Interrelationship Of University Students With Digital Technologies In Times Of Crisis

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Abstract

The objective of this study was to describe the interactions in distance learning during the Covid-19 confinement, between students and teacher, students-students and between students and content. The research was methodologically descriptive with a field design using quantitative methods. The sample consisted of 100 students of the Bachelor's Degree Program in Early Childhood Education at the Universidad Francisco de Paula Santander. A questionnaire with 34 questions with several response options was used. The results determined that the homework assignment was the most used by the students, which required constant interaction with the content. It was concluded that interactions in ICT-mediated education forced during confinement by Covid-19, require various forms of interactions for students to incorporate elements of teaching support between distance learners, the content, their peers and their teachers with a system of appropriate tools that provide formative and summative evaluation, with synchronous and asynchronous methods.

Keywords: interaction, ICT-mediated education, virtual education, covid-19

Resumen

El objetivo del presente estudio fue describir las interacciones en la enseñanza a distancia durante el encierro por Covid-19, entre estudiantes y maestro, estudiantes-estudiantes y entre estudiantes y contenido. La investigación fue metodológicamente descriptiva con diseño de campo con métodos cuantitativos, la muestra estuvo conformada por 100 estudiantes del Programa de Licenciatura en Educación Infantil de la Universidad Francisco de Paula Santander. Se utilizó un cuestionario con 34 preguntas con varias opciones de respuesta. Los resultados determinaron que la asignación de tarea fue la más empleada por los estudiantes, la cual requería una interacción constante con el contenido. Se concluyó que las interacciones en la educación mediada por TIC obligada

durante encierro por Covid-19, requieren diversas formas de interacciones para que los estudiantes incorporen elementos de apoyo a la enseñanza entre los educandos a distancia, el contenido, sus pares y sus profesores con un sistema de herramientas adecuados que brinden la evaluación formativa y sumativa, con métodos sincrónicos y asincrónicos

Palabras clave: interacción, educación mediada por TIC, educación virtual, covid-19

Introduction

As of March 2020, the educational emergency and social isolation due to the confinement by covid-19 forced to assume the continuity of classes at home and remotely, under the characteristic features of separation of teacher and student and the use of technological tools of learning and ICT-mediated education (Avendaño et al., 2021; García Aretio, 2021; Prada, Gamboa & Hernández, 2020). In particular, the education developed in the programs of the Universidad Francisco de Paula Santander, to train competent educators in the processes of integral development of children, was also impacted by COVID-19, which, like the rest of the programs of the university, were carrying out learning strategies in ICT-mediated education, virtual or online, to minimize the effects and paralysis of face-to-face classes.

In the words of Trillo Miravalles (2007), distance education "does not exclude the traditional classroom, although this does not mean that both levels have similar logics..." (p.2). For García Aretio (2003), distance education is a bidirectional communication system, which replaces personal interaction in the student-teacher classroom as the preferred means of teaching, with the systematic and joint action of diverse didactic resources and the support of a tutorial organization, that promote student learning and that in the

current situation of educational emergency, interactions in teaching and learning moved to virtual environments in a synchronous and asynchronous way of the changing educational environment of pre-confinement, confinement and post-confinement (García Aretio, 2021).

Regarding interactions, Friesen & Kuskis (2012) argue that much of the literature relevant to these domains tends to focus on student-student and student-teacher interaction. Interaction is understood as a discourse that facilitates teaching-learning processes, with an orientation towards the social construction of knowledge. Thus, an interaction is a reciprocal action or influence of two or more people (Vanegas & Gamboa, 2022a; Vanegas & Gamboa, 2022b). Interaction refers to a bidirectional activity that leads to student participation and active cognitive interaction.

Thus, interactions in ICT-mediated and virtual education are divided into three categories: learner and learning content, student and teacher, and learners with other learners (Martínez, 2008). From the perspective of Moore (1989) and Moore & Kearsley (2012), *learner-learner interaction* occurs between two learners or between a group of learners studying the same course. This can happen with or without the instructor. Hence, there is a social interaction defined in the way people learn. Whereas**,** *student-teacher interaction* occurs when an educator delivers information, provides feedback or simply encourages or guides the student. It also occurs when a learner asks the teacher questions or communicates with the teacher about the course.

In this way, the teacher or tutor of the course serves as a guide, facilitator, expert or support depending on the situation (Gamboa et al.,

2020). That is, the teacher, unlike the professor in a traditional classroom, does not occupy a central place. He or she becomes a guide/mediator/facilitator and not a sage on the stage. This carries the message that the teacher is willing to help students learn and support them until the end of the course. Therefore, it increases the dialogue and offers several different ways for them to communicate with the educator, while the educator tracks the learner's performance and participation in the course. Meanwhile*, learner-content interaction*, this type of interaction takes place when learners themselves obtain information directly from the learning materials. It happens whenever they interact with the text or are deeply engrossed in the content. Moore and Kearsley (ob. cit.) consider the interaction between the learner and the content to be the most conclusive form of interaction, as this is where learning takes place. Once learners access learning materials such as multimedia, lectures, and handouts, they should be able to consume them in their own way. They should be able to pause, rewind, replay and fast-forward parts of the course to master it.

Thus, in this type of interaction, students are provided with different options about the content (text, audio, video, among others). In addition, challenging tasks that require students to interact with the content and explore the topic in greater detail, is what Basantes et al. (2018; Urbina, 2017) describe as a rebound section, which constitutes a filter with activities to share knowledge in a critical and reflective way through forums, chat, videoconferences, blogs among other web resources or Moodle platform, because in this way the student must read and assimilate the information of the exposure section, otherwise he/she will not be able to continue with the planned activities.

Moore & Kearsley (2012) emphasize that online teaching requires understanding not only the interaction, but also how to facilitate it through technology, since they are essential for learning and participation, as well as for the interaction between student-student; between student-instructor and between student-content (Moore, 1989; Moore & Kearsley, 2012). In addition, these forms of interaction requires a different mix of media and technology (Bates, 2015) and have been studied from various points of view, giving rise to various theories, to which the growth of distance and virtual learning has given them a new dimension.

In other words, learning and teaching involve various forms of interaction between different actors. In this direction, Suárez (2010) delved into the knowledge of cooperative interaction under asynchronous mediation conditions in virtual training and argues that interaction implies a communicational competence that is beyond connectivity as a technical competence, since it is also used with resources based on the interactions that students have with them in open environments (Gordillo et al., 2018).

Similarly, interactions have been evaluated considering the model proposed by Garrison et al. (2000), who considered that social, cognitive and teaching presence are fundamental factors for the development of effective learning in an online community of inquiry on cognitive, teaching and affective interactions (Padilla et al., 2015). Likewise, the significance of interaction for learning in a synchronous and asynchronous way between people has ceased to be a technological environment to become a social one as a tool for training, hence, it has ceased to be private and selective and is becoming a public and

globalized environment, where people join the internet network to exchange ideas, build knowledge or establish relationships at different levels (Cabero & Llorente, 2010) (Medina Romero et al, 2021).

In this regard, Moreno (2015) emphasizes that the relationship between student and tutor and its impact on the generation of learning skills begins with motivation and feedback, which can occur through synchronous and asynchronous means, with studies showing its effectiveness which tends to increase proportionally in relation to the number of students.

On the other hand, regarding the interactions with educational resources during the educational emergency in a public university in the city of Cúcuta-Colombia, Avendaño et al. (2021) found that the classes have awakened the interest of the interlocutors and the motivation had a positive perception among students and teachers. Therefore, the participants mostly agree that the explanations of the teachers have been interesting and attractive, since the teachers have promoted active and dynamic participation and have used relevant educational resources and media. These results are opposite to those reported by Gamboa et al. (2020), where they mainly highlight the effects on sleep hours and eating habits.

Similarly, Avendaño et al. (2021), considering the crisis context resulting from the pandemic and the scenario of the Universidad Francisco de Paula Santander, found that the actors of said institution consider the use of asynchronous and synchronous communication tools as a pedagogical value in times of crisis. Additionally, they found that teachers think it is important to use synchronous tools (different places at the same

time, such as blogs, social networks, mobile devices) to face the educational emergency.

Therefore, this inquiry allows to continue expanding the scientific field of interactions and their effectiveness in ICT-mediated education, and at the same time, to go deeper into these topics, since according to Friesen & Kuskis (2012), the understanding of interaction is of rigor for anyone who investigates the sociocultural implications of human-machine interaction and that the term interaction has been integrated into the discourses of ICT-mediated education, lifelong learning, educational technology and other educational subdomains.

In this sense, learning is not only linked to a construction of knowledge that is continuously assimilated and accommodated by the direct or indirect experience of the learner and his environment, but, on the Internet, learning is mixed with the way of navigating the web as a learning environment and generator of knowledge that can be "shared, distributed, modified, improved and is always available to users" (Cobo & Pardo, 2007, p. 102). Furthermore, it resides outside of us, it is focused on connecting specialized information sets, and the connections that allow thinking that learning has greater importance than the current state of knowledge, therefore, learning is socially enhanced by technology as reviewed in the works of Ortiz-Arismendi et al. (2019), Claro-Vasquez (2017), and Siemens (2005).

In practice, it is important to explore the process in which individual students receive and manipulate information or socially construct or connect people or information by themselves to learn. It can be said that distance learning improves in the level of development of the desired learning that appears after the

entry to an educational interaction with others, the teacher or resources to achieve the intended educational purpose; therefore, it is necessary to examine the interactions that have taken place in the reality of ICT-mediated education learning during confinement by Covid-19, especially the three forms of interaction in distance education described by Moore (1989): Between learners and teacher, between learners themselves, and between learners and content), since it is important to investigate interactions in online learning from the social, cognitive, and teacher-presence point of view (Garrison et al, 2000).

Therefore, the objective of this research is to describe the interactions in distance learning during the confinement by Covid-19, in terms of how to provide and effectively acquire theoretical, practical, and experiential knowledge, which is not easily acquired due to the nature of the curriculum outside the usual classroom of the Academic Program of Bachelor in Early Childhood Education, as it seeks from the same, that education and training for activities in the educational field coherent and relevant proposals to the challenges of the educational emergency in the local, regional and national context.

The Method
The research was descriptive and field design with quantitative methods. The purpose of this study is to specify properties, characteristics and profiles of individuals, groups, communities, which is subjected to analysis (Hernández Sampieri et al., 2014; Gamboa, 2019), on the effect of the interaction of the initial training students of Bachelor's Degree in Early Childhood Education at the Universidad Francisco de Paula Santander, and the effectiveness of learning during the confinement by the Covid-19. To achieve the purpose of this study, it was developed in three

phases: research design, data collection, analysis and development.

Similarly, a quantitative analysis of the information provided by Scopus under a bibliometric approach on the scientific production related to Teleducation during Covid-19 identified from Latin American institutions is carried out in order to know the focus of scientific papers and the contribution that Latin countries have made to the literature on the study of ICT-based education during the Covid-19 pandemic.

Research design
The population consisted of 133 students belonging to the Bachelor's Degree Program in Early Childhood Education. The population data were obtained through an online survey for the students of said program. A total of 126 students answered the questionnaire and 100 of those who applied the instruments were valid. The probability sampling referenced by Bernal (2010) was adopted, with a value for p=0.50, a margin of error of 5% and a confidence level of 95%. The result obtained was 100 subjects. The interaction variable, which is an independent variable, consisted of student and learning content; teacher and student and; student and student.

Collection of information

For the collection of the research information, a questionnaire on online teaching activities was developed based on the purpose of the research. The instrument was self-administered online structured with 34 questions with several response options. The questionnaire consisted of two parts, namely: Basic data, which consisted of general questions (age, sex, among others). The second part referred to interaction and learning effectiveness, which was divided into: online

teaching, synchronous teaching activities, learning interaction, learning effectiveness. Expert judgment was used to estimate the content validity of the questionnaire.

For the proposed biometric analysis, the selection of articles or research papers is carried out by establishing search criteria in the Scopus platform.

- Research papers (articles, conference papers, books, book chapters, among others) whose variable of study is Teleducation and Covid-19.
- Research papers published in Latin American countries.

Procedure, data collection and analysis

The data collected were organized and tabulated in Excel spreadsheets. From there, a descriptive exploration was carried out in the questionnaire in which statistics such as frequency were included for the analysis and interpretation of the data.

Results and discussion

The survey determined that 88% are female and the rest are male (12%). The breakdown by age showed that 75.0% of the students were between 21 and 30 years of age, followed by 23.0% of those between 31 and 40 years of age. The remaining 2.0% were over 40 years of age. Similarly, it was learned that students accessed through devices such as pc (30%) laptop (25%) tablet (12%) and smart phones (33%). In turn, it was learned that 100% of the respondents have internet to take up distance learning.

Table 1. Characteristics of distance learning received by students during confinement.

	Item	Options	No	Percentage
M **o** **d** **e** **o** **f** **i** **n** **s** **t** **r** **u** **c** **t** **i** **o** **n** **r**	4. How often have you experienced ICT-mediated education before the pandemic?	Frequently	7	7,0%
		Occasionally	35	35,0%
		Never	58	58,0%
	5 What means did your teachers use to communicate with you during the educational emergency? (multiple choices)	Institutional Platforms (PLAD)	90	90,0%
		Mobile devices (WhatsApp, Telegram)	91	91,0%
		Social Networks (Facebook, Twitter)	15	15,0%
		Meet (Google)	95	95,0%
		Personal Blog	2	2,0%
	6. Does the teacher connect at the same time as you to carry out teaching and learning activities?	Frequently	95	95,0%
		Occasionally	5	5,0%
		Never	0	0,0%
	7. What was the means for teachers to upload teaching materials during the pandemic?	Institutional Platforms (PLAD)	100	100,0%
		Mobile devices (WhatsApp, Telegram...	0	0,0%
		Social Networks (Facebook, Twitter)	0	0,0%
		Meet (Google)	0	0,0%
		Personal Blog	0	0,0%

			Count	%
e c e i v e d	8. Did you access the didactic material to carry out your learning activities?	Frequently	75	75,0%
			25	25,0%
		Occasionally		
		Never	0	0,0%
D i d a c t i c a c t i v i t i e s	9. Did you have access to the lecture-screen presentation for the master classes?	Frequently	98	98,0%
		Occasionally	2	2,0%
			0	0,0%
		Never		
	10. Did you have access to playback of videos made by the teacher?	Frequently	5	5,0%
		Occasionally	10	10,0%
			85	85,0%
		Never		
	11. Did you have access to playback of videos created by others?	Frequently	95	95,0%
		Occasionally	5	5,0%
			0	0,0%
		Never		

Table 1 shows the data on the characteristics of distance education received by the students. It was determined in item 4, that 58.0% of the respondents had never experienced studying under the modality of ICT-mediated education, while 35.0% indicated that occasionally they have done this type of study and the rest, 7.0% frequently have experienced it. Regarding item 5, it was verified through the respondents that during the pandemic they used to communicate with the Institutional Platforms in 90.0%, with mobile devices through WhatsApp and Telegram 91.0%, through videoconferencing using meet (Google) 95.0% and with social networks (Facebook, Twitter) another 15.0%.

Regarding item 6, it was found that 95.0% of the teachers connect frequently at the same time as the respondents (students) to carry out teaching and learning activities. The remaining 5.0% do so occasionally at the same time. On the other hand, in relation to item 7, it was found that 100.0% of the teachers frequently used the Institutional Platform (PLAD) during the pandemic to upload didactic materials for the respondents to access them. Likewise, it was found (item 8) that 75.0% of the students surveyed frequently accessed the didactic material to carry out their learning activities. The rest did so occasionally (25.0%).

Similarly, Table 1 shows the didactic activities carried out during the pandemic. In item 9, 98.0% of the students surveyed had frequent access to lecture-screen presentations of master classes given by their teachers. With regard to item 10, only 5.0% of the respondents said that they frequently reproduced videos made by their teachers, another 10.0% said that they occasionally watched them and 85.0% said that their teachers never made the videos presented. Similarly, it was shown in item 11, that 95.0% of the respondents frequently access to reproduce videos created by other teachers within the didactic activities.

When observing the results of items 4, 5, 6, 7 and 8, 9, 10 and 11, it was confirmed that less than half of the students had experience in distance learning before the pandemic, these data show an adaptation of the students to distance learning. At the same time, students frequently received synchronous teaching, since they are connected to their teachers at the same time, hence there is a teacher-student interaction. While asynchronous teaching was presented in the student-content interactions (didactic material) on the institutional platform. This resource is valuable in the development of research competencies as stated in Ayala García & Barreto Prieto (2018) since technological resources facilitate access to various sources of information.

Thus, the actors of the Bachelor's Degree Program in Early Childhood Education used synchronous and asynchronous teaching, which agrees with García Aretio (2021) who states that, in the pre-confinement, confinement, as well as in the post-confinement, the interactions in teaching and learning were transposed to virtual environments in a synchronous and asynchronous way, since it is relevant not only to the student-teacher interaction (Friesen & Kuskis, 2012) but also to the student-content interaction that could be presented in ICT-mediated education with both synchronous and asynchronous didactic activities in the teaching presented (Kuskis, 2012) but also to the student-content interaction that could be presented in ICT-mediated education with technologies both synchronous and asynchronous didactic activities in the presented teaching (lecture with presentation screen) which shows that most teachers prefer to lecture with a presentation screen in online teaching.

Table 2. Interaction in learning

	Item	Options	No	Percentage
I n t e r a c t i o n	12 Did you conduct discussion based on the didactic material (text) in a synchronous manner in the videoconference classes?	Frequently	75	75,0%
		Occasionally	23	23,0%
		Never	2	2,0%
	13 Did you conduct discussion based on the didactic material (text) asynchronously on the PLAD platform, WhatsApp or social networks?	Frequently	35	35,0%
		Occasionally	51	51,0%
		Never	14	14,0%
	14 Did you conduct audio/video based discussion synchronously in classes via videoconference?	Frequently	36	36,0%
		Occasionally	40	40,0%
		Never	24	24,0%
		Frequently	25	25,0%

i n l e a r n i n g	15 Did you conduct audio/video based discussion asynchronously on PLAD platform, WhatsApp or social networks?	Occasionally	42	42,0%
		Never	33	33,0%
	16 Did you conduct discussion based on the didactic material (text) in a synchronous manner with your working group?	Frequently	95	95,0%
		Occasionally	5	5,0%
		Never	0	0,0%
	17 Did you conduct discussion based on the didactic material (text) asynchronously with your working group?	Frequently	92	92,0%
		Occasionally	5	5,0%
		Never	3	3,0%
	18 Did you conduct synchronous audio/video-based discussion with your work group?	Frequently	15	15,0%
		Occasionally	50	50,0%
		Never	35	35,0%
	19. Did you conduct asynchronous audio/video-based discussion with your work group?	Frequently	30	30,0%
		Occasionally	44	44,0%
		Never	26	26,0%
	20 Did you have interaction on digital whiteboards with the whole class?	Frequently	0	0,0%
		Occasionally	10	10,0%
		Never	90	90,0%
	21 Did you have interaction on digital whiteboards with your work group?	Frequently	0	0,0%
		Occasionally	0	0,0%
		Never	100	100,0%
	22 Did you receive timely feedback from your teachers?	Frequently	75	75,0%
		Occasionally	25	25,0%
		Never	0	0,0%

In Table 2, it was determined in item 12, that among the alternatives frequently and occasionally 49.0% of the students surveyed carry out discussions based on the didactic material (text) synchronously in live classes via videoconference. However, among the same alternatives in item 13, it could be known that 98.0% perform discussions based on the didactic material (text) asynchronously on the PLAD platform, WhatsApp or social networks, as highlighted by Espinel-Rubio, Hernández-Suárez & Rojas-Suárez (2020). With regard to item 14, it was verified that 68.0% of respondents never conducted audio/video-based discussions synchronously in live classes via videoconference. However, 87.0% (item 15) said that they frequently and occasionally made asynchronous audio/video-based discussions on the PLAD platform, WhatsApp or social networks.

Regarding item 16, it was found that 95.0% of the students surveyed carried out discussions based on the didactic material (text) synchronously with their work group in the live classes with the teacher. However, in item 17, this type of discussion based on the didactic material (text) was carried out 97.0% asynchronously with their work group. Similarly, in item 18, it was found that 80% of the respondents never carried out synchronous discussions based on audio or video with their work group. However, in item 19, 74.0% of these audio- and video-based discussions were carried out asynchronously frequently and occasionally.

Regarding item 20, it was found that 90.0% of the respondents never had interaction with the whole class on digital whiteboards. Likewise, in item 21, it was established that the same students during the covid-19 pandemic never had interaction on digital whiteboards with their work group in 100.0%.

Attending items 12 to 22, it is deduced that live teaching was biased and teacher-centered, however, in asynchronous teaching that was based on student-student and student-content interactions, they had a first contact with ICT-mediated education interactions that has a sense of both synchronous and asynchronous presence with little knowledge of the forms of interaction between the different actors, which contradicts Suárez (2010) who argues that a deep understanding of interactions and mediations is required both in the cooperative conditions of students and asynchronous mediations in virtual training, and that in turn,

involves a communicational aptitude that is beyond connectivity as a technical capacity in open environments (Gordillo et al., 2018).

Despite this, the asynchronous student-student interactions recognized students as subjects of teaching, in which a more advanced student could teach another with less knowledge, since there is a social presence (Garrison et al., 2000), which was centered on the maintenance of student participation and the diversity of content and information vehicles available on the platform. In this sense, it is inferred that interactions affect the flow of the learning curve, which requires them according to the principles of distance learning, design and instructional methods that include the three forms of interaction in ICT-mediated education described by Moore (1989) and Moore and Kearsley, (2012): between students and teacher, between student-student and between students and content.

Table 3. Effectiveness in learning

	Item	Options	No	Percentage
S y n c h r o n o u s m o d e e f	22 Was your learning assessed during the teacher's live classes (videoconference)?	Frequently	10	10,0%
		Occasionally	41	41,0%
		Never	49	49,0%
	23 Were you assigned tasks to perform during live classes (via videoconferencing)?	Frequently	0	0,0%
		Occasionally	0	0,0%
		Never	100	100,0%
	24 Did you conduct online tests during live classes (videoconferences)?	Frequently	0	0,0%
		Occasionally	25	25,0%
		Never	75	75,0%
	25 Did you take an online questionnaire during the live classes (via videoconference)?	Frequently	36	36,0%
		Occasionally	40	40,0%
		Never	24	24,0%
	26 Did you perform peer evaluation during live classes (via videoconference)?	Frequently	0	0,0%
		Occasionally	0	0,0%
		Never	100	100,0%
	27 Did you perform, minutes, content analysis, online test homework during live classes (via videoconferencing)? Frequently		0	0,0%

f e c t		Occasionally	0	0,0%
		Never	100	100,0%
A s y n c h r o n o u s m o d e e f f e c t	28 Was your learning assessed after the teacher's live lectures?	Frequently	100	100,0%
		Occasionally	0	0,0%
		Never	0	0,0%
	29 Were you assigned tasks to perform after the live classes?	Frequently	100	100,0%
		Occasionally	0	0,0%
		Never	0	0,0%
	30 Did you take an online test after the teacher's lectures?	Frequently	35	35,0%
		Occasionally	65	65,0%
		Never	0	0,0%
	31 Did you do an online questionnaire after the class with the teacher?	Frequently	35	35,0%
		Occasionally	65	65,0%
		Never	0	0,0%
	32 Did you perform post-class peer assessment in asynchronous activities?	Frequently	12	12,0%
		Occasionally	45	45,0%
		Never	43	43,0%
	33 Submitting work after class with the teacher?	Frequently	100	100,0%
		Occasionally	0	0,0%
		Never	0	0,0%
	34 Did you perform, work report, minutes, content analysis, online test homework after class with the teacher?	Frequently	100	100,0%
			0	0,0%
		Occasionally		
		Never	0	0,0%

The data recorded in Table 3 show that item 22 revealed that 49.0% of the students surveyed said that they were never evaluated in their learning during the live classes (videoconference), another 41.0% said that they were occasionally evaluated and 10% said that they were frequently evaluated. Regarding item 23, it is worth noting that 100.0% were assigned tasks to perform during the live classes. But 75.0% (Item 24) of them never took online tests during these classes mentioned, the rest did it occasionally.

However, they applied in item 25, online quizzes during the same classes in the following frequency proportion: 36.0% frequently; another 40.0% occasionally and never 24.0%. While with respect to items 26 and 27, 100.0% of the students surveyed stated that never in the live classes did they perform peer evaluation nor minutes, content analysis, online test task respectively.

Under this perspective, these results (items 22 to 27) make possible the effects in the

interactions in a synchronous manner presented in the teaching in the educational emergency times with the interactions with the didactic material, since it was found that the homework assignment (item 29) was the most used, which is consistent with what was found in the items (33 and 34) about sending assignments, minutes, content analysis, online test homework after class with the teacher, in which students required constant interaction with the content and in item 28, that students were frequently evaluated 100% after the live class with the teacher, through homework (item 29) with 100.0%, online test (item 30) and online quiz (item 31) with a periodicity each of frequently (35.0%) and occasionally (65.0%) respectively, as well as peer evaluation after the class in asynchronous activities: Frequently (12.0%), occasionally (45.0%) and never (43.0%).

These data show that some teachers are accustomed to lecturing with a whiteboard and directly filming courses with cameras, but others were less interactive in their participation in the learning and discussions developed online, although the organization of many in-class and after-class evaluations indicate that the interaction was focused on student-content, as well as teacher-student, in terms of interest and motivation of teachers to continue classes with technology, which coincides with the findings of Avendaño, Luna and Rueda (2021) that teachers have encouraged active participation, dynamic and have used relevant resources and educational media. Therefore, they have found a pedagogical value in ICT in times of crisis (Avendaño et al., 2021).

For the above mentioned and in spite of the use of instructional media, such as computer conferencing and the valuable levels of student-student and student-teacher interaction; it seems that classroom teachers who were forced to teach in the pandemic are not supported by highly interactive teaching and learning models and in line with the communicative ideals of university education. For gaps are observed that hinder the ability of students to project themselves socially and affectively in a community of inquiry, as raised by Garrison et al. (2000) on the social presence of students. Also, these data found is opposed to the instructional designs of ICT-mediated education by placing challenging tasks for students to interact with the content as proposed by Basantes et al. (2018) and that constitutes a filter with activities to share knowledge in a critical and reflective way through forums, chat, videoconferences and not as a fulfillment of tasks which is what was found in the present study.

BIBLIOMETRIC ANALYSIS
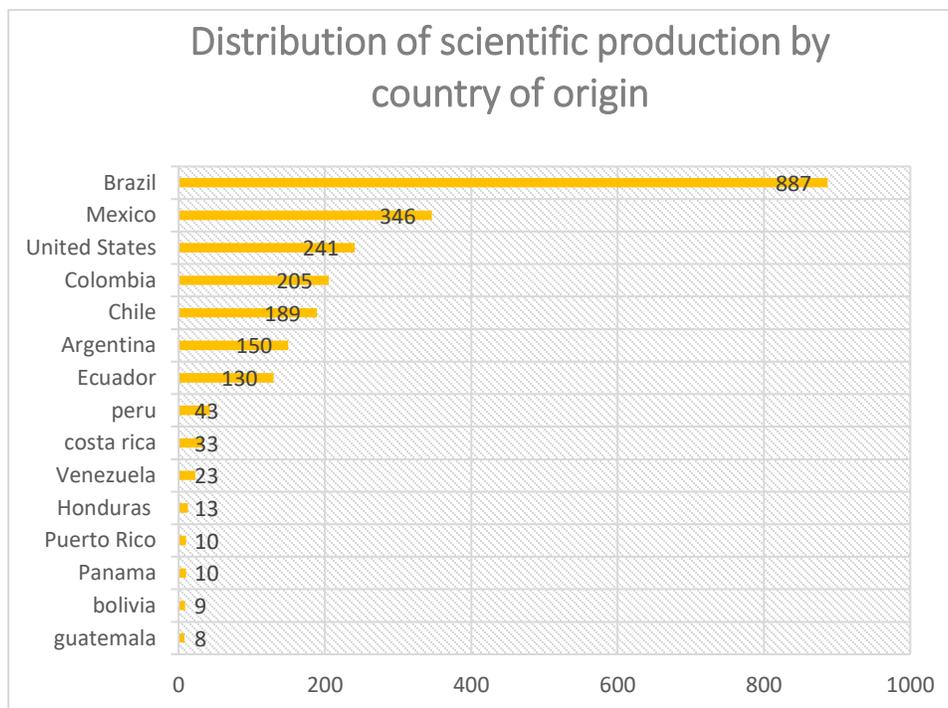**Classification by country (Latin America)**

Figure 1. Distribution of scientific production by country of origin.
Source: Own elaboration (2022); based on data provided by Scopus.

Brazil was the Latin American country with the largest number of publications referring to the study of Teleducation within the framework of Covid-19 as well as the measurement of students' perception of the new methodologies imposed to give continuity to academic training following the policies of social distancing. The total number of scientific papers published by authors affiliated to Brazilian institutions was 887, including articles such as "Remote teaching of pathology under the COVID-19 pandemic: perceptions of medical students" (Rodriguez, Zornoff & Kobayasi, 2022) whose objective was to analyze the perceptions of medical students on the benefits and difficulties of remote teaching of pathology during the COVID-19 pandemic. A questionnaire was applied to third year medical students who mostly considered live interactive lectures as superior to traditional face-to-face lectures, and stated that among the main difficulties encountered in virtual environments were the

difficulty in separating from home activities, lack of motivation and worsening quality of life due to physical distance from colleagues and faculty.

Conclusions

The interactions shown through the compelled processes in ICT-mediated education during the pandemic have a relatively marginalized feature compared to the specific teaching of distance learning, i.e., this compelled transition of interactions emphasizes only on providing relevant knowledge materials to students. Therefore, the teaching platform constituted a comprehensive and clear resource for publishing teaching contents, however, students faced teaching with a lack of interaction and guidance, due to the lack of communication and sharing of the learning process in interactions with technological media.

Thus, there is a lack of effective constraint on student-student interactions and feedback in teacher-student interactions, which has a contradiction that directly impacts the learning of knowledge and the quality of learning, as well as, self-learning to establish a complete system of teaching support services while the teacher effectively promotes interactions with their students, with each other and with the content.

The measurement of scientific production regarding the study of students' perception of ICT-supported education during the Covid-19 pandemic in Latin America reflects a generalized feeling among students, who have expressed in applied studies that although the academic contents continue to be of quality, the virtual methodology has disadvantages compared to face-to-face, opening the field even to an important debate involving aspects such as inequality due to the difficult access to digital tools and connectivity to an Internet network by low-income families. Therefore, it is expected that from the scientific experience it will be possible to design strategies that address these needs through the design of programs that seek to reduce this social gap.

Therefore, it is concluded that interactions in ICT-mediated education forced during confinement by Covid-19, require various forms of interactions for students that incorporate elements of teaching support between distance learners, the content, their peers and their teachers with a system of appropriate tools that provide formative and summative assessment, including self- and peer-assessment, ensuring the objectives and goals of learning, training and autonomy of learners with synchronous and asynchronous methods.

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