Digital competences and collaborative skills among university students

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Abstract

Digital competences as the use of ICT after the COVID-19 era had a very significant effect, especially in the education sector, with which university students learned to use and collaborate academically through digital platforms or media. This research work aims to analyze and describe digital competences and their collaborative attitudes in university students. The method used is descriptive research, with a quantitative approach. 1073 university students participated in a survey with questions whose answers were evaluated with the Likert scale. Resulting in the favorite place to use the Internet after home is any place because they have a device (mobile phone), which in the long term would bring consequences to visual and mental health. Despite this negative point, the university is the third favorite place that helps students greatly in academic work. In conclusion, university students successfully learned digital competences and they are taking advantage of it in their academic affairs and do work in a very collaborative way.

Keywords: Digital skills, Collaborative skills, Digital education, ICT, University students

1. Introduction

The experience during the COVID-19 quarantine forced all higher education institutions to use multiple educational platforms and online tools [1] so that both teachers and students from different universities adapted to the change from traditional teaching to e-learning [2]. This transformation has impacted digital education and teaching-learning, management, and evaluation [3]. This digital transformation has also been considered in curricular teaching in these times through digital formats that are now more easily adapted and transferred [4]. During and after COVID-19, a variety of educational resources were addressed, most of them open access, with the aim of making information available to students and teachers and thus improving educational practices at all levels [5], also taking into account that university students demand hybrid learning in academic sessions. This refers to traditional teaching without neglecting virtual teaching [6].

Within the dynamic educational system and its accelerated evolution that refers to digital education, it is necessary to be updated in information technologies that play a fundamental role in the achievement of objectives [7]. There is also a need to use classification techniques in order to optimize the self-learning experience [8], which was a proposal by UNESCO as an educational tool to be incorporated into digital learning and to open a debate between education, technology, and social impact [9]. Underlining the orientation of digital education as an integral part of the different curricula that aim to facilitate interactions to achieve the empowerment of autonomous capacity among students and thus be able to make decisions in their own life projects [10]. Digital education, with its technological contribution, can achieve a sustainable and quality education that contributes to the development of society [11], for this digital transformation must be further promoted and ensure its positioning with innovative and properly grounded contributions [12].

Digitalization makes educational content reach the student in a faster, simpler, and more attractive way [13]. With the interaction of people-computers and the accelerated technological advance, the aim is to efficiently improve the quality of education by opening up to new changes in innovation [14]. With the aim of exploring, new teaching-learning models focused on identifying opportunities that promote the acquisition of new values [15]. In order to achieve all this, knowledge about the incorporation of technology in teaching and learning must increasingly improve the digital competences of both teachers and students in order to achieve the required objectives [16]. Considering that digital learning is not only a central issue in education but also in the business world, which is generating many changes in growth and competences in different markets around the world [17]. We can consider the knowledge of digitalization and the different educational platforms as a fundamental skill of the 21st century [18].

Teaching students to develop digital competences is essential to ensure that new technologies complement the needs required by the labor market [19], as work environments are becoming increasingly digitalized and the requirement for digital competences is becoming indispensable [20]. Taking into account that young people have a higher level of digital competences than adults and even compared to children [21], this is why the role of digital competences in the vocational training of young university students should be evaluated more rigorously [22]. This was highlighted at the international conference on adult education in 2022 where global interest in the role of the use of digital technologies in adult education was noted [23], as a large number of employees currently consider the digitization of certain processes to be a major threat to their jobs, as well as considering that digital skills are the main reasons of learning gaps [24].

The growth of online courses brings with it the importance of acquiring digital competences for both teachers and students [25]. These competences are fundamental tools that promote innovative learning within higher education [26], thus opening up multiple opportunities in their learning and deepening their educational experiences by integrating technology into their professional training [27]. Innovative pedagogical methods are important to adapt to new changes and manage accessibility to all types of information [28], for which teacher training plays a fundamental role in providing students with the necessary and important skills in order to avoid creating gaps in learning and to ensure that everyone has access to technological resources [29]. Initiatives that should be included as part of the management of information technologies not only in the university system but also throughout society to transform public service in general and encourage the participation of society as a whole [30], always trying to avoid the disparity in digital skills and knowledge in many cases due to financial resources that limits the perspective on social and economic growth [31].

Along with digitization, digital societies should be fostered with an education committed to improving access to different digitized learning resources [32], thus redesigning current learning environments more efficiently [33], where critical thinking, creativity, communication skills, and collaboration [34] can be integrated. Taking into account that in the 21st century the teaching-learning process should be based on these four skills [35], collaboration being an important competence that the student manages to develop in teamwork [36], as it is also necessary to create collaborative learning environments. It is often observed in university graduates who do not have the necessary skills to work in teams and do not meet the demands of modern jobs [37], a situation that

should evolve continuous learning focused on laboratories that include technology as a key tool for gamification that implements collaborative learning [38].

Collaborative skills are necessary in the vocational training of students in order for them to be successful in the increasingly diverse work field, which goes hand in hand with inter-professional education [39]. The growing development of information technologies has modified the different teaching and learning methods giving priority to developing collaborative skills through digital tools [40]. Considering that collaboration plays a key role in society due to its contribution to sustainable development and its contribution to management [41], the future worker requires coordinating and organizing multidisciplinary teams with professionals who must also know how to face the challenges of working in places where collaboration and communication are involved [42]. The work carried out in teams will serve to face not only current challenges but also future ones, achieving sustainable development and significant efficiency [43], as in the modern world students must be equipped with 21st-century competences, indispensably those related to conflict resolution and thus guaranteeing competitiveness in today's economy [44].

In order to encourage the development of collaborative skills, group or team-based learning should be implemented [45], considered a pedagogical strategy in recent years due to its efficiency in promoting active learning in different educational environments [46]. Many higher education institutions focus their learning process on technical skills and not on leadership and collaboration skills [47], since in the workplace it is required that the professional not only have a job but also the ability to keep it. Thus, individual experiences are in decline while the ability to work as a team and as a whole is becoming a great need [48], so it is very important to instill leadership and teamwork in students, which are the main skills in all management [49] and we must therefore create spaces that become a challenge for students when working in teams and not generate prejudice in the development of their skills and attitudes [50].

The current working environment demands people with collaborative skills and abilities due to the rapid evolution of technology [51], a situation that requires higher institutions to generate relevant learning experiences to overcome the reality of communication and social interaction in time and space [52]. This should promote more active learning that may require at the same time organizational reorientation because teachers must play a very important role in supporting more consciously collaborative learning among their students through multiple group activities [53]. In order to generate ideas in the service of society with the aim of cultivating in them an integral and positive development [54] always prioritizing the importance of education in empathetic personal growth [55].

1.1. Justification and objective of the study

With the arrival of COVID-19, the abrupt transition from face-to-face teaching to e-learning, and the subsequent return to face-to-face classes, both students and teachers were forced to develop digital skills and competences for the development of academic sessions, which also led to the development of collaborative attitudes. The aim of this research work is to analyze the correlation that exists between the development of digital competences and collaborative attitudes in university students. In addition, to give greater emphasis to the research, we will have the following specific objectives: 1. To determine and analyze the digital competences of university students and their dimensions (digital competences for searching and processing information and interpersonal competences in the use of ICTs university environment) and 2. To determine and analyze the collaborative attitudes of university students.

2. Methodology

2.1. Population and sample

In order to fulfill the objectives of this research work on digital competences and collaborative attitudes in university students, descriptive results are presented with a descriptive analysis also presented in frequency tables, as well as an inferential analysis with a normality test. For this purpose, quantifiable information has

been collected for analysis through a questionnaire, having as population university students and a sample of 1073 university students. Of this sample 57.41% are male and 42.59% are female; 62.07% study in a public university while 37.93% study in a private university, in addition, the age of students is 16 to 20 years whose percentage is 65.52%; the age of 21 to 25 years is 24.79%; from 26 to 30 years is 6.15% and over 31 years is 3.54%. The students who were chosen randomly and who responded voluntarily to the research questionnaire knowing that it is anonymous were informed at first about the research work, so verbal authorization was requested for the use of their answers for a final report. It is for this reason that we have the highest representation of students in the area of engineering with 43.15%, followed closely by students in the area of humanities and literature with 35.6% and the remaining professional careers represent 21.25%. On the other hand, the place where they use the Internet most is their own homes, which represents 53.5%, and they spend between 1 and 3 hours a week, which represents 38.8%, followed closely by those students who use the Internet between 4 and 9 hours a week, which represents 38.2%. The second place for accessing the Internet is the device itself, as it has Internet and there are students who have a contract for unlimited Internet, which means that they are connected all the time. The other smaller percentage of students who use the internet are at the internet booths, where they concentrate on doing work and downloading information to be processed in groups.

2.2. Instruments

A questionnaire was selected as the research instrument, from the four instruments found. When selecting this instrument, great care was taken because we were looking for digital competences similar to our environment, which is why we selected the work already validated by Mena and Meza [56], which was carried out in three dimensions: a) Digital competences for searching and processing information; b) Interpersonal competences in the use of information and communication technologies in the university environment and c) Collaborative attitudes among university students.

With these three dimensions grouped into two groups, the correlation between the development of digital competences and collaborative attitudes among university students is analyzed, using a four-point Likert scale survey to measure the three dimensions, detailed as follows: 1= I feel totally ineffective to perform what is presented, 2= I feel ineffective to perform what is presented, 3= I feel effective to perform what is presented, 4= I feel totally effective to perform what is presented. This survey also obtained socio-demographic data such as gender: male-female, university of study: public-private, professional school studied, finding out where they make the most use of the Internet, and the weekly hours that the students dedicate to the use of the internet during the week.

The first dimension is digital competences for the search for and processing of information, with seven items: CD1: I can communicate with others by e-mail; CD2: I use chat to interact with others; CD3: I use instant messaging as a tool for communicating with others; CD4: I can communicate with other participants in social networks; CD5: I am able to operate in social networks; CD6: I can participate appropriately in forums; CD7: I consider myself competent to participate in blogs; followed by interpersonal competences in the use of information and communication technologies in the university environment, with nine items, CD8: I consider myself competent to participate in blogs: I can participate appropriately in forums; CD7: I consider myself competent to participate in blogs; followed by the second dimension interpersonal competences in the use of information and communication technologies in the university environment, where there are nine items, CI8: I know how to use social bookmarking, tagging; CI9: I am able to use educational platforms; CI10: I can browse the internet using different browsers; CI11: I am able to use different search engines; CI12: I feel competent to work with some digital mapping software to find places; CI13: I know how to use software to plan my study time; CI14: I work with documents on the web; CI15: I am able to organize, analyses and synthesize information through concept maps using some software tools; AC16: I am able to use software to disseminate interactive presentations online and finally the third dimension Collaborative attitudes among university students, in which there are four items, AC17: I feel competent to work with tools and software that help me to analyses and/or

navigate educational content; AC18: I work with images using software tools and/or applications; AC19: I feel able to use podcasting and video casts; AC20: I use QR codes to disseminate information.

2.3. Data analysis

For the data analysis, an anonymous survey was carried out on a sample of 1073 university students. This questionnaire consists of socio-demographic information, type of university, place of study, average age of the students, professional career, hours, and place where they usually connect to the internet. In addition twenty (20) questions were divided into two variables and three dimensions. The first variable is the development of competences, which has seven (7) questions that correspond to digital competences for the search and treatment of information. As a second dimension, there are nine (9) questions that correspond to interpersonal competences in the use of ICTs in the university environment and also, as a second variable, there are the collaborative attitudes of university students in which four (4) questions on virtual tools and social communication in the university were considered, which corresponds to the third dimension. The sample of 1073 was collected between May 2 and July 23, 2024, with the Google Form which was configured to respond only with the Gmail email or an institutional email only once. Once the date of the survey was completed, the information was downloaded in Excel format to review all the information. Once the answers were checked for completeness, they were put into the SPSS 24 programmer format to carry out some tests of the questionnaire. The questionnaire used the four-point Likert scale with which several analyses were carried out, such as inferential analysis, the normality test, and also some hypothesis tests to relate the dimensions of the variables.

3. Results and discussion

Table 1 describes the areas of the different degree courses that participated, with the greatest student participation with students from the engineering area. This is due to the fact that the researchers themselves motivate and encourage participation in these research projects. While in the social sciences, there is still a lack of motivation because the teachers do not encourage research. If we look at it from another point of view, this area should lead the surveys because it is an area that can work in a multidisciplinary way together with other areas and motivate its students to carry out research work. This area should be at the top of the surveys because it is an area that can work in a multidisciplinary way together with other areas and motivate its students to carry out research work. In the same way, there is no participation of basic science students, perhaps because they are focused on other types of more theoretical research or experimental types in the laboratories.

Table 1. Distribution of study areas

Areas of study	*Fi*	*%*
- Basic Sciences (Mathematics, Physics, Chemistry, etc.)	51	4,8
- Health Sciences (Medicine, Veterinary Medicine, Nursing, etc.)	136	12,7
- Social Sciences (Social Communication, Archaeology, etc.)	41	3,8
- Humanities and Letters (Law, Education, Administration, etc.)	382	35,6
- Engineering (Civil, Systems, Industrial, etc.)	463	43,2
Total	1073	100,0

Note: Own elaboration

Table 2 shows the preferred place to connect to the Internet and have more comfort to do their academic work or the most important thing they do is to connect to a social network and interact while looking for some information. The favorite place of students is their own home (53.5%) because they have more comfort, as they also have an Internet network with higher speed and can download more easily to the computer or laptop any type of file, and this is done while they are talking or checking a social network. In second place is the mobile device (23.6%); this is because it can be used anywhere while not in class or doing some work. It is at that moment when social media occupies because the student is on WhatsApp or Facebook sharing or reviewing a profile to be able to engage in a conversation. Another place where the student has access to the Internet is the university itself (18.2%) because there is a free Wi-Fi network, which is available to all students in the

environment of the university itself. In these cases, the social networks most used by students are restricted, in this case, it is the only place that is focused on academic matters leaving aside the social networks.

Table 2. The most common place to connect to the Internet

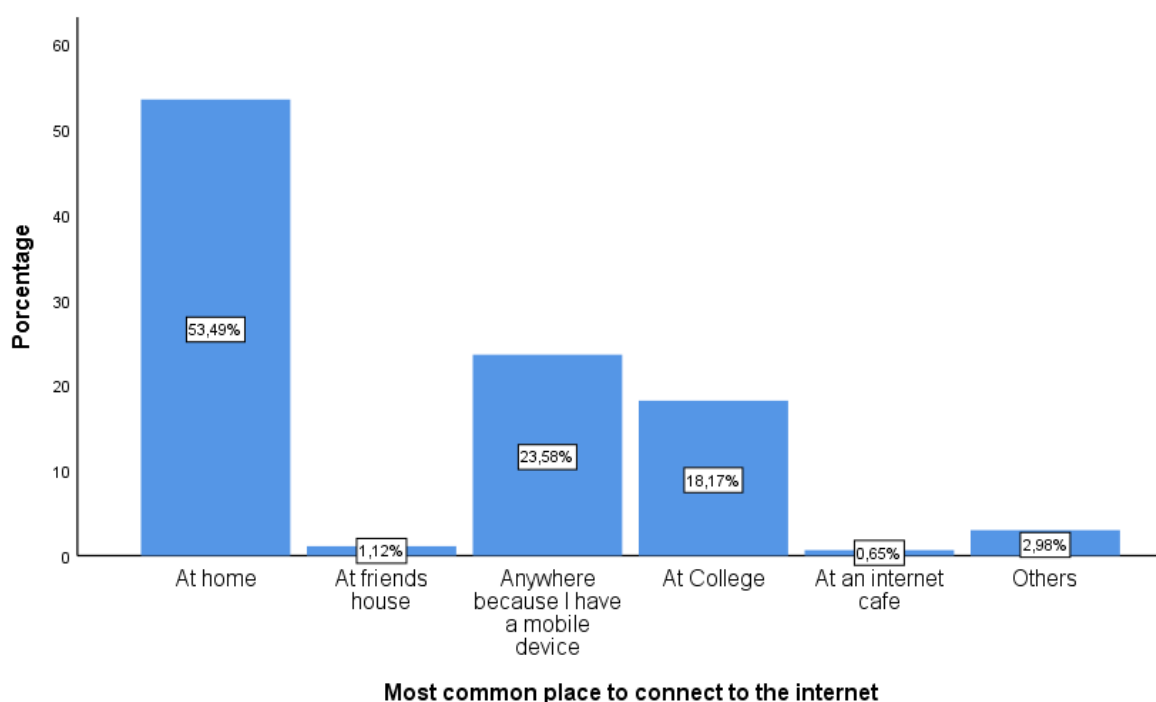| Place	f	%
At home	574	53,5
At a friend's house	12	1,1
Anywhere because I have a mobile device	253	23,6
At university	195	18,2
At an Internet café	7	0,7
Total	1073	100,0

Note: Own elaboration

Figure 1. Distribution of the most commonly used places to connect to the Internet

Table 3 shows the number of hours that university students are connected to the Internet, where it is shown that 38.8% of students are connected for 1 to 3 hours a day and the other large percentage is 38.2% of students who are connected from 4 to 9 hours a day. These huge percentages worry the scientific community because it could be assumed that we are on the verge of students acquiring a vice for the Internet and this would bring with it many side effects on the health of students.

Table 3. Dedication to surfing the Internet during the week (per hours per week)

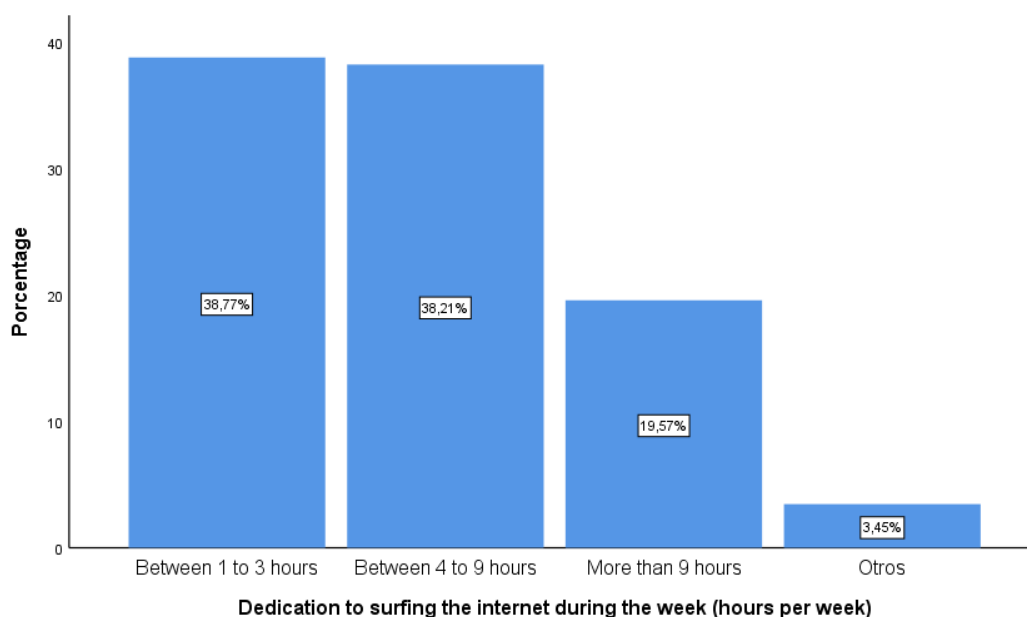| Hours/week	f	%
Between 1 to 3 hours	416	38,8
4 to 9 hours	410	38,2
More than 9 hours	210	19,6
Other	37	3,4
Total	1073	100,0

Note: Own elaboration

Figure 2. Time spent surfing the Internet during the week (per hours per week)

3.1. Descriptive analysis

Descriptive results for the development of digital competences and collaborative attitudes in university students are presented in frequency tables:

Table 4 and Figures 3, 4, and 5 show the results for the variable "development of digital competences and its dimensions". With regard to the variable "development of digital competences", of the total number of university students analyzed, 45.3% showed a high level, 24.3% showed a very high level, another 21% showed a low level, and 9.4% showed a very low level of development of digital competences.

Regarding "digital competences for information search and processing", it was observed that 41% of the students showed a high level, 25.7% showed a very high level, 23.5% showed a low level, and 9.8% showed a very low level of digital competences for information search and processing.

With regard to interpersonal competences in the use of ICTs in the university environment, it was observed that 45.6% of the students showed a high level, 2.22% showed a very high level, another 22.2% showed a low level, and 10.1% showed a very low level of interpersonal competences in the use of ICTs in the university environment.

Table 4. Frequency table of the development of digital competences and their dimensions

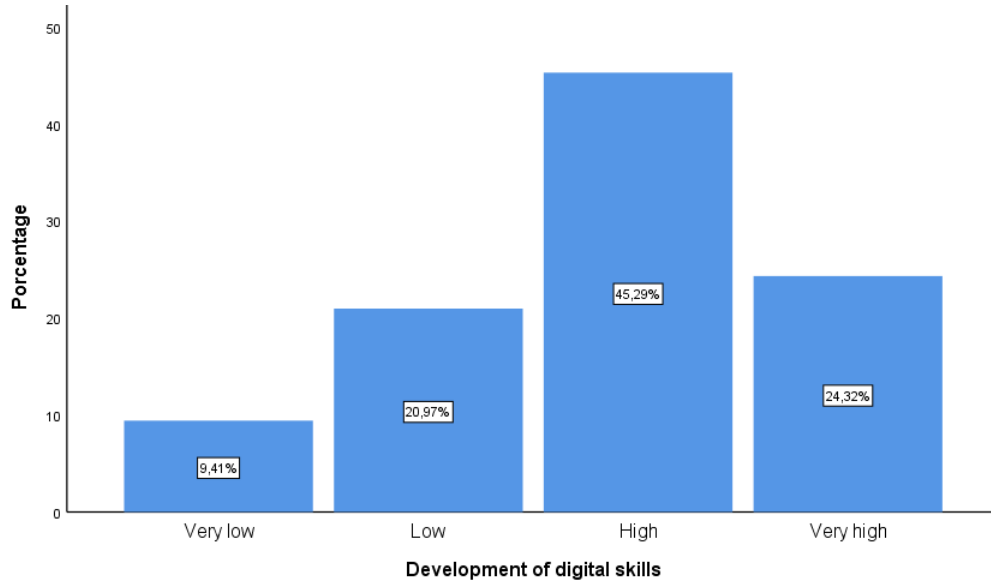| Level	Development of digital competences		Digital competences for the search for and processing of information		Interpersonal competences in the use of ICTs in the university environment	
	f	*%*	*f*	*%*	*f*	*%*
Very low	101	9,4	105	9,8	108	10,1
Low	225	21,0	252	23,5	238	22,2
High	486	45,3	440	41,0	489	45,6
Very high	261	24,3	276	25,7	238	22,2
Total	1073	100,0	1073	100,0	1073	100,0

Note: Own elaboration

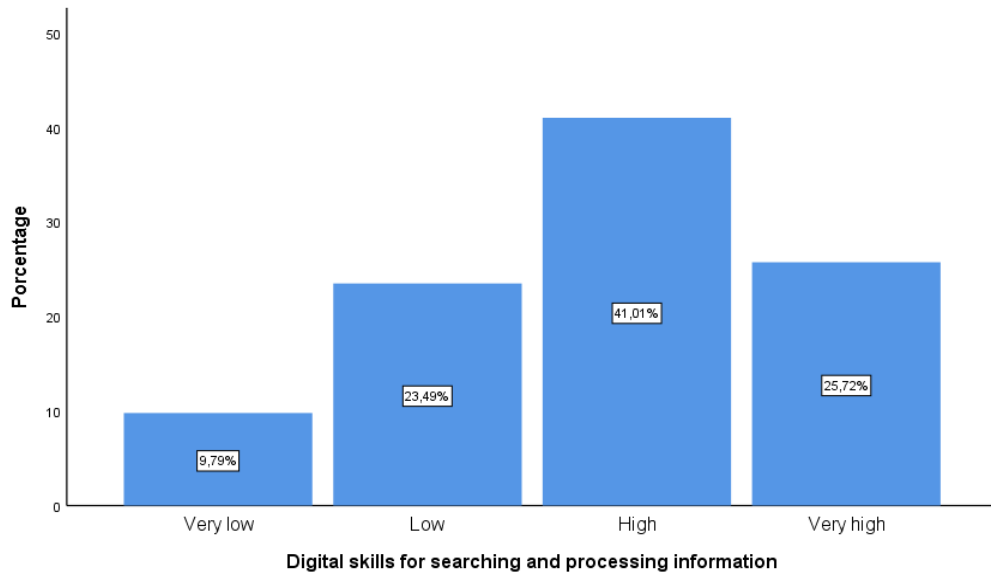Figure 3. Bar chart of digital competences

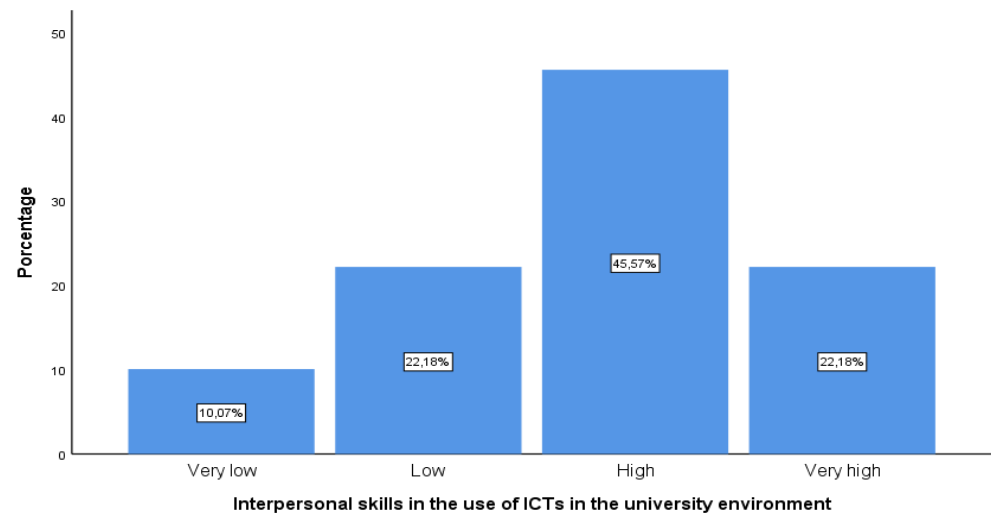Figure 4. Bar chart of digital competences for information searching and processing

Figure 5. Bar chart of interpersonal competences in the use of ICTs in the university setting

As can be observed, Table 5 and Figure 6 show the results of the variable collaborative attitudes and its only dimension, virtual tools, and social communication in the university. With respect to the variable "collaborative attitudes", of the total number of university students analyzed, 34.6% evidenced a high level, 32.4% showed a low level, another 18.6% showed a very high level, and 14.4% showed a very low level of collaborative attitudes.

Regarding virtual tools and social communication in the university, it was observed that 34.6% evidenced a high level, 32.4% showed a low level, another 18.6% showed a very high level, and 14.4% showed a very low level of "virtual tools and social communication" in the university.

Table 5. Frequency table of students' collaborative attitudes

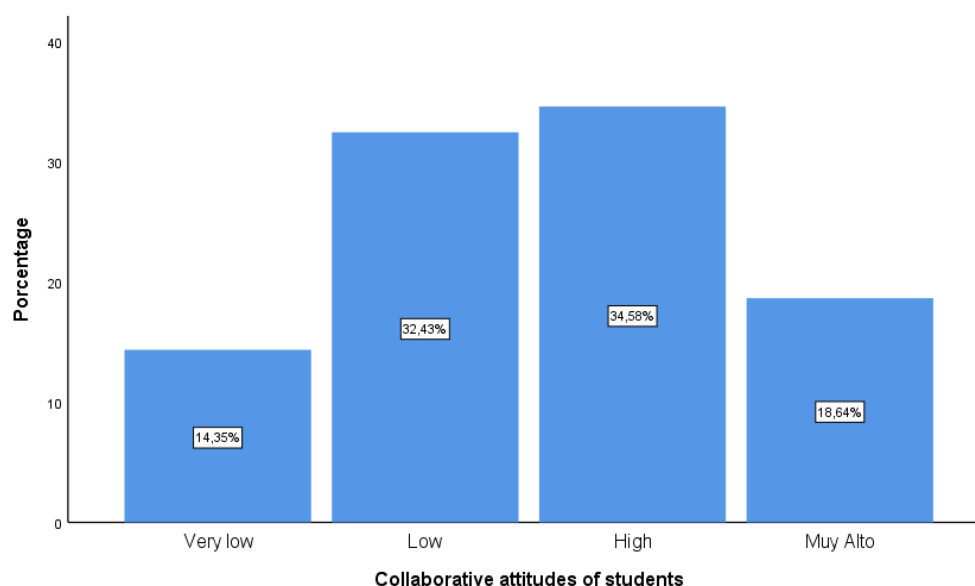| Level	Collaborative attitudes		Virtual tools and social communication at the university	
	f	%	f	%
Very low	154	14.4	154	14.4
Low	348	32.4	348	32.4
High	371	34.6	371	34.6
Very high	200	18.6	200	18.6
Total	1073	100.0	1073	100.0

Note: Own elaboration

Figure 6. Bar chart of collaborative attitudes

3.2. Inferential Analysis

To determine which type of statistical process will be used, a normality test will first be conducted.

Table 6. Normality test

	Kolmogorov-Smirnov		
	Statistic	gl	Sig.
Development of digital competences	.090	1073	.000
Digital competences for the search and treatment of information	.110	1073	.000
Interpersonal skills in the use of ICTs in the university environment	.105	1073	.000
Collaborative attitudes	.113	1073	.000
Virtual tools and social communication at the university	.113	1073	.000

Note: Own elaboration

Table 6 shows the normality test using the Kolmogorov-Smirnov statistic, since according to Rivera et al. [57], this statistic is effective for analyzing normal distributions in large samples (>50). The test was applied to both variables and their dimensions. The results show that in the two variables of analysis and their dimensions, the p-value obtained is less than the maximum permissible error (<0.05), which determines that the variable "development of digital competences" and its dimensions: "Digital competences for the search and treatment of information" and "Interpersonal competences in the university environment"; as well as the variable "Collaborative attitudes" and its dimension: "Virtual tools and social communication in the university".

In conclusion, the theoretical assumption of normality is not met in the two variables to be able to perform a parametric statistical procedure, so to analyze the relationship between two variables, the nonparametric statistic Spearman's Rho is used, following the line proposed by Landau and Everitt [58].

3.3. Results for the research objective

Alternate hypothesis (Hi): There is a relationship between the development of digital competences and collaborative attitudes in university students.

Null hypothesis (Ho): There is no relationship between the development of digital competences and collaborative attitudes in university students.

Decision rule: Significance level = 5%; If p-value (sig.) < 0.05, H0 is rejected and H1 is accepted; If p-value (sig.) > 0.05, H0 is accepted.

Table 7 and Figure 7 show the results for the correlation analysis hypothesis test between the development of digital competences and collaborative attitudes, showing that the p-value obtained is $0.00 < 0.05$, a value with which the alternative hypothesis is accepted and the null hypothesis is rejected, i.e., there is a statistically significant relationship. Likewise, the correlation coefficient = 0.817 is shown, concluding that there is a significant, direct, and high-intensity relationship between the development of digital competences and collaborative attitudes in university students.

Table 7. Spearman's Rho result between the "development of digital competences" and "collaborative attitudes in university students"

Collaborative attitudes			
Spearman's Rho	Development of digital skills	Correlation Coefficient	.817**
		Sig. (2-tailed)	.000
		N	1073

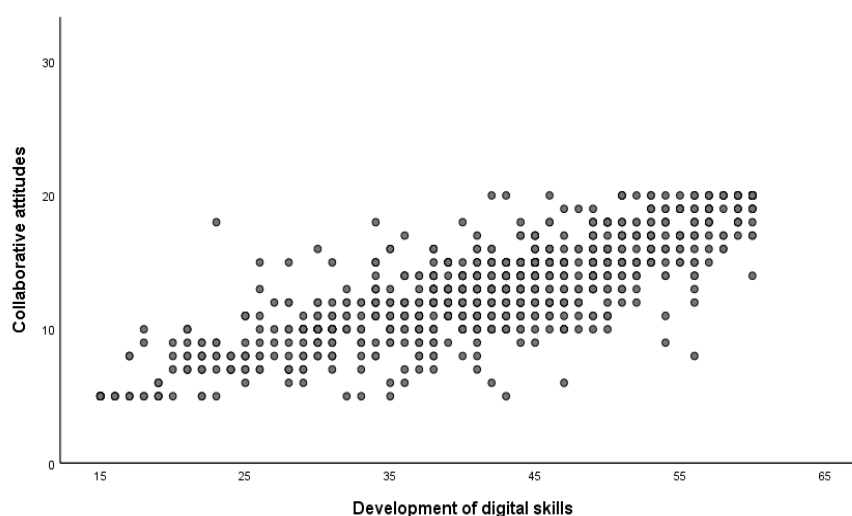Note. ** significant at 99% confidence level.

Figure 7. Scatter plot between the development of digital competences and collaborative attitudes in university students

3.4. Other results

Alternate hypothesis (Hi): There is a relationship between digital competences for information search and processing and collaborative attitudes in university students.

Null hypothesis (Ho): There is no relationship between digital competences for information search and processing and collaborative attitudes in university students.

Decision rule:

- Significance level = 5%.
- If p value (sig.) < 0.05, H0 is rejected and H1 is accepted.
- If p value (sig.) > 0.05, H0 is accepted.

Table 8 and Figure 8 show the results for the correlation analysis hypothesis test between Digital competences for information search and processing and collaborative attitudes in university students, showing that the p-value obtained is $0.00 < 0.05$, a value with which the alternative hypothesis is accepted and the null hypothesis is rejected; that is, there is a statistically significant relationship. Likewise, the correlation coefficient = 0.737 is shown, concluding that there is a significant, direct and high intensity relationship between digital competences for information search and processing and collaborative attitudes in university students.

Table 8. Spearman's Rho result between "digital competences for information search and processing" and "collaborative attitudes in university students"

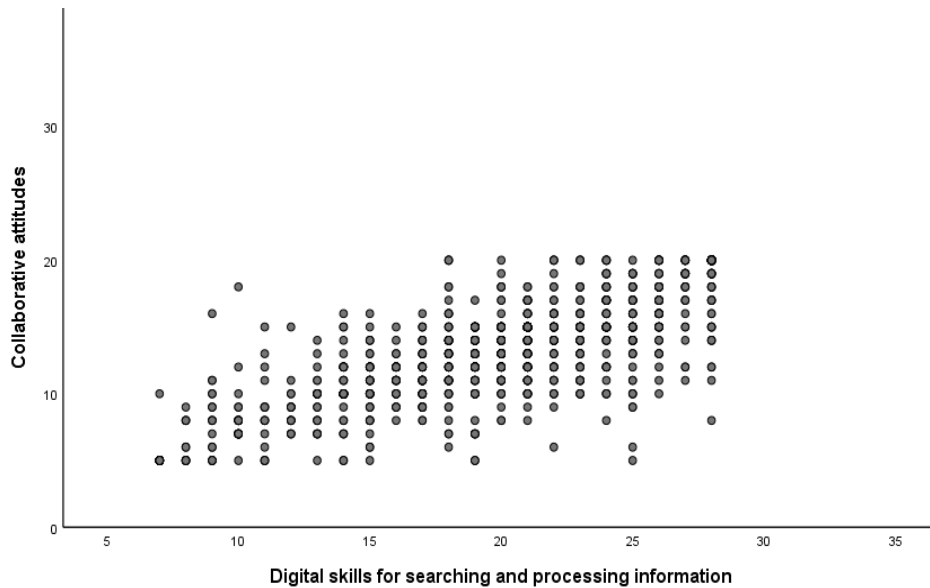|		Collaborative attitudes	
Spearman's Rho	Digital competences for information search and processing	Correlation Coefficient	.737**
		Sig. (2-tailed)	.000
		N	1073

Figure 8. Scatter plot between digital competences for information search and processing and collaborative attitudes in university students.

3.5. Other results

Alternate hypothesis (Hi): There is a relationship between interpersonal competences in the use of ICTs in the university environment and collaborative attitudes in university students.

Null hypothesis (Ho): There is no relationship between interpersonal competences in the use of ICTs in the university environment and collaborative attitudes in university students.

Decision rule:

- Significance level = 5%.
- If p-value (sig.) < 0.05, H0 is rejected and H1 is accepted.
- If p-value (sig.) > 0.05, H0 is accepted.

Table 9. Spearman's Rho result between "interpersonal competences in the use of ICTs in the university environment" and "collaborative attitudes in university students"

		Collaborative attitudes	
Spearman's Rho	Interpersonal competences in the use of ICTs in the university environment	Correlation Coefficient	,840**
		Sig. (2-tailed)	,000
		N	1073

Interpretation**:**

Table 9 and Figure 9 show the results of the correlation analysis hypothesis test between Interpersonal competences in the use of ICTs in the university environment and collaborative attitudes in university students, evidencing that of p-value obtained is $0.00 < 0.05$, the value with which the alternate hypothesis is accepted and the null hypothesis is rejected; that is, there is a statistically significant relationship. Likewise, the correlation coefficient = 0.840 is shown, concluding that there is a significant, direct, and high-intensity relationship between "interpersonal competences in the use of ICTs in the university environment" and "collaborative attitudes in university students".
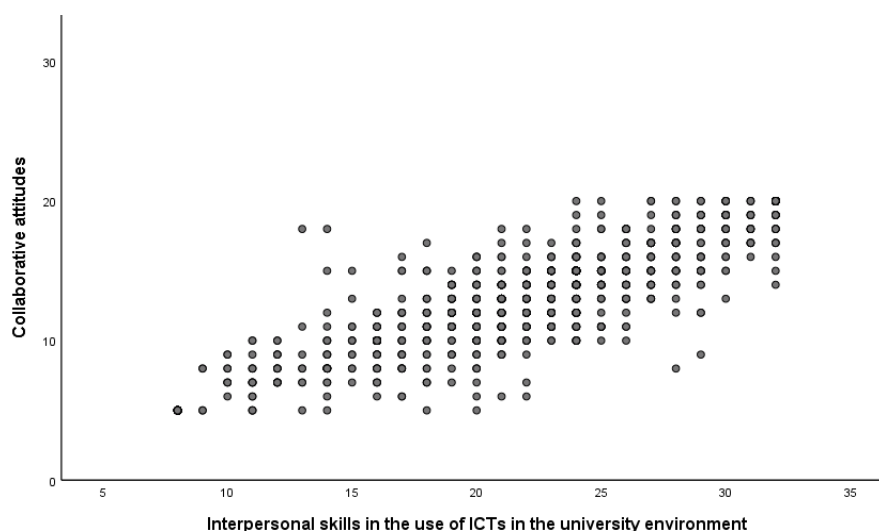

Figure 9. Scatter plot between "interpersonal competences in the use of ICTs in the university environment" and "collaborative attitudes in university students"

3.6. Discussion

The use of the Internet and digital platforms as well as social networks among young university students is very recurrent as 38% of them spend 1 to 3 hours a week surfing the Internet; while 38.2% spend between 4 to 9 hours a week; 53.5% of them state their home as the place where they connect to the Internet the most. 23.6% connect to the Internet anywhere because they have mobile device, a situation that allows us to affirm that students do not want to leave aside the technology learned during e-learning. The mixture of both is required, better known as hybrid teaching [7], trying to include innovative teaching initiatives integrating technology and digitization as a policy to be able to adapt to new social changes [15]. Considering that the demand for e-learning continues to grow and achieving significant implications on teachers and students thus providing a solid foundation in the advancement of pedagogical strategies [8]. The principles of higher education that are sustainable in the university environment should be maintained [9].

In the results on digital competences in university students, it was evidenced that 45.3% have a high level, 24.3% showed a very high level, another 21% showed a low level, and 9.4% showed a very low level of development of digital competences. There is still a very reserved attitude of students towards digitization considering that it will not help them much to find a suitable job when they graduate from university [1]. These resistant teacher groups should receive continuous training in technology and pedagogy [2] because a digital transformation is necessary to know, to produce and mitigate the resistance of many sectors [24]. It is necessary to improve the motivation of students, the evaluation of their experiences and ensure the continuity of online learning [27], taking into account that the integration of digital devices in the teaching-learning process generates motivation, concentration, and a good working environment in the classroom [28].

Regarding the collaborative attitudes of university students, it was found that 34.6% evidenced a high level, 32.4% showed a low level, another 18.6% showed a very high level, and 14.4% showed a very low level. With the optimization of technology students improve their collaborative skills [33]. These digital tools, although they improve collaborative skills, depend a lot on what tools and what methods are used [40]. Digital skills have a great contribution in the academic performance of students, but it is suggested that teachers should properly program and organize their teaching [25]. Collaborative skills are useful to serve and improve diverse populations with proper planning with greater capacity in the face of various biases [39], and all digitization requires a strategic and committed vision from local and national managers [17]. So all those who develop government policies should ensure the necessary funding for the integration of technologies and that this is permanently available [16], knowing that the difference in digital skills between young people in rural and urban areas differ strongly, although the use of technologies is similar [21].

Regarding virtual tools and social communication in the university, it was observed that 34.6% evidenced a high level, 32.4% showed a low level, another 18.6% showed a very high level, and 14.4% showed a very low level, being the skills and group collaboration associated with sustainable development [41]. Future professionals must possess coordination skills, conflict resolution and know how to communicate in teams [42]. For this, each of the positive impacts that collaborative work has to support collective goals must be identified [43], and students can improve their collaborative skills, but they must learn to speak when necessary, they must know how to listen to each other and have active participation in discussion spaces that lead to reflection [44]. Teamwork must be implemented to develop successful collaborative skills that offer many ideas about long-term learning [46], these teamwork skills generate initiatives for training and meet what is required in the social environment [47].

The university community should continue to do more research on collaborative skills and collaborative work in general, due to the existence of gaps that still need to be filled. As we already know the strategy of collaborative work in the classroom proved to be effective, so why is it not promoted in the university system despite the existence of theoretical and practical evidence about its benefits? Similarly, research on collaborative techniques should be carried out, since there is very little research on the subject. On the other hand, higher education institutions should promote and encourage the implementation of new strategies for collaborative work in the classroom with the sole purpose of strengthening the learning process of their students, in order to take immediate action for adequate professional training always with the support of teachers who are responsible for facilitating the development of collaborative work in class sessions.

3.6.1. Limitations, importance and justification

Collaborative work, like teamwork, has limitations, if colleagues have incompatible personalities, the relationship that exists between colleagues or competition between them, makes this work impossible. This is why the teacher must know how to manage a group of students and foster a good relationship between them, encouraging spaces for criticism and generation of new talents without reaching a competition between them, encouraging organization and planning so that no one resists collaborative work. On the other hand, few teachers seek further training in this aspect, as many of the professionals who work in universities do not have the

necessary tools for collaborative work, let alone the strategies to apply them, which makes it difficult to train professionals with decision-making power, which is what society requires and demands.

The importance of this work is due to the positive influence of collaborative work and the use of technologies such as digital competences in the growth of the organization, allowing students to work together, and learn about new experiences and ideas in order to move forward toward the common goal and achieve the best possible results. It also brings with it the satisfaction and commitment of each of the students to the fulfillment of their duties, thus achieving reduced stress levels, better communication, and better productivity to achieve the development of new and better talents.

The demand of society is to have integral professionals with the ability to work as a team with the aim of achieving a common good. The aim of this research work is to promote pedagogical strategies for better academic performance not only for the teacher but also for the student, being the students who must internalize this process and take a position as protagonists in a process throughout their lives and thus benefit not only the university community but also the social environment where universities must project themselves. Finally, it is intended that this compilation will provide ideas and some references to include in the teaching-learning process that will serve to improve the quality of education provided by higher education institutions in order to improve the level of academic performance of students.

4. Conclusions

58% of young people connect to the Internet at home, followed by 23.6% who connect to the Internet anywhere because they have the Internet on their mobile phone, with 38.8% who spend between 1 and 3 hours a week surfing the Internet, followed by 38.2% who spend between 4 and 9 hours a week surfing the Internet. With regard to digital competences for searching for and processing information, 41% have a high level, and likewise, for interpersonal competences in the use of ICTs in the university environment, 45.6% have a high level, which leads to the conclusion that university students have a high level in the development of digital competences. On the other hand, in terms of virtual tools and social communication at university, 34.6% have a high level, but 32.4% have a low level, being very even between the high and low levels, it can be concluded that more work needs to be done on collaborative attitudes.

It was determined that there is a relationship between the development of digital skills and collaborative attitudes in university students with a confidence level of 99%, it was found that there is a relationship between digital skills for searching and processing information and collaborative attitudes in university students also with a confidence level of 99%, finally, it was found that there is a relationship between interpersonal skills in the use of ICTs in the university environment and collaborative attitudes in university students also with a confidence level of 99%.

Author contribution

The contribution to the article is as follows: SSP, YLHR, CABG, ZSFT, ALR, YBA, CCO: conception and design of the study; YLHR, CABG: data collection; ABG, ZSFT, ALR, YBA, CCO: analysis and interpretation

of the results; SSP, YLHR, CCO: preparation of the draft. All authors approved the final version of the manuscript.

Ethical approval statement

Ethical approval for reporting this case was obtained from the National Amazonian University of Madre de Dios, through the work plan approved under the resolution of the Vice Rector of Research.

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