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La Técnica de Grupo Nominal como herramienta para seleccionar ítems que miden el nivel de competencias digitales en estudiantes de posgrado*The Nominal Group

Technique as a tool to select items that measure the level of digital skills in postgraduate students

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RESUMEN

La competencia digital se ha vuelto crucial en la era digital y comprender el nivel de competencias digitales de los estudiantes de posgrado es fundamental para adaptar los programas educativos y desarrollar estrategias efectivas de enseñanza y aprendizaje. El objetivo de esta investigación fue seleccionar los ítems de un cuestionario para evaluar el nivel de competencias digitales en estudiantes de posgrado en un contexto específico, utilizando la Técnica de Grupo Nominal (TGN). Los participantes del estudio fueron seleccionados por su experiencia y conocimientos en el campo de las competencias digitales. Se realizó una discusión estructurada en la que los expertos identificaron y debatieron las dimensiones y los componentes clave de las competencias digitales relevantes para los estudiantes de posgrado, y se priorizaron y seleccionaron los ítems más representativos que medirían el nivel de competencias digitales en los estudiantes. Los resultados proporcionaron un conjunto de ítems validados y confiables incluidos en un cuestionario que se adapta a las competencias digitales identificadas previamente. Este cuestionario puede evaluar de manera efectiva el nivel de competencias digitales en los estudiantes de posgrado en un contexto específico, cuyos resultados ayuden a informar políticas y estrategias educativas que mejoren la formación en competencias digitales en los estudiantes de referencia.

PALABRAS CLAVE

Nivel de Competencia Digital; Técnica de Grupo Nominal; Estudiantes de Posgrado.

ABSTRACT

Digital competence has become crucial in the digital era and understanding the digital skills level of postgraduate students is essential to adapt educational programs and develop effective teaching and learning strategies. The objective of this research was to select the items of a questionnaire to assess the level of digital skills in postgraduate students in a specific situation, using the Nominal Group Technique (NGT). Study participants were selected for their experience and knowledge in the field of digital skills. A structured discussion was held in which the experts identified and discussed the key dimensions and components of digital competences relevant to postgraduate students, and the most representative items that would measure the level of digital skills in students were prioritized and selected. The outcomes provided a set of validated and reliable items included in a questionnaire that is tailored to previously identified digital skills. This questionnaire can effectively assess the level of digital skills in postgraduate students in a specific context, the outcomes of which help inform educational policies and strategies that improve digital skills training in reference students.

KEYWORDS

Digital skills Level; Nominal Group Technique; Graduate Students.

INTRODUCTION

In recent decades, and particularly after the year 2000, there has been a significant increase in the development of new information and communication technologies (ICT), bringing with it great changes in all areas of current society (Ayala-Mora et al., 2022; Infante-Moro et al., 2021a, 2021b, 2022a; Jiménez Rodríguez, 2023; Tomczyk et al., 2023). In this order, great transformations have occurred, creating highly competitive environments.

Great changes in the forms of digital communication were brought about with the arrival of the COVID pandemic in 2020. Social isolation from the point of view of direct contact between people caused communication to change drastically overnight and multiple Innovations appeared around ICT, which had to be applied emergently and almost immediately, presenting great challenges for educational institutions, government organizations and, of course, the entire business environment (Kalsoom et al., 2022; Infante-Moro et al., 2021c, 2022b, 2022c; Santana-Valencia & Chávez-Melo, 2022; Fidalgo-Blanco et al., 2023).

If the advance of ICT in itself can be considered a great achievement in the way all types of communities are related, it also constitutes a problem when identifying groups of people from all areas that cannot quickly insert themselves into this technological advance, generating a technological generational gap with multiple negative impacts. Therefore, skills in the use of ICT must be adopted and increased in these vulnerable groups.

Concepts of digital competence

Authors such as Oberländer, Beinicke and Bipp (2020) propose the definition of digital competence as the set of basic knowledge, skills, abilities and other characteristics that help people efficiently and successfully carry out their work tasks with respect to digital media. It can be seen that this definition of competence addresses the work aspect in which people are inserted by trying to fit them into companies through the tools used and their functions within them, in order that future workers are trained in the skills demanded by these companies (Infante-Moro et al., 2021d; Álvarez-Rodríguez & Vera, 2022; Guevara-Otero et al., 2023). And

other authors say that digital competencies have to do with those skills of information, communication, collaboration, critical thinking, creativity and problem solving, skills that can undoubtedly be used in digital contexts (García-Peñalvo, 2005; Mishra & Koehler, 2016; Van Laar et al., 2019).

In this sense, not all people have these types of skills, which is why it has been seen that there is a significant digital divide (especially in Latin American countries), where the education sector is a vulnerable sector of this gap; in which teachers are expected to have these competencies to ensure educational quality (Martín-Párraga et al., 2023; Pegalajar Palomino & Rodríguez Torres, 2023; Cabero-Almenara et al., 2023). According to Huepe, Palma and Truco (2022), the Economic Commission for Latin America (CEPAL) reported that teachers at all educational levels should be empowered with the tools and assume their new role: not only that of guide or counselor, but that of digital resources manager. This entails (in teachers) the adoption of digital competencies as a daily and continuous learning process, inherent to the advancement of the digital society (Rodríguez Martínez, 2021; Morales Salas & Rodríguez Pavón, 2022; Salazar- Martínez et al., 2023; Infante-Moro et al., 2023; Gallardo-Pérez et al., 2023; Khushk et al., 2023; Cisneros Barahona et al., 2023; Moreno-Mediavilla et al., 2023; Montenegro-Rueda et al., 2023).

Therefore, if teachers have deficiencies in this type of skills, it is expected that the graduation profile of the students will also present a significant lag in terms of the issue of digital skills, which are necessary in the work context where they are inserted.

In such a situation, the digital skills that individuals have become very important in the educational, work and social environment, so that they become essential in the daily lives of human beings. And in this context, digital competencies in Information and Communication Technologies (ICT) are inherent to educational development to achieve greater interactivity between the actors of the teaching-learning process (PEA), trigger the generation of learning, transmit knowledge through of active methodologies and evaluate learning in a fair and automatic way (Morales Salas, 2021; García-Holgado et al., 2021; Morales Salas & Veytia Bucheli, 2022; Córcoles-Charcos et al., 2023; Colás-Bravo & Hernández-Portero, 2023; Martínez Presas et al., 2023; Guzmán-Duque, 2023; González-Zamar et al., 2023). Hence, it is necessary to investigate the level of digital skills that students studying a postgraduate degree have.

To do this, it is necessary to first determine what type of digital competencies should be evaluated in postgraduate students, classifying these digital competencies into Dimensions that help us conceptualize the digital educational context. Thus, the objectives of this research were:

Determine the dimensions and digital skills that can be evaluated in postgraduate students.

Select the questionnaire items using the Nominal Group Technique (NGT), which measure the level of digital skills in postgraduate students in a specific context.

MATERIAL AND METHODS

The methodological procedure that was followed to fulfill the aforementioned objective consisted of two phases: The first consisted of determining the dimensions and their competencies and the second phase consisted of selecting the questionnaire items that adapted to the digital competencies previously described.

Description of the dimensions and their competencies

Two phases were followed to design the study: The first consisted of determining the dimensions and their competencies based on the following steps:

Determination of dimensions.

The selection of digital skills.

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The classification of digital competencies in each of the dimensions. 4- The description of the dimensions and digital competencies.

Nominal Group Technique to select the questionnaire items that measure the level of digital competencies

The second phase consisted of selecting the questionnaire that adapted to the digital competencies previously described.

A questionnaire was selected from the article "Design and validation of an instrument for evaluating the digital competence of university students" (Gutiérrez-Castillo et al., 2017), where the construction process of this instrument is developed and analyzed, its characteristics psychometrics and their validity for the study of technological competencies in students. This questionnaire, called: Digital Competence of Higher Education Students (DCHES), has 43 items in its original design.

According to Infante-Moro et al. (2019), the 43 items that make up the aforementioned questionnaire allow us to analyze technological literacy, the search and processing of information, critical thinking and problem solving, communication and interaction, and the safe, legal and responsible use of ICT, in addition to creativity and innovation on the part of users.

And for this research, we sought to select those questionnaire items that best adapted to the dimensions and digital competencies in ICT described in the first phase; Therefore, the Expert Panel method was used through the Nominal Groups Technique.

The Expert Panel, according to Georghiou et al. (2010), consists of a group of people who make up panels analyze and combine their knowledge according to a particular area of interest. Experts can be local, regional, national or international. And the panels are organized to achieve legitimization of expertise, including creative, imaginative and visionary perspectives.

On the other hand, Escobar-Pérez and Cuervo-Martínez (2008) consider it as "an informed opinion of people with experience in the subject, who are recognized by others as qualified experts on it, and who can provide information, evidence, judgments and evaluations" (p. 29). Now, the Nominal Group Technique, whose origin comes from the Anglo-Saxon term Nominal Group Technique (NGT), was made known in 1968 and its main creation is attributed to Delbecq et al. (1976), whose purpose was to improve the development of work meetings and their operational dynamization to seek the productivity required of them. Years later, Rohrbaughen (1981) was the one who definitively gave it the term Nominal Group Technique (as it is known to this day).

For this research, two rounds of eight phases each were taken to execute the Nominal Group Technique, with the objective of using it as a working method for the validation of the questionnaire by the panel of invited experts (Olaz-Capitán, 2013).

3. RESULTS

1) From the description of the dimensions and their competencies

Four dimensions were defined with their respective competencies, which are detailed below.

1. Dimension: Communication.

The word "communication" is defined by the Royal Spanish Academy (2021), simply as "action and effect of communicating". For Lamb et al. (2013), communication is "the process by which we exchange or share meanings through a common set of symbols" (p. 484), and while for Chiavenato (2006), communication is "the exchange of information between people. It means making a message or information common. It constitutes one of the fundamental processes of human experience and social organization" (p. 110).

For the purposes of this study, the "Communication" dimension was defined as the ability of a person to transmit and exchange information and ideas with others; as well as being able to interact and collaborate within a group through ICT. From this dimension, two digital competencies in ICT are derived, described below and represented in Figure 1:

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a) Competence: Interaction through digital media. Defined as the ability to use different systems, devices, media and formats to carry out communication.

b) Competence: Collaboration with digital media. Defined as the ability to interact with other colleagues and users using computer programs, social networks, and ICT-based communication channels. That is, being able to interact through digital technologies and knowing how to manage them according to the context.

Figure 1. Dimension: Communication and its associated competencies
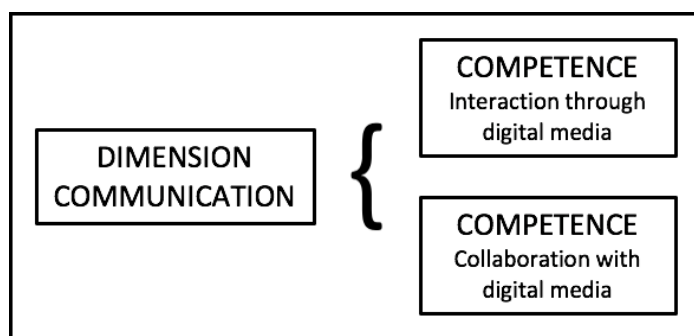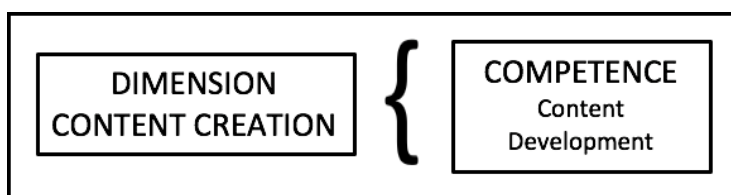

Source: Self-made.

2. Dimension: Content creation.

According to different concepts that exist on the Internet, the authors define the term "Content Creation" as follows: all the digitized information from interactive materials, which integrates elements of various types. They can be iconic, visual, auditory and audiovisual elements, which allow them to be used by people according to their needs and make it possible to explore and manipulate information in a creative, attractive and collaborative way. It is from this dimension that the following competence, referred to below and represented in Figure 2, was taken for analysis:

a) Competence: Content Development. According to the National Institute of Educational Technology and Teacher Training (2019), it is defined as: digital competence that involves the critical and safe use of Information Society Technologies for work, free time and communication, relying on basic ICT skills (use of computers to retrieve, evaluate, store, produce, present and exchange information, and to communicate and participate in collaborative networks over the Internet).

**Figure 2. Dimension: Creation of Content and its associated competence.**

Source: Self-made.

3. *Dimension: Access to information.*

We are going to refer to "access to information" as the set of techniques to search, categorize, modify and access information found in a system: databases, libraries, files and the Internet, among others. That is, it is about acquiring or having the knowledge and skills necessary to find information appropriate to one's needs, store it and organize it to use it for one's own benefit, or that of an organization. From this dimension, digital competence in ICT was derived, described below and shown in Figure 3:

a) Competence: Navigation, search and filtering. Defined as the competence necessary to function in the digital world, referring to information and everything related to its search, classification and storage. PEA actors are expected to know how to search for information or a document published on the Internet, find and compile data on a specific topic or issue, join different sources or newsletters to receive it by email, and know the valid formulas and methodologies to find and store information while having sufficient knowledge to function normally in this activity.

Figure 3. Dimension: Access to information and its associated competence.
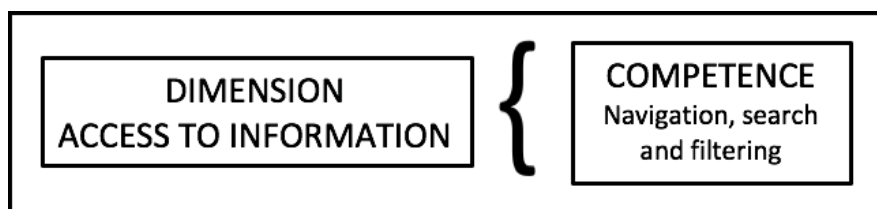
Source: Self-made.

4. *Dimension: Problem resolution*

The "Problem resolution" dimension can be understood as one of the most common intellectual activities in the development of humanity. There is no single concept of problem solving, it is always linked to the investigation of what cannot be understood or what represents an unknown for a problematic situation, it is also associated with creativity and intellectual curiosity. According to Rojas de Escalona (2010), problem solving combines two complex processes: one is understanding, which generates a problem space, and another is the solution that explores the problem space to try to solve it. The representation that the subject constructs of the problem determines the way in which he or she will propose to solve it.

Due to the above, in the context of the use and application of digital competencies, for the authors of this research, this dimension has a high level of importance because there is a need to solve technical problems in the use of new technologies and existing ones. existing, to obtain creative and timely use in everyday situations in the workplace.

Thus, the "Problem resolution" dimension has as its competence "Problem solving", described below and referred to in Figure 4:

a) Competence: Problem solving. According to the European Documentation Center of the Francisco de Vitoria University (2017), the digital competence of "Problem solving" is defined as "the possession of the knowledge and

skills necessary to solve technical problems in the use of new technologies; to use them creatively; and to find opportunities in their development" (p. 2).

Taking this concept into account, we understand that the students who are the subject of this study must identify, investigate and define situations in the technological environments of their workplaces to solve problems.

Figure 4. Dimension: Problem solving and its associated competence.

Source: Self-made.

As a recapitulation of the four study dimensions and the five competencies associated with them, Table 1 is shown:

DIMENSIONS	AREAS OF COMPETENCE	DEFINITION OF COMPETENCE
1. Communication	a) Collaboration with digital media	Interact with other colleagues and users using computer programs, social networks, and ICT-based communication channels.
	b) Interaction through digital media	Ability to use systems, devices, media and formats to communicate.
2. Content creation	c) Content development	Develop digitized content using ICT.
3. Access to information	d) Navigation, search and filtering	Browsing, searching and filtering information.
4. Problem resolution	e) Problem solving	They identify, investigate and define situations in technological environments to solve problems.

Table 1. Dimensions and digital competencies in ICT.
Source: Self-made.

2) From the application of the Nominal Group Technique to select the questionnaire items (DCHES)

a) Selection of the Group of Experts (GE)

To apply the Nominal Group Technique and in accordance with the previous definitions, 10 people were invited who, according to their profile, experience and knowledge, were considered experts in various topics, which allowed them to work in the selection and validation process of the questions that make up the questionnaire for this study. The composition of the expert group is shown in table 2:

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Table 2. Composition of the group of experts.

EXPERT	AGE	GENDER	LEVEL OF STUDY	SPECIALTY	UNIVERSITY
1	38	Male	Doctorate	Information technology	University of Guadalajara
2	36	Female	Master's degree	Marketing Research	University of Guadalajara
3	47	Female	Doctorate	Computer systems	University of Guadalajara
4	45	Male	Doctorate	Information technology	University of Guadalajara
5	52	Male	Doctorate	Computer systems	University of Guadalajara
6	40	Female	Master's degree	Information technology	University of Guadalajara
7	43	Female	Doctorate	Business Administration	University of Guadalajara
8	38	Female	Doctorate	Information technology	University of Guadalajara
9	50	Male	Doctorate	Marketing Research	University of Guadalajara
10	41	Female	Master's degree	Business Administration	University of Guadalajara

Source: Self-made.

b) Explanation of meeting objectives

As a first instance, the moderator (in this case one of the researchers of this study) made an explanation about what he intended to do with each of the members as participants, as well as the importance of their joint task.

Taking into account that the selected questionnaire had a large number of questions (43), the decision was made to divide it into two parts to validate it with respect to the dimensions and their digital competencies in ICT. Likewise, two rounds of work were created, in the first round 25 questions were validated and in the second round the remaining 18 were validated.

Two forms were given to each expert. The first format, as shown in Table 3, contained the 5 competencies and the first 25 questions, so that they could be validated according to his experience. This was developed during the first round of work.

Table 3. Checklist for the GE validation work. Round 1. Questions 1 – 25

EXPERT Nº					
DATE:			ROUND 1	Questions 1 – 25	
COMPETENCIES					
ID	1	2	3	4	5
Quiz question	Collaboration with digital media	Interaction through digital media	Content development	Navigation, search and filtering	Problem solving
1					
2					
3					
4					
5					
…					
25					

Source: Self-made.

The second format, as shown in Table 4, contained the 5 competencies and the rest of the 18 questions to be validated during the second round of work.

Table 4. Checklist for the GE validation work. Round 2. Questions 26 – 43.

EXPERT Nº					
DATE:			**ROUND 2**	**Questions 26 – 43**	
COMPETENCIES					
ID	**1**	**2**	**3**	**4**	**5**
Quiz question	**Collaboration with digital media**	**Interaction through digital media**	**Content development**	**Navigation, search and filtering**	**Problem solving**
26					
27					
28					
29					
30					
...					
43					

c) Work rounds for the Nominal Group Technique

Work Round Number 1. It consisted of 8 phases.

First Phase: Silent generation of ideas.
The expert participants, with the format in hand, compared the questions according to digital competencies in ICT. This was done individually.

Second Phase: Sequential manifestation of ideas by the participants.
In this phase, each of the experts explained the results of their checklist to the rest of the group, commenting on the reason for their decision. Only opinions were heard and individual notes were taken.

Third Phase: Discussion of ideas.
Each of the questions were analyzed again, but in this case a discussion of ideas was carried out, the modeler encouraged debate and the possibility of discarding ideas, redefining them, relocating them, grouping them or decomposing them. Each participant was able to question the other regarding the reason for his or her decision on any of the questions.

Fourth Phase: Preliminary, silent and independent voting.
In this phase, each expert returned to his questionnaire and, silently, analyzed the importance of the ideas outlined in the previous phase, with the aim of materializing his preferences regarding the result of his checklist. Particular choices were made for the responses in the checklist and the results were delivered to the group modeler.

Fifth Phase: Pause.
This stop seeks to "oxygenate" the group, since until this moment the time consumed was two hours and 30 minutes, which is why it is reasonable to seek a brief break to later reopen the discursive process.
During the break time, the modeler compiled the voting results of the fourth phase in a summary table for presentation in the next phase.

Sixth Phase: *Discussion of the results obtained in the first vote.*

The moderator presented to the group the concentrated results of the voting that took place in the Fourth Phase. The results were analyzed and possible inconsistencies and the reflection of each expert were discussed.

Seventh Phase: *Final silent and independent vote.*

Following the scheme outlined in the Fourth Phase, the silent assessment of each participant was carried out. At this point in the methodology and in comparison with the previously mentioned phase, each participant was able to definitively confirm or eliminate the possible answers according to their final criteria as a result of the previous "filtering" (carried out in all the previous phases). And the results were delivered to the Moderator.

Eighth Phase: *List and agreement on the built proposal.*

As in the Sixth phase, the group moderator showed a table with the general (and condensed) results obtained as a product of the silent vote in the Seventh phase. The result shown in the Eighth phase was the final one for the validation of the first 25 questions that were part of Round 1 and were included in the checklist, as shown in table 5. As a final rule, the Nominal Group defined that a question would be Validated when it reached at least 70 % of the final vote in the Eighth phase.

Table 5 also shows the concentrated result of the validation of the questionnaire questions against the criteria of Digital Competencies in ICT carried out in the first round of work by the members of the group of experts.

Anexo 1

Source: Self-made.

It is observed that, of the 25 questions presented in the first round, only one question was not validated (as it obtained 2 votes in favor, equivalent to 20 %). The rest of the questions (24) obtained more than 70 % votes in favor, so they were selected for the new version of the questionnaire that would be applied to Postgraduate in Administration students.

Work round number 2.

The second round was carried out with the remaining 18 questions (from 26 to 43) and the methodology was the same as that used in Round 1, taking into account the eight phases. In the Eighth phase, the final result was obtained for the validation of the remaining 18 questions that would form part of the checklist questionnaire.

Table 6 shows that of the 18 questions that were submitted to validation by the group of experts, 11 were included in the questionnaire, and 7 questions were left out of it because they did not reach 70 % of the vote on the competence.

Table 6. Result of the validation work of the Round 2 Expert Panel.

Anexo 2
Source: Self-made.

In summary and as a result of the application of the Nominal Group Technique, it was obtained that of a total of 43 questions in the questionnaire (and according to the analysis in the two rounds of work), 35 items were validated (which is equivalent to a 81 %), leaving 11 questions out of it (which is equivalent to 19 %, as shown below in figure 5).

Figure 5. Result in % of questions Validated and Not validated by the Group of Experts.
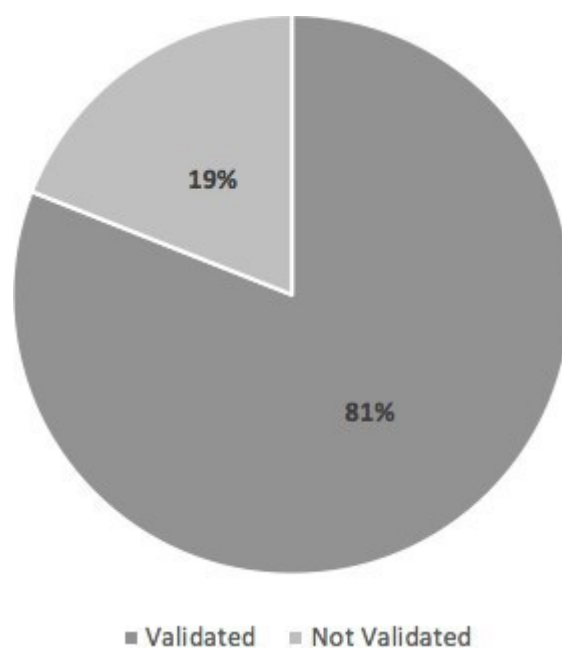
Source: Self-made.

In this way, the Digital Competence of Higher Education Students (DCHES) questionnaire was adapted with a total of 35 items, the result of which was due to the existing congruence for each of the 5 competencies associated with the Dimensions described in the first phase.

Below, Table 7 shows the number and description of the validated questions that make up the questionnaire that hopes to measure the level of digital competencies that the authors of the PEA have:

Table 7. Final design of the questionnaire according to the dimensions and their competencies.

Anexo 3
Source: Self-made.

4. DISCUSSION AND CONCLUSIONS

To give consistency to the study, the dimensions and their competencies were determined, resulting in four dimensions and five associated competencies (See Table 1). These dimensions include technical skills, digital knowledge, communication skills in digital environments, information skills and digital literacy, among others.

By determining the dimensions and classification of their competencies, it will be possible to explore specific factors such as age, gender or previous experience in technology, which are related to the level of digital competencies of graduate students, helping to better understand the characteristics of the students that influence their level of digital competence.

Specific digital competencies could be mapped within each identified dimension. This will allow us to understand the skills and knowledge that students must have to develop an efficient educational scaffolding.

A questionnaire of 43 questions was selected, extracted from an article prepared by Gutié-rrez- Castillo et al. (2017). And The Nominal Group Technique was applied with a panel of 10 ex-

perts, the result of which consisted of the selection of 35 items that made up the new instrument to be applied to Postgraduate students and taking into account the four dimensions and their competencies (table 7).

This is something that was not used in previous studies where this questionnaire by Gutiérrez- Castillo et al. (2017) as an instrument to measure the level of digital skills in students (Infante- Moro et al., 2019, 2021e, 2022d), and it is true that it is something to take into account, since not all training programs must have all the items recommended by Gutiérrez-Castillo et al. (2017), but these must be in accordance with the training programs and the digital skills that they require for the future work performance of their students.

In this way, it is expected that the analysis and selection of the questionnaire items in this study will reveal the general level of digital skills that graduate students have at a given university based on their future professional performance.

With the selected items, it will be possible to identify the areas where postgraduate students have greater mastery and those in which they need to improve, identifying gaps that can strengthen the design of training programs or support activities in those specific areas.

The results of the questionnaire will inform the review and adjustment of the academic programs at all times, ensuring relevance and constant updating. The feedback obtained through the evaluation of digital competencies will contribute to the continuous improvement of educational design.

And once the questionnaire is applied with the selected items, it will be possible to compare the results with standards or benchmarks established for digital competencies at the postgraduate level. This will allow students to evaluate their academic performance in comparison with other programs or with established reference criteria.

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