Digital skills and sociodemographic variables in university teachers in the Peruvian Amazon during the COVID-19 pandemic

Competencias digitales y variables sociodemográficas en docentes universitarios de la Amazonía peruana durante la pandemia del COVID-19

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Abstract

The objective of this research was to analyze the sociodemographic variables associated with the digital skills of university teachers in the Peruvian Amazon during the COVID-19 pandemic. The approach was quantitative, the design was non-experimental and the type was cross-sectional comparative descriptive. The sample consisted of 167 teachers from 3 universities to whom the Digital Teaching Competence Questionnaire was applied, an instrument with adequate metric properties (validity based on content and reliability). According to the results, the digital skills of 55.7% of university teachers are developed, 40.7% are partially developed and 3.6% are poorly developed. Similarly, it was determined that some sociodemographic variables such as age group and area of knowledge were significantly associated with the level of development of digital skills ($p<0.05$). It was concluded that university teachers were characterized by having digital skills developed in the post- pandemic context, which were more favorable in younger teachers and whose area of knowledge was Engineering and Architecture.

Keywords: Digital skills, teachers, virtual education, university, COVID-19.

Resumen

El objetivo de la presente investigación fue analizar las variables sociodemográficas que se asocian a las competencias digitales de los docentes universitarios de la Amazonía peruana durante la pandemia de COVID-19. El enfoque fue cuantitativo, el diseño fue no experimental y el tipo, descriptivo comparativo de corte transversal. La muestra estuvo conformada por 167 docentes de 3 universidades a quienes se les aplicó el Cuestionario de Competencia Digital Docente, instrumento con adecuadas propiedades métricas (validez basada en el contenido y confiabilidad). De acuerdo a los resultados, las competencias digitales del 55,7% de los docentes universitarios están desarrolladas, del 40,7% están parcialmente desarrolladas y del 3,6% se encuentran poco desarrolladas. Del mismo modo, se determinó que algunas variables sociodemográficas como el grupo etario y el área de conocimiento se asociaban de manera significativa al nivel de desarrollo de las competencias digitales ($p<0,05$). Se concluyó que los docentes universitarios se caracterizaban por contar con competencias digitales desarrolladas en el contexto postpandemia, las cuales eran más favorables en los docentes más jóvenes y cuya área del conocimiento era Ingeniería y Arquitectura.

Palabras clave: Competencias digitales, docentes, educación virtual, universidad, COVID-19.

Introduction

During the month of December 2019, cases of atypical pneumonia caused by a new coronavirus called SARS-CoV-2, which was the cause of the disease COVID-19 were reported in the city of Wuhan (China)[1]. Given the exponential increase in cases in several countries and continents, it was considered an international pandemic in March 2020, a situation that tested the health systems of all countries[2].

In Peru, the COVID-19 pandemic caused the Government to decree a state of emergency and force the population to remain in social isolation to prevent the spread of the disease, for which many activities were suspended, including university academic activities[3]. Subsequently, and given the need not to interrupt the educational service, the teaching modality changed from face-to-face or semi-face-to-face to being strictly virtual[4,5]. Nevertheless, in this new scenario of virtualization of education, limitations were perceived, mainly due to connectivity, the technological gap and the digital skills of teachers[6], an aspect that will be emphasized, since they were the ones who had to learn in the road to use virtual classrooms, integrate some resources and applications and interact through applications such as Zoom, Google Meet, WhatsApp video calls and other technological means that give continuity to the teaching-learning process[7].

Digital competencies are defined as a series of knowledge, skills, abilities, attitudes and strategies associated with Information and Communication Technologies (ICT) that the teacher must use, handle and manage in school circumstances to optimize student learning, thus improving their levels of achievement, as well as constantly optimizing and innovating their pedagogical practice[8,9]. Another definition was established by Krumsvik[10], who stated that digital skills referred to the set of knowledge, skills and abilities that allow the teacher to implement the use of ICT in learning sessions, optimizing teaching and encouraging turn the digital literacy of their students.

Then, they imply the acquisition of a set of skills, knowledge and attitudes that the teacher must possess for the technical, pedagogical and didactic incorporation of information and communication technologies (ICT) in educational contexts; in short, what a teacher must know for the design, production, use and evaluation for the educational incorporation of ICT in teaching-learning processes[11].

According to the National Institute of Educational Technologies and Teacher Training[12], digital skills are made up of 5 clearly defined areas: Information, communication, content creation, security and problem solving. Information refers to identifying, locating, obtaining, storing, organizing and analyzing information, data and digital content, assessing its purpose and relevance for teaching. Communication involves interacting in digital environments, sharing resources through online tools, connecting and collaborating with others through digital tools, and participating in communities and networks. Regarding the creation of content, it includes editing new digital content, integrating and reworking previous knowledge and content, making artistic productions, multimedia content and computer programming, knowing how to apply intellectual property rights and use licenses. Regarding security, it has to do with the protection of information and personal data, protection of digital identity, protection of digital content, security measures and responsible and safe use of technology. Finally, problem solving allows identifying needs for the use of digital resources, making informed decisions about the most appropriate digital tools according to the purpose or need, solving conceptual problems through digital means, using technologies creatively, solving technical problems and updating their own competence and that of others.

There are studies that were carried out with the purpose of knowing the level of development of digital skills in university teachers and the findings are diverse, since some determined that it was low[9,13,14] and others found that it was moderate[11,15,16]. Likewise, there is research focused on knowing the association between digital skills and sociodemographic variables, and although the results are not totally conclusive, they mostly reported that male teachers[17-19], younger [17,20] and who had a higher level of training academic[15,21,22] present a higher level of development of their digital skills compared to the other contrast groups.

Based on the above, the general objective of this research was to analyze the sociodemographic variables associated with the digital skills of university teachers in the Peruvian Amazon during the COVID-19 pandemic.

Materials and methods

Design

The research was characterized by having a quantitative approach, since it was based on numerical measurement to determine behavior patterns in the study sample[23]. Regarding the design, it was non-experimental, since the digital skills variable was not intentionally manipulated, but was observed as it occurred in its environment[24]. Regarding the type, it was descriptive - cross-sectional, since the characteristics and properties of the study variable were analyzed and the data collection was carried out in a single moment, respectively[25].

Population and sample

The study population consisted of 295 teachers who taught at the 3 universities that provide higher education services in the Madre de Dios region, Peru: Universidad Nacional Amazónica de Madre de Dios (UNAMAD), Universidad Andina del Cusco (UAC) and Universidad Nacional de San Antonio Abad del Cusco (UNSAAC). Regarding the sample, it was made up of 167 teachers, an amount determined by stratified probabilistic sampling with a confidence level of 95% and a significance level of 5%. Table 1 describes the sociodemographic characteristics of the sample and it can be seen that more male teachers participated, who were between 41 and 50 years old, worked at the UNAMAD, had Master's degrees, were hired, they had between 1 and 10 years of experience and their area of knowledge was Social and Legal Sciences.

Table 1. Sociodemographic characteristics of the sample.			
Sociodemographic characteristics		n= 167	%
Gender	Male	118	70.7
	Feminine	49	29.3
Age group	From 21 to 30 years old	8	4.8
	From 31 to 40 years old	56	33.5
	From 41 to 50 years	68	40.7
	From 51 to 60 years	27	16.2
	From 61 to 70 years	8	4.8
University	UNAMAD	125	74.9
	UAC	32	19.2
	UNSAAC	10	6.0
Highest level of study	Bachelor	24	14.4
	Master's degree	102	61.1
	Doctorate	41	24.6
labor condition	Hired	99	59.3
	Appointed	68	40.7
Years of service in university teaching	From 1 to 10 years	98	58.7
	From 11 to 20 years	60	35.9
	From 21 to 30 years old	9	5.4
Knowledge area	Arts and Humanities	23	13.8
	Basic Sciences	29	17.4
	Health Sciences	18	10.8
	Social and Legal Sciences	65	38.9
	Engineering and Architecture	32	19.2

Technique and instruments

The technique used for data collection was the survey, while the instrument was the Digital Teaching Competence Questionnaire[26], which was structured using the Google Forms application. This questionnaire was adapted to the Peruvian context in a previous study[19], it presents 21 Likert-type items (not at all, a little, some, almost a lot and a lot) and evaluates 5 dimensions: information (items 1 to 3), communication (items 4 to 9), content creation (items 10 to 13), security (items 14 to 17) and problem solving (items 18 to 22). Its metric properties were determined through the content-based validity and reliability process. In this sense, it was established, through the expert judgment technique, that the questionnaire had an adequate level of validity (Aiken's V= 0.939). On the other hand, reliability was found through a pilot test and it was determined that the questionnaire also had an adequate level of reliability (α= 0.964).

Process

The data collection took place in the month of May 2022. For this, a meeting was established with the authorities of the targeted universities with the aim of informing them about the purpose of the research and requesting their respective authorization. Afterwards, the teachers were contacted through the *WhatsApp* instant messaging application, the purpose of the research was detailed, their consent was requested and the link was attached so that they could access and respond to the instrument, which lasted approximately 15 minutes. The information obtained was exported to a Microsoft Excel file, where data processing was carried out considering the respective assessment scale.

Analysis of data

To perform the statistical analysis, SPSS® V. 26 software was used. The descriptive results were summarized in frequency tables, while the inferential results were obtained through the non-parametric Chi Square (X^2) test, which made it possible to determine whether the digital skills variable was significantly associated with the proposed sociodemographic variables.

Results

The digital skills of 55.7% of the teachers surveyed are developed, 40.7% are partially developed and 3.6% are underdeveloped. The exposed data shows that the majority of teachers have the knowledge, skills and abilities to use ICT in the development of learning sessions to improve their pedagogical practice and optimize the teaching-learning process, which in turn will make it possible raise student achievement levels. However, it is necessary to highlight that a considerable percentage of teachers have not fully developed their digital skills, so it is necessary to carry out the digital literacy process and consolidate their digital skills so that they can timely and adequately integrate ICTs in their teaching.

Table 2 shows that the majority of teachers have developed information skills (74.9%), communication skills (55.7%), content creation (55.1%), security (62.9%) and problem solving (50.9%). However, it is necessary to mention that there is also a considerable percentage of teachers who are in the process of developing them.

Table 2. Descriptive results of the dimensions of digital skills						
Variables y dimensions	Developed		Partially developed		Underdeveloped	
	n	%	n	%	n	%
Information	125	74.9%	37	22.2%	5	3.0%
Communication	93	55.7%	66	39.5%	8	4.8%
Content creation	92	55.1%	54	32.3%	21	12.6%
Security	105	62.9%	50	29.9%	12	7.2%
Problem solving	85	50.9%	53	31.7%	29	17.4%

As can be seen in Table 3, digital skills were significantly associated with the age group and area of knowledge of the teachers ($p<0.05$). In this sense, it was determined that the youngest teachers and whose area of knowledge was Engineering and Architecture presented higher levels of development of digital skills compared to young teachers who belonged to other areas of knowledge.

Table 3. Association between digital skills and sociodemographic variables

Variables sociodemográficas		Digital skills			X^2	p-value
		Developed	Partially developed	Underdeveloped		
Gender	Male	70 (59.3%)	46 (39.0%)	2 (1.7%)	5.283	0.071
	Feminine	23 (46.9%)	22 (44.9%)	4 (8.2%)		
Age group	From 21 to 30 years old	5 (62.5%)	3 (37.5%)	0 (0.0%)	17.521	0.025
	From 31 to 40 years old	33 (58.9%)	22 (39.3%)	1 (1.8%)		
	From 41 to 50 years	42 (61.8%)	25 (36.8%)	1 (1.5%)		
	From 51 to 60 years	10 (37.9%)	15 (55.6%)	2 (7.4%)		
	From 61 to 70 years	3 (37.5%)	3 (37.5%)	2 (25.0%)		
University	UNAMAD	20 (62.5%)	12 (37.5%)	0 (0.0%)	7.578	0.108
	UAC	64 (51.2%)	55 (44.0%)	6 (4.8%)		
	UNSAAC	9 (90.0%)	1 (10.0%)	0 (0.0%)		
Highest level of study	Bachelor	12 (50.0%)	10 (41.7%)	2 (8.3%)	2.651	0.618
	Master's degree	58 (56.9%)	42 (41.2%)	2 (2.0%)		
	Doctorate	23 (56.1%)	16 (39.0%)	2 (4.9%)		
Labor condition	Hired	54 (54.5%)	39 (39.4%)	6 (6.1%)	4.283	0.117
	Appointed	39 (57.4%)	29 (42.6%)	0 (0.0%)		
Years of service in university teaching	From 1 to 10 years	52 (53.1%)	41 (41.8%)	5 (5.1%)	2.031	0.730
	From 11 to 20 years	36 (60.0%)	23 (38.3%)	1 (1.7%)		
	From 21 to 30 years old	5 (55.6%)	4 (44.4%)	0 (0.0%)		
Knowledge area	Arts and Humanities	8 (34.8%)	15 (65.2%)	0 (0.0%)	19.339	0.013
	Basic Sciences	15 (51.7%)	13 (44.8%)	1 (3.4%)		
	Health Sciences	6 (33.3%)	10 (55.6%)	2 (11.1%)		
	Social and Legal Sciences	39 (60.0%)	23 (35.4%)	3 (4.6%)		
	Engineering and Architecture	25 (78.1%)	7 (21.9%)	0 (0.0%)		

Discussion

Currently, teacher training in ICT remains a challenge, both for teachers in training and for those who provide services. Overshadowed by the importance of competency-based training and protected by a more constructivist paradigm, a competent teaching staff is required, not only pedagogically, but also at a technological level[27]. For this reason, this research sought to analyze the sociodemographic variables associated with the digital skills of university teachers in the Peruvian Amazon during the COVID-19 pandemic.

In the first place, it was determined that the teachers of the 3 universities focused on the present investigation presented developed digital competences, which could be explained due to the training carried out in each university with the purpose that they can adapt to the virtual modality and this way they improve their pedagogical practice. However, there is a considerable group of teachers who, due to the lack of interest they have in ICT, are in the process of developing their digital skills, so it is necessary to continue strengthening these skills, since virtual teaching is becoming widespread and it is necessary that have basic knowledge and skills to interact with new technologies.

A similar result was reported in Finland, where they found that digital skills were higher than at the start of the pandemic and that teachers' beliefs may not be as crucial a factor in digital teaching practices[28]. In the same way, it is related to a study carried out in Spain, where it was determined that teachers presented intermediate and high levels of development of their digital skills related to information and information literacy, as well as communication and cooperation between the different entities. involved in the teaching-learning process[29]. In the Peruvian context, an investigation was also carried out and they determined that teachers had a sufficient level of development of their digital skills in the context of the pandemic. Among the best valued skills are information security and content creation. On the contrary, the least valued competence was problem solving and would be explained by connectivity and accessibility problems that characterize the Peruvian university context[30].

Since the COVID-19 pandemic was decreed in March 2020[31] and virtual classes began, teachers had to apply strategies that in most cases they had not previously done, such as data processing and protection, communication in digital environments, sharing online resources, connecting and collaborating with other people, rewriting content and assessment tests, developing virtual environments, creating multimedia content, programming computers, etc.[32]. In order to deal effectively with this context, training was given to make teachers technologically literate, as well as to develop their digital and methodological skills[33].

Regarding sociodemographic variables, it was determined that gender was not significantly associated with the level of development of digital skills, however, there are slight differences that suggest that men consider themselves more digitally competent than women. The above coincides with some studies that also determined that gender was not a factor that influenced the digital skills of teachers[34-36].

On the other hand, it was determined that the age group of teachers was significantly associated with the level of development of digital skills ($p<0.05$), that is, younger teachers had a higher level of development than older teachers. older teachers. This finding is consistent with various studies[17,20,32,37-39] and a possible explanation would be because the youngest teachers belong to generation Z and are considered digital natives, while the older teachers can be considered digital migrants.

In this regard, Prensky[40] defines digital natives as those individuals who have grown up in a digitized world and have been surrounded by computers, smartphones, video games and other tools that have constituted their surrounding environment since birth. However, digital immigrants are those who have had to adapt to new technologies and incorporate digital tools at another time in their lives in their daily or professional activities.

Another relevant finding shows that the area of knowledge of teachers was significantly associated with the level of development of digital skills ($p<0.05$), that is, teachers whose areas of knowledge were related to Engineering and Architecture presented a higher level of development compared to those who belonged to Arts and Humanities, Basic Sciences, Health Sciences and Social and Legal Sciences. This result coincides with what was reported in a cross-cultural study carried out in 21 countries, where they determined that university professors in the areas of Engineering and Architecture had a better self-perception of their digital skills[32]. Nevertheless, it is not related to the findings of a study carried out in Finland, where it was determined that the teachers of Humanities and Social Sciences were the ones who had higher scores in all the variables of digital competences than the respondents of Health Sciences[13].

In recent years, an aspect of great relevance for university teachers in relation to digital technologies is their adaptation and mimicry with them, which in itself is not an easy task, since, among other things, it requires them to become digitally literate, and everything that this demands[41]. Faced with this scenario, it is important that universities promote the development of digital, didactic and pedagogical skills so that they can respond effectively to the demands of contemporary education and, above all, improve teaching-learning processes[42].

Relevant findings were made in the present investigation, nevertheless, it was not exempt from limitations, due to the number of participants, as well as the characteristics of the instrument (being self-administered), which does not allow significant generalizations and could generate social desirability biases., respectively. In this sense, it is suggested that in future studies the sample be increased, including teachers from other regions, and other data collection techniques and instruments be used to give more objectivity to the aforementioned process.

Conclusion

It was concluded that the digital skills of the majority of university teachers were at a developed level, as well as in the dimensions of information, communication, content creation, security and problem solving. On the other hand, it was determined that some sociodemographic variables such as age group and area of knowledge were significantly associated with the level of development of digital skills. By virtue of the above, it is recommended that universities continue promoting the development of digital, didactic and pedagogical skills so that they include ICT in a timely and appropriate manner in learning sessions and improve their pedagogical practice.

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