

Characterization of teaching practices mediated by ICT. A perspective with university students

Caracterización de las prácticas docentes mediadas por TIC. Una perspectiva con estudiantes universitarios

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ABSTRACT

Education systems had never been as dependent on technology as they were during the pandemic; although, thanks to this, school processes were able to continue, there were also shortcomings in terms of technological equipment, internet connectivity and digital literacy for online work. The aim of this paper is to characterise the practices of teachers at the Centro Universitario del Norte, University of Guadalajara, in relation to the guidelines and policies for the implementation of online courses during the pandemic. The research was mixed and cross-sectional in two phases, a first one qualitative through interviews and a second one quantitative with a questionnaire validated by experts and with a Cronbach's alpha of 0.771. A total of 237 students, 41% of the population affected by the pandemic, were surveyed. The results show a gap between the institutional proposal for virtual work and what happens in reality; as well as areas of opportunity for the construction of a technopedagogical design, and a programme in digital competences for students and teachers, where significant differences according to degrees are identified through analysis of variance.

RESUMEN

Los sistemas educativos nunca habían dependido tanto de las tecnologías como ocurrió durante la pandemia; si bien, y gracias a ello, se logró dar continuidad a los procesos escolares, también se evidenciaron carencias en cuanto a equipamiento tecnológico, conectividad a internet y alfabetización digital para el trabajo en línea. El objetivo del presente trabajo caracteriza las prácticas de los docentes del Centro Universitario del Norte, de la Universidad de Guadalajara, frente a los lineamientos y políticas para la implementación de cursos en línea durante la pandemia. La investigación fue mixta y transversal en dos fases, una primera cualitativa mediante entrevistas y una segunda cuantitativa con cuestionario validado por expertos y con un alfa de Cronbach 0.771. Se recogieron 237 estudiantes, el 41% de la población afectada por la pandemia. Los resultados muestran un desfase entre la propuesta institucional para el trabajo virtual y lo que ocurre en la realidad; así como, áreas de oportunidad para la construcción de un diseño tecnopedagógico, y un programa en competencias digitales para estudiantes y docentes, donde se identifican mediante análisis de varianza las diferencias significativas según titulaciones.

KEYWORDS · PALABRAS CLAVES

Higher education; distance education; pandemic; ICT; pedagogical practices
Educación superior; educación a distancia; pandemia; TIC; prácticas pedagógicas

1. Introduction

Once the COVID-19 pandemic had been declared, the governments of all countries unanimously decided to suspend activities involving large groups of people, including educational activities, considering schools to be high-risk environments for contagion, which forced an abrupt transition to online learning; this, despite the difficulties that many teachers and students had in accessing information and communication technologies, the lack of internet connectivity and their lack of training in the development of virtual teaching-learning processes.

The study by Crawford et al. (2020) offers an interesting analysis of the responses from universities in 20 countries, where we find a wide diversity: from those universities that chose to maintain the minimum requirements for face-to-face learning (e.g., 1.5 metres distance) to those that moved all their teaching programmes online. Therefore, each institution must define its digitisation policy to support students without compromising quality. The pandemic undoubtedly provided an opportunity for institutions to learn about and analyse their own distance learning systems, and to understand, in the aftermath of the pandemic, that dealing with this emergency situation is not the same as having a quality distance learning modality (Hodges et al., 2020). We know how the pandemic affected students' learning due to fear and uncertainty, as well as motivation and self-regulation (Romero-Rodríguez et al., 2022). Similarly, we know that teachers' beliefs and preconceptions were affected after the pandemic, as pointed out by Ricardo and Vieira (2023), who perceive a certain lack of institutional support and changes in conceptions about technology-based assessment. Together with the difficulty of carrying out external work placements normally, these were the two most difficult elements: online assessment and external practical training.

There is no doubt that this pandemic marked a turning point for all universities, with very diverse responses that allow us to analyse their success factors (Infante-Moro et al., 2022) and in which the renewing capacity of university institutions in terms of research is made clear (Karalis and Raikou, 2020), so it is worth asking what actions we should take in terms of the digital transformation that we need to implement. We already know that it is not enough to digitise or provide infrastructure to institutions; without a doubt, the transformation begins with this provision, but above all, with knowing how to use technologies for a real change in educational processes (Rubio de las Alas-Pumariño, 2020; Llorens Largo & López-Meseguer, 2022; Crespo Artiaga, 2022). Having understood the relationship between digitalisation and transformation, we come to the much-demanded training in digital skills for all university actors, both teachers and students. It is well known that teachers need training in digital competence in all universities, especially in the Ibero-American context (Cabero-Almenara et al., 2023a). However, although this request is well known, it has been proven that this training is not enough to acquire digital skills, which is why some authors propose recovering good practices through the use of blended learning (Valverde-Berrocoso and Balladares Burgos, 2017). In the wake of the pandemic, we must consider this strategy to analyse innovative proposals based on the practices produced during and after the pandemic.

Therefore, it is necessary to review the CDD training, which is requested and required. The digital training of students is equally necessary, because, as in the case of the previous pairing, the confusion is the same. In terms of skills, one is the technological mastery and ability of young people and the other is knowing how to communicate and build knowledge through it. We support this argument with the experience of the Covid pandemic, where the

'myth' known between digital 'natives' and 'immigrants' has fallen, between students and teachers (Cabero-Almenara et al., 2023b).

It is time to analyse university systems in order to identify the strengths and weaknesses of pedagogical models and practices, with the aim of reinforcing a more inclusive and comprehensive educational model for all university human resources. We started this analysis at the CuNorte campus of the University of Guadalajara (Mexico). To guide the analysis of results, we rely on the theory of Martínez (2021) and on what is established by the psychology of virtual education, which states that 'the mediating capacity of ICT is a potentiality that becomes effective or not in educational practices depending on the uses that participants make of them' (Coll et al., 2011).

In this sense, in the work presented here, we aim to characterise teaching work and the institution's policies for the implementation of technologies, initially from the perspective of students' knowledge and opinion of such policies and teaching practices. We have made a comparison between this and the typology of ICT uses proposed by the authors cited, where the four (technologies as protagonists by mediating between all the elements of the interactive triangle, made up of teachers, students and content) and five categories analysed (technologies as an element for the construction of diverse learning environments, administered by teachers and used by students for the construction of meaningful learning) are considered ideal.

2. Methodology

The importance of this article lies in documenting a particular experience within the context of what happened during the pandemic and analysing that experience from the short distance that has elapsed. The objective is to characterise the ICT practices used by professors at CUNorte, University of Guadalajara, from the perspective of their students, in relation to the 'Guidelines and policies for the implementation of online courses' (CUNorte, 2011). The purpose, as the word 'characterise' means according to the RAE, will be to identify the peculiar attributes clearly in relation to the other areas of opportunity in the system, which allow us to guarantee the teaching and learning processes with technological innovation, in this case from the perception of the end users of our services. With this purpose in mind, the objectives of the study are:

1. Analyse students' knowledge of the digitisation model and policy offered by the institution to support their learning.
2. Find out what online teaching model teachers are proposing based on the experience of students during Covid-19.

The research was descriptive with a mixed design due to the type of methodological approach in the construction of knowledge from data analysis. First, a proof of concept was carried out from a qualitative perspective, with an instrument and protocol of questions that are collected later in 'Initial interview protocol' Table 1. Secondly, after its analysis and conclusion, we moved on to a second phase where we translated the results into a survey, which was validated by 12 experts in Educational Technology, with an average of 'Senior' experience in Educational Technology research of 9 years, researchers and teachers belonging to 5 Ibero-American higher education institutions, carrying out the validity and reliability of the instrument according to the technique of Corral (2009).

In relation to the population and the sample selected, it is worth noting that the total enrolment of CUNorte (students registered with subjects registered) is 1907 students. The 12-degree programmes offered by CUNorte that have had graduates to date are detailed in Table 2. The survey was administered to 572 students in their seventh to tenth semester, as they experienced the pandemic as CUNorte students. Of these, 238 responded to the survey, which represents 41% of the total eligible population. Therefore, the sample selection was probabilistic given that the questionnaire was sent to the entire population, and everyone had the same opportunity to respond. The sample of 238 students who responded represents a subset of the total population, but the initial selection was random and not based on convenience.

3. Analysis and results

3.1. Analysis of the qualitative stage data.

For the first phase, we used a qualitative approach that allows for the description of detailed situations (Hernández, 2010) and the inductive method that makes it possible to analyse particular facts in order to reach general conclusions (Bisquerra, 1989). The scope of the study was explanatory, with the aim of establishing the causes of the teachers' way of working and generating a sense of understanding (Hernández, et al., 2010). As for the data collection techniques, a structured interview was used that followed the protocol of the dimensions of the institution's regulations and policies. Likewise, recordings were made (Shagoury, 2000) to facilitate subsequent analysis and records (Woods, 1995). For the analysis of the data, as they were polysemic, verbal in nature and of a large volume, (Rodríguez, et al., 1999), categorisation, analysis and interpretation were used (Martínez, 1984). The interview script was formulated taking into consideration the guidelines and policies for the implementation of online courses dictated by the Northern University Centre of the University of Guadalajara, which constitute the navigation chart for teachers to build and administer virtual classrooms. An in-depth interview was carried out with five students in order to gain a broader understanding of the way of working at CUNorte. This interview was preceded by the student's authorisation for recording. Once the information had been obtained, the following concentration matrix shows the regular categories in Table 1.

Table 1

Concentration matrix

Categories	Subcategories	A1	A2	A3	A4	A5	I	R
Knowledge of the academic model	There is confusion between academic model and educational modality.	✓	✓	✓	✓			✓
	Relevance of the educational modality.	✓			✓		✓	
	The academic model is identified.					✓	✓	
Perception of the educational modality	The modality is clearly identified.	✓	✓	✓	✓	✓		✓
	There is no commitment from the teacher.				✓		✓	
	The teacher should be an advisor.	✓	✓	✓	✓	✓		✓
	The student must be self-taught.	✓	✓		✓			✓

Categories		Subcategories	A1	A2	A3	A4	A5	I	R
Teaching role based on the model and the modality		The student works using technology.					✓	✓	
	Role of the student based on the model and the modality	There is an abuse in the practices of copying and pasting information.	✓		✓			✓	
More face-to-face classes are needed.		✓						✓	
Pupil dependent on the teacher.			✓	✓				✓	
There are self-taught students.				✓				✓	
The student must be self-taught.						✓	✓	✓	
Graduation profile of law students	The graduate must be familiar with the discipline.	✓	✓					✓	
	Graduates should be researchers.		✓	✓	✓	✓			✓
	The graduate must be self-taught.			✓	✓			✓	
Technologies made available to teachers	Projectors.	✓			✓			✓	
	Laboratories.	✓						✓	
	Library.	✓						✓	
	The necessary ICTs are available for the work.	✓	✓		✓	✓			✓
	The use of technologies is limited.	✓	✓		✓				✓
	Computers.		✓	✓	✓				✓
	Platform.		✓	✓	✓				✓
	Whiteboard.			✓	✓	✓			✓
	Resources.						✓	✓	
	Internet.						✓	✓	
Pedagogical use of technological tools	The majority of teachers use ICT.	✓		✓	✓	✓			✓
	There are traditionalist teachers.	✓	✓					✓	
	ICT facilitates learning.	✓						✓	
	There are teachers who use ICT.		✓					✓	
	Limited use of technologies.		✓	✓	✓				✓
	To search for information.			✓				✓	
	To project information (whiteboard).				✓			✓	
Policies and guidelines on the use of ICT	Teacher training.	✓	✓		✓	✓			✓
	Some teachers do not know how to use ICT.		✓					✓	
	I don't know.			✓				✓	
	Teacher training is insufficient.				✓			✓	
Use of technological tools	Access to information.	✓						✓	
	Transmit knowledge to students.	✓						✓	
	ICTs facilitate learning.	✓						✓	
	To present in class.		✓		✓	✓			✓
	To do tasks.		✓	✓				✓	
	To do activities on the platform.		✓	✓			✓		✓
	Limited use of ICT.				✓			✓	
Design and evaluation of activities	Aspects considered by the teacher for the design of teaching-learning activities.	They recommend that we use more books and less internet.	✓					✓	
		The content takes precedence over the needs of the students.		✓		✓		✓	
		The needs of the students are taken into account.			✓	✓	✓		✓
	Activities most used	Tasks.	✓	✓	✓	✓	✓		✓
		Presentations.	✓					✓	

Categories	Subcategories	A1	A2	A3	A4	A5	I	R
by teachers.	Forums.		✓	✓			✓	
	Preliminary, integrative and learning activities.				✓		✓	
Activities, through the use of technologies, that give teachers better results.	Practical activities.	✓	✓		✓			✓
	Activities on the smart board.		✓				✓	
	Research activities.		✓	✓	✓			✓
Activities, through the use of technologies, that have been less favourable.	Forums.					✓	✓	
	Theoretical activities.	✓						✓
	We don't know how to use wikis.		✓			✓	✓	
	The forums, since information is copied and pasted from the internet.			✓			✓	
	Integrating activities, as a summary of the previous ones is provided.				✓		✓	
Contribution to the student's graduate profile	Writing documents.	✓						✓
	Use of technologies.	✓				✓	✓	
	Legal argumentation.	✓						✓
	Dependent students.		✓		✓			✓
	Self-taught students.			✓				✓
	Research students.				✓			✓
	Information consumers.				✓			✓
Problems in the use of technological resources	Capable students.					✓	✓	
	Lack of teacher training.	✓	✓	✓	✓	✓		✓
	Adaptation to the educational modality.	✓						✓
	Limited use of ICT.	✓	✓	✓	✓	✓		✓
	There are teachers who do know how to use the tools.						✓	✓
Advantages of using the technologies	Optimisation of time.	✓		✓		✓		✓
	Access to information.		✓	✓	✓			✓
	As tools for developing resources.				✓			✓
Disadvantages of the use of technologies	ICTs facilitate learning.				✓	✓	✓	
	Lack of teacher commitment.	✓				✓	✓	
	Internet abuse		✓	✓				✓
Proposals	Inappropriate use of ICTs.				✓			✓
	Using ICT correctly.	✓	✓	✓				✓
	Teaching commitment.	✓		✓		✓		✓
	Improving teacher-student communication.	✓						✓
	Increase practical activities.		✓					✓
Needs	Implementation of teacher training processes.			✓	✓		✓	
	The necessary ICTs are available for the work.	✓	✓	✓	✓	✓		✓

Notes: I= Irregular. R= Regular.

In general terms, from the regular categories and subcategories it can be concluded that the students are unaware of the academic model of the institution (University of Guadalajara; 2007), and consequently its theoretical and institutional foundations, and

although it is not their obligation to know it, through their answers it is evident that neither do the teachers identify it, nor do they put it into practice, since if this were the case the students would have information on the subject.

Question: 'What aspects of the academic model of CUNorte are you familiar with?'

A-2 "... We are in a blended learning system, where some days we attend face-to-face classes and the other part of our studies is done on a platform where we send assignments and coursework, do forums and wikis and different activities."

From the answers given by the students it is clear that for them the academic model is synonymous with the educational modality, which they clearly identify as a blended learning system, where they attend face-to-face classes two days a week and use the Moodle platform, which allows them to carry out a series of online activities, such as tasks, forums and wikis, which corresponds with positions such as that of Bartolomé (2004).

Question: 'What is the educational approach of CUNorte? (What is it like, what does it consist of?)'

EA-5 'It involves a combination of counselling, working with teachers and also hours in which you have to do research on your own to fulfil the tasks... it is a joint effort with students, counsellors and technology...'

With regard to the role to be played by teachers and students based on the academic model and the educational approach, there is a consensus that the traditional school model must be broken with. They mention that due to the way of working adopted at CUNorte, teachers have to act as advisors, solving the doubts of the students, who must play a more active role by being self-taught and, consequently, responsible for their own learning process.

Question: 'What role do your teachers play in the teaching-learning process?'

Question: 'What role do you play in the teaching-learning process?'

EA-4 I think that the role that corresponds to us is to be self-taught, that it depends on us what we want or don't want to learn, then also to be researchers in turn, because when we don't understand a concept or something else, well, if we have to set about the task of researching it and being able to go into it in more depth.

With regard to technologies, as well as making a considerable list, they agree that there is a smart board, and that for online work they have the Moodle platform, set up as a virtual classroom, but they say that most teachers do not know how to use it.

Question: 'Given the educational approach of CUNorte, what technological tools do your teachers have available to them for the development of teaching-learning activities?'

A-4 'They have the electronic whiteboard, which most of them don't know how to use, but it's a very powerful tool, which if they were to use it properly would be really useful, because they have the projector, the computer, the platform, from my particular point of view, what wikis and forums are, are very interesting, but at the same time they bore me because they don't use them properly, they just answer for the sake of it, when it's meant to generate debate...'

The students point out that the tools made available are sufficient to carry out their activities, recognising that the institution has made a significant effort and economic

investment in both infrastructure and equipment, and that it is important to work on how best to take advantage of it.

Question: 'In addition to the technological tools you have, what other tools do you consider necessary for the development of your teaching work?'

A-1 'I see that all the classrooms here at the university centre have the technological tools that no other university has... we have everything at hand... we have projectors, auditoriums, with respect to the auditorium we can even link up in a chat with another university centre and it's better, if it's okay, I wouldn't add another technological tool.'

When questioned about the digital literacy of teachers, students reiterate that there are shortcomings, so they propose that ICT be used efficiently, as well as a greater commitment on the part of their teachers to work in this modality.

Question: 'From your experience, what training have your teachers been given on how they should use the technological tools available to you for the development of your activities within the learning process?'

A-4 '... I realise because my mum is also a teacher... and whenever they are going to start a new semester they give them, I think it's a week-long course, ... I see that my mum arrives a bit frustrated because she doesn't understand, let's say they are adults... my mum says colloquially, we are old-fashioned, they have the little book..., and my mum arrives a bit frustrated, that they rush through and don't take the time and have the patience to enable them to acquire those skills to use that technology...."

Elsewhere in the interview, when referring to the use that teachers make of ICT, they again identify areas of opportunity in terms of the training available to them, and this is demonstrated both in virtual classrooms and in face-to-face settings.

Question: 'What do teachers use the technological tools provided by CUNorte for?'

A-4 I just see that they use the computer to show templates on slides, nothing else; the electronic board really causes them a lot of work, that it doesn't get stuck on one side, that it doesn't work anymore, and that also gets them desperate...

A-2 '... there are teachers who simply don't use these tools ... maybe it's because of a lack of knowledge, but it shouldn't exist ... maybe because it's easy, because it's convenient, because they also have a traditionalist system in their teaching, maybe.'

With regard to the design and evaluation of activities, students consider that assignments are the most used, and that, on the other hand, collaborative activities, such as wikis and forums, are not programmed by teachers, who show no interest in them.

Question: 'What activities do your teachers usually set you as students to do?'

A-4 'The usual activities, preliminary, learning and integrative activities, and precisely in this semester we didn't have forums or wikis, it was as if we saw that even the teachers weren't interested, so they transmitted that lack of interest in forums and wikis to us, they were just activities like that, nothing more than homework...'

Among the most important questions is the need to understand the students' view of the problems their teachers face in using ICT, and how they say the teachers get frustrated when things don't go as expected and the response is to turn off the equipment and return to their comfort zone, to traditionalism, which is what they are good at and despite all the

resources at their disposal to transmit knowledge, they prefer not to use them because they don't know how.

Question: 'What problems do your teachers face in using technological tools for their teaching activities and how have they overcome them?'

A-4 'In many things, one of them, when the computer is slow or something, I tell them, they get desperate, they turn it off and we go to the usual, as always, there they are, the knowledge they have inside and that's it, in the tasks sometimes we ask them if they can increase the reading and many of them stay that way. How do I increase the reading? ... I feel that they have many, I don't know how to put it, weapons where a lot of knowledge can be transmitted, but they don't use them.'

In terms of proposals for improving teaching-learning processes, the consensus is that teachers should recognise their training deficiencies and take the courses necessary to carry out their work correctly, which coincides with proposals such as those made by authors such as Benavides and Pedró (2007).

Question: 'What would you suggest to teachers to help them improve and become more efficient in their use of the technological tools available to them for the development of teaching-learning activities?'

A-4 'If they don't know how to use them fully, they should take courses so that they can develop these tools, these programmes properly.'

3.2. Analysis of the data from the quantitative phase

Once the analysis of the qualitative phase was finished, a questionnaire was constructed from the initial interview protocol consisting of 14 items, achieving reliability through the calculation of Cronbach's alpha coefficient. The total consistency of the post-test questionnaire is satisfactory (0.771). A Cronbach's alpha value between 0.70 and 0.90 indicates good internal consistency for a one-dimensional scale (Gutiérrez-Castillo et al., 2016). Cronbach's alpha is a simple and reliable way to validate the construct of a scale and as a measure that quantifies the correlation between its constituent items.

The following analyses were carried out to evaluate the adequacy of the data and the validity of the quantitative findings:

Determination of the correlation matrix: The correlation matrix was calculated to evaluate the relationships between the items in the questionnaire.

KMO index (Kaiser-Meyer-Olkin): The KMO index obtained was 0.7, which is considered adequate for a confirmatory factor analysis, suggesting a satisfactory interaction between the items in the questionnaire (Hair et al., 1999).

Bartlett's test of sphericity: This test tested the hypothesis that the correlation matrix is an identity matrix. The values obtained were less than 0.05, indicating that the variables are related and that a factor analysis is appropriate with the data.

In addition, the total explained variance was analysed, observing a saturation in 5 groups with a cumulative percentage of 65.950%. This percentage is adequate, since the minimum threshold for factor extraction is usually set at 60% (Hair et al., 2010).

To reinforce the validity of the quantitative findings, additional statistical significance tests were performed:

Analysis of variance (ANOVA): One-way ANOVA was used to determine whether there are significant differences between the means of three or more groups. The ANOVA results showed significant differences ($p < 0.05$) between the groups, suggesting that it is necessary to consider diverse and specific support policies for each group, in line with the objectives of the study.

Table 2

Distribution of students by degree programme

	Frequency	Percentage	Valid percentage	Cumulative percentage
	1	,4	,4	,4
Law	33	13,9	13,9	14,3
Administration	11	4,6	4,6	18,9
Agribusiness	13	5,5	5,5	24,4
Anthropology	3	1,3	1,3	25,6
Public Accounting	17	7,1	7,1	32,8
Education	35	14,7	14,7	47,5
Valid Electronics and Computing	16	6,7	6,7	54,2
Nursing	58	24,4	24,4	78,6
Electrical Mechanics	6	2,5	2,5	81,1
Nutrition	13	5,5	5,5	86,6
Psychology	24	10,1	10,1	96,6
Tourism	8	3,4	3,4	100,0
Total	238	100,0	100,0	

With regard to qualifications and as can be seen in Figure 1, in questions 20 and 21 there are significant differences in the averages (a Likert scale of 1 to 4 is used, from 'not at all a priority' to 'a very high priority').

20. Updating study plans and programmes to include the acquisition or development of digital skills by students.

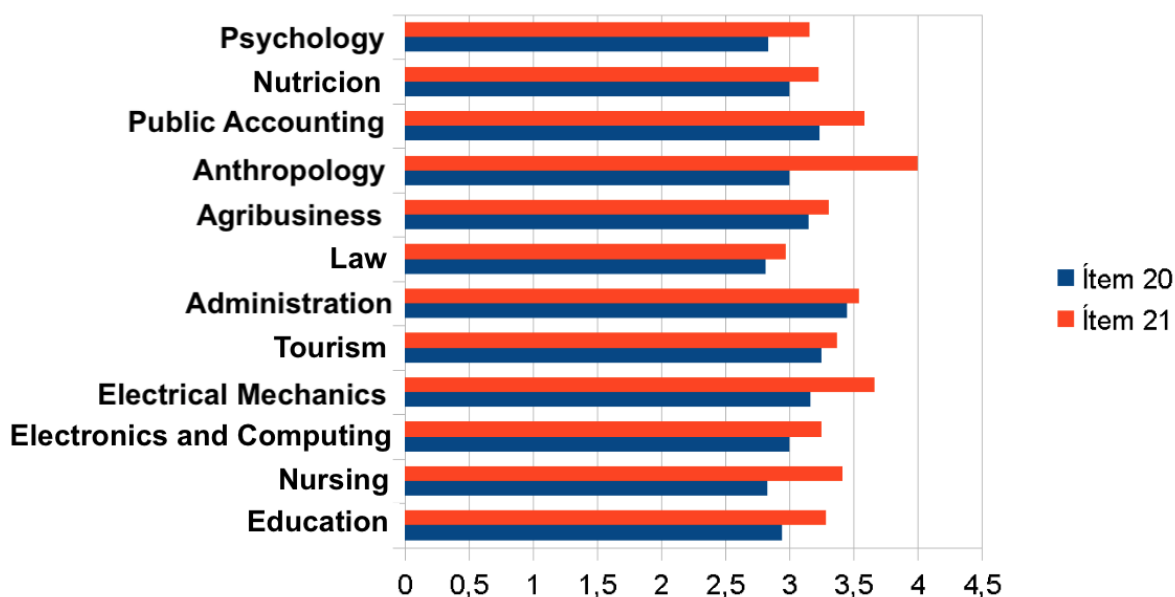
21. Educational institutions guaranteeing access to technologies and internet connection for teachers and students.

It can be clearly seen that item 21 beats item 20 in all the degrees, which indicates that the guarantee of access to technologies and connectivity by educational institutions seems to be a higher priority for the respondents.

The following graph reflects these assessments (Figure 1):

Figure 1

Differences in averages according to qualifications



Source: own creation.

On the other hand, we can also observe that the lowest scores in item 20 are in education, nursing, law and psychology. In item 21, the lowest scores are observed in the same degrees (although, as we said before, they exceed those of item 20). This coincidence may be related to the fact that the sum of these degrees represents more than half of the respondents (63.1%), the number of degrees being 4 out of 11 respondents in total.

According to 63% of the students, teachers did their best to work online during the pandemic, but failed to implement better resources to facilitate learning. Similarly, with regard to an important key issue at the methodological level, namely assessment, 58.4% of the students indicated that the teachers diversified the forms of assessment with participation in videoconferences, submission of assignments, exams, etc. 20.6% of students understand that not all university students have the same conditions for learning in a distance learning mode. For their part, 17.2% emphasise the same, adding the potential of technology for innovation and improving learning.

4. Discussion and conclusions

It is important to point out that the results obtained are not exclusive to the context in which the research is carried out; on the contrary, they are highly consistent with work carried out recently in various academic fields, from which the following issues emerge:

As a consequence of the pandemic, online education emerged as a trend that is here to stay (Franco Castro, et al., 2023), because, in addition to enabling the continuity of work in schools, it has been shown to be a great opportunity to 'live new experiences' according to Santiago Mijangos et al., (2021) but above all, and as this author, who is in line with our objectives, states in his conclusions, 'to detect weaknesses that can be strengthened over time in the use of ICT', and which in our study, unlike this one, also offers differentiated

knowledge for decision-making according to groups. Offering students new options for strengthening their learning, and as Ambuludí-Marín et al., (2021) says, both inside and outside the classroom, without distinction between the two contexts, given that our teaching model is B-Learning, which integrates both classroom and remote teaching.

It has become clear that future generations will require new and better skills to face the challenges that arose during the pandemic (Ávila et al., 2022). School processes must provide training, under ethical conditions, so that each student can live in a society that demands commitment from everyone (Sierra et al., 2021), so schools would have to include topics related to ICT and education as part of the curriculum (López et al., 2021).

But for this, it is necessary to be aware that online work and good results for the objective of improvement with this study of our B-Learning model depend on the capacity and skills shown by both students (20.6% consider that they do not have these competences) and teachers in the use of technologies to use digital media at home (Corral & Corral, 2020), as observed and deduced in the opinions in the interviews with the students as necessary (such as A-2, EA-4, A-4...), and that for these students it is still essential to acquire and/or develop these skills in agreement with Gellibert Merchán et al. (2021) to guarantee an efficient use of technological resources.

Finally, the educational policies set out by governments must guarantee teachers' and students' access to technological resources and an internet connection (Castro et al., 2021), this, accompanied by teacher training spaces, with the aim of achieving quality education, student well-being and the reduction of social inequalities (Rueda, 2021).

From the analysis of the information obtained and from the perspective of the students in the present study, important conclusions are drawn in three respects:

- a. As evidence of positive change, it is noteworthy that, in the opinion of the students, the teachers at CUNorte identify the B-Learning educational modality and its relevance to the context with sufficient clarity, recognise the potential of ICT to complement face-to-face work, also consider that the necessary technologies for school work are available and that progress has been made in digital literacy, which allows access to countless online resources. However, during the pandemic and for 63% of the students, the teachers made an effort to work online, as well as being flexible with 58.4% to diversify different assessment methodologies. However, the use of better resources was lacking.
However, there is also evidence of traditional practices, which, although all the learning units have an online course on the Moodle platform, which has various activities and resources, its use is limited. It is relegated to a task box, and it is clear that when activities such as Forums and Wikis are programmed, it is not possible to promote collaborative work, mainly because the instructional design is not appropriate. It is also worth noting that teachers do not pay constant or timely attention to the virtual classrooms.
- b. Finally, it can be said that there is a considerable gap between what the institution stipulates in its guidelines and policies for the administration of online courses and what happens in reality, which corresponds, to a greater extent, to typologies 1 and 3 on the use of ICT, with priority being given to work on two aspects, the first, the construction of a techno-pedagogical design, as a comprehensive proposal on the use of technologies; and, the second, in a proposal for teacher training that,

attending to the needs of teachers, ensures innovation in their work and improvement in student learning.

- c. In addition to the above, the institution should analyse the significant differences according to the degrees where the need to guarantee access to technologies and internet connection by teachers and students is expressed. It should also analyse the reasons for the differences according to the degrees in terms of the request for the acquisition of digital competences for students; at the same time, it should design training plans for all students according to these results.

The present study had the limitations inherent to a retrospective view, as the sample was not all the students who experienced the time of the pandemic. It would also be interesting to extend the study and results by contrasting them with other students who did not experience this time, and to focus on the current reality, on the idea of continuing to characterise the weaknesses and advantages of the system itself.

To conclude, it would also be useful to find out the reasons for the significant differences between degrees. It would also be interesting to carry out another study comparing the students' perceptions with the teachers' opinions, which would provide a broader and more realistic view for decision-making.

Author Contributions

Conceptualization, M.A.M.M. and M.C.S.; Data curation, F.J.R.R.; Formal analysis, M.C.S. and F.J.R.R.; Investigation, M.A.M.M. and M.C.S.; Methodology, M.A.M.M. and M.C.S.; Project administration, M.A.M.M. and M.C.S.; Resources, M.A.M.M.; Software, F.J.R.R.; Supervision, M.A.M.M. and M.C.S.; Validation, M.C.S. and F.J.R.R.; Visualization, M.A.M.M.; Writing – original draft, M.A.M.M. and M.C.S.; Writing – review & editing, M.A.M.M. y M.C.S.

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The data set used in this study is available upon reasonable request to the corresponding author

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Not applicable

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All authors have consented to the publication of the results obtained by means of the corresponding consent forms.

Conflicts of interest

The authors declare that they have no conflict of interest

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