as well as for the improvement of the teaching-learning process, as well as new and better methods evaluation.

5. Empowering Learners: promoting through digital technology, student autonomy and the active participation of students in their own learning process. In this way, ICTs can favor personalized and differentiated teaching processes, respecting the different levels, rhythms and interests of the learners.

6. Facilitating Learners' Digital Competence: it addresses how teachers can promote the digital skills of their students, training them so that they can take risks and use ICTs in a safe and responsible way. In this sense, teachers must be able to design and implement comprehensive activities that promote media and information literacy, so that they can solve digital problems, create digital content and use these technologies for communication and cooperation.

Figure 3. *Teaching areas and competencies and their relationships according to DigCompEdu.*
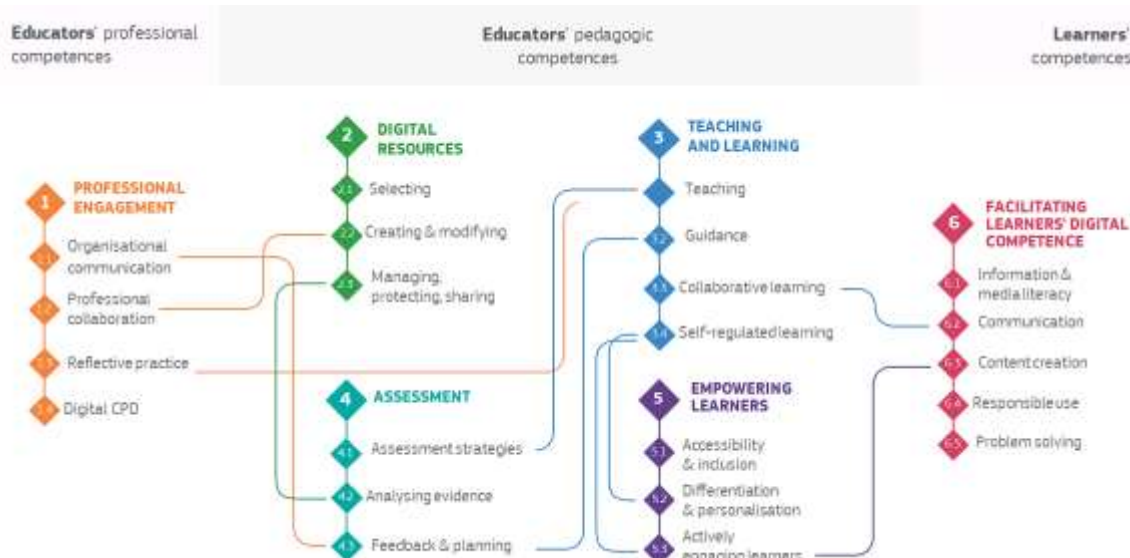
Source: (*Caena & Redecker, 2019).*

As described, area 1 is the professional core of this framework, related to the competencies that all teachers, committed to a Knowledge Society, must achieve to improve their educational practice. Areas 2, 3, 4 and 5 are constituted with the pedagogical nucleus, since they are directly related to the teaching-learning process. Finally, area 6 is related to the citizens who want to be trained to face technological evolution in the future (Cabero-Almenara & Palacios-Rodríguez, 2020; Caena & Redecker, 2019).

All these areas are evaluated according to six levels of competence: level A1 (Novice) and A2 (Explorer) where teachers who are starting to use technology to improve their professional and pedagogical practices are grouped; B1 (Integrator) and B2 (Expert) already integrate technology in a variety of ways and contexts; C1 (Leader) and C2 (Pioneer or innovator), they share their experience with their colleagues, as well as experiment with complex innovative technologies and develop new pedagogical methods, approaches and evaluation strategies (Caena & Redecker, 2019) . The evaluation of the level of digital competencies is thus evaluated with a digital tool called *DigCompEdu Check-in* , of which there is a Spanish version (Cabero-Almenara & Palacios-Rodríguez, 2020) that can be experienced for free at the following site: https://ec.europa.eu/eusurvey/runner/DigCompEdu-H-ES?language=es .

When observing the proposals of UNESCO and the European Commission, it can be seen that both pursue similar aspects. First, the development of the teacher as a professional where it is intended to raise their ICT skills to apply them in their daily work. Second, the development of the teacher from the pedagogical field, looking for strategies that promote good daily practice through the inclusion of ICT, to improve the learning of his students and himself, through collaboration and cooperation. Third, the comprehensive development of students for a digital knowledge society as a result of the above.

In addition to these, another of the models applied in Latin America for both teachers and students is the *International Society for Technology in Education (ISTE)* for teachers in the US,

with its Information and Communication Technologies Standards (NETS- T). This presents five relatively practical dimensions applicable to any context: Student learning and creativity; Learning experiences and assessments typical of the digital age; Characteristic work and learning of the digital age; Digital citizenship and responsibility; Professional growth and leadership. In this case, multiple standards and rubrics are available to give a classification in four levels: beginner, medium, expert and transformer. These standards for different areas can be consulted on the ISTE page at the following address: https://cutt.ly/zhT37AL. It is a model close to the constructivist theories of learning and that considers ICT and education in a more holistic and transdisciplinary way (Esteve-Mon et al., 2016).

Already in the Latin American context specifically, there are the contributions of Rangel Baca (2015) who, based on the review of the literature and the judgment of experts, proposes a profile of practical digital skills and close to the reality of teachers in the region, consisting of three dimensions: technological, informational and pedagogical. These dimensions cover 13 teaching competencies and 52 achievement indicators. According to this proposal, the competencies proposed for each dimension are summarized in table 2. From this it must be said that it focuses mainly on the teacher, but not on the student, who is supposed to benefit from it in their learning process.

Table 2. *Digital dimensions and competencies for the Latin American teacher.*

Dimension	Definition	Teaching digital skills
Technological	It focuses on basic knowledge about the operation and use of ICT in the professional field, which includes the management of basic computer programs, basic computer security and the maintenance of computer equipment. Similarly, it explores the willingness of teachers to keep up to date on this topic.	C1. Handles basic concepts and functions of the computer. C2. Performs basic connectivity, installation and security tasks for computer equipment. C.3. Handles basic functions of productivity programs. C.4. It shows a positive attitude for its permanent update on issues related to ICT.
Informational	Knowledge and skills necessary to manage the information retrieved from the Internet through ICT, in an ethical and socially correct way.	C.5. Knows how to locate and retrieve information. C.6. Analyze and select information efficiently. C.7. Organize the information retrieved from the internet appropriately. C.8. Use and present information effectively, ethically and legally
Pedagogical	It encompasses the level of knowledge about how ICTs impact and enable education, through its integration into the planning, development and evaluation of teaching practice in the teaching-learning process.	C.9. Shows a critical and favorable attitude to the possibility of integrating ICT in their teaching practice. C.10. Designs and implements teaching and learning strategies mediated by ICT. C.11. Designs and evaluates educational materials or resources in

	digital support, to integrate them into their teaching practice.
	C.12. It uses ICT to support administrative-teaching tasks.
	C.13. Use ICT to exchange ideas, information, experiences or knowledge with students, colleagues or experts.

Source: (Rangel Baca, 2015)

Despite the above, many studies indicate shortcomings in the digital skills that teachers have to face the current scenario of education. In this sense, a study carried out in Portugal with high school teachers, maintains that their level of digital competence is moderate, with the lowest values in pedagogical skills and the promotion of students' skills. Specifically, it indicates the sub-dimensions of evaluation, empowerment of students and that of facilitating the digital competence of students, were the ones with the lowest score (Dias-Trindade et al., 2020).

This is supported by the work of Fernández-Cruz and Fernández-Díaz (2016) in more than a thousand teachers from 80 schools in the Community of Madrid. In this sense, their results show an alarming difference between the digital skills that teachers have with those that they should have to promote them in their students. Thus, it is observed that 46.31% of the teachers have a bad or very bad profile regarding their training in ICT, which may depend from age, to gender, professional experience, the degree obtained, the subjects taught, ICT resources at home, attitude, among others. This is also confirmed by other authors such as Hinojo Lucena et al. (2019) in Andalusia and by Falcó Boudet (2017) in the Autonomous Community of Aragon, who agree that teachers have a low level of competencies related to didactic achievement of ICT, also related to age, type of center, previous training in ICT, academic degree, experience, among others.

Considering these antecedents, the investigations have also focused on students of educators training university careers. In this sense, the work of Casillas et al. (2017) in students in training for Teachers, shows scores in digital skills such as knowledge, use and attitudes towards ICT, in average values, being higher in men than in women.

In Latin America, the information reveals that in Chile, Pedagogy students report that during their career, digital skills have been "marked by the use of traditional applications such as Word, Excel or Power Point, the same not happening with other types of software" (Flores-Lueg & Roig Vila, 2016). Also, in Pedagogy students from Chile and Uruguay, a level of basic teaching competencies was observed in the four dimensions analyzed: Curricular, didactic and methodological; Planning, organization, management of digital technology spaces and resources; Ethical, legal and security aspects; Personal and professional development (Silva et al., 2019). For their part, in Ecuador, the results show that middle-level mathematics teachers "have negative opinions about the impact that digital competence has on the teaching-learning process of mathematics, (…), due to lack of knowledge and mastery to apply them in teaching" (Revelo-Rosero et al., 2019).

In this same sense, a study on the subject that compares countries such as Costa Rica and Spain in Primary Education teachers reveals that teachers have difficulties in skills such as the

Dariel Díaz-Arce; Efraín Loyola-Illescas

organization and analysis of information to determine its purpose and relevance (Information Area) , digital collaboration to create resources, content and knowledge (Communication Area), the proper use of intellectual property rights and Internet use licenses (Creation Area), and the solution of technical and software problems in general. This influences that students perceive themselves as having a low level of digital competences in all the areas evaluated (Pérez-Escoda et al., 2020).

All the above suggests the need to raise the digital skills of teachers to face the new challenges of education from professional development that integrates new methodologies and innovative pedagogies that include ICT as a transversal part of the curricula at all educational levels.

- Student digital competence.

In the educational, social and technological field, according to González Calatayud et al. (2018), multiple terms are distinguished to identify people according to their temporal relationship with ICT. In this way, concepts such as "digital natives" and "digital immigrants" are observed to differentiate those who were born with the technologies from those who were not, those who had to adapt to it and learn them as adults. This also distinguishes other sounder concepts such as *Baby Boomers*, Generation X, Y or Z and Generation Net. This could generate the false expectation that those who were born with the most competent technologies for working with ICT.

Focusing specifically on the area of Education, it could be defined as student digital competences, those that a student must develop and use for effective learning and throughout life, autonomously, critically, reflectively, ethically, in cooperation and collaboration with the others, using ICT and the Internet in a safe and creative way (Cabezas González et al., 2017). This is found in the proposal of the European Commission of the Digital Competences Framework for Citizens mentioned above, considering the five areas of competence: Informational and Data Literacy, Communication and Collaboration, Creation of Digital Content, Security and Problem Solving.

A significant part of the research on digital skills in students comes from Spanish institutions. In this case, a study carried out on about 350 university students indicates that the students show greater skills in using the computer and installing-uninstalling programs, as well as the knowledge required to access, search and retrieve information in different formats, with enough homogeneity among the participants. On the other hand, the lowest scores refer to process automation and knowledge about compatibility between hardware and software. In the same way, most consider that they cannot solve problems that arise with the internet or with the computer. Likewise, there is great heterogeneity in the use of advanced search options and in other skills related to the passage of files between computers, collaboration on the Internet, the creation or modification of audiovisual content, among others (Prendes-Espinosa et al., 2010).

More recent studies such as that by Rodicio-García et al. (2020) agree with the previous results, who argue that the majority of Spanish university students report not having the appropriate technological skills for their performance, as well as difficulties in implementing their

study and catch up with the constant changes in ICT. They also highlight the results of Pascual et al. (2019) in university students of the Master's Degree in Primary Education, in which there is a lack of knowledge of information management, communication, fingerprint monitoring, as well as in the shortcomings on how to solve new computer problems. Likewise, data from three European universities show that the majority of the more than 1000 students close to graduation have intermediate-high competencies in digital and information literacy, while in content creation, especially in the creation of multimedia content and its dissemination is intermediate-low (López-Meneses et al., 2020).

In the case of high school or elementary school students, research is scarcer. In this sense, a study carried out in Italy, on a sample of more than a thousand adolescents at the secondary level of education (14-16 years old), showed that the hypothesis that digital skills are well developed in this generation is not entirely correct. Thus, high competencies were observed in technical aspects, much more than in the dimensions of critical awareness and socio-emotional. It is striking that only 65% can perform an adequate search on the internet, while only 50% can evaluate its reliability and another 43% can narrow their search (Calvani et al., 2012).

On the other hand, in Bulgaria, despite the fact that there is an educational system aimed at developing digital skills in its secondary-level students, more than 80% of them obtained medium to low scores in the basic skills related to the European Framework of Reference of Digital Competences in the areas of information, communication, content creation, security and problem solving (Slavova & Garov, 2019). Likewise, the research by Pérez-Rodríguez et al. (2019) in 10 provinces of Spain with 672 students of these levels, show that the majority have only medium levels of media competence, and approximately, only 10% are in the advanced level. The worst levels are in dimensions related to programming and production processes, as well as in ideology and values, where 70% or more is in a basic grade.

In Latin America, the results in the diagnosis of this issue are heterogeneous, which depends on the diversity of methodologies, objectives, population, instruments used and scope. This is recorded in the review carried out by Henriquez-Coronel et al. (2018) in which the hypothesis suggests that there is no evidence to argue that students possess high- level digital skills: in some countries, such as Chile, approximately 50% of young people have low digital skills, while in others such as Costa Rica and Mexico, most of them have a medium level. All this agrees with the need to develop curricular strategies to raise the skills and competencies of students in the safe, efficient, responsible and critical management of new digital technologies (Pérez-Escoda et al., 2020; Sánchez-Caballé et al., 2020).

We can also mention here the work of Crawford-Visbal et al., (2020) with students of the Communication career of four Latin American universities (Argentina, Colombia, Peru and Venezuela), in which different techniques were applied to collect the data: focus groups, semi-structured interviews and questionnaires. Three of the competency areas given in the Framework of the European Commission for Digital Competence were evaluated: Communication and collaboration; Creation of digital content; Information search on the internet. In the latter, very few students perform their searches in databases or on academic websites, most do a simple Google search. Most share content online, but very few create videos or audio-podcasts and much less

Dariel Díaz-Arce; Efraín Loyola-Illescas

multimedia. Although more than 50% create digital content, the frequency with which they share it is occasional.

Another similar research was carried out by Martínez Navarro (2020) in students from 15 universities from five Latin American countries (Chile, Colombia, Ecuador, Peru and Venezuela). In this case, four digital competences were evaluated: Information literacy, Technological literacy, Multimedia literacy and Communication literacy. The results show that in both men and women, the competences related to information literacy were the best scored, followed by media, technological and finally communicative, presenting Chile and Colombia as the best located, and Ecuador the worst. This is in accordance with the fact that most students in this country locate information in unreliable sources such as simple searches on *Google*, *Yahoo* or *Wikipedia*, compared to those that use databases with specialized information such as *Google Scholar*, *Scopus*, *Web of Science*, among others (Sánchez Marrero et al., 2019). Likewise, although most declare that they know how to navigate the internet and locate information through different search engines, for other skills such as using time organization tools, collaborative work and content creation, the scores are much lower (Vázquez-Cano et al., 2017).

For all the above, the hypothesis is raised that although students may have been born and raised in a digital world, they do not necessarily have the appropriate digital skills to efficiently face studies and their personal development. Therefore, strategies are required to promote these competencies in future citizens so that they not only understand technology and its sociocultural and economic impact, but are also able to use them to improve these societies and learn throughout their lives.

- How to promote digital skills in students in the current context?

The need to raise digital skills in both teachers and students is a reality, even more so in the current context, in which a viral pandemic further increases the digital divide and deepens the crisis in current educational systems. For this reason, some initiatives have been developed in recent years to promote these skills from the innovative role of educational institutions, based on the fact that a competent teacher in the digital field could also promote these skills in their students. For this reason, the strategies are focused on both the macro and microcurricular levels, with some of the most popular being institutional actions to develop and implement plans, courses, curricular changes and other programs, mainly at the university level. In this way, it has been seen that students prefer to acquire these skills while being guided in their subjects, and they expect institutions and teachers to support them during this learning process (Sánchez-Caballé et al., 2020).

For this topic, experiments and strategies of various kinds have been previously developed, promoting the use of active methodologies to achieve their objectives. In the case of the former, the work of Slavova and Garov (2019) in secondary school students in Bulgaria should be noted . These authors designed a simple intervention with different methodologies whose translation is summarized below:

1.   Assign a task to refresh your knowledge on:

1.1. Search and analysis of internet information on a topic related to information technologies. Verify the authenticity of the sources and systematize the information found.

1.2. Format the text in a document, following certain rules for it.

1.3. Work with spreadsheets in solving practical problems related to their subjects. In addition, they must analyze the information given to them, develop calculations according to the task and summarize the results in diagrams or graphs.

1.4. Create presentations on a specific topic related to the topics of your resume.

1.5. Work with documents in PDF format, create these using word processing programs, spreadsheets and presentations.

During this process, students self-evaluate their tasks according to criteria defined by the teacher, they also perform a co-evaluation of their classmates' work and then deliver them to the teacher through the cloud. This is how they develop logical and critical thinking. Each practical task will increase in difficulty to promote and strengthen their skills.

2. Students participate in online tests created by the teacher to verify their progress. They include computer science topics, as well as information technology, solving these tests using their cell phones.

3. In a final phase, students work on projects in the field of information technology. They work collaboratively on shared documents.

The results obtained by researchers when moving from one school year (2016/2017) to another (2017/2018) are promising: performance in digital skills rises by more than 50%, referring to the scores that exceed the limits to grant a certification. Something similar happens with the collaborative task indicated in the last phase of the process.

Similar to this work are the didactic strategies aimed at Project Based Learning (PBL). This approach organizes student learning around the solution of problems in the real world, through the approach of a project that the student must develop, execute, analyze and present results. In this way, it favors learning in an integrated and dynamic way (Botella Nicolás & Ramos Ramos, 2019). Thus, an experience in the subject of ICT training of the Master's Degree in Early Childhood Education at the University of Santiago de Compostela, summarizes the results of a work where students are asked to design a didactic project with ICT for a center and 5–6-year-old students. In its development, the emphasis is on informational skills, content creation, security, among other dimensions of digital skills. In this way, high results were obtained in the satisfaction of the students with respect to their training in competencies related to the didactic-pedagogical and professional development components. In a similar dynamic, Albertos et al. (2016) also obtain positive results in Engineering students, with an action-research strategy; while González Calatayud et al. (2018) achieve positive results in Pedagogy students through directed tasks.

These proposals show that the development of student digital skills can be inserted in a transdisciplinary way, with tasks that do not focus only on the skills of managing ICT tools, but also on how the product obtained can be evaluated with the efficient use of the same.

Another of the proposed strategies has been the "technological saturation" of educational centers, promoting the OLPC (One Laptop Per Child) or 1: 1 model in order to implement an education that increases the integration of ICT in the teaching process -learning at secondary level. In this case, Fernández Miravete (2018) in the Murcia region. In this sense, the author analyzes the results of 4 academic courses evaluating five dimensions of digital competences: Digital resources and degree of use of ICT in general; Knowledge and use of ICT resources; Culture and respect in the use of digital information; Efficient access to information; Levels of use and efficiency in the communication of information. Among the most relevant results, it is observed that more than 90% of the students included in the experimental group called "digital" improved their digital competence a lot or a lot, with better results compared to the control or "non-digital" group, especially in access efficient information, the use of virtual platforms, among others.

All the above methodologies and strategies could be very positive for the development of student skills in the current context, as long as they can be inserted into a teaching-learning program that takes into account blendedness or virtuality, given the confinement situation in some countries or regions.

In this sense, a known affective e-learning strategy has shown satisfactory results in the development of these competencies in students. In this, an interuniversity program is implemented in a blended mode with a group of hypermedia didactic units, in an innovative and inclusive learning model. The authors, after implementing it, observe positive results in terms of the digital competences evaluated, considering that the program also adapts to the previous knowledge and the different rhythms and learning styles of the students. Thus, significant improvements were observed in topics such as "copyright, the use of internet standards, interaction with various internet sources, the management of digital identity, or the creation and editing of audios and videos, have obtained an improvement in their scores after completing the training program" (Pérez García & Hernández-Sánchez, 2020).

To this must be added the pedagogical approach and methodological innovation of the model of the Aula Reversed (Flipped classroom) that seems to fit well with the current context of the COVID19. In this, the educational roles are reversed, where the teacher obtains a more role of moderator and learning guide. Thus, the tasks are reordered, so that the student acquires the concepts outside of class and in it, doubts are clarified and the contents are applied in collaborative work environments and in different situations (Hinojo Lucena et al., 2019), which well It could be problem solving, working on cooperative and collaborative projects, among others mentioned above.

The Inverted Class approach can be understood as a meta-strategy or perfectly applicable model to connect ICT with the new pedagogies necessary for classrooms. With this approach, the development of digital skills and competencies is bidirectional, from the teacher in

the creation of creative, collaborative and cooperative spaces and environments, in constant search and evaluation of content, its quality, safety, etc., to the student who It is the person who develops these skills to achieve their cognitive objectives and at the same time shares their creative diversity with the teacher and their peers, respecting the ethical norms of copyright, among others. However, for the effective development of this model, teachers are required to have basic digital skills to implement it in an online or blended educational system (Andía Celaya et al., 2020).

The results of Andía Celaya et al. (2020) indicate that teachers have difficulties especially in the areas of competence directly related to the implementation of the Inverted Class, such as communication and collaboration, as well as the creation of content. In this last area it should be noted that it is considered by the authors as the most important to develop this type of methodologies. Thus, it was observed that while teachers can create educational videos with greater or lesser effectiveness, the aspects related to the implementation of playful learning strategies (gamification), the creation of open educational resources and the use of digital tools for the creation of evaluations, they have lower than average scores. The work of Pozo-Sánchez et al. (2020) agrees with these results, in a sample of 627 teachers who were characterized by presenting low techno-pedagogical competencies that limit the confidence of teachers to implement this model.

Among the experimental interventions aimed at raising students' digital skills through the Flipped Classroom, the one by Sosa Díaz and Palau Martín (2018) in young university students in Early Childhood and Primary Education stands out. The results indicate a perception of significant improvement in skills such as the interpretation of audiovisual information, the creation and dissemination of digital content, the critical analysis of the use of ICT, the didactic strategies to integrate ICT in the classroom, among others. A good perception is also observed in collaborative work among future teachers. The systematic review carried out by Gómez-García et al. (2020) agrees with this, in which it is observed that, despite the various methodologies to implement the Inverted Classroom in groups of students and educational centers, students have d in presenting significant improvements in informational skills.

With the above, it can be reflected that the more the students' digital skills are developed, this model will become more and more efficient, resulting in a spiral of continuous improvement, both in their skills and in their knowledge.

4. CONCLUSIONS

The COVID 19 pandemic has had significant global repercussions and is expected to continue for some time to come. In this context, multiple economic and social activities have come to be developed in virtuality, understanding the requirements of social distancing imposed by this disease. Among these activities, one of the most urgent and at the same time most affected is in the field of education, where the problem of the digital divide between poor and rich countries, and between the different socioeconomic strata of countries and communities, is increasing.

Despite this, this situation offers an undeniable opportunity to reformulate education, with the implementation, development and dissemination among teachers and students of technologies that help to achieve that long-awaited information and knowledge society. However, the

Dariel Díaz-Arce; Efraín Loyola-Illescas

bibliography consulted indicates that both teachers and students do not yet have the digital skills developed to face this increasingly evident digitizaín of society.

The foregoing could also be related initially to the wide range of terms that encompass, to a greater or lesser extent, the abilities of citizens to become part of an information, communication and knowledge society. In this way, digital skills should be differentiated from others, such as digital literacy and information literacy.

Although the distinctive aspects of these concepts still being debated, one might conclude that while information literacy refers primarily to how people manage information securely, creatively and responsibly, and digital literacy focuses more towards skills for the management of ICT precisely to be included in that information society, including the first and other types of digital literacies, digital skills for their part, are directed more towards understanding the global dimensions of these technologies and their transformative potential of society, including the different types of digital literacies. In this case, the development of conceptual and dimensional frameworks, as well as the implementation of standards and indicators, could help to further study this issue.

So far, studies in both teachers and students reveal that these competencies are under development. Likewise, the data suggest that although young people have grown and developed in a digitized society, this does not mean that they have adequate digital skills. This is significantly influenced by the digital divide, which depends on socio-economic and political factors, preventing access and efficient training on ICT-related issues.

By the above, the author believes that should be implemented both curricular and professional programs that promote the scope of these powers, which will always evolve as developmental technologies that require them. For this, it is necessary to identify, according to each regional, national or local reality, what are the standards or basic competencies that the main actors of the Teaching-Learning process require to face the challenges imposed by this new reality.

Among these methodologies, the Inverted Classroom could be very useful, since it can integrate multiple didactic strategies to achieve, not only that students appropriate or improve their digital skills, but it is also an opportunity for teachers to increase their techno-pedagogical preparation. However, it should be noted that this methodology should focus more and more on continuous assessment processes not only of learning, but also of the teaching-learning processes themselves, through timely feedback from both students and their own. Teachers who participate in this process.

Therefore, the author considers that to implement this strategy in an educational center, the current state of digital skills and computer resources and access to technology must first be raised, both for students and teachers. By identifying the deficiencies and implementing improvement strategies, this model could not only flow in its most classic version, but also move towards more innovative forms within virtual, blended or distance education where learning does not stop. in the field of an educational center, but rather points towards all of life. In this way, the topic can be as broad as it is prolific for years to come.

Dariel Díaz-Arce; Efraín Loyola-Illescas

REFERENCIAS BIBLIOGRÁFICAS

Acosta-Silva, D. A. (2017). Tras las competencias de los nativos digitales: avances de una metasíntesis. *Revista Latinoamericana de Ciencias Sociales, Niñez y Juventud*, *15*(1), 471–489. https://doi.org/10.11600/1692715x.1513014062016

Albertos, A., Domingo, A., & Albertos, J. E. (2016). Estrategia docente para el desarrollo de la competencia digital en el aula universitaria: Del uso recreativo al uso formativo. *Educar*, *52*(2), 243–261. https://doi.org/10.5565/rev/educar.732

Andía Celaya, L. A., Campión, R. S., & Sota Eguizábal, J. M. (2020). ¿Estamos técnicamente preparados para el flipped classroom? un análisis de las competencias digitales de los profesores en España. *Contextos Educativos*, *25*, 275–311. https://doi.org/10.18172/con.4218

Botella Nicolás, A. M., & Ramos Ramos, P. (2019). Investigación-acción y aprendizaje basado en proyectos. Una revisión bibliográfica. *Perfiles Educativos*, *41*(163), 127–141. http://www.scielo.org.mx/scielo.php?pid=S0185-26982019000100127&script=sci_arttext

Cabero-Almenara, J., & Palacios-Rodríguez, A. (2020). Marco Europeo de Competencia Digital Docente «DigCompEdu». Traducción y adaptación del cuestionario «DigCompEdu Check-In». *Revista de Educación Mediática y TIC*, *9*(1), 213–234. https://doi.org/10.21071/edmetic.v9i1.12462

Cabezas González, M., Casillas Martín, S., Sanches Ferreira, M., & Teixeira Diogo, F. L. (2017). Validación de un instrumento para medir la competencia digital de estudiantes universitarios (CODIEU) Validation of an instrument to measure the digital competence of university students (CODIEU). *Revista de Estudios e Investigación En Psicología y*

Dariel Díaz-Arce; Efraín Loyola-Illescas

Revista Innova Educación Vol. 3. No. 1 (2021) pp. 120-150

143

This work is under a Creative Commons Attribution 4.0 international license.

Educación, *Extr.*(13), A13-022. https://doi.org/10.17979/reipe.2017.0.13.2180

Caena, F., & Redecker, C. (2019). Aligning teacher competence frameworks to 21st century challenges: The case for the European Digital Competence Framework for Educators (Digcompedu) . *European Journal of Education*, *54*(3), 356–369. https://doi.org/10.1111/ejed.12345

Calvani, A., Fini, A., Ranieri, M., & Picci, P. (2012). Are young generations in secondary school digitally competent? A study on Italian teenagers. *Computer & Education*, *58*(2), 797–807. https://doi.org/10.1016/j.compedu.2011.10.004

Carretero, S., Vuorikari, R., & Punie, Y. (2017). *DigComp 2.1: The Digital Competence Framework for Citizens with eight proficiency levels and examples of use.* Union, Publications Office of the European. https://doi.org/10.2760/38842

Casillas, S., Cabezas, M., Ibarra, M. S., & Rodríguez, G. (2017). Evaluation of digital competence from a gender perspective. *Proceedings of the 5th International Conference on Technological Ecosystems for Enhancing Multiculturality*, *Part F1322*, 1–5. https://doi.org/10.1145/3144826.3145372

CEPAL, & UNESCO. (2020). *La educación en tiempos de la pandemia de COVID-19.* https://www.cepal.org/es/publicaciones/45904-la-educacion-tiempos-la-pandemia-covid-19

Chan, B., Churchill, D., & Chiu, T. (2017). Digital Literacy Learning In Higher Education Through Digital Storytelling Approach. *Journal of International Education Research*, *13*(1), 1–16. https://files.eric.ed.gov/fulltext/EJ1144564.pdf

Coldwell-Neilson, J. (2017). Assumed digital literacy knowledge by Australian universities: Are students informed? *ACE '17: Proceedings of the Nineteenth Australasian Computing Education Conference*, 75–80. https://doi.org/10.1145/3013499.3013505

Dias-Trindade, S., Moreira, J. A., & Gomes Ferreira, A. (2020). Assessment of university teachers on their digital competences. *Assessment of University Teachers / QWERTY*, *15*(1), 50–69. https://doi.org/10.30557/QW000025

Domingo-Coscolla, M., Bosco-Paniagua, A., Carrasco-Segovia, S., & Valero-Valero, J. A. (2020). Fomentando la competencia digital docente en la universidad: Percepción de estudiantes y docentes. *Revista de Investigación Educativa*, *38*(1), 167–782. https://doi.org/10.6018/rie.340551

Carrillo-García, M.E., Cascales-Martínez, A., & López Valero, A. (2018). Apps para el aprendizaje de idiomas en la Universidad de Murcia. *RED. Revista de Educación a Distancia.*, *58*. https://doi.org/10.6018/red/58/13

Equipo técnico Encuesta Nacional Multipropósito de Hogares. (2020). *Encuesta de seguimiento al Plan Nacional de Desarrollo. Indicadores de tecnología de la información y la*

Dariel Díaz-Arce; Efraín Loyola-Illescas

144

comunicación. (No. 02). https://www.ecuadorencifras.gob.ec/documentos/web-inec/Estadisticas_Sociales/TIC/2019/201912_Boletin_Multiproposito_TIC.pdf

Espada, M., Rocu, P., Navia, J. A., & Gómez-López, M. (2020). Rendimiento académico y satisfacción de los estudiantes universitarios hacia el método flipped classroom. *Profesorado, Revista de Currículum y Formación Del Profesorado*, *24*(1), 116–135. https://doi.org/10.30827/profesorado.v24i1.8710

Esteve-Mon, F. M., Gisbert-Cervera, M., & Lázaro-Cantabrana, J. L. (2016). La competencia digital de los futuros docentes: ¿Cómo se ven los actuales estudiantes de educación? *Perspectiva Educacional*, *55*(2), 38–54. https://doi.org/10.4151/07189729-Vol.55-Iss.2-Art.412

Falcó Boudet, J. M. (2017). Evaluación de la competencia digital docente en la Comunidad Autónoma de Aragón. *Revista Electrónica de Investigación Educativa*, *19*(4), 73. https://doi.org/10.24320/redie.2017.19.4.1359

Fernández-Cruz, F.-J., & Fernández-Díaz, M.-J. (2016). Los docentes de la Generación Z y sus competencias digitales. *Comunicar*, *24*(46), 97–105. https://doi.org/10.3916/C46-2016-10

Fernández Miravete, Á. D. (2018). La competencia digital del alumnado de educación secundaria en el marco de un proyecto educativo TIC (1:1). *Edutec. Revista Electrónica De Tecnología Educativa*, *63*, 60–72. https://doi.org/10.21556/edutec.2017.63.1027

Flores-Lueg, C., & Roig Vila, R. (2016). Percepción de estudiantes de Pedagogía sobre el desarrollo de su competencia digital a lo largo de su proceso formativo. *Estudios Pedagógicos*, *42*(3), 129–148. https://doi.org/http://dx.doi.org/10.4067/S0718-07052016000400007

Formichella, M. M., Alderete, M. V., & Krüger, N. (2020). Efecto de las TIC sobre los resultados educativos: estudio en barrios vulnerables de Bahía Blanca. *Ciencia, Docencia y Tecnología*, *31*(61), 120–144. https://doi.org/10.33255/3161/736

García Fernández, N., Rivero Moreno, M. L., & Ricis Guerra, J. (2020). Brecha digital en tiempo del COVID-19. *Hekademos: Revista Educativa Digital*, *28*, 76–85. https://dialnet.unirioja.es/servlet/articulo?codigo=7602854

Gisbert Cervera, M., González Martínez, J., & Esteve Mon, F. M. (2016). Competencia digital y competencia digital docente: una panorámica sobre el estado de la cuestión. *Revista Interuniversitaria de Investigación En Tecnología Educativa*, 74–83. https://doi.org/10.6018/riite2016/257631

Gómez-García, G., Hinojo-Lucena, F.-J., Cáceres-Reche, M.-P., & Ramos Navas-Parejo, M. (2020). The Contribution of the Flipped Classroom Method to the Development of Information Literacy: A Systematic Review. *Sustainability*, *12*(18), 7273. https://doi.org/10.3390/su12187273

González Calatayud, V., Román García, M., & Prendes Espinosa, M. P. (2018). Formación en competencias digitales para estudiantes universitarios basada en el modelo DigComp. *Edutec. Revista Electrónica de Tecnología Educativa*, *65*, 1–15. https://doi.org/10.21556/edutec.2018.65.1119

Henriquez-Coronel, P., Gisbert Cervera, M., & Fernández Fernández, I. (2018). La evaluación de la competencia digital de los estudiantes: una revisión al caso latinoamericano. *Chasqui. Revista Latinoamericana de Comunicación*, *137*, 93–112. https://doi.org/10.16921/chasqui.v0i137.3511

Hinojo Lucena, F. J., Aznar Díaz, I., Romero Rodríguez, J. M., & Marín Marín, J. A. (2019). Influencia del aula invertida en el rendimiento académico. Una revisión sistemática. *Campus Virtuales*, *8*(1), 9–18. http://uajournals.com/ojs/index.php/campusvirtuales/article/view/384/300

INDEC. (2020). *Tecnología. Informes técnicos.* INDEC: Instituto Nacional de Estadística y Censos de La República Argentina. https://www.indec.gob.ar/indec/web/Nivel3-Tema-4-26

INEGI. (2018). *Encuesta Nacional sobre Disponibilidad y Uso de Tecnologías de la Información en los Hogares (ENDUTIH) 2018*. Instituto Nacional de Estadística y Geografía. https://www.inegi.org.mx/programas/dutih/2018/

IX Encuesta de Acceso y Usos de Internet. (2017). https://www.subtel.gob.cl/wp-content/uploads/2018/07/Informe_Final_IX_Encuesta_Acceso_y_Usos_Internet_2017.pdf

Karsenti, T., Poellhuber, B., Parent, S., & Michelot, F. (2020). What is the Digital Competency Framework? *International Journal of Technologies in Higher Education*, *17*(1), 11–14. https://doi.org/10.18162/ritpu-2020-v17n1-04

Koelling, G., & Townsend, L. (2019). Research clinics: An alternative model for large-scale information literacy instruction. *Communications in Information Literacy*, *13*(1), 75–90. https://doi.org/10.15760/comminfolit.2019.13.1.6

Kolle, S. R. (2017). Global research on information literacy: a bibliometric analysis from 2005 to 2014. *The Electronic Library*, *35*(2), 283–298. https://doi.org/10.1108/EL-08-2015-0160

Crawford-Visbal, J. L., Crawford-Tirado, L., Zoraida Ortiz-Záccaro, Z., & Abalo, F. (2020). Assessment of Digital Competences in Communication Students across four Latin American Universities. *Education in the Knowledge Society*, *21*, 1–14. https://doi.org/10.14201/eks.19112

Lloyd, M. (2020). Desigualdades educativas y la brecha digital en tiempos de COVID-19. In H. CasanovaCardiel, Á. Díaz-Barriga, L. Pérez Fuentes, & S. Plá (Eds.), *Educación y pandemia: una visión académica* (1a ed., pp. 115–121). Universidad Autónoma de México.

http://www.iisue.unam.mx/nosotros/covid/educacion-y-pandemia

López-Meneses, E., Sirignano, F. M., Vázquez-Cano, E., & Ramírez-Hurtado, J. M. (2020). University students' digital competence in three areas of the DigCom 2.1 model: A comparative study at three European universities. *Australasian Journal of Educational Technology*, *36*(3), 69–88. https://doi.org/10.14742/AJET.5583

López Núñez, J. A., Campos Soto, M. N., Aznar Díaz, I., & Rodríguez Jiménez, C. (2020). Competencia digital del profesorado para la atención al alumnado con dificultades de aprendizaje. Una revisión teórica. *Revista Electronica Interuniversitaria de Formacion Del Profesorado*, *23*(2), 143–154. https://doi.org/10.6018/reifop.419171

Lucas, M. (2019). Facilitating Students' Digital Competence: Did They Do It? In M. Scheffel, J. Broisin, V. Pammer-Schindler, A. Ioannou, & J. Schneider (Eds.), *Transforming Learning with Meaningful Technologies. EC-TEL 2019. Lecture Notes in Computer Science* (Vol. 11722, pp. 3–14). Springer Verlag. https://doi.org/10.1007/978-3-030-29736-7_1

Machin-Mastromatteo, J. D. (2012). Participatory action research in the age of social media: literacies, affinity spaces and learning. *New Library World*, *113*(11/12), 571–585. https://doi.org/10.1108/03074801211282939

Maciá Bordalba, M., & Garreta Bochaca, J. (2018). Accesibilidad y alfabetización digital: Barreras para la integración de las TIC en la comunicación familia/escuela. *Revista de Investigacion Educativa*, *36*(1), 239–257. https://doi.org/10.6018/rie.36.1.290111

Martínez Navarro, J. A. (2020). La competencia digital de los estudiantes universitarios latinoamericanos. *IJERI: International Journal of Educational Research and Innovation*, *14*(14), 276–289. https://doi.org/10.46661/ijeri.4387

Mendoza-Ruano, J. J., & Caldera-Serrano, J. (2014). Umbrales para la determinación de la brecha digital: Comparativa entre regiones desarrolladas. *Transinformacao*, *26*(2), 125–132. https://doi.org/10.1590/0103-37862014000200002

Mishra, K. E., Wilder, K., & Mishra, A. K. (2017). Digital literacy in the marketing curriculum: Are female college students prepared for digital jobs? *Industry and Higher Education*, *31*(3), 204–211. https://doi.org/10.1177/0950422217697838

Ocaña-Fernández, Y., Valenzuela-Fernández, L., & Morillo-Flores, J. (2020). La competencia digital en el docente universitario. *Propósitos y Representaciones*, *8*(1), e455. https://doi.org/10.20511/pyr2020.v8n1.455

ONU. (2020). *El impacto del COVID-19 en la educación podría desperdiciar un gran potencial humano y revertir décadas de progreso.* NOTICIAS ONU. https://news.un.org/es/story/2020/08/1478302

Pascual, M. A., Ortega-Carrillo, J. A., Pérez-Ferra, M., & Fombona, J. (2019). Competencias

Digitales en los Estudiantes del Grado de Maestro de Educación Primaria. El caso de tres Universidades Españolas. *Formación Universitaria*, *12*(6), 141–150. https://doi.org/10.4067/S0718-50062019000600141

Pérez-Escoda, A., Iglesias-Rodríguez, A., Meléndez-Rodríguez, Lady, & Berrocal-Carvajal, V. (2020). Competencia digital docente para la reducción de la brecha digital: Estudio comparativo de España y Costa Rica Teacher's Digital Competence for Reducing Digital Divide: Comparative Study Between Spain and Costa Rica. *Tripodos*, *46*, 77–96. http://www.tripodos.com/index.php/Facultat_Comunicacio_Blanquerna/article/view/790

Pérez-Rodríguez, A., Delgado-Ponce, A., Marín-Mateos, P., & Romero-Rodríguez, L. M. (2019). Media competence in Spanish secondary school students. Assessing instrumental and critical thinking skills in digital contexts. *Educational Sciences: Theory and Practice*, *19*(3), 33–48. https://doi.org/10.12738/estp.2019.3.003

Pérez García, Á., & Hernández-Sánchez, A. M. (2020). Efectos del programa affective e-learning en el desarrollo de la Competencia Digital en estudiantes del Grado en Educación Primaria. *Educatio Siglo XXI*, *38*(3), 129–150. https://doi.org/10.6018/educatio.416431

Pinto, M., & Uribe-Tirado, A. (2017). Presencia de la formación en competencias informacionales (Alfin) en las bibliotecas nacionales iberoamericanas. *Investigación Bibliotecológica*, *31*(71), 73–102. https://doi.org/10.22201/iibi.0187358xp.2017.71.57811

Pozo-Jara, A. (2017). La alfabetización informacional y la alfabetización informática: ¿iguales o diferentes? *Dominio de Las Ciencias*, *3*(3), 689–713. https://dominiodelasciencias.com/ojs/index.php/es/article/view/625

Pozo-Sánchez, S., López-Belmonte, J., Rodríguez-García, A. M., & López-Núñez, J. A. (2020). Teachers' digital competence in using and analytically managing information in flipped learning. *Cultura y Educacion*, *32*(2), 213–241. https://doi.org/10.1080/11356405.2020.1741876

Prendes-Espinosa, M.-P., Castañeda-Quintero, L., & Gutiérrez-Porlán, I. (2010). ICT competences of future teachers. *Comunicar*, *XVIII*(35), 175–182. https://doi.org/10.3916/C35-2010-03-11

RAE. (2014). Competencia. In *Diccionario de la Real Academia Española* (23a ed.). Asociación de Academias de la Lengua Española (ASALE).

Rangel Baca, A. (2015). Competencias docentes digitales: propuesta de un perfil. *Píxel-Bit, Revista de Medios y Educación*, *46*, 235–248. https://doi.org/10.12795/pixelbit.2015.i46.15

Revelo-Rosero, J. E., Vinicio Lozano, E., & Bastidas Romo, P. (2019). La competencia digital docente y su impacto en el proceso de enseñanza–aprendizaje de la matemática. *Espirales Revista Multidisciplinaria de Investigación*, *3*(28), 156–175. https://doi.org/10.31876/er.v3i28.630

Dariel Díaz-Arce; Efraín Loyola-Illescas

Rodicio-García, M. L., Ríos-De-Deus, M. P., Mosquera-González, M. J., & Penado Abilleira, M. (2020). La Brecha Digital en Estudiantes Españoles ante la Crisis de la Covid-19. *Revista Internacional de Educacion para la Justicia Social*, *9*(3), 103–125. https://doi.org/10.15366/RIEJS2020.9.3.006

Sá, M. J., & Serpa, S. (2020). COVID-19 and the promotion of digital competences in education. *Universal Journal of Educational Research*, *8*(10), 4520–4528. https://doi.org/10.13189/ujer.2020.081020

Sales, D. (2020). Definition of information literacy 2018. *Anales de Documentacion*, *23*(1), 1–5. https://doi.org/10.6018/analesdoc.373811

Sánchez-Caballé, A., Gisbert-Cervera, M., & Esteve-Mon, F. (2020). The digital competence of university students: a systematic literature review. *Aloma: Revista de Psicologia, Ciències de l'Educació i de l'Esport*, *38*(1), 63–74. http://revistaaloma.net/index.php/aloma/article/view/388

Sánchez Marrero, O., Amar Mohamed, R., & Triadú Xifra, J. (2019). Tratamiento de la información y la competencia digital de los estudiantes para la producción de géneros discursivos en la Universidad Ecotec (Ecuador). *Espacios*, *40*(15), 14–25. http://www.revistaespacios.com/a19v40n15/a19v40n15p14.pdf

Silva, J., Usart, M., & Lázaro-Cantabrana, J. L. (2019). Competencia digital docente en estudiantes de último año de Pedagogía de Chile y Uruguay. *Comunicar*, *27*(61), 31–40. https://doi.org/10.3916/C61-2019-03

Slavova, L., & Garov, K. (2019). Increasing the Digital Competences of Students. *Mathematics and Informatics*, *62*(1), 43–52. https://azbuki.bg/wp-content/uploads/2019/03/azbuki.bg_dmdocuments_Math_Info_1_19_Slavova_Garov.pdf

Solís de Ovando Calderón, J., & Jara Jara, V. (2019). Competencia digital de docentes de ciencias de la salud de una universidad chilena. *Píxel-BIT Revista de Medios y Educación*, *56*, 193–211. https://doi.org/https://doi.org/10.12795/pixelbit.2019.i56.10

Sosa Díaz, M. J., & Palau Martín, R. F. (2018). Flipped classroom para adquirir la competencia digital docente: una experiencia didáctica en la Educación Superior. *Pixel-Bit, Revista de Medios y Educacion*, *52*, 37–54. https://doi.org/10.12795/pixelbit.2018.i52.03

Spante, M., Hashemi, S. S., Lundin, M., & Algers, A. (2018). Digital competence and digital literacy in higher education research: Systematic review of concept use. In *Cogent Education* (Vol. 5, Issue 1, pp. 1–21). Taylor and Francis Ltd. https://doi.org/10.1080/2331186X.2018.1519143

Sturges, P., & Gastinger, A. (2012). La alfabetización informacional como derecho humano. *Anales de Documentación*, *15*(1), 1–14. https://doi.org/10.6018/analesdoc.15.1.147651

Tagge, N. (2018). Leveraging accreditation to integrate sustainable information literacy

Dariel Díaz-Arce; Efraín Loyola-Illescas

instruction into the medical school curriculum. *Journal of the Medical Library Association*, *106*(3), 377–382. https://doi.org/10.5195/jmla.2018.276

Tang, C. M., & Chaw, L. Y. (2016). Digital Literacy: A Prerequisite for Effective Learning in a Blended Learning Environment? *The Electronic Journal of E-Learning*, *14*(1), 54–65. https://files.eric.ed.gov/fulltext/EJ1099109.pdf

UNESCO. (2019). *Marco de competencias de los docentes en materia de TIC*. UNESCO Biblioteca Digital. https://unesdoc.unesco.org/ark:/48223/pf0000371024?fbclid=IwAR1Fl_5c4W9G206eh5 AAMkcc-PGXx2QT3PBx1mVETRcjTlvC_yEZErXmrYI

Vázquez-Cano, E., Reyes Vélez, M., Colmenares Zamora, L., & López Meneses, E. (2017). Competencia digital del alumnado de la Universidad Católica de Santiago de Guayaquil - Dialnet. *Opción: Revista de Ciencias Humanas y Sociales, 83*, 229–251. https://dialnet.unirioja.es/servlet/articulo?codigo=6228337

Vidal Ledo, M., Fernández Valdés, M. de las M., Zayas Mujica, R., & Paredes Esponda, E. (2016). Alfabetización Informacional. *Educación Médica Superior*, *30*(4). http://www.ems.sld.cu/index.php/ems/article/view/924

Yépez-Reyes, V. (2018). Analfabetismo digital: una barrera para las narrativas transmedia y el diálogo social al margen de la industria cultural. *Razón y Palabra*, *22*(2_101), 285–301. https://www.revistarazonypalabra.org/index.php/ryp/article/view/1203

Dariel Díaz-Arce; Efraín Loyola-Illescas