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Emergency remote teaching in higher education institutions during the COVID-19 pandemic: a systematic review of the literature

Daiany Alves Araújo Moreira

Tocantins State University (UNITINS), Dianópolis, Tocantins, Brazil,
daiany.aa@unitins.br

Mônica Aparecida da Rocha Silva

Federal University of Tocantins (UFT), Palmas, Tocantins, Brazil,
monicars@mail.uft.edu.br

Abstract: Due to the Covid-19 pandemic, Higher Education Institutions (IES) suspended regular classes and adopted Emergency Remote Teaching (ERE), allowing the continuity of learning. In this sense, this article aimed to describe the main challenges and benefits of Emergency Remote Teaching in HEIs, using as methodology the systematic literature review, the method proposed by the authors Centobelli, Cerchione, and Esposito (2017). The results showed that the main challenges faced by HEIs were: insufficient resources for online learning, network connectivity, and Internet access, technical skills of teachers, inadequate curriculum, adaptation of the course and assessment process, little interaction, loss of focus, and demotivation for studying. The main benefits identified were: flexibility of study; teacher creativity; improvement of students' academic performance; accelerated use of digital technologies in the teaching-learning process; self-learning; organizational factors; and reduced commuting time. Although the ERE was imposed abruptly and presented many challenges, it was of paramount importance at the pandemic moment, allowing the continuity of the teaching-learning process and thus preventing an even greater loss in the field of education.

Keywords: Emergency Remote Teaching (ERE). Higher Education Institutions (IES). Systematic Literature Review (RSL).

O Ensino Remoto Emergencial nas Instituições de Educação Superior durante a pandemia de COVID-19: uma Revisão Sistemática da Literatura

Resumo: Devido à pandemia da Covid-19, as Instituições de Educação Superior (IES) suspenderam as aulas presenciais e adotaram o Ensino Remoto Emergencial (ERE), possibilitando a continuidade do aprendizado. Nesse sentido, o presente artigo objetivou descrever quais foram os principais desafios e as vantagens do ensino remoto emergencial nas IES, tendo como metodologia a revisão sistemática da literatura, método proposto pelos autores Centobelli, Cerchione e Esposito (2017). Os resultados demonstraram que os principais desafios enfrentados pelas IES foram: insuficiência de

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recursos para aprendizagem on-line; conectividade de rede e acesso à internet; habilidade técnica dos professores; currículo inadequado; adaptação do curso e processo avaliatório; pouca interação; perda de foco; e desmotivação para os estudos. As principais vantagens encontradas foram: flexibilidade dos estudos; criatividade do professor; melhoria no desempenho acadêmico dos alunos; acelerou uso das tecnologias digitais no processo de ensino-aprendizagem; autoaprendizagem; fatores organizacionais e redução do tempo de deslocamento. Embora, o ERE tenha sido imposto de forma abrupta e apresentado muitos desafios, ele foi de suma importância para o momento pandêmico, possibilitando a continuidade do processo de ensino-aprendizagem, evitando, assim, que ocorresse uma perda ainda maior na área da Educação.

Palavras-chave: Ensino Remoto Emergencial (ERE). Instituições de Educação Superior (IES). Revisão Sistemática da Literatura (RSL).

Enseñanza remota de emergencia en instituciones de educación superior durante la pandemia de COVID-19: una revisión sistemática de la literatura

Resumen: Debido a la pandemia del Covid-19, las Instituciones de Educación Superior (IES) suspendieron las clases presenciales y adoptaron la Enseñanza Remota de Emergencia (ERE), posibilitando la continuidad de los aprendizajes. En ese sentido, este artículo tuvo como objetivo describir los principales desafíos y ventajas de la enseñanza remota de emergencia en las IES, utilizando como metodología la revisión sistemática de la literatura, método propuesto por los autores Centobelli, Cerchione y Esposito (2017). Los resultados mostraron que los principales desafíos que enfrentaron las IES fueron: falta de recursos para el aprendizaje en línea; conectividad de red y acceso a internet; habilidad técnica de los docentes; currículum inadecuado; adaptación del curso y proceso de evaluación; poca interacción; pérdida de enfoque; y falta de motivación para estudiar. Las principales ventajas encontradas fueron: flexibilidad de estudio; la creatividad del profesor; mejora en el rendimiento académico de los estudiantes; uso acelerado de tecnologías digitales en el proceso de enseñanza-aprendizaje; auto aprendizaje; factores organizativos y reducción del tiempo de viaje. Si bien el ERE se impuso abruptamente y presentó muchos desafíos, fue de suma importancia para el momento de la pandemia, posibilitando la continuidad del proceso de enseñanza-aprendizaje, evitando así una pérdida aún mayor en el área de Educación.

Palabras clave: Enseñanza Remota de Emergencia (ERE). Instituciones de Educación Superior (IES). Revisión Sistemática de la Literatura (RSL).

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1 INTRODUCTION

The Covid-19 pandemic affected all sectors of society, and education was no different. In early 2020, educational institutions had to suspend classes due to isolation and security measures to contain and reduce the spread of the new coronavirus. According to the United Nations Educational, Scientific and Cultural Organization (UNESCO, 2020), the temporary closure of Higher Education Institutions (IES) affected approximately 23.4 million higher education students and 1.4 million teachers in Latin America and the Caribbean, representing approximately 98% of the student and teacher population.

In this sense, in many countries, IES began to use Emergency Remote Teaching (ERE) as a strategy to cope with the pandemic moment, and teachers and students had to adopt and adapt to digital technologies for the continuity of the teaching-learning process. Emergency remote teaching is a temporary educational model that replaces presential teaching, in which classes are transmitted in real-time using digital technologies. This model is similar to face-to-face teaching, in which the teacher and students interact and the schedules are the same as those of presential teaching (ARRUDA, 2020; HODGES et al., 2020).

ERE makes use of digital platforms that have been created for different purposes and are not exclusively used for educational purposes. Given this variety of resources, the teacher can choose the one that best suits his or her skills (GARCIA et al., 2020; CUNHA et al., 2021). Thus, there are several digital platforms and available applications used in ERE, among which are: Google Classroom, Zoom, Google Meet, YouTube, Microsoft Teams, WhatsApp, Facebook, and other social networks and messaging services. (BORK-HÜFFER et al., 2021; GARCIA et al., 2020; JOYE; MOREIRA; ROCHA, 2020; SANTOS JUNIOR; MONTEIRO, 2020; NISIFOROU; KOSMAS; VRASIDAS, 2021).

However, ERE is not configured as a new model of education but should be understood as a support to the educational process, in an agile way, aiming at the continuity of education for a certain period (SANCHEZ JÚNIOR; SILVA, 2020). For the authors Stewart and Lowenthal (2021), in general analysis, this modality would be a kind of "band-aid" for a temporary wound.

The rapidity and urgency of ERE further exposed social inequalities, as many students did not have access to digital technologies and the Internet. Similarly, many teachers were unprepared

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for the transition from face-to-face to online formats and lacked digital literacy skills. As for schools, some of them did not have adequate infrastructure, highlighting the lack of planning in educational institutions (ARRUDA, 2020; CUNHA et al., 2021; HODGES et al., 2020; MOREIRA, 2022; NISIFOROU; KOSMAS; VRASIDAS, 2021).

In this context, the present article aims to describe the main challenges and benefits of emergency remote teaching in Higher Education Institutions during the Covid-19 pandemic, using systematic literature review (SLR) as a methodology. The article is divided into four sections: Introduction; Methodology, describing how the research was developed and the paths taken; Content analysis of the selected articles; and finally, the final considerations.

2 METHODOLOGY

First of all, a systematic literature review (SLR) was conducted. The SLR, according to Farias (2016, p. 10, our translation), is carried out with a specific and careful protocol, using "transparent, systematic and explicit methods to identify, select, evaluate and critically analyze bibliographic data". In this sense, the entire course of the systematic literature review must be recorded to allow its replication and thus to reproduce the same results on the researched topic. This process requires a careful selection in order not to exclude relevant studies, seeking a broad scope and complete bibliography. Thus, to carry out the SLR, it is necessary to follow a process with several steps, being thorough and precise (FARIAS, 2016; RAMOS; FARIA; FARIA, 2014; OKOLI, 2019).

In the present study, the method proposed by the authors Centobelli, Cerchione, and Esposito (2017) was used, which has two essential and reasonable phases: the first corresponds to the acquisition and selection of articles, and the second to the descriptive and content analysis of the selected materials, allowing their replication by third parties. Therefore, some adaptations and modifications were made to fit the context and scope of this study. The phases of the methodology used are presented below.

2.1 Articles Acquisition and Selection Phase

In this first phase of the research, the process was divided into two stages: the search and the

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selection of materials (CENTOBELLI; CERCHIONE; ESPOSITO, 2017), as described in the next subsections.

2.1.1 Material Search Stage

According to Centobelli, Cerchione, and Esposito (2017), this phase of the research includes the identification of the keyword and the definition of the databases to be used. The search was carried out in the Web of Science and Scopus databases of Elsevier, and the selected period was between January 2020 and December 2021, since emergency remote education is a new topic and is associated with the beginning of the Covid-19 pandemic.

To define the keyword set, tests, and word combinations were performed. Therefore, the set of keywords in English was defined together with the Boolean operators "AND" and "OR" as follows " remote teaching" AND "covid-19" OR "coronavirus" AND universit* OR "higher education" OR college, AND education.

In the Scopus platform, the search was first performed by clicking on the documents link, selecting "article title" in the first "Search within" field, and defining the search only by "article title" to be more objective. In the "Search documents" field, the combination of keywords and Boolean operators "remote teaching" AND "covid-19" OR "coronavirus" was used. In the second field, "Article title, abstract, keywords" and in the "Search documents" field, the combination of keywords and Boolean operators were used: universit* OR "higher education" OR "college". The use of the asterisk allowed the selection of articles containing the English words university and universities. Finally, in the third field, "Article Title, Abstract, Keywords", and the word "Education" was used to obtain documents related to education and not to other sectors, defining the period from 2020 to 2021. Therefore, at the end of this step, 52 documents were initially obtained.

In the Web of Science database, all "All Databases" and all "All" collections were selected to broaden the search for studies on the research topic. Thus, the same procedure was used as in the Scopus database, in "Documents", in the first field, "Title", the words "remote teaching" AND "covid-19" OR "coronavirus" were searched. In the second field, "Topic", the title, abstract, and keywords were searched using the keyword phrase universit* OR "higher education" OR "college". In the third field, "Topic" and the word "Education" were selected, setting the publication date from January 1, 2020, to December 31, 2021, and finally obtaining 243 documents. The search was

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carried out between February 6 and 7, 2022, and 295 articles were found in the two databases.

2.1.2 Material Selection Stage

In this phase, the established inclusion and exclusion criteria of the documents selected in the previous step were applied. In addition, the Web of Science and Scopus databases were used as inclusion criteria only if the articles were peer-reviewed. In this context, 42 articles from Scopus and 225 articles from Web of Science were counted, for a total of 265 articles. We also used open-access articles as inclusion criteria, counting 31 articles from Scopus and 172 articles from Web of Science, for a total of 203 articles.

The titles and abstracts of the 172 articles were then read by research area in the Web of Science database. After reading, the following research areas were excluded: *"Mathematics"; "Surgery"; "Engineering"; "Information Science Library Science"; "Pathology"; "Geriatrics Gerontology"; "Dentistry Oral Surgery Medicine"; "General Internal Medicine"; "Pharmacology Pharmacy"; "Respiratory System"; "Health Care Sciences Services"; "Infectious Diseases"; "Psychiatry"; "Pediatrics"; "Nutrition Dietetics"; "Literature"; "History"; "Chemistry"; "Sociology"; "Biochemistry Molecular Biology"; "Communication"; "Oncology"; "Physics"; "Radiology Nuclear Medicine Medical Imaging"; "Religion";* and *"Linguistics"*, as these areas were not related to the subject matter of the research in this study.

This left 95 articles from the Web of Science database and 31 from Scopus, for a total of 126 articles. Duplicate articles were then excluded, leaving 25 articles. In this context, 101 articles were used for the next process of inclusion and exclusion analysis. Thus, in order to select the articles that were closest to the researched topic, three article selection criteria were established, as shown in Chart 1.

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Chart 1 - Inclusion/exclusion criteria

CRITERIA	DEFINITION
First criterion: focus of the abstracts	Include abstract focusing on emergency remote teaching in Higher Education Institutions in the context of the new coronavirus pandemic.
Second criterion: focus of the articles	Include articles focusing on emergency remote teaching in Higher Education Institutions in the context of the new coronavirus pandemic.
Third criterion: references cited	Include articles not included in Scopus and Web of Science, but cited in the literature on emergency remote teaching in Higher Education Institutions.

Source: Adapted from Centobelli, Cerchione and Esposito (2017).

The first criterion was to select only those articles whose abstracts included the topic of emergency distance education in higher education institutions in the context of the pandemic of the new coronavirus. Thus, we analyzed the title and abstract of the 101 articles and classified them into three categories, as shown in Table 1.

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Table 1 - Selection of the first stage

CATEGORY[1]	DEFINITION	NUMBER OF ARTICLES
A	Articles focusing on emergency remote teaching at higher education institutions in the context of the pandemic.	13
B	Articles that address emergency remote teaching in higher education institutions in the context of the pandemic, but with a focus on the evaluation of a specific discipline and/or profession in isolation in the context of remote teaching in the pandemic.	39
C	Articles that address emergency remote teaching in higher education institutions in the context of the pandemic, but focus on studies related to the psychological assessment of students and teachers; teacher training courses, lectures, extension projects; gender issues; comparison between remote and presential teaching; and miscellaneous issues.	19
	TOTAL	101

Source: Adapted from Centobelli, Cerchione and Esposito (2017).

After analysis and classification, the articles in categories B and C were excluded because they did not represent the scope of this research. The Category A articles were fully included. In this context, the 13 articles selected in category A were submitted to the second inclusion criterion for detailed analysis. Thus, the title, abstract, methodology, and results were specifically analyzed. Chart 2 summarizes the data from this analysis.

Regarding the third inclusion criterion, related to references cited in the literature but not included in the Scopus and Web of Science databases, it is noteworthy that no additional articles were identified, and this aspect validates the proposed review process. In the end, 13 articles were selected for the subsequent phases of descriptive and content analysis of the selected materials. It is noteworthy that the selected articles are from IES from different regions of the world, as shown in Chart 2.

[1] **Category** A - included articles with a focus on emergency remote teaching at institutions of higher education in the context of the pandemic. **Category B** - included articles with a focus on emergency remote teaching in higher education institutions in the context of the pandemic but with a focus on evaluating a specific discipline and/or profession in isolation in the context of remote teaching in the pandemic. **Category C** - included articles with a focus on Emergency Remote Teaching at higher education institutions in the context of the pandemic, but with a focus on studies related to psychological assessment of students and teachers; teacher training courses, lectures, extension projects; gender issue; comparison between remote and presential teaching; and miscellaneous issues.

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Chart 2 - Summary data of selected articles in category A

Database	Title	Authors	Objective	Journals	Year	Research Location
Scopus and Web of Science	COVID-19, emergency remote teaching evaluation: the case of Indonesia.	Cahyadi *et al.*	Assessing the implementation of ERE and exploring critical issues during the Covid-19 pandemic in Indonesian higher education.	Education And Information Technologies	2021	Seven universities and colleges in three provinces of Indonesia.
Scopus and Web of Science	Needs a little TLC: examining college students' emergency remote teaching and learning experiences during COVID-19	Shin e Hickey	Examining the experiences of university students' emergency remote teaching during Covid-19.	Journal Of Further and Higher Education	2020	A public university located in suburban New Jersey, United States.
Web of Science	Investigating the application of emergency remote teaching during the COVID-19 pandemic in higher education	Bingimlas	Investigating the application of Emergency Emergency during the Covid-19 crisis in Saudi higher education.	Amazonia Investiga	2021	Prince Sattam bin Abdul-Aziz University of Saudi Arabia.
Scopus and Web of Science	Emergency remote teaching and students' academic performance in higher education during the COVID-19 pandemic: A case study.	Iglesias *et al.*	Analyze the change to emergency remote teaching in the School of Telecommunications Engineering (Universidad Politécnica de Madrid) and the impact of organizational aspects related to unplanned	Computers In Human Behavior	2021	School of Telecommunications Engineering (Universidad Polit'ecnica de Madrid), in Spain.

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			change, variables related to instruction and use of digital assistive technologies, and on students' academic performance.			
Scopus and Web of Science	What Really Matters: Experiences of Emergency Remote Teaching in University Teaching and Learning During the COVID-19 Pandemic.	Erlam *et al.*	To understand how the Covid-19 pandemic affected academics at a university in Auckland, New Zealand, with respect to their transition to emergency remote learning platforms.	Frontiers In Education	2021	A medical faculty at a university in Auckland, New Zealand.
Scopus and Web of Science	Experiencing the Transition to Remote Teaching and Learning during the COVID-19 Pandemic.	Tsai *et al.*	Identify the challenges and opportunities that can be encountered in remote learning.	Interaction Design And Architectures	2020	Penn State University, a public university in the United States United States.
Scopus and Web of Science	Higher Education Teaching Practices Experience in Mexico, During the Emergency Remote Teaching Implementation due to COVID-19.	Zapata-Garibay *et al.*	Understanding the challenges faced by faculty and students in higher education as a result of implementing the emergency remote teaching model in the context of the Covid-19 outbreak.	Frontiers In Education	2021	Public and private universities in Mexico.
Web of Science	Online Teaching and Learning in	Coman *et al.*	Identify how Romanian universities were able to provide	Sustainability	2020	Transylvania University of Brasov and

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	Higher Education during the Coronavirus Pandemic: Students' Perspective.		knowledge during the coronavirus pandemic.			the Western University of Timisoara in Romania.
Web of Science	Efectos de la pandemia por coronavirus en la educación superior universitária.	Melendez *et al.*	Identify the effects of the coronavirus pandemic on university higher education, particularly on the students and faculty of the Universidad Católica Los Ángeles de Chimbote.	Revista Conrado	2021	Los Ángeles Catholic University of Chimbote, Peru.
Web of Science	A Silver Lining of Coronavirus: Jordanian Universities Turn to Distance Education.	Bataineh *et al.*	Investigating the effectiveness of distance education in Jordanian universities in light of the coronavirus pandemic and identifying the obstacles faced by university students.	International Journal of Information and Communication Technology Education	2021	Public and private universities in Jordan.
Web of Science	Empirical Research on the Application of Online Teaching in Chinese Colleges and Universities Under the Situation of Novel Coronavirus Pneumonia Prevention and Control.	Zhu	Demonstrate how the Chinese government implements online education comprehensively with specific measures, how Chinese colleges and universities implement massive online education quickly, how teachers and students adapt quickly to online education.	International Journal of Emerging Technologies in Learning	2020	Colleges and universities in China.
Scopus and Web of Science	Identified Challenges from Faculty Teaching at Predominantly	Colclasure *et al.*	Identify teaching-learning challenges during the initial transition to ERT at Predominantly	*Education Sciences*	2021	Predominantly Undergraduate Institutions (PUIs) in the

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	Undergraduate Institutions after Abrupt Transition to Emergency Remote Teaching during the COVID-19 Pandemic.		Undergraduate Institutions (PUIs) in the Midwestern United States.			Midwest of the United States.
Web of Science	Faculty experiences on emergency remote teaching during COVID-19: a multicentre qualitative analysis.	Valsaraj *et al.*	Understand faculty members' instructional delivery experiences, explore the challenges, and how they overcame these challenges during the transition from traditional classroom teaching to ERT.	Interactive Technology and Smart Education	2021	Public and private universities from India, Malaysia, Oman and United Arab Emirates.

Source: Elaborated by the author (2022).

2.2 Descriptive Analysis

In this phase, the selected articles were grouped according to the different concepts, providing a summarized view, besides aiming at a preliminary analysis focused on Emergency Remote Teaching in Higher Education Institutions. Likewise, for the descriptive analysis of the 13

selected articles, four perspectives were defined, corresponding to: 1. articles over time; 2. articles in periodicals; 3. articles by methodology; and 4. articles by thematic area.

2.2.1 Articles over time

Because it is a new topic, the number of articles is not significant. Thus, the time frame of the research was only two years (2020 and 2021) and in this period four articles were published in 2020 and nine articles in 2021. In this context, it can be estimated that the trend will be the increase of research since it is clear the importance of the topic.

2.2.2 Articles in journals

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The 13 selected articles were published in different journals, comprising: Amazonia Investiga, Computers In Human Behavior, Education And Information Technologies, Education Sciences, Interaction Design And Architectures, Interactive Technology and Smart Education, International Journal of Emerging Technologies in Learning, International Journal of Information and Communication Technology Education, Journal Of Education For Teaching, Journal Of Further and Higher Education, Revista Conrado, Sustainability and Frontiers In Education. Therefore, even though it is a new theme, emergent remote teaching presents relevance as an object of study, since it has affected different areas of Higher Education. Still, it can be noticed that the journals are distinct, with respect to the areas of knowledge, thus evidencing the interdisciplinarity of the theme.

2.2.3 Articles by Methodology

Regarding the methodology used by the selected articles, the combination of the qualitative-quantitative approach stands out, followed by qualitative research and the quantitative approach. The four articles that used the qualitative method correspond to case studies, two single case studies, and two multiple case studies, with the interview, open questionnaire, and online forms as data collection tools. The three articles that used the quantitative method used the online questionnaire as a data collection tool. The articles that used the mixed method combined quantitative and qualitative research instruments. Thus, six studies with the mixed approach stand out for the research conducted on emergency remote teaching during the Covid-19 pandemic.

2.2.4 Articles by thematic area

For this phase, two thematic areas were defined for the selected articles, to examine how higher education institutions faced the pandemic using emergency distance learning. The first area corresponded to the challenges of distance education during the Covid-19 pandemic, identifying the main challenges faced by IES in implementing distance education as an alternative during the pandemic of the new coronavirus. The second section analyzed the benefits of remote teaching during the Covid-19 pandemic.

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3 Content analysis of the selected materials

The selected articles were analyzed in depth, highlighting their strengths, weaknesses, and research gaps. The analysis of the articles allowed a detailed view of the issues addressed in the researched topic. In this sense, this step was divided into the thematic areas of the research: the first corresponded to the challenges of remote teaching during the pandemic, and the second to the advantages of remote teaching during Covid-19.

3.1 Thematic Area 1: Challenges of remote teaching during the Covid-19 pandemic

The global crisis caused by the Covid-19 pandemic affected all sectors of society. The disruption to education was significant, altering traditional teaching methods and affecting the academic community. To continue teaching, educational institutions had to quickly adopt emergency remote teaching for temporary use during the new coronavirus pandemic, which occurred quickly and without planning (HODGES et al., 2020). This enabled the continuity of the learning process in most educational institutions, including higher education.

However, educational institutions did not have time to plan for the implementation of ERE, especially at the beginning of the pandemic situation, which led to consequences and challenges. Tsai et al. (2020) research at Penn State University, a public university in the United States, found that the abrupt shift to emergency remote teaching posed challenges for students and faculty, such as insufficient resources for online learning; technological challenges, such as lack of technical skills; lack of access to a stable Internet network; lack of experience with the new teaching-learning format; lack of organizational support; assessment and learning process issues; and lack of engagement and effective communication with classes. In addition, mental overload, concern about the pandemic, and uncertainty about the future were other challenges faced by students and faculty.

In the study developed by Coman et al. (2020) at the Transylvanian University of Brasov and the West University of Timisoara in Romania, the authors

concluded that higher education institutions were not prepared for exclusively online learning. The universities lacked adequate infrastructure and technical conditions to provide this type of education. In this scenario, professors faced adversities in adapting to the new format, such as a lack of technical skills and difficulties in interacting with students. As for the students, they indicated:

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loss of concentration, which they attributed to the professors since they were not adapted to the online teaching methods at the beginning of the transition; difficulties in concentration; interruptions at home; and resistance to the presentation of online assignments. Another negative aspect pointed out by the authors was isolation; participants reported a lack of interaction with professors and classmates, which made online learning more demotivating and difficult.

In Indonesia, a survey was developed in seven universities and colleges in three provinces of the country to assess the implementation of Emergency Remote Teaching and the critical issues during the pandemic in higher education. According to the data found, there were several challenges related to internal organizational resources and external factors, especially at the beginning of ERE implementation. Among the external challenges was the lack of access to a secure, stable, and affordable Internet connection, as well as the socio-economic problems of the participants. This confirms the reality found in the country, that is, the difficulties of access to the Internet. This element can be explained by the existence of socio-economic inequality, which ends up excluding many students from the classes, becoming a big problem for the ERE. In terms of internal resources, the challenges encountered were related to the traditional curriculum, which is considered inappropriate for ERE, as well as the adoption of a standardized curriculum, which hinders the implementation of this teaching method. Furthermore, the following challenges were mentioned: lack of technical skills of teachers in the use of digital technologies, difficulties in accessing digital technologies, and aspects related to plagiarism and cheating in assessments. In this sense, the authors propose the development of new curricula for crises (CAHYADI et al., 2021).

In this perspective, the authors Melendez et al. (2021) identified the effects of the pandemic on the academic body of the Universidad Católica Los Ángeles de Chimbote, Peru. Regarding the students, they identified negative effects: problems related to connectivity; lack of access to the established synchronous moments; lack of interaction with the educational community; lack of motivation to study; and lack of technical ability to use virtual educational platforms, which was perceived by most as an inefficient modality for teaching. As for the teachers, the main problems they faced were: lack of appropriate content for online teaching and little experience in using virtual educational platforms.

Although the study conducted by Bingimlas (2021) at Prince Sattam bin Abdul-Aziz University, Saudi Arabia, evaluated the implementation of ERE as positive, it also identified barriers to its implementation. The study identified the following barriers: excess of activities; poor

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Internet connection at home; most of the courses were not designed for emergency distance learning; lack of infrastructure at home for the learning process; difficulty in accessing the classes synchronously; and lack of digital and technological skills of the teachers.

Corroborating the study of faculty experiences with Emergency Remote Teaching in universities in Mexico, Zapata-Garibay et al. (2021) also found these difficulties. The authors conclude that the main challenges include: lack of equipment and adequate infrastructure; lack of knowledge of digital tools and time management; and that faculty from private universities were better able to adapt to ERE than faculty from public institutions.

In the survey conducted in universities in Jordan by Bataineh et al. (2021), students felt that institutions were not ready to adopt online learning, as most students were not satisfied with the experience of online learning implemented during the pandemic. Among the barriers they faced were: internet speed (poor), technical problems, inappropriate content design, demotivation, loss of focus, and too many activities.

Concerning faculty members, Valsaraj et al. (2021), in studying the adaptation experiences of this audience in leading public and private universities in India, Malaysia, Oman, and the United Arab Emirates, found that the difficulties they faced were present from the beginning of the process. Due to the lack of experience of the faculty members, there were difficulties in aligning the course content with the learning outcomes. In addition, there were difficulties with student interest due to different learning styles, lack of communication, and problems with network connectivity and Internet access.

In this sense, the study conducted by Zhu (2020) at Anhui Polytechnic University, China, highlights that higher education institutions in the country had early preparation and a good evaluation for the implementation of online teaching during the pandemic. However, it was possible to verify some challenges: the excessive use of digital technologies; although the professors adapted and used their creativity in this process, it was not enough because the online methodology requires more preparation, which led to wear and tear during the learning moment, especially in long courses; connection problems; and overloaded digital platforms, which affected the teaching-learning process.

Erlam et al. (2021) sought to understand how the pandemic affected academics at a New Zealand university, analyzing the challenges and benefits during the transition. The authors highlighted the following as key challenges: lack of planning and communication from the

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university, concerns about students' access to digital technologies, poor time management, lack of adequate home office space, lack of digital skills and competencies, and poor work-life balance.

In this sense, the research conducted at a public university located in suburban New Jersey, United States, revealed adversities: the loss of learning, mainly due to the dependence on the faculty member's ability, making the process even more difficult; lack of motivation; lack of communication and feedback; difficulty in stimulating creativity; insufficient workload adjustment; mental, emotional, and physical health problems, especially among female students who had to reconcile studies, work, and family; educational and social inequalities were amplified, making adaptation difficult; problems in access to digital technologies, increasing digital exclusion (SHIN; HICKEY, 2020).

The study conducted in the Midwest region of the United States, in PUIs (Predominantly Undergraduate Institutions) developed by Colclasure et al. (2021), revealed that teachers were not prepared for ERE. According to the teachers, there were many challenges, among them: the adoption of new pedagogical practices and the use of new technologies, the increase of the workday, and the creation of an imbalance between personal-professional life and physical-mental health. Professors also reflected on the problems of interaction with students and the lack of contact with the academic community. This reduction in contact, and consequently in student-teacher interactions, led many professors to become dissatisfied with their work.

In the aforementioned study, teachers reported that inequalities in access to technology and technological barriers affected many students due to increased responsibilities and domestic activities. In addition, the lack of contact with the community and teachers was one of the factors that led to students' demotivation and lack of interest in the teaching-learning process. Added to this is the concern for the mental health of the students during this period (COLCLASURE et al., 2021). Thus, Chart 3 summarizes the main challenges and obstacles faced by higher education institutions, their teachers, and students in the context of the pandemic, according to the studies reported in this topi.

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Chart 3 - Main challenges for ERE in higher education and the authors they cited

MAIN CHALLENGES	AUTHORS
Insufficient resources needed for online learning	Coman *et al.* (2020); Tsai *et al.* (2020); Zhu (2020); Colclasure *et al.* (2021); Cahyadi *et al.* (2021); Shin e Hickey (2020); Bingimlas (2021); Erlam *et al.* (2021); Zapata-Garibay et al. (2021); Melendez *et al.* (2021); Bataineh *et al.* (2021); Valsaraj *et al.* (2021).
Network connectivity and internet access	Coman *et al.* (2020); Tsai *et al.* (2020); Zhu (2020); Colclasure *et al.* (2021); Cahyadi *et al.* (2021); Shin e Hickey (2020); Bingimlas (2021); Erlam *et al.* (2021); Zapata-Garibay *et al.* (2021); Melendez *et al.* (2021); Bataineh *et al.* (2021); Valsaraj *et al.* (2021).
Teachers' lack of technical ability	Coman et al. (2020); Shin e Hickey (2020); Tsai et al. (2020); Cahyadi *et al.* (2021); Bingimlas (2021); Erlam *et al.* (2021); Zapata-Garibay *et al.* (2021); Melendez *et al.* (2021).
Inadequate curriculum for ERE	Tsai *et al.* (2020); Zhu (2020); Colclasure *et al.* (2021); Valsaraj *et al.* (2021); Bataineh *et al.* (2021); Melendez *et al.* (2021).
Difficulty in adapting the course and evaluating the students	Tsai *et al.* (2020); Zhu (2020); Cahyadi *et al.* (2021); Shin e Hickey (2020); Bingimlas (2021); Condori Melendez *et al.* (2021); Bataineh *et al.* (2021); Valsaraj *et al.* (2021).
Little interaction with the academic community and loss of student focus	Coman *et al.* (2020); Tsai *et al.* (2020); Colclasure *et al.* (2021); Shin e Hickey (2020); Bataineh *et al.* (2021); Valsaraj et al. (2021).
Demotivation for studies	Coman *et al.* (2020); Shin e Hickey (2020); Melendez *et al.* (2021); Bataineh *et al.* (2021); Colclasure et al. (2021).
Imbalance between work and personal life	Colclasure *et al.* (2021); Erlam *et al.* (2021).
Inadequate time management	Shin e Hickey (2020); Erlam *et al.* (2021); Zapata-Garibay *et al.* (2021).
Excess of activities	Bingimlas (2021); Bataineh *et al.* (2021); Colclasure et al. (2021).
Inadequate home infrastructure	Bingimlas (2021); Erlam *et al.* (2021).
Mental overload and other pressures	Shin e Hickey (2020); Tsai *et al.* (2020); Colclasure *et al.* (2021).
Overuse of digital technologies, overloaded digital platforms	Zhu (2020).

Source: Elaborated by the author (2022).

In short, the pandemic exposed pre-existing socioeconomic inequalities and further exacerbated the digital divide. This was one of the main challenges related to ERE in the pandemic moment since online education requires not only access to the Internet but also a stable, reliable, and

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high-speed connection, for which many IES institutions were not prepared.

It is noteworthy that many of the challenges associated with emergency remote teaching fell on the teachers, due to a lack of training in the use of digital technologies in the teaching-learning process, especially at the beginning of the implementation of ERE. Standardized curricula - designed for face-to-face teaching - also added to the challenges, as flexible curricula would be more appropriate for distance learning (CAHYADI et al., 2021).

For the students, the emergency remote teaching posed many obstacles, such as access to online classes and difficulties in accessing and using digital educational platforms; adaptation to the new teaching-learning format and the new assessment model, which led many students to lose interest and focus, increasing the lack of motivation to study. In general, these factors have contributed to widening educational inequalities, especially in regions with greater social vulnerability.

Thus, it can be concluded that this abrupt transition from presential education to ERE caused an increase in activities and an overload of digital platforms, leading to excessive use of digital technologies and a demand for more time in front of "the screens". Thus, in addition to the lack of an adequate home infrastructure for remote learning, it was possible to verify an imbalance between personal and professional life, causing mental overload.

The pandemic affected the entire educational community. In this study, it was observed that even the institutions, technicians, teachers, and students were not prepared for this transition and change in the teaching model. Finally, several factors hampered the implementation process of ERE, exacerbating existing problems such as digital exclusion and access to technology, which are the result of socio-economic inequalities.

3.2 Thematic Area 2: Advantages and Prospects of Remote Learning during the Covid-19 Pandemic

The transition process of the teaching modality, despite its difficulties, also brought benefits with its implementation. Tsai et al (2020) presented as positive aspects of the implementation of ERE at Penn State University, a public university in the United States, the family and community support for students and teachers, a fact highlighted by its relevance in the pandemic moment. Faculty emphasized that family support, the educational institution, and colleagues were

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fundamental in supporting the transition process.

For the aforementioned authors, another relevant point was the aspect of flexible learning and performance, as far as the students are concerned

because they can choose their study schedules and learn at their own pace. For the teachers, this flexibility was linked to the organization of the classes and greater involvement with the students. Another point that was highlighted was about pedagogy and digital technology. For students, digital technologies facilitated the learning process by allowing them to watch recorded lessons multiple times, take breaks, and take notes, which is more difficult in face-to-face classes. For the teachers, the technology facilitated the transition and enabled an improvement in the teaching-learning process because they were able to reevaluate their teaching methods and create a good experience. Some teachers reported that they intended to continue using the technologies and learning ERE after the emergency ended.

The study by Bingimlas (2021) at Prince Sattam bin Abdul-Aziz University in Saudi Arabia assessed the graduate students' perspective on the conditions of preparation, implementation, and evaluation of barriers in applying ERE during COVID-19. For the respondents, emergent distance learning facilitated the self-learning process as it allowed them to express their opinions more easily, as well as encouraged them to read the course materials, gain a better understanding of the scientific content, and have good interaction in the learning moments.

In this sense, Iglesias-Pradas et al. (2021) analyzed the change to emergency remote teaching in the School of Telecommunications Engineering, Universidad Politécnica de Madrid/Spain, having as axes of investigation: the impact of organizational aspects related to this unplanned change; the variables related to instruction and the use of supporting digital technologies; and the academic performance of students during the pandemic. In this case, the results were positive, showing an increase in the academic performance of students in the ERE, even though the analysis shows that the overall performance of students in remote emergency conditions was significantly better than in face-to-face teaching.

However, these results are not generalizable to all universities. As the authors themselves mentioned above, these results may be related to pre-pandemic factors. The majority of students were users of digital technologies, in addition to having smartphones, tablets/laptops, and wireless connections at home, which reduced the impact of the pandemic. Another factor that may have had

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an impact was that the institution studied had a technical infrastructure and was already using the Moodle system in its courses, and many teachers and students were already using virtual learning spaces. In addition, most of the professors were already technology experts and had digital skills and used them for synchronous and asynchronous communication in their classes. These factors had a positive effect on the rapid adaptation of emergency distance education in the case of this study.

Zhu (2020) discussed the implementation of emergency remote teaching in universities in China, presenting positive points and highlighting the easy adaptation of students and the creativity of teachers. However, the author points out that these results were possible due to some factors, such as The preparation of the teachers in the initial phase of the pandemic, increasing their knowledge about the digital platforms and technologies, resulting in better use and creativity; a large part of the students already presented knowledge and skills to use digital technologies (even the author reports that the students felt more enthusiastic, were more creative and active in this process); The support, clarification, and planning of the educational institutions at that moment, adopting the procedures established by the Chinese government, besides the evaluation and monitoring process was more present, trying to overcome the existing obstacles; and the online teaching during the pandemic accelerated the use of digital technologies in the teaching-learning process.

Although the study by authors Erlam et al. (2021) highlighted many challenges, it also revealed some benefits, including increased flexibility for learning, increased teacher creativity, increased student autonomy, and reduced travel time. In this regard, Cahyadi et al. (2021) pointed out that in contrast to the initial phase of class disruption in March 2020, by early July 2020, teachers were more prepared for ERE, although they faced technical difficulties. The authors reported that emergency remote teaching allowed faculty to familiarize themselves with online learning platforms, which presented greater flexibility and simplicity in the teaching process, making them more creative.

For the authors Valsaraj et al. (2021), the positive aspects were based on the support of institutions, mentors, and colleagues, in addition to the various training programs and guidelines to support the process of transition to ERE. Teachers' reports indicate that the challenges they faced were important to bring about changes in their teaching practices and methodologies, as well as the improvement of skills and training in the use of digital technologies in the learning process, making the management of education more efficient. Colclasure et al. (2021), in their studies on teachers'

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perspectives on ERE, presented as a positive aspect the possibility of working from home, which allows a greater strengthening of family ties.

Thus, the main advantages found in the analyzed studies, referring to the IES, are summarized in the following chart.

Chart 4 - Main advantages of ERE in Higher Education and the authors who cited them

MAIN ADVANTAGES	AUTHORS
Greater flexibility in studies	Bingimlas (2021); Cahyadi *et al.* (2021); Erlam *et al.* (2021); Iglesias-Pradas *et al.* (2021); Tsai *et al.* (2020); Zhu (2020); Valsaraj *et al.* (2021).
Greater teacher creativity	Cahyadi *et al.* (2021); Erlam *et al.* (2021); Zhu (2020); Iglesias-Pradas *et al.* (2021).
Improvement in academic performance	Iglesias-Pradas *et al.* (2021); Zhu (2020).
Family and community support	Tsai *et al.* (2020); Valsaraj *et al.* (2021).
Accelerated use of digital technologies in the teaching and learning process	Zhu (2020); Tsai *et al.* (2020); Valsaraj *et al.* (2021); Iglesias-Pradas *et al.* (2021).
Organizational Factors	Zhu (2020); Iglesias-Pradas *et al.* (2021); Valsaraj *et al.* (2021).
Easy adaptation of students	Zhu (2020); Iglesias-Pradas *et al.* (2021);
Self-learning	Bingimlas (2021); Erlam *et al.* (2021).
Reduced travel time	Erlam *et al.* (2021).
Strengthening the family bond	Colclasure *et al.* (2021).

Source: Elaborated by the author (2022).

By examining the data presented, it is possible to assess that ERE has presented benefits for teaching-learning. Among the positive points, there is a greater flexibility in teaching for students and teachers, because besides allowing an increase in creativity and diversity of methods, it allows different forms for the teaching-learning process, such as the use of digital technologies, allowing an improvement in academic performance in this process.

An analysis of the studies, especially those cited by Iglesias-Pradas et al. (2021) and Zhu (2020), shows that the positive results in IES were influenced by several factors, some of which predate the pandemic, such as organizational elements. In this context, the studies that evaluated the transition from face-to-face teaching to ERE as positive were institutions that already had an adequate infrastructure for the online modality, at least in part, they already used systems such as Moodle. They also used asynchronous learning and virtual learning spaces in their courses, which

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facilitated the process of change and planning. It is also worth noting that some teachers already had some knowledge and digital skills, which facilitated the adaptation of the ERE.

As for the students, many of them were users of digital technologies and had devices and wireless connections at home, which facilitated the process of change and adaptation to ERE and provided motivation and incentive for study and self-learning. Another important factor was the support of family, community, institution, and colleagues for the abrupt change, as well as the reduction of travel time since this extra time was used to improve studies and methodological practices. Thus, with the isolation, teachers and students stayed at home, providing an opportunity to deepen and strengthen family ties.

With all these sudden changes, and with the implementation of the ERE, there has been an acceleration in the use of digital technologies for the teaching-learning process. Therefore, the incorporation of digital technologies and the Internet in the field of education is of paramount importance, as it allows the expansion and qualification of access to knowledge. The results of the studies analyzed indicate that many teachers have rethought their methodologies and practices, seeking improvements and even changing their processes for incorporating digital technologies in their teaching in the future.

The pandemic of the new coronavirus caused much damage, loss, and change in society, especially in the areas of education and public health. For education, these changes were drastic, forcing educational institutions to suddenly change the face-to-face teaching model for emergency remote teaching. Many IES did not have the infrastructure and knowledge to use digital technologies in the teaching-learning process. However, by keeping the right proportions, through the ERE, the IES managed to give continuity to the teaching-learning process, thus mitigating the negative impacts and promoting improvements in the educational process.

Nevertheless, it has not been an easy process, but it has been a necessary one. Therefore, online learning has great potential for the future, but it requires investment in public education policies, infrastructure, technology, teacher training, educational programs and applications, and digital inclusion.

4 FINAL CONSIDERATIONS

This paper aimed to describe the main challenges and benefits of Emergency Remote

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Education in higher education institutions during the pandemic of the new coronavirus. The results showed that the main challenges faced by the IES were: insufficient resources needed for online learning; poor network connectivity and often lack of Internet access; inadequate curriculum for the ERE; difficulty in adapting to the new teaching-learning format and the new assessment model; and teachers' lack of skills regarding the use of digital technologies in the teaching-learning process.

It is worth mentioning: little interaction with the academic community and loss of focus among students; lack of motivation to study; imbalance between work and personal life; inadequate time management; excess of activities; inadequate home infrastructure; excessive use of digital technologies, overloaded digital platforms; mental overload and other pressures. Thus, it is possible to see that the effects caused by the pandemic were significant in the higher education institutions studied.

The main advantages of Emergency Remote Teaching were: flexibility of study time; greater creativity of the teacher; family and community support; time-saving, since there is no displacement to the IES; strengthening of family ties; self-learning of students; improvement of academic performance of students, highlighting the cases where students already had access to digital technologies; organizational factors; accelerated use of digital technologies in the teaching-learning process. It can be concluded from the results that ERE was more effective in higher education institutions that already had expertise in the use of digital technologies in the teaching-learning process.

Given this result, it is observed that in the future a new learning process, mediated by digital technologies, aspires to be implemented by IES, especially those that seek to expand access to knowledge, with improvement and diversification in the teaching and learning process. In this scenario, it is possible to state that, with the end of the pandemic, higher education will never be the same as it was before, because the emergency remote teaching, even if it has a temporary and emergency character, has affected the way of teaching and learning with the mediation of digital technologies.

In this sense, based on the challenges and advantages identified in the analyzed higher education institutions, we propose some measures that can be implemented to achieve better results, such as: offering training courses in the use of digital technologies for students and professors; investing in infrastructure and digital technologies; providing access to digital technologies and Internet access, especially for the most vulnerable populations, and public policies aimed at digital

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inclusion. Also, as a suggestion, it is essential to carry out new empirical research on the impact of Emergency Remote Teaching in higher education, on assessment systems, and teaching-learning processes in the long term, since this study was conducted with secondary data from scientific research on ERE.

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