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*Artículos científicos*

## **El estado de las Competencias Digitales Durante la Pandemia COVID-19, una visión ampliada**

***The Condition of Digital Competences Over the COVID-19 Pandemic,  
an Expanded Vision***

***O estado das Competências Digitais Durante a Pandemia COVID-19,  
uma visão alargada***

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### **Resumen**

Este estudio de caso argumenta el uso de la educación a distancia en línea como una alternativa emergente para enfrentar el confinamiento educativo generado por la pandemia COVID-19, que obligó a los académicos de las Instituciones de Educación Superior en modalidad presencial a transitar al mundo digital sin contar con las competencias digitales pertinentes. El objetivo de este estudio es reconocer si los docentes cuentan con las recomendaciones de la UNESCO sobre competencias digitales y realizar una autoevaluación de un grupo de estudiantes de nivel posgrado sobre el dominio de las competencias digitales y de la dimensión pedagógica necesarias para enfrentar el reto del confinamiento académico. La metodología utilizada es cualitativa y la población de estudio está conformada por un grupo de diez estudiantes de nivel maestría en el área de Innovación Educativa. Se emplea la heurística como medio de participación directa para conocer las experiencias de los estudiantes y se lleva a cabo a través de la pedagogía de la pregunta. Los resultados se presentan en forma de porcentaje, que define el grado de dominio de las competencias digitales recomendadas en 2008 y de las competencias y estándares de las TIC desde la



dimensión pedagógica en 2016. Se concluye que hasta el momento de la aplicación del instrumento de evaluación, el grupo de estudio desconoce el dominio de las competencias digitales y de la dimensión pedagógica necesarias. Asimismo, se observa que el uso de este diagnóstico mejora la calidad educativa en el diseño emergente de los cursos en modalidad a distancia en línea.

**Palabras Clave:** Calidad Educativa, Competencias Digitales, Educación a Distancia, Educación On-Line.

### **Abstract**

This case study argues for the use of online distance education as an emerging alternative to face the educational confinement generated by the COVID-19 pandemic, which forced academics from Higher Education Institutions in face-to-face mode to transit the digital world, without the relevant digital skills. Recognize if teachers have the UNESCO recommendations on digital skills?, establishes as an objective to carry out the self-assessment of a group of postgraduate students on the mastery of digital skills and the pedagogical dimension with which they have before the challenge of academic confinement. The methodology is qualitative, the population is a group of ten master's level students in the area of Educational Innovation. Heuristics are used as a means of direct participation to know the experiences of the students and it is conducted through the pedagogy of the question. The results are represented in a percentage that defines the behavior of the degree of mastery of the digital skills recommended in 2008 and of the ICT Skills and standards from the pedagogical dimension of 2016. It is concluded that the mastery of digital skills and the pedagogical dimension is unknown by the study group until the moment of the application of the evaluation instrument. Likewise, that the use of this diagnosis improves the educational quality in the emergent design of the courses in online distance mode.

**Keywords:** Distance learning, Digital skills, Educational quality, Online Education.

## Resumo

Este estudo de caso defende o uso da educação a distância online como uma alternativa emergente para enfrentar o confinamento educacional gerado pela pandemia do COVID-19, que obrigou acadêmicos de Instituições de Ensino Superior na modalidade presencial a migrar para o mundo digital. as competências digitais relevantes. O objetivo deste estudo é reconhecer se os professores cumprem as recomendações da UNESCO sobre competências digitais e realizar uma autoavaliação de um grupo de pós-graduandos sobre o domínio das competências digitais e a dimensão pedagógica necessária para enfrentar o desafio do confinamento acadêmico. A metodologia utilizada é qualitativa e a população de estudo é constituída por um grupo de dez mestrados na área da Inovação Educacional. A heurística é utilizada como meio de participação direta para conhecer as experiências dos alunos e é realizada por meio da pedagogia da pergunta. Os resultados são apresentados em percentagem, que define o grau de domínio das competências digitais preconizado em 2008 e das competências e padrões TIC da dimensão pedagógica em 2016. Conclui-se que até ao momento da aplicação do instrumento de avaliação, o grupo de estudo não conhece o domínio das competências digitais e a necessária dimensão pedagógica. Da mesma forma, observa-se que o uso desse diagnóstico melhora a qualidade educacional no design emergente de cursos a distância online.

**Palavras-chave:** Competências Digitais, Qualidade Educacional, Educação a Distância, Educação On-Line.

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## Introduction

During the exercise of teaching, active learning is a significant fact when integrating the use of Information and Communication Technologies (ICT) in the subject programs of postgraduate courses in education, especially when this requirement emerges due to the confinement as in the COVID-19 pandemic. A first complexity in terms of the educational quality of this modality is the lack of knowledge of the term "communication" and the concept of digital skills.

In a synchronous or asynchronous course, ignorance or limited understanding of communication restricts the dialogue between the teacher and the student and, consequently,

the teaching-learning process. Therefore, it is important to clarify the terms and concepts of ICTs during the beginning of the courses, which strengthens cognitive development when moving from knowledge to understanding and finally to application.

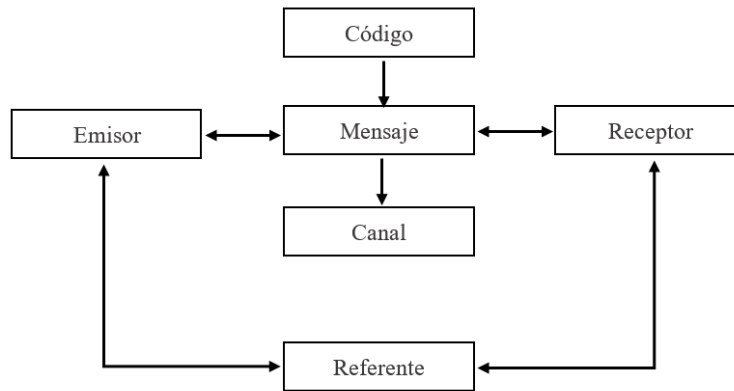
In addition, by engaging students in dynamic participation, either synchronously or asynchronously, through the question pedagogy, participants are encouraged to become self-motivated and develop reading and analytical skills through heuristics. This allows the development of their own, critical-reflexive, argumentative and proactive thinking, as well as an inquiring, analytical, synthetic and creative cognition (Gómez et al., 2019).

Based on the above, the documentation of this case study (Álvarez and Álvarez, 2018) is presented, in which 10 participants from a postgraduate course in Educational Innovation collaborate in a bidirectional way in a high-impact educational dialogue to diagnose and learn about the scope of digital skills through observation and objective organization by the researcher (Jiménez, 2022).

Synchronous communication is defined as an educational dialogue that implies a communication process in the classroom (figure 1), where two main actors intervene, the teacher and the student, in an academic environment mediated by a dialogic relationship that facilitates communication. The purpose of communication is to formalize a process through which relationships are built that differentiate positive and/or negative realities, allowing the construction of knowledge and nurturing interpersonal relationships and spaces for citizen participation. (Ríos et al., 2020).

When going from synchronous communication (face-to-face courses) to asynchronous communication (online distance courses), the communication scheme must be modified because it is carried out at different times and times (figure 2). If this important change is omitted during the design of online distance courses, results of low academic quality will be obtained, since activities that require presence in specific places are prioritized, even when it does not exist, leading teachers to carry out activities such as take assistance through video calls with active microphone and camera.

**Figure 1.** Elements of synchronous communication.

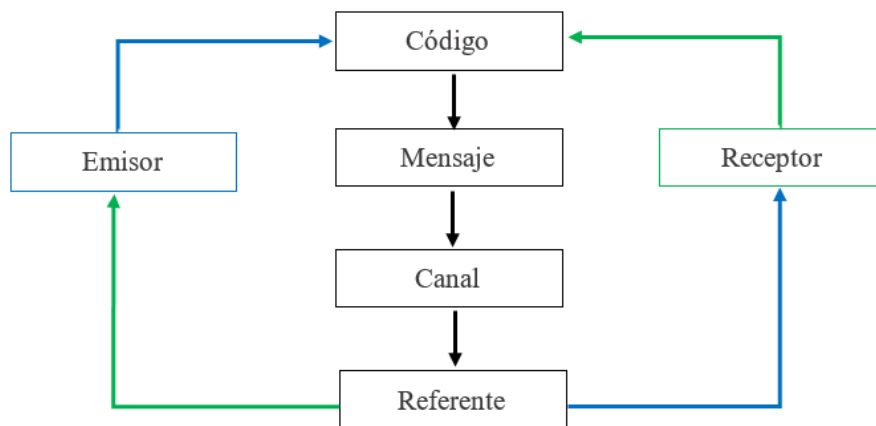


Source: Authors.

According to figure 1, synchronous communication establishes a sequence that cannot be skipped, limited or interrupted. Interrupting the sequence generates as a consequence confusing, wrong or diffuse messages, which alter or modify knowledge or scientific practices by generating new knowledge.

In figure 2, the independent position of both the sender and the receiver is clear and it is justifiable that one speaks of a partial or incomplete communication process. However, it is not confusing or fuzzy. Messages are complete and depend on time asynchrony for confirmation by both sender and receiver. This quality allows to deepen the information individually through the Internet and the Web, even without feedback.

**Figure 2.** Elements of asynchronous communication.



Source: Authors.

By analyzing both diagrams of synchronous communication (figure 1) versus asynchronous communication (figure 2), it is possible to identify that there must be a direct relationship between the variables of digital skills and academic performance. This relationship must be strong and transversal, so that many of the students' digital skills must be the consequence of a complementary need to their academic training (Machuca and Véliz, 2019). In addition, it is relevant that students recognize that digital skills, like writing, mathematics and languages, must be skills and abilities that are not learned in an intensive forty-hour course. They require the transversality that is obtained from basic and upper secondary education. Also, when using digital skills consciously, it is important to consider that students' attention and motivation are increased and focused.

In teaching procedures, by applying didactics with the use of digital skills, the planning of pedagogical practice is encouraged and simplified by centralizing it in the students. By procuring the design and execution of student-oriented activities, an intuitive academic productivity is achieved that allows the creation, management, control and organization of documents with procedures and sequences that reduce learning curves. The evidence collects life habits and the process of effective communication. They are evidence of mastery of digital skills that students perceive and motivate them to increase the average performance of the group (Apaza, 2022).

Figure 3 expresses a direct relationship in the digital skills and abilities between peers, both of teachers and students, because both must be able to handle the same digital skills and in the same proportion (it is not possible to ask students to swim in a pool without water). Regarding the pedagogical dimension, this is understood as the relationship between the design of pedagogical activities and materials with the use of productivity tools, as well as the processes of evaluation and selection of the didactic resources required for it. (Organización de las Naciones Unidas para la Educación, la Ciencia y la Cultura [UNESCO], 2008).

At the end of the case study, it is identified that a lack of capacity in either of the two actors (teachers or students) will have repercussions as a limitation of communication and the use of educational quality. A relevant variable that contextualizes the success of academic training tactics in the online distance modality is the age of the teachers, since a high percentage of justifications to avoid the use of ICTs rely on the technological gap, which is produced generationally and that expands exponentially with the continuous advancement of

technological development. Likewise, the technological gap depends to a large extent on the level and degree of studies of teachers, since the transversality of knowledge frames a greater mastery of digital skills depending on the degree of studies.

It is important to mention that problem solving is a competence that is directly associated with the capacities of teachers and students (Zempoalteca et al., 2017), locating Problem-Based Learning (ABP) and Project-Based Learning (ABPr) as a high-impact strategy for distance education, which involves analytical reading activities, self-assessment through checklists, expository participation and collaborative reflection.

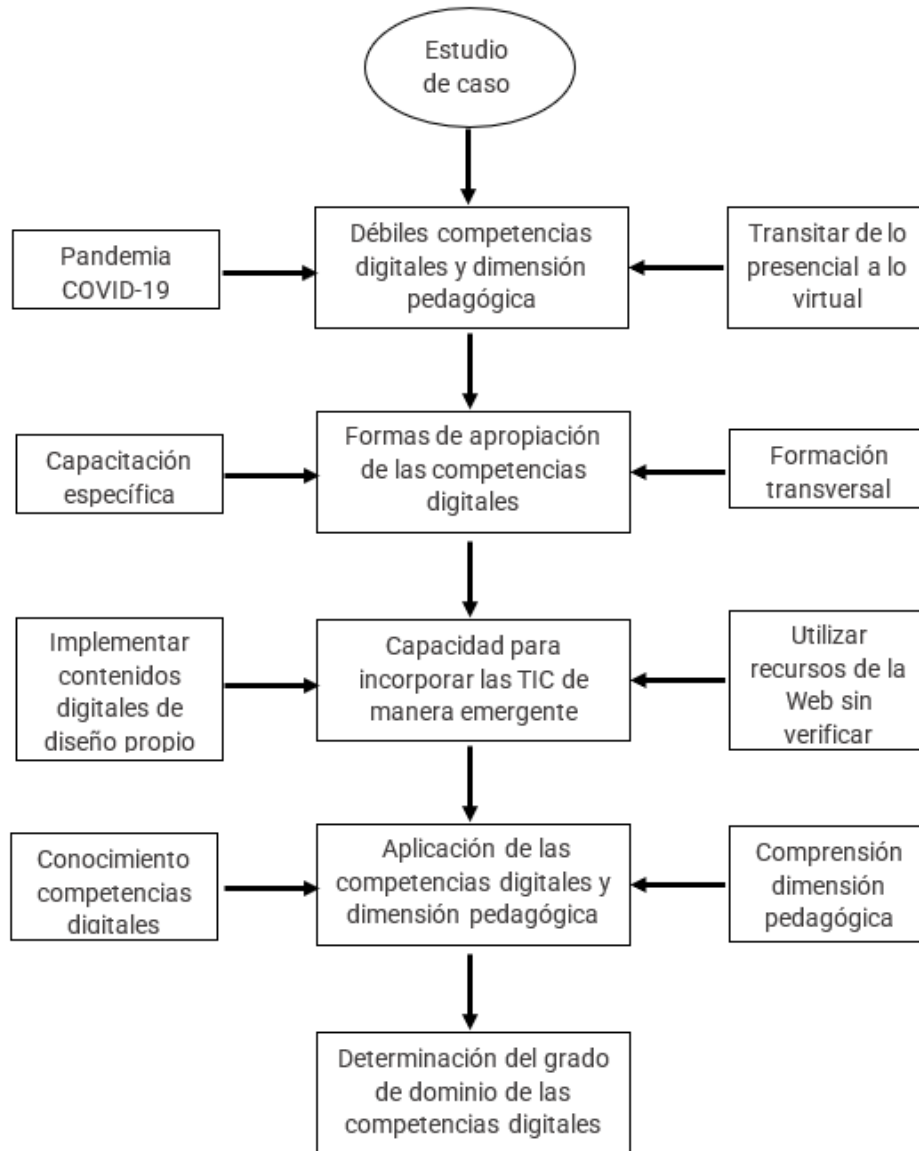
## Methodology

It was decided to study this experience as a case study to document, as textual evidence, the elements involved during the development of a postgraduate course from the perspective of an application and relevant use of digital skills, which expand the techno-pedagogical capacity (López et al., 2022), allowing to actively express (Sánchez, 2014) the emotional component, concerns and doubts of collaborating peers (teachers and students).

The case study method (figure 3) was considered a valuable research strategy, since its greatest strength lies in the fact that through it the behavior of the people involved is identified and recorded (without interpreting or explaining it) in the circumstances studied.

In addition, because the data that is collected comes from the experience and observation of the participants, who collect the information through heuristic and hermeneutic techniques that they use during their inquiries and analysis of information (Jiménez, 2022; Ramírez et al., 2019). . Also in this work it has been considered that the case study is one of the most appropriate methods to learn the reality of a context in which it is necessary to explain relationships of complicated origin, such as the capacity of digital skills and to study a phenomenon which is essentially ambiguous, complex and uncertain, such as the domain of the pedagogical dimension in digital skills. Because in Ibero-America, studies referring to the domain of digital skills have focused more on the technological component of ICTs than on aspects of a pedagogical nature. (Padilla y Ayala, 2021).

**Figure 3.** Case study organization diagram.



Source: Authors.

To validate the results obtained, the study of a single case is used, using the checklists as tools for the collection of qualitative evidence in order to describe, verify or explain a capacity, a skill or a competence, thus promoting the strategies digital assessment more effectively and providing relevant feedback in an agile way (George, 2021).

In the design of the case study, the recommendations of Álvarez and Álvarez (2018) are followed, who provide a rigorous sequence of the method, configuring the knowledge generation activities in an orderly and sequential manner (figure 3).



- ✓ The phenomenon under study is the application of digital skills in the design and implementation of education courses that are taught asynchronously through the use of ICT.
- ✓ The appropriation of digital skills by teachers in Educational Innovation is studied.
- ✓ The research topic is Educational Information and Communication Technologies, from the point of view of its implementation in the design of distance education courses.
- ✓ The study perspective is carried out from the perspective of the students who have a dynamic participation.
- ✓ Exploration focuses on the mastery of digital skills.

### **Development**

In the development of this work, the documents "ICT Competence Standards for Teachers" and "ICT Competencies and Standards from the Pedagogical Dimension" (UNESCO, 2008; UNESCO, 2019; Valencia, 2016) were used as awareness elements. These documents were the basis of the analytical readings carried out by the participants, highlighting the sections that contribute to self-analysis and that were used to configure the checklists that support the determination of the degree of mastery of digital skills and the pedagogical dimension. For this, three moments of analysis were established that allowed the qualitative documentation of the appropriation of these competences.

### **First moment**

In the first moment, after a brief instructional explanation, the group of participants began the first reading of "ICT Competence Standards for Teachers" and later, based on figure 4, a group reflection was carried out in a forum open in the classroom. During this time, concerns and doubts were clarified, as well as new and rarely used concepts were specified. Emphasis was placed on the contribution that each layer involved in the professionalization of teachers makes, with a perspective aimed at consolidating digital skills.

**Figure 4.** Structured summary of digital skills.



Source: From (UNESCO, 2008).

- The first line corresponds to the policy and vision of the institution and educational level in which the teacher is enrolled. Therefore, it is desirable that all teachers are certified to the same institution and educational level should have the same teaching skills. Otherwise, it is valid that each teacher has a differentiation of the domain of competences.
- The second line refers to the learning that students must master during the moments of: knowing, understanding and applying, in favor of their performance as professional individuals working in the classroom.
- The third line clarifies the use of economic, technological and human resources. Seen from the pedagogical perspective, it is the way or form of how it supports the use of ICT. Example: pedagogy of the question (Taeli et al., 2019).
- The fourth line ranks the tools to be used considering that they are: basic (Facebook, Twitter, WhatsApp by cell phone), complex (internet, multimedia devices; Tablet, Lap-top, etc.) and specialties (internet, multimedia, augmented reality, collaborative and interactive work).
- The fifth line establishes that in a standard classroom equipped with: a computer with integrated audio and video (multimedia), a collaborative group has the possibility of adding forums, chat and a learning organization. Elements that add evidence of learning (didactic techniques such as) motivational elements.

- The sixth line prioritizes the first approaches to the use of ICT (applications such as Twitter and Facebook), knowledge that increases when it is no longer used for social purposes and is used for educational purposes. The ability to use and manage the devices must be such that they always answer questions about technical support to students.

During this first session, it became clear and precise that communication and therefore learning was limited. By requiring an additional explanation to the analytical reading, it is shown that there is a lack of knowledge of the terms used and a lack of experience in the design and implementation of online distance courses.

For this reason, it is the pertinent moment to carry out a first self-assessment that, in a sensitive way, allows knowing the mastery of digital skills of each participant. These competencies were analyzed in the results section, after data collection using the checklists (Tables 1, 2 and 3). Table 1 presents the understanding of the basic notions of ICT when applied in the educational field. Table 2 refers to how much knowledge can be deepened in the sectors involved and Table 3 specifies the capacity to generate knowledge in the areas of interest.

**Table 1.** Modified checklist: approach to ICT basics.

ICT competency standards for teachers					
Approach related to the basic notions of ICT					
Politics and vision	Support social development and improve economic productivity. Related objectives: include development of transversality in digital technology (ICT).				
Competence	Teaching competence	Yes	No	Own example	Weighting
Politic	Define educational policies in the classroom in the use of ICT				
Curriculum and Assessment	Adapting ICT in the educational curriculum				
Pedagogy	Mediating the use of ICT				
ICT	Applying ICT and multimedia in the classroom				
Organization and Administration	Use equitably the use of ICT				
Teacher Professional Development	Acquire knowledge through ICT and the Web				

Source: Authors.

**Table 2.** Modified checklist: approach to deepening knowledge.

ICT competency standards for teachers					
Approach related to the deepening of knowledge					
Politics and vision	Increasing the economically active population through of complex knowledge				
Competence	Teaching competence	Yes	No	Own example	Weighting
Politic	Define, modify and apply pedagogical practices				
Curriculum and Assessment	Know the technique of applied knowledge				
Pedagogy	Structure, generate, implement and monitor, projects and solutions				
ICT	Learn about applications and tools of ICT and the Web				
Organization and Administration	Generate flexible learning environments with ICT				
Teacher Professional Development	Create complex academic collaboration projects				

Source: Authors.

**Table 3.** Modified checklist: Approach to knowledge generation.

ICT competency standards for teachers					
Approach related to knowledge generation					
Politics and visión	Increase productivity to generate knowledge and innovation for common benefit				
Competence	Teaching competence	Yes	No	Own example	Weighting
Politic	Understand the scope of national education policies				
Curriculum and Assessment	Know complex cognitive processes for learning				
Pedagogy	Openly model learning processes to apply cognitive competencies				
ICT	Design ICT-based knowledge communities.				
Organization and Administration	Playing a leadership role enriched by ICT				
Teacher Professional Development	Learning through ICT				

Source: Authors.

After the self-assessment on digital skills, the second moment required, previously, a session that was no longer awareness-raising. This continuity dealt with the contextualization of the teaching task. Although the strategies that each teacher follows with respect to their chair are based on their experience, it is also required, as well as having a mastery of digital skills, to have mastery of the pedagogical dimension.

## Second moment

To understand digital skills in the design of courses in the online distance modality, the "With what?" communication with the student will be established. Although there are several tools available (chat, forum, mail, video call, among others), it is the software that provides the technological capacity for fluid communication, both synchronous and asynchronous. For example, Zoom, Classroom, TEAMS, Moodle, among others. A highly relevant feature in digital skills is accessibility for all users, which means that it must be understood that the lower the Internet bandwidth capacity, the lower the efficiency and effectiveness of technological resources. For example, in the case study, the limitation of some participants who do not have access to the use of the microphone or the camera reduces the communication between all the participants, but does not distort the messages, since these are delivered through several channels (audio, video, text). However, the lack of internet connection, even having the latest generation of computer equipment and multimedia technologies, makes these tools obsolete as they lack efficient data transfer. Therefore, the teaching-learning process is reduced, in some moments, to its minimum intention and, in others, to its total absence.

Therefore, digital skills not only depend on the ability of the student, but are also closely linked to economic and technological availability. It is important to consider the technological limitation such as:

- ✓ Low quality devices (Video camera)
- ✓ Restricted access to data (internet)
- ✓ Updating of devices and software (device obsolescence)
- ✓ Generation gap (no need for alternative communication)

The pedagogical dimension is the "How?" be able to use digital skills to promote the teaching-learning process. The how?" it involves theories, methods, techniques, strategies-activities, tools and instruments (didactic materials and equipment).

The reality of many professionals is that they have little experience in the area of teaching, which is why their pedagogical dimension is based on emerging teaching experiences (or on class notes). It is essential to recognize that pedagogical training does not replace mastery of digital skills, and training in digital skills does not replace mastery of the pedagogical dimension. Among the theories that can be used in the distance modality are:

- ✓ Behaviorism
- ✓ Constructivism
- ✓ Cognitive
- ✓ Educational Technology
- ✓ Psychosocial

Regarding the method to be used, two mainly stand out: deductive, also called the scientific method, which prioritizes observation, the formulation of hypotheses, experimentation, analysis and the formulation of conclusions; and inductive, also called empirical, which prioritizes reality and positivism, that is, "if I don't observe it, I can't believe it."

Regarding teaching techniques, these are very broad and their adaptation depends to a large extent on the teaching capacity. Some desirable techniques in asynchronous communication in a teaching-learning process are mentioned below:

- ✓ Problem-Based Learning
- ✓ Analytical readings
- ✓ Graphic organizers
- ✓ Case studies
- ✓ Practices and interventions

Technique is considered to be the ability of an individual to repeat the same exercise or practice over and over again in order to perfect it and achieve a goal.

Regarding the technique, it is understood that it is capable of generating, maintaining or innovating patterns of visual, auditory and kinesthetic behavior in individuals (Romero, 2016), implementing resources such as:

- ✓ Group dynamics that seek to standardize learning
- ✓ Motivation and need for group learning

Likewise, strategies are understood as a set of activities aimed at obtaining an end. These strategies involve concepts such as saving, limiting, comparing, ranking, ordering, and organizing.

If the objective is to achieve educational quality in terms of mastery of digital skills and the pedagogical dimension, it is observed that by increasing mastery in both strategies, a greater reasoning capacity is obtained when making the transition from face-to-face to virtual.



The tools and instruments, considered as equipment and didactic material, must be aligned with the educational objectives. An example of a lack of alignment is the current distance education, which was not suitable for teachers or students. The educational grades do not receive the adequate means and didactic resources for their educational level. For example, at the preschool level technology is used that is not understood by students (such as WhatsApp and video calls on personal computers), and at the higher level the capabilities of WhatsApp and video calls do not substitute for occupational contexts.

This new stage of contextualization reinforces the obligation on the part of the teacher to have digital skills and establishes the personal responsibility of the participants when designing and dosing digital content that is implemented in an asynchronous distance course.

This situation gives rise to the application of a modified checklist that contains a total of twenty-seven level elements, distributed in categories of design, implementation and evaluation. Tables 4, 5 and 6 show as an example the representative elements of the third level that correspond to the evaluation. Table 4 inquires about the degree of integration of ICT's, table 5 establishes the identification of the degree of reorientation of ICT's and table 6 about the evolution of ICT's, when as a teacher or user appropriates its domain.

The information is collected using the format of Table 7, where the ICT competencies and standards are identified from the pedagogical dimension.

**Table 4.** Modified checklist level of ownership: integration.

ICT competence	Level of ownership		
	Integration		
	Know	Use	Transform
Evaluate The Yes, I have the competence is represented by a 1 The I do not have the competition is represented by a 0	Find information on educational trends mediated by ICT  Plan educational scenarios supported by ICT.  Identifies resources and limits when using ICT.	Relate content, activities and evaluation through educational scenarios.  Replicates content, activities and/or evaluations of educational scenarios with ICT.  Promotes collaborative learning for authentic problem solving.	Change the design of educational scenarios.  Enriches the structure of an educational setting through ICT.

Source: Authors.

**Table 5.** Modified checklist level of appropriation: re-orientation.

ICT competence	Level of ownership		
	Re-orientation		
	Know	Use	Transform
<p>Evaluate</p> <p>The Yes, I have the competence is represented by a 1 The No, I do not have the competence is represented by a 0</p>	<p>Understand the scope and limits of ICT.</p> <p>Identifies ICT applications considering Learning objectives.</p> <p>Understand the potential of ICT to provide feedback, monitor and evaluate educational scenarios.</p>	<p>Disseminates the implementation of ICT by lectures and class materials.</p> <p>Collaborate in the implementation of educational scenarios.</p> <p>Proposes teaching and learning situations through real and authentic problems.</p>	<p>Incorporates different ICT tools in the initial design.</p> <p>Change the design of the educational scenario adapted to the needs of students.</p> <p>Adjust the educational scenario by systematically analyzing feedback</p>

Source: Authors.

**Table 6.** Modified checklist appropriation level: evolution.

ICT competence	LEVEL OF OWNERSHIP		
	EVOLUTION		
	Know	Use	Transform
<p>Evaluate</p> <p>The Yes, I have the competence is represented by a 1</p> <p>The No, I do not have the competence is</p>	<p>Measures the impact of ICT.</p> <p>Recognize the means of follow-up and evaluation.</p> <p>Identify opportunities for improvement and change.</p>	<p>Systematize monitoring with ICT support.</p> <p>Measures the impact of ICT on the teaching-learning process.</p>	<p>Supports the effectiveness of meaningful learning by communicating monitoring and evaluation strategies.</p>

Source: Authors.

**Table 7.** Modified checklist level of integrated appropriation: integration, reorientation and evolution.

ICT competen ce	LEVEL OF OWNERSHIP								
	INTEGRATION			RE-ORIENTATION			EVOLUTION		
	Kno w	Use	Transfor m	Kno w	Use	Transfor m	Kno w	Use	Transfor m
Partial Score									
Partial Score									
Partial Score									
Total, of elements of favorable level				Percentage out of 27 level elements					

Source: Authors.

### Third moment

This scenario is transitory when moving from design to action. Reflections become specific propositions. At the end of the educational scenario, this should be understood as the contextualization in which synchronous and asynchronous strategies, activities and didactic material are developed, which direct the interaction of ICT within an educational context when designing a course in the online distance modality. .

By "educational scenario" we must understand the contextualization of the occupational situation on which the setting of the course is carried out. As an example of what has been mentioned, the most appropriate discernment practices are mentioned:

- ✓ Panel of experts
- ✓ Discussion forums
- ✓ Discernment of a topic (student presentations)

- ✓ Conference (teacher presentations)
- ✓ Autonomous work (readings and exercises by one person)
- ✓ Collaborative work (readings and exercises by more than two people)
- ✓ Participation: Visual (active camera), Auditory (active microphone), Kinesthetic (camera, microphone and physical space)
- ✓ Help desks (share experiences of an expert with students)

## Results

By weighing the self-assessments, it was possible to estimate the level of appropriation of digital skills by professionals in training in the area of education.

Table 8 indicates a high percentage of appropriation of digital skills, which suggests that the cross-sectional studies associated with the bachelor's degree provide the essential elements of the basic notions of ICT.

**Table 8.** Approach to the basics of ICT.

Participant	Percentage %
1	83
2	83
3	93
4	83
5	100
6	83
7	100
8	100
9	100
10	100
Mean	92.5

Source: Authors.

Table 9 shows a decrease in the depth of the appropriation of knowledge in terms of competitiveness when using ICT. The lack of academic requirements that are achieved with

the continuity of a postgraduate education, such as programming or the development of own software, is identified.

**Table 9.** Approach to deepening knowledge.

Participant	Percentage %
1	83
2	83
3	61
4	83
5	100
6	83
7	100
8	100
9	66
10	85
Mean	84.4

Source: Authors.

Table 10 is a representation of the complexity necessary to generate knowledge, which requires constant updating and training on specific software and hardware platforms. Regarding the technological validity, it is considered that software and hardware obsolescence greater than three years is ineffective and has a low impact due to the rapid development in the field of computing.

**Table 10.** Approach to knowledge generation.

Participant	Percentage
	%
1	66
2	33
3	33
4	83
5	66
6	100
7	50
8	100
9	66
10	75
Mean	67.2

Source: Authors.

Regarding the appropriation of the pedagogical dimension, Table 11 shows that this element must transcend not only in the discourse, but also be put into practice and implemented. For this, the experience in the design and implementation of courses in the online distance modality is essential and indispensable. Being a full-time teacher implies a responsibility that is acquired with discipline and perseverance, since the availability of resources does not guarantee the appropriation of your practice.

**Table 11.** ICT competences and standards from the pedagogical dimension.

Participant	Percentage
	%
1	53
2	66
3	63
4	56
5	83
6	66
7	76
8	73
9	50
10	76
Mean	66.2

Source: Authors.

## Discussion

Being the case study participants a highly heterogeneous group, both in ages, professions, job occupations and economic strata, it was possible to appreciate that, even when the clash of identities and cultures generates resistance to knowledge and change, the homologation of transversal capacities It is highly essential to promote synchronous (Figure 1) or asynchronous (Figure 2) communication and offer high academic quality. There is a marked need in the selection and creation of virtual objects, as well as in the design and development of virtual environments (Banoy and Montoya, 2022).

In a postgraduate course, teacher-student interaction requires clear and efficient messages. Mastering a bilateral process implies using short and specific messages, both in person and online. Making an impact with communication in the classroom, whether in person or online, implies configuring and organizing the message appropriately. Aspects such as the way in which information is transmitted (speed, volume, intonation, among others), body and facial



posture, mastery of space in the classroom, personal appearance and the context in which it is carried out must be taken into account. They present testimonials and diverse experiences. Avoiding difficulties such as inattention, misinterpretations, or behavioral attitudes improves both synchronous and asynchronous communication (Hernández, 2019).

The graduate level educator in today's society must be able to promote autonomous and directed learning in their students, seeking their occupational development despite the circumstances. It depends on him that the diversity of knowledge promotes the formation and values of trust in academics. It is important that the technological gap is not an obstacle and that it adapts transversally to the technological demands of a globalized world (García, 2017). The teacher's background depends to a large extent on the teacher's formal and informal professional training. Therefore, his contribution to his peers (students) will be fluid in his communication and in the teaching-learning process, as long as the digital skills of teachers are continuously and permanently attended to.

Educational scenarios necessarily imply a communication process within the classroom, whether synchronous or asynchronous, which plays a determining role in the contextualization of teaching-learning processes. Language is necessary in the basic constructions of thought, from the formation of thought to its formalization. Therefore, the teacher's pedagogical dialogue manages the communication that will define the quality of the interactions with the students to achieve significant learning. This management implies establishing educational scenarios that generate a welcoming environment where motivation, socialization and a systemic process that arises from the students are linked, promoting their initiative in expressions and decision-making in their learning (Herrera, 2019).

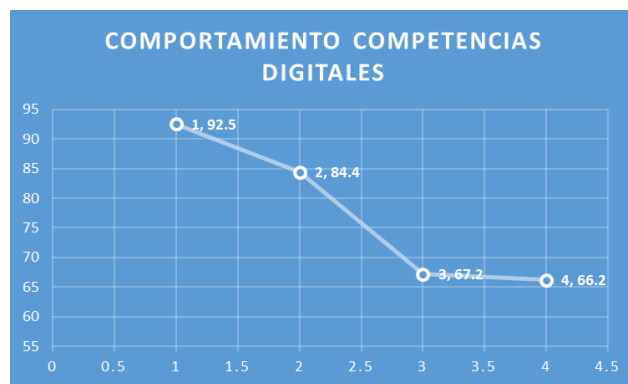
When there is a climate of trust, security, tolerance and equity between teachers and students, both can recognize themselves as educational agents in a virtual world and take full advantage of the benefits and potential offered by new technologies. It is essential to increase the level of digital literacy in the current context (García et al., 2021).

The design and implementation of courses in the online distance mode requires that the experiences, such as coexistence and debates, are elements that enhance the processes of interpersonal communication and media production. These interaction dynamics generate greater participation and intrinsic motivation, which favors efficient asynchronous communication and a high level of achievement in digital skills. These competencies cover important areas such as information and literacy, interaction through technology,

collaboration through digital channels, digital identity management, online citizen participation and digital content creation. (Reina y Sosa, 2023).

Finally, the graph of the results in percentage of the checklists (Figure 5) shows the trend that, at the postgraduate level, digital skills and the pedagogical dimension, it is essential to promote the promotion of innovative pedagogical practices based on communication, through the adoption of models and strategies on the use of digital resources or devices. These practices make it possible to build new knowledge by studying new knowledge, simplifying the resolution of complex and interdisciplinary problems through the use of self-management processes that link digital skills with humanism. (George et al., 2022).

**Figure 5.** Behavior of digital skills and pedagogical dimension.



Source: Authors.

## Conclusions

This section states that the education of both digital skills and the pedagogical dimension must be transversal and permanent. For this, it is necessary to explore both the formal and the informal modalities of distance education, especially in the creation of educational scenarios that depend on the experience of designers, who must have faced most of the technological and communication problems that arise. by venturing into and deepening digital skills.

Regarding the implementation of emerging non-contact courses, the directed use of didactic resources and media must provide and generate pragmatic and positivist evidence. In this way, the motivation and scientific curiosity of the student is kept high, guiding them towards the achievement of educational objectives and goals in an interactive way.

Finally, it is established that asynchronous communication is the key element in the appropriation of digital skills and the pedagogical dimension. If teachers do not prepare a preamble that clarifies the new terms and concepts to be studied, participants will not be able to develop their full academic potential, which will reduce collaboration between peers (teacher-students) and limit their ability to maintain a smooth flow of information. . Instead of using the dialogue to generate new knowledge and knowledge through reasoning, they will be limited to solving doubts.

### Future lines of research

The relevance of this work by documenting the experience on the degree of mastery of digital skills and the pedagogical dimension in a group of postgraduate students lays the foundations for establishing a comparison with other postgraduates from the perspective of occupational performance as future work. with the aim of improving teaching practice through technological inclusion mediated by digital skills.

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