Analysis of virtual scientific research training in students of a private university in Lima in times of pandemic

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Abstract

This research was conducted under the interpretive paradigm, qualitative approach, hermeneutic design, and descriptive level. The main objective is to conduct a qualitative analysis of scientific research formation in undergraduate students of a private university in Lima in times of pandemic. The analysis was carried out with nine participants, students in semesters IX and X who virtually attend the Scientific Research course, a transversal subject taught by a private university in Peru, which is part of the research training. The in-depth interview technique was applied, and as an instrument, a semi-structured interview guide was applied initially to six participants and subsequently to the other three, until the information saturation point was reached. Once the data were collected and analyzed, it was determined that the transition from face-to-face to virtual education originated difficulties, due to the limitations inherent to technological connectivity in their training. It is concluded that training in scientific research is weak, due to the lack of an affective relationship in student-teacher interactions.

Keywords: Scientific research, university education, research training, e-learning, virtual education.

Introduction

I The emergence of the pandemic brought with it certain restrictive measures as a result of the spread of the Covid-19 virus, which has affected the dynamics of the different economic sectors in all countries (Chamorro-Atalaya et al., 2022). Education is no stranger to these changes; the closure of schools and universities also impetuously affected the traditional way in which classes were taught, likewise, research production in the first stage of the pandemic was impacted in all its phases (Chamorro-Atalaya et al., 2022; Pérez-Sánchez et al., 2022; and López Carmona et al., 2018).

Science and research are fundamental for the economic and social development of nations; scientific innovation, continues to mark a gap between regions, worldwide. For this reason, the development of research skills and research culture is promoted from the school stage and is generally developed at the university stage (Mormina, 2019). The mission of the university in contemporary times is to promote, stimulate and disseminate knowledge aimed at seeking continuous improvement in the integral formation of human beings and their role in society (González-Díaz et al., 2022). This knowledge is disseminated through articles and different scientific products (González-Díaz et al., 2022).

The research culture is related to the set of cognitive, evaluative, and attitudinal elements shared by an educational community, to increase

scientific productivity through productive research projects that are in line with the institutional lines of research (González-Díaz et al., 2022).

Scientific research is divided into 4 phases: the search for funding; data collection; data analysis; and the writing of scientific articles and student theses (Ortega-Rubio et al., 2020). The first one seeks to collect funds to be able to carry out the research exposing the contribution that the research will have to social welfare; the second consists of data collection through different collection instruments such as interviews, and sampling, among others; the third, consists of analyzing the data in laboratories or statistical programs to obtain and interpret the results; finally, the last phase, consists of writing the entire research adding the introduction, methodology, results, discussion and conclusions and references (Ortega-Rubio et al., 2020).

The effort made in the educational sector to move from face-to-face teaching to online classes of university subjects and to face the pandemic has had both positive and negative impacts; for example, teaching strategies have had to be restructured, so that factors such as the lack of knowledge of virtual platforms, the failure of Internet connectivity, the lack of collaborative attitude in students and the excessive load of tasks or activities generate some discomfort, which students and teachers relate directly to virtual classes (Vital-López et al., 2022).

Scientific and technological research activities, within each of its 4 phases, were also affected by the restrictions that were imposed, due to the confinement related to the COVID-19 pandemic, so only higher education institutions that adapted more quickly to the new challenges and could restructure, a product of the flexibility of the teaching processes of this subject, were able to manage more efficiently the contingency (Ortega-Rubio et al., 2020). This invited both teachers and students to assume new competencies, which would allow them to continue improving the indicators related to research culture in the digital era (González-Díaz et al., 2022). After a year and a half of the

pandemic, it is known that many the educational institutions have managed to adapt to the rapid changes: implementing their digital platforms providing training support to their teachers and students (mostly young people), are choosing to adapt to digital education, although the gap is still open with those who do not have the adaptive facilities.

The present research aims to conduct a qualitative analysis of scientific research training in undergraduate students at a private university in Lima in times of pandemic.

TECHNOLOGICAL MEANS TO FACILITATE E-LEARNING IN SCIENTIFIC RESEARCH

The new tools belonging to the digital era open multiple possibilities for innovation and promotion of scientific activity (Picó et al., 2019).

There is a tool called transmedia, which focuses on making the process of communicating a message didactic, it can even be applied in academic institutions, to promote scientific research (Picó et al., 2019). Its application favors the participatory culture oriented to the simultaneous co-creation of content related to research in social media, these contents can show internal processes of the project such as drafts of the research, images of meetings, and brainstorming, among other contents that allow the virtuality to be carried in a better way (Picó et al., 2019).

On the other hand, Pérez-Manzano and Almela-Baeza (2018), refer to gamification as a useful tool for the application of tools used in a gaming environment in a different context such as scientific research. They propose the Antarctica project, where through a game a story is narrated in which there has been sabotage to active research scientific facilities, as the plot progresses the student will discover the importance of research and the unethical interests of the antagonists (Pérez-Manzano and Almela-Baeza, 2018).

Finally, the platforms for online classes, present class contents in different formats, including the

course schedule, objectives, methodology, activities, and evaluations. Some add forums for doubts, participation and evaluation, and feedback activities. These platforms help to guide students and teachers through the course to achieve learning effectiveness (Pérez-Sánchez et al., 2022).

A virtual environment is needed, through digital tools and platforms, which offer the possibility of managing knowledge, tasks, and evaluations, efficiently in a virtual environment, through pedagogical design and technologies, since the use of the latter, without taking into account a change in methodology will not be successful in improving academic performance and the promotion of research in university students (Casero and Sanchez, 2022).

METHOD

This research was conducted from the interpretative paradigm and qualitative approach, of dialectical and systemic nature, whose results come from the dialectic between subject and object of study. It is of a descriptive level and takes the hermeneutic design, whose central activity is to interpret the meaning of the texts, in this case, of the answers of the participants of an in-depth interview (subject of the script in Table 1). The participants were nine undergraduate students from a private university in Lima, belonging to the last academic semesters of their careers. Initially, there were six participants; later, the number of participants increased until reaching the point of saturation of the required information.

Table 1 Interview script

In-depth interview script for participants

In-depth interview script for participants
Appreciation of virtual education
Experiences in the transition phase: face-to-face to virtuality
Effects on professional training
Appreciation in scientific research training
Proposals for improvement in university education, with emphasis on scientific research.

Note: Own elaboration.

The qualitative data obtained through the interview went through a process of data reduction (information considered not relevant to the research such as questions and answers out of context), categorization, coding, interpretation, and discussion. The analysis was performed with Atlas.ti. The research presents scientific rigor in that it meets the criteria of credibility, transferability, and auditability of the data.

The research design is detailed in Table 2:

Table 2 Phases of content analysis of in-depth interview responses

Content analysis
Transcription of questions and answers from in-depth interviews
Coding of interview responses
First dump
Input of codes into Atlas qualitative software. Ti
Elaboration of qualitative maps
Second dump

Analysis of results by categories and subcategories

Interpretation of categories and subcategories

Discussion of results (empirical and theoretical triangulation)

Conclusions

Note: Own elaboration.

In accordance with the categorization process, the following categories and subcategories were obtained from the data considered relevant:

Table 3 Categorization matrix

| Categories	Subcategories
Virtual education	1. Transition phase from face-to-face education to virtuality: impact
	2. Impact on scientific research training
Training in scientific research	1. Training in scientific research in face-to-face education
	2. Training in scientific research in virtual education
	3. Improvement proposal for scientific research training

Note: Own elaboration.

RESULTS AND DISCUSSION

Figure 1 shows the qualitative map for the category "Virtual education" and the subcategory "Transition phase from face-to-face to virtual education".

Figure 1 Transition phase: face-to-face education to virtuality: impact
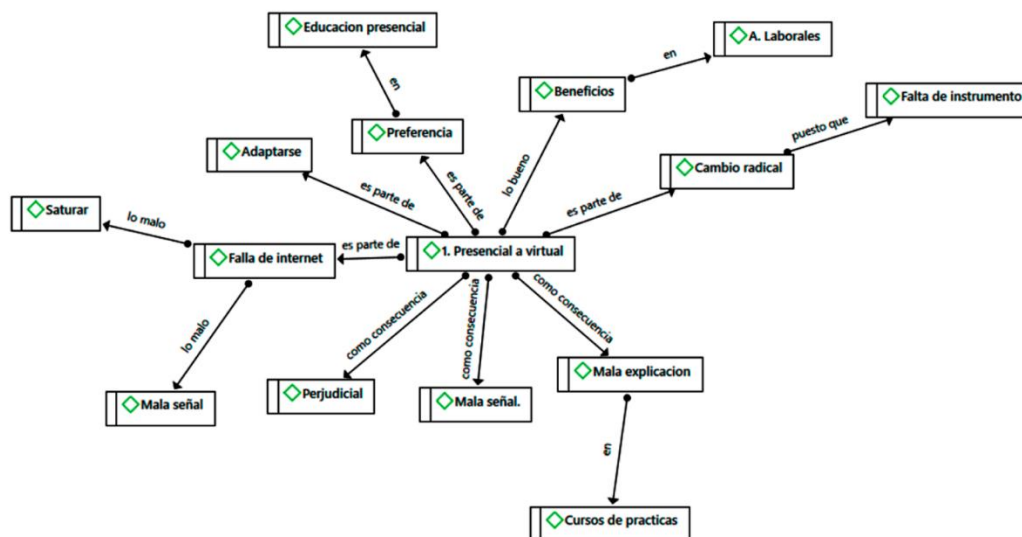
Category 1: virtual education, Subcategory 1: transition phase: face-to-face education to virtuality - affectation

Note: Own elaboration.

Interpretation: As a consequence of the pandemic, the university has had to adapt its virtual educational system by designing and implementing digital platforms, so that teachers can guide their teaching to students with the use of digital tools. In other words, the transition phase from face-to-face to virtuality has caused, according to the results of the research, a degree of affectation on students in terms of their professional training due to two main aspects: technology and teaching.

Regarding technology, there were certain deficiencies such as weak signal, power or internet cuts, saturation due to the number of users using certain platforms, among others, because it was in the process of implementation

and adaptation; and as for teaching, there were limitations in the didactic explanation of the teacher, which could not be reinforced in the field or laboratories, as a fundamental part of the training. However, as the system was established and adapted, certain advantages could not be denied, especially those related to the flexibility of schedules, which favored the students who worked, since they did not have to invest time in the transportation that moved them from the university or home to their work centers.

Figure 2 shows the qualitative map referring to the category "Virtual education" and the subcategory "Impact on training in scientific research".

Figure 2 Impact on scientific research training

Subcategory 2: Impact on scientific research training
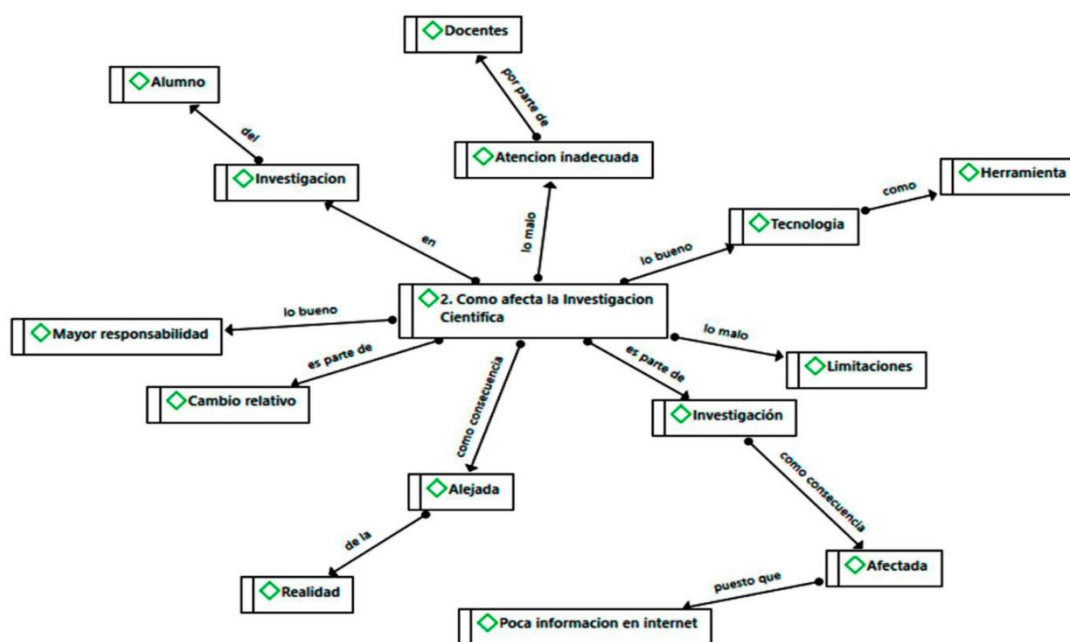
Note: Own elaboration

Interpretation: About the impact generated by the change from face-to-face to virtuality in scientific research training, according to the results, this has been affected to a certain extent. Among the negative aspects, it has been observed that the students have not been close to the field (reality) because they have received non-face-to-face classes; likewise, the research training should take place in reality, especially regarding the application of data collection

instruments; it also highlights the inadequate attention by the teachers of the course to their students, due to the large number of students that must attend to give advice, short time of virtual classes and the overinformation present on the Internet, which is further reduced, due to technical problems. The interviewees also refer as a limitation to the lack of reliable information on the Internet, which can be inferred to be due to the lack of adequate teaching guidance, since there is a vast amount of information on the Internet: research background, theories,

concepts, research instruments, among others. The positive aspects that stand out are that students have adapted to virtual education, because, being in constant contact with the Internet and technology, they manage, even better than teachers, the technological tools, also, this allows them to develop greater responsibility for their training and they

consider that this change is relative but understandable.

Figure 3, as a result, shows the qualitative map referring to the category "Training in scientific research" and the subcategory "Training in scientific research in face-to-face education".

Figure 3 Scientific research training in face-to-face education
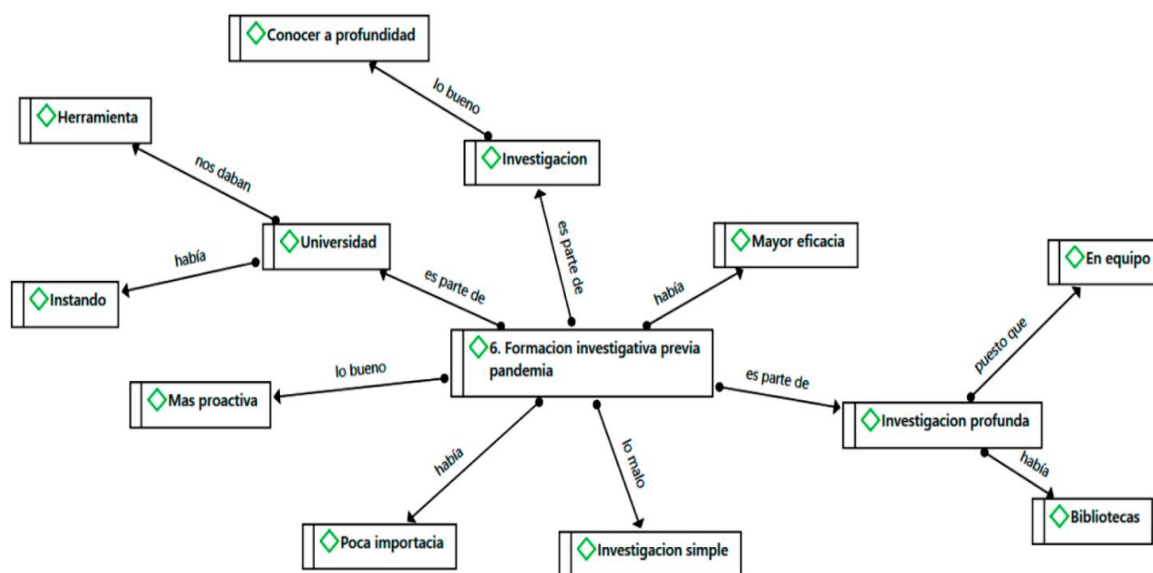
Category 2: scientific research training, Subcategory 1: scientific research training in face-to-face education.
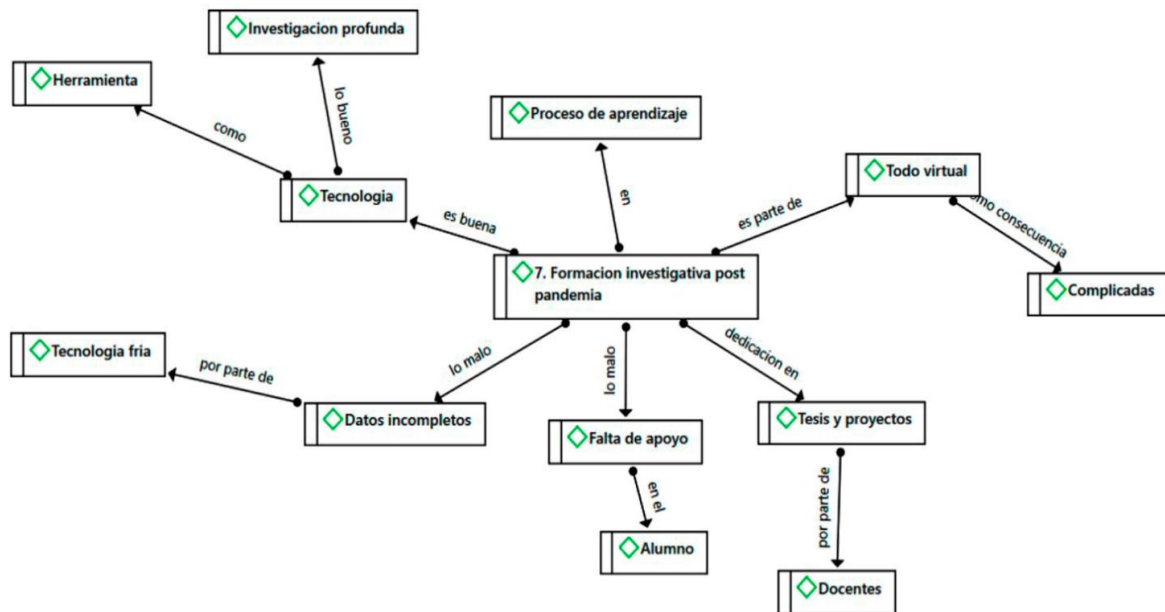
Note: Own elaboration

Interpretation: To have comparative results in scientific research training in face-to-face and virtual education, the positive aspects of face-to-face education are that it was more proactive in the teacher-student relationship, the in-depth knowledge in research, the provision of tools by the university, the use of libraries and teamwork;

in fact, these are essential aspects for an adequate research training to have effectiveness in teaching. However, negative aspects of face-to-face training are highlighted in terms of simple research, and the little importance given to the course, which can be taken into account for improvement rethinking at the university.

In Figure 4, as a result, the qualitative map referring to the category "Training in scientific research" and the subcategory "Training in scientific research in virtual education" can be observed.

Figure 4 Training in scientific research in virtual education

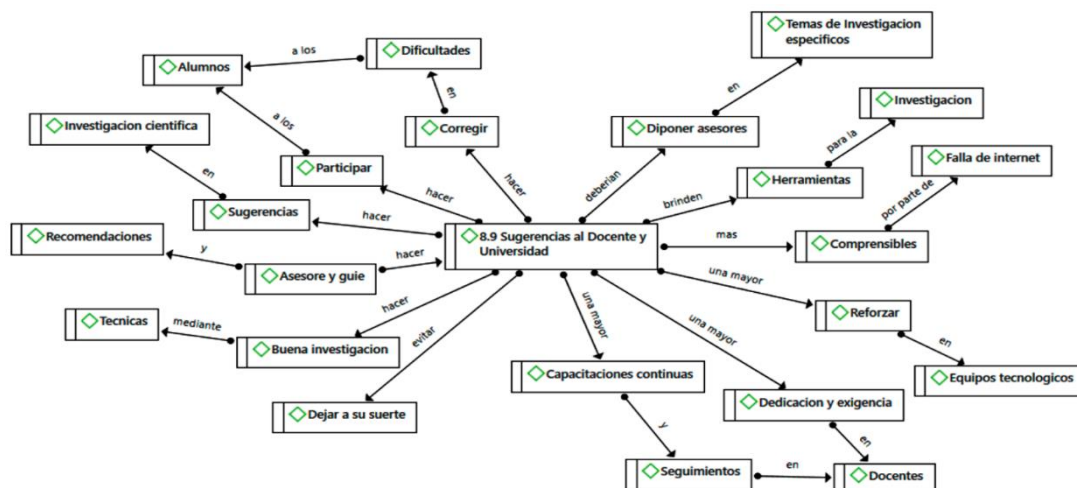Subcategory 2: scientific research training in virtual education

Note: Own elaboration

Interpretation: According to the results of the study, research training in remote education presents two areas, one positive and the other negative. The negative one refers to the lack of constant support to students by the teacher and the university itself in the dedication to research as a teaching focused on the development of research projects and theses; and complications in the centralism to virtuality which leads to obtaining incomplete data with a "cold technology", the latter understood as lack of the affective relationship that students acquire in face-to-face interaction with their teachers and classmates. The positive area is centered on the fact that students consider that technologies are allowing them to carry out deeper research by having access to broader information, innovative topics, and new and sufficient search engines in the networks, which correspond to their university learning process.

In Figure 5, as a result, the qualitative map referring to the category "Training in scientific research" and the subcategory "Proposal for improvement for training in scientific research" can be observed.

Figure 5 Improvement proposal for scientific research training

Subcategory 3: improvement proposal for scientific research training.

Note: Own elaboration

Interpretation: The research also sought to receive from the student's suggestions addressed to their scientific research teachers and the university for the improvement of negative aspects that limit their research training. Several subcategories emerge from this research: reinforcement of technological equipment; provision of tools for research; availability of advisors on specific research topics; continuous training and follow-up of teachers; they also suggest that their teachers advise and guide them more frequently and in a sustained manner; correct difficulties in the learning process; conduct good research using different techniques; greater dedication and demand in advising and not leave them "to their own devices". The students consider that diploma courses in scientific research should be carried out in virtual and face-to-face modalities to consolidate their research capacities, which will allow them to program themselves and alternate work and study.

DISCUSSION

The results obtained, according to the category "virtual education" and the subcategory "transition phase: face-to-face education to virtuality - impact" are similar to those reported by Regehr and Goel (2020); and Ebner et al. (2020) in the sense that higher education has been affected by the covid-19 pandemic, due to the difficulties in guaranteeing teaching and learning processes and training in scientific research in virtual environments. Universities and other higher education institutions have been forced to move rapidly from face-to-face classes to online education, causing the reorientation of their academic and administrative processes towards digitization (Murphy, 2020). However, the pandemic phenomenon has posed new challenges to educational institutions, such as the short migration time of adaptability to virtual education, creating uncertainty in the teaching-learning processes, and the need for better learning approaches (Huang et al., 2020). In fact,

in some countries, the pandemic is an unprecedented phenomenon causing their higher education institutions to rethink their teaching and learning models (Murphy, 2020).

Chamorro-Atalaya et al. (2022) also argue that, in addition to the implementation of virtual tools, the teaching-learning processes should be restructured to increase competitiveness and generate positive results in the perception of educational quality by students. Likewise, the use of user-friendly platforms that allow teachers and students to navigate smoothly and do not saturate the network should be one of the objectives of any higher education institution (Chamorro-Atalaya et al., 2022).

Although access to the Internet and the existence of technological platforms before the pandemic made it possible to move from face-to-face to virtual education, some studies report that the abrupt change has led to a decline in the quality of teaching and learning despite the efforts made (Bedoya-Dorado et al., 2021). The change from virtual to face-to-face education required various methodological adjustments, which not all university teachers can adopt correctly, causing students to perceive poor teaching quality (Pérez-Sánchez et al., 2022). The motivation of teachers creates adequate space for them to accept changes and allows that, despite the constant use of digital tools, the active role of students is maintained (Gómez-García et al., 2022).

The an imperative need to implement technological tools to improve educational quality, especially in post-pandemic periods (Krishnamurthy, 2020). Therefore, the poor management of virtual platforms, the lack or failure of internet connectivity, lack of participation in classes by students, the pressure in the work environment, and the perception that students have a greater load of activities and tasks affect the efficiency of virtual education (Vital-López et al., 2022 and Vázquez-Cano et al., 2022). In the words of Regehr and Goel (2020) the pandemic caused by covid-19 constitutes not only an emergency routine but a real crisis that requires new and meaningful responses that link the whole society.

The results of the research by Tejedor et al. (2020) report that the majority of university students value negatively the transition from face-to-face to virtuality, since they recurrently associate it with an increase in the academic and emotional burden.

Concerning the results obtained, according to the category "virtual education" and subcategory "impact on training in scientific research", university students consider that virtual education has had a negative impact on their view of their teachers while demanding basic digital competencies from their trainers. Gertrudix (2021) points out that although digital channels facilitate access to vast information, so without proper guidance from teachers, overinformation, infoxication, and information clutter act as forces of dispersion of attention towards the main objective of the research.

This type of education has required express learning for many teachers in the management of technologies (Cáceres-Muñoz et al., 2020) to have access to remote education, although inequalities of accessibility have been evidenced, especially in more vulnerable social groups (Cervantes Gutiérrez, 2020).

Likewise, Ortega-Rubio et al. (2020) indicate that, in the data collection phase, fieldwork and experimental work are developed, within a laboratory, so it must be done in person because it is necessary to travel in some type of transport to take measurements, physical, chemical, social or economic surveys and take the results to experimental laboratories, which are also affected by the amount of capacity. Hude et al. (2022) agree and indicate that the facts that occur in the field increase the enthusiasm of students in research, so online learning needs various means of support to avoid boredom.

Similarly, Montenegro-Rueda et al. (2021) agree and indicate that virtual education, related to research, in the university environment, prevents the concentration of students in face-to-face classes and deprives them of the experience of collecting data in person, going to laboratories, and performing the phases of research in situ. In fact, "scientific culture" should not be reduced to a simple collection of concepts and facts, but these should go hand in hand with the cognitive capacities of the subjects, including positive attitudes and evaluations, in a face-to-face manner toward science (Sánchez-Mora et al. 2020).

Casero and Sánchez (2022) argue that the main advantage of confinement is that students can continue their studies from their homes, which can eliminate a factor related to university dropout due to lack of time or resources since many universities also reduced their pension payments because classes were no longer offered in their facilities.

Concerning the results obtained, according to the category "training in scientific research" and subcategory "training in scientific research in face-to-face education" these results are reinforced by what is specified by Ruiz-Robledillo et al. (2022) and Gavriluta et al. (2022), who agree that distance education, does not allow the availability of appropriate technical equipment and laboratories found in the classroom; the discipline taught by teachers within the classroom; socializing "face to face" with peers and teachers, and the traditional teaching methodology already dominated by university teachers. The lack of socialization can even affect the emotional state of students, which also affects academic performance and experience in virtual education (Bourion-Bédès et al., 2021). Serrano et al. (2022) agree that the obligation of students to adapt to the online mode of teaching violates them and can lead them to experience psychological distress due to the burden of academic and family responsibilities.

Mormina (2019) argues that scientific capabilities are presented in the context of each country and are rooted in historical, cultural, and social influences, so the importance of interpreting science and research as the tools to improve some problems in their reality should be emphasized because if the importance and validity of research are not internalized in emerging countries indifference towards scientific research courses will continue. Casero and Sanchez (2022) indicate that a virtual environment may decrease interest in certain theoretical subjects, so teachers should work

with the help of technological and communication tools to improve communication channels with students and propose activities for exchanging opinions and debates to maintain interest in the class.

Concerning the results obtained, the category "training in scientific research" and subcategory "training in scientific research in virtual education" can be corroborated with what was reported by Ortega-Rubio et al. (2020), who argue that during the data analysis stage, usually, face-to-face meetings are held to establish the procedures to be followed and the assignment of functions, so that later they can meet to review the progress; however, in the new normal, the meetings would be virtual and not everyone will be able to see at the same time the results of the physical analysis of the field samples performed in the laboratory.

On the other hand, Ruiz-Cabezas et al. (2022) argue that the training of university teachers in digital tools is necessary for the development of innovation as competence, which contributes to improving scientific production since the culture of innovation increases the number of publications with innovative topics that bring about renown to the institution. Flores-Cáceres et al. (2021) agree and also argue that university teachers focus only on meeting the objectives of the curriculum; however, they do not restructure their didactic strategies so that these objectives are achieved in a virtual environment.

Fedotova et al. (2021), on the other hand, argue that direct communication is a fundamental value to transmit not only information, but also experience and cultural codes between teachers and students, so the elimination of lectures and seminars would have a negative impact on university education.

Finally, concerning the results obtained, according to the category "training in scientific research" and subcategory "Proposal for improvement for training in scientific research" the authors Chamorro-Atalaya et al. (2022) agree and consider necessary the exhaustive monitoring of the performance of teachers and their pedagogical strategies in the collaborative learning process, since in this environment the relationship between the teacher and the student is perceived and how the teacher's strategies make the university student seek and generate his knowledge and how the impact of his achievements on the educational quality indexes of the institution. Any learning process must contemplate teacher accompaniment, which is difficult in a virtual environment; personal contact is beneficial to maintaining student motivation (Rembielak and Marciniak, 2021; and Boté-Vericad, 2021).

Flores-Cáceres et al. (2021), on the other hand, argue that a good performance of the research teacher should be embodied in the willingness for changes in the teaching-learning processes in virtual education; however, he concludes that the teaching effectiveness for students to acquire relevant knowledge and skills has decreased and this is related to the low innovation of the didactic strategies used. Daniela et al. (2018) agree that the use of new methodologies, frameworks, and innovative approaches provides a bold response to the global need for distance education, training, and research.

Likewise, about what was found, Chamorro-Atalaya et al. (2022) found that 30% of university students maintain that teachers should have the disposition to provide personalized attention and constantly update the methodology they use.

CONCLUSIONS

Training in scientific research in university students in times of pandemic has been relegated, especially in the transition phase from face-to-face to virtuality. Understanding that one learns to do research by doing it, the fieldwork phase (application of data collection instruments) has been limited; in many cases, instruments have had to be applied virtually. Although, with the implementation of technologies in the academic world, it is easier to find scientific information that contributes to the research training of university students; nevertheless, a positive attitude towards scientific knowledge is required from them and their teachers.

As a result of the pandemic, the university has been obliged to condition its virtual educational system, through the design and implementation of digital platforms, whose main objective is that teachers continue with the teaching, guidance, monitoring, and supervision of their students through these platforms. This transition phase, from face-to-face to virtuality, has caused, according to the results of the research, affectation on students in terms of their professional training, due to two main aspects: technology and teaching.

For training in scientific research, the negative aspects are that students have not been close to the field or laboratories (reality) because they have received non-face-to-face classes and research training should take place in reality, especially concerning the application of data collection instruments. On the other hand, the inadequate attention or lack of support from the teachers of the course to their students stands out, because the pressure from the students to get support is greater in the classroom.

Among the most positive aspects of face-to-face education is that it is more proactive in the teacher-student relationship, the in-depth knowledge in research, the provision of tools by the university, the use of libraries, and teamwork, which are essential aspects of adequate research training and to be effective teaching.

Concerning remote education, two areas are also presented; the dedication of research as teachings focused on the elaboration of research projects and theses; however, the negative aspect is the lack of constant support to students by the teacher and the university itself. The complications in the centralism to the virtuality lead to the obtaining of incomplete data with a "cold technology", understanding this last one as a lack of the affective relationship that the students acquire in the presentiality when interacting with their teachers and classmates.

Conflict of interest

The authors declare that they have no conflicts of interest in the process of drafting, revising, and publishing this article.

References

[1] Bedoya-Dorado, C., Murillo-Vargas, G., y González-Campo, C. (2021). Gestión universitaria en tiempos de pandemia por COVID-19: Análisis del sector de la educación superior en Colombia. Estudios Gerenciales, 37(159), 251-264. http://dx.doi.org/10.18046/j.estger.2021.159.4409

[2] Boté-Vericad J. (2021). Perceived barriers for distance teaching in higher education during the COVID-19 crisis: "I never did a video before". Education for Information, 37 (3), pp. 377 - 397. https://doi.org/10.3233/EFI-200418

[3] Bourion-Bédès, S., Tarquinio, C., Batt, M., Tarquinio, P., Lebreuilly, R. Sorsana, C. Legrand, K. Rousseau, H. y Baumann, C. (2021). Stress and associated factors among French university students under the COVID-19 lockdown : The results of the PIMS-CoV 19 study. Journal of Affective Disorders, 283, pp. 108 -114. https://doi.org/10.1016/j.jad.2021.01.041

[4] Cáceres-Muñoz, J., Jiménez, A. y Martín-Sánchez, M. (2020). Cierre de Escuelas y Desigualdad Socioeducativa en Tiempos del Covid-19. Una Investigación Exploratoria en Clave Internacional. Revista Internacional de Educación para la Justicia Social, 9(3). https://doi.org/10.15366/riejs2020.9.3.011

[5] Casero, M., y Sánchez, M. (2022). Cambio de modalidad presencial a virtual durante el confinamiento por Covid-19: percepciones del alumnado universitario. RIED. Revista Iberoamericana de Educación a Distancia, 25 (1), pp. 243-260. https://doi.org/10.5944/ried.25.1.30623

[6] Cervantes, E. y Gutiérrez, P. (2020). Resistir la Covid-19. Intersecciones en la Educación de Ciudad Juárez, México. Revista Internacional de Educación para la Justicia Social, 9(3). https://doi.org/10.15366/riejs2020.9.3.001

[7] Chamorro-Atalaya, O., Alvarado-Bravo, N., Aldana-Trejo, F., Huarcaya-Godoy, M., Anton-De los Santos, M., Anton-De los Santos, J. y Fierro-Bravo M. (2022). Technological tools for virtual teaching and their effect on the satisfaction of online learning. Indonesian Journal of Electrical Engineering and Computer Science, 25 (3), pp. 1634 - 1643.

https://doi.org/10.11591/ijeecs.v25.i3.pp16 34-1643

[8] Chamorro-Atalaya, O., Marcelo-Veliz, B., Morales-Romero, G., Trinidad-Loli, N., Villar-Valenzuela, D., Caycho-Salas, B. y León-Velarde, C. (2022). Collaborative learning through virtual tools : Analysis of the perception of student satisfaction of teaching performance. Indonesian Journal of Electrical Engineering and Computer Science, 26 (2), pp. 1082 - 1090. https://doi.org/10.11591/ijeecs.v26.i2.pp10 82-1090

[9] Chamorro-Atalaya, O., Morales-Romero, G., León-Velarde, C., Quevedo-Sánchez, L., Medina-Bedón, Y., Tasayco-Jala, A. y Fierro-Bravo, M. (2022). Functionality of the learning platform and its effect on the satisfaction of students in the online teaching environment. Indonesian Journal of Electrical Engineering and Computer Science, 26 (2), pp. 1073 - 1081.https://doi.org/10.11591/ijeecs.v26.i2 .pp1073-1081

[10] Ebner, M., Schön, S., Braun, C., Ebner, M., Grigoriadis, Y., Haas, M. y Taraghi, B. (2020). COVID-19 epidemic as E-learning boost? Chronological development and effects at an Austrian university against the background of the concept of "E-learning readiness." Future Internet, 12(94), 1-20. https://doi.org/10.3390/FI12060094

[11] Fedotova, O., Platonova, E., Igumnov, O., Bu, T. y Zhang, T. (2021). The impact of the digital technological platforms on the institutional system of the higher education during the COVID 19 pandemic. E3S Web Conf., 273, 12069. https://doi.org/10.1051/e3sconf/20212731 2069

[12] Feng, Z. (2021). Research on the systematization of sports students in scientific exercise training. Revista Brasileira de Medicina do Esporte, 27 (5), pp. 494 - 497. https://doi.org/10.1590/1517-8692202127042021_0093

[13] Flores-Cáceres, R., León-Velarde, C., Díaz-Leyva, T., Escobedo-Bailón, F., Ortega-Galicio, O., Chirinos-Mendoza, A. y Tasayco-Jala, A. (2021). Virtual education and student perception of teacher performance in the distance learning environment. Indonesian Journal of Electrical Engineering and Computer Science, 24 (3), pp. 1638 - 1646. https://doi.org/10.11591/ijeecs.v24.i3.pp16 38-1646

[14] Gavriluta, C., Dalban, C. y Ioan, B. (2022). Educational, Emotional, and Social Impact of the Emergency State of COVID-19 on Romanian University Students. International Journal of Environmental Research and Public Health, 19, 3990. https://doi.org/10.3390/ijerph19073990

[15] Gertrudix, M., Rajas, M., Romero-Luis, J. y Carbonell-Alcocer, A. (2021). Comunicación científica en el espacio digital. Acciones de difusión de proyectos de investigación del programa H2020". Profesional de la información, v. 30, n. 1, e300104. https://doi.org/10.3145/epi.2021.ene.04

[16] Gómez-García, M., Vizcaíno-Imacaña, P., Ortíz-Padilla, M. y Soto-Valera, R. (2022). Análisis de las experiencias de los docentes con los espacios virtuales de aprendizaje: el caso de la Universidad Internacional del Ecuador UIDE. Revista Electrónica Interuniversitaria de Formación del Profesorado, 25 (2), pp. 113-127. https://doi.org/10.6018/reifop.518121

[17] González-Díaz, R., Acevedo-Duque, A., Martin-Fiorino, V. y Cachicatari-Vargas, E. (2022). Latin American professors' research culture in the digital age. Comunicar, 70 (30), pp. 71-83. https://doi.org/10.3916/C70-2022-06

[18] Huang, R., Tlili, A., Chang, T., Zhang, X., Nascimbeni, F. y Burgos, D. (2020). Disrupted classes, undisrupted learning during COVID-19 outbreak in China: Application of open educational practices and resources. Smart Learning Environments, 7 (19), 1-15. https://doi.org/10.1186/s40561-020-00125-8

[19] Hude, D. Shunhaji, A., Siskandar y Hasanah, H. (2022). Online Learning And Mental Healt To Rise The Students Interest In High School Di Indonesia. Journal of Positive School Psychology, Vol. 6, No. 6, pp. 60 – 70. https://journalppw.com/index.php/jpsp/arti cle/view/7039

[20] Krishnamurthy, S. (2020). The future of business education: A commentary in the shadow of the COVID-19 pandemic. Journal of Business Research, 117, 1-5.

https://doi.org/10.1016/j.jbusres.2020.05.0 34

[21] Lacalle, J. y Vilar, M. (2019). Estudios literarios y lectura distante: un primer acercamiento a la actualidad de la investigación en las revistas académicas argentinas". Anclajes, vol. XXIII, n.° 1, enero-abril 2019, pp. 19-40. https://doi.org/10.19137/anclajes-2019-2312

[22] López, L., López, B. y Prieto, E. (2018). Tendencias innovadoras en la formación on-line. La oferta web de postgrados e-learning y blended learning en España. Píxel-Bit, (53), 1-15. https://doi.org/10.12795/pixelbit.2018.i53.06

[23] Montenegro-Rueda, M., Luque-de la Rosa, A., Sánchez-Serrano, J., Fernández-Cerero, J. (2021). Assessment in Higher Education during the COVID-19 Pandemic: A Systematic Review. Sustainability, 13, 10509. https://doi.org/10.3390/su131910509

[24] Mormina, M. (2019). Science, Technology and Innovation as Social Goods for Development: Rethinking Research Capacity Building from Sen's Capabilities Approach. Sci Eng Ethics 25, 671–692 . https://doi.org/10.1007/s11948-018-0037-1

[25] Murphy, M. (2020). COVID-19 and emergency eLearning: Consequences of the securitization of higher education for postpandemic pedagogy. Contemporary Security Policy, 41(3), 492-505. https://doi.org/10.1080/13523260.2020.1761749

[26] Ortega-Rubio, A., Murillo-Amador, S., Díaz-Castro, L., Beltrán-Morales, G. Gómez-Anduro, G., Castro-Iglesias, C. y Blázquez, C. (2020). COVID-19: Los reajustes en el trabajo de investigación científica en México. Terra Latinoamericana, 38. pp. 917-930. https://doi.org/10.28940/terra.v38i4.864

[27] Pérez-Manzano, A. y Almela-Baeza, J. (2018). Gamification and transmedia for scientific promotion and for encouraging scientific careers in adolescents. Comunicar, 55, 93-103. https://doi.org/10.3916/C55-2018-09

[28] Pérez-Sánchez, L., Lavandera-Ponce, S., Mora-Jaureguialde, B. y Martín-Cuadrado, A. (2022). Training Plan for the Continuity of Non-Presential Education in Six Peruvian Universities during COVID-19. International Journal of Environmental Research and Public Health, 19, 1562. https://doi.org/10.3390/ijerph19031562

[29] Picó, M., Sáez, E. y Galán, E. (2019). Investigación transmedia. Cultura participativa en la Creación del conocimiento académico. El profesional de la información, v. 28, n. 4, e280414. https://doi.org/10.3145/epi.2019.jul.14

[30] Regehr, C. y Goel, V. (2020). Managing COVID-19 in a large urban research-intensive university. Journal of Loss and Trauma, 25(6-7), 1-17. https://doi.org/10.1080/15325024.2020.1771846

[31] Rembielak, G. y Marciniak, R. (2021). The Value of Postgraduate Students Opinions in the Quality Management of Academic E-Learning. Foundations of Management,13 (1), pp. 183-194. https://doi.org/10.2478/fman-2021-0014

[32] Riofrío-Calderón, G. y Ramírez-Montoya, M. (2022). Mediation and Online Learning : Systematic Literature Mapping 2015–2020. Sustainability, 14, pp. 2951. https://doi.org/10.3390/su14052951

[33] Ruiz-Cabezas, A., Medina-Domínguez, M., Subía-Álava, A., y Delgado-Salazar, J. (2022). Evaluation of a competences training program for university professors : a case study. Formación universitaria, 15 (2), pp. 41-52. https://dx.doi.org/10.4067/S0718-50062022000200041

[34] Ruiz-Robledillo, N., Vela-Bermejo, J., Clement-Carbonell, V., Ferrer-Cascales, R., Alcocer-Bruno, C. y Albaladejo-Blázquez, N. (2022). Impact of COVID-19 Pandemic on Academic Stress and Perceived Classroom Climate in Spanish University Students. International Journal of Environmental Research and Public Health, 19, pp. 4398. https://doi.org/10.3390/ijerph19074398

[35] Serrano, J., Reyes, M. y de Guzman, A. (2022). Psychological Distress and Coping of Filipino University Students amidst the Global Pandemic: A Mixed-Method Study. Journal of Positive School Psychology, 6 (6), pp. 373 – 386. https://journalppw.com/index.php/jpsp/article/view/6918

[36] Sánchez-Mora, M., Aguilera-Jiménez, P., Hernández-Arellano, M., y Patiño-Barba, M., (2020). Aplicación de los conocimientos científicos y la prevención de Covid-19 en México en tiempos de la posverdad. Prisma Social, (31), 82-109. https://www.proquest.com/scholarly-journals/aplicación-de-los-conocimientos-científicos-y-la/docview/2465812904/se-2?accountid=37408

[37] Tejedor, S., Cervi, L., Tusa, F., y Parola, A. (2020). Educación en tiempos de pandemia: reflexiones de alumnos y profesores sobre la enseñanza virtual universitaria en España, Italia y Ecuador. Revista Latina de Comunicación Social, (78), 1-21. http://dx.doi.org/10.4185/RLCS-2020-1466

[38] Vázquez-Cano, E., Parra-González, M., Segura-Robles, A. y López-Meneses, E. (2022). The negative effects of technology on education: a bibliometric and topic modeling mapping analysis (2008-2019). International Journal of Instruction, 15 (2), 37-60.
https://doi.org/10.29333/iji.2022.1523a

[39] Vital-López, L., García-García, R., Rodríguez-Reséndíz, J., Paredes-García, W., Zamora-Antuñano, M., Oluyomi-Elufisan, T., Rodríguez, H., Álvarez, A. y Cruz-Pérez, M. (2022). The Impacts of COVID-19 on Technological and Polytechnic University Teachers. Sustainability, 14, pp. 4593. https://doi.org/10.3390/su14084593