Emergency remote education: A perspective of its potentialities and limitations in a Peruvian university

Israel Barrutia Barreto and Santiago Saturnino Patricio Aparicio

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Abstract: This research aims to identify the potentialities and limitations of emergency remote education in the Peruvian university context as a consequence of the COVID-19 pandemic based on teachers' experience of the Hermilio Valdizán National University (UNHEVAL). The type of this research was descriptive and the sample consisted of 123 teachers of the academic period 2020-I. For the data collection, a questionnaire was used, whose validation was made through the judgment of experts (0.96) and the reliability of the results through the Z-test. According to the results, flexibility stands out between the potentialities in regards to topics' distribution, time, and the possibility to produce greater interest in the participants. It was observed that time flexibility is not considered as favorable unlike what was detected through literature. Infrastructure stands out, especially when is related to the connectivity and Internet access as well as the distractors produced by the easy access to devices and applications that are not related to the class session. The paper revealed weakness in the digital competencies of both teachers and students, and the scarce level of social interaction caused by social isolation. It is concluded that the potentialities and limits of emergency remote education in a Peruvian university are conditioned by different elements specific to each context or country and must be considered for the production of new educational proposals as a policy of prevention of the possibility of new events that require mandatory isolation.

Keywords: higher education; emergency remote teaching; potentialities; limits; Peru

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I. Introduction

Higher education has been managed, especially, in three educative modalities: on-campus, hybrid and online learning. On-campus learning takes place in a classroom with the help of books and chalkboards (Veselina and Snejana 2020). Hybrid learning or b-learning introduces two interesting elements by the students: free choice and use of technology (Barchelor 2019, 4); besides, it alters on-campus and virtual sessions. Online learning tends to develop in a virtual space without any agent's intervention. By this classification scheme, the fundamental aspect is the use of technology as a tool for the development of the didactic process.

However, at the beginning of 2020, the inevitable effects caused by COVID-19 affect all the activities of human beings such as working, communication, training and education. The pandemic effect has changed the education of 1600 million students in more than 190 countries around the world (Naciones Unidas 2020, 2). Most of the countries decide to follow strict protocols as a measure to minimize and prevent the spread, while others opt for group immunity (Bozkurt and Sharma 2020).

Despite the context caused by the pandemic, online education was the only viable modality to carry out the didactic process (Veselina and Snejana 2020, 248), leading to a new modality called emergency remote education. This new modality consists of moving the teaching-learning process towards a virtual space, it was first thought to apply in an on-campus modality (Cabrales 2020). The difference between the new modality and the online remote education is the temporary solution for a specific and mandatory situation (Borzkurt and Sharma 2020).

In Peru, the early measures adopted in the first stage allow to stop the levels of infection, support the economy and protect Peruvian people (Figallo et al. 2020). Regarding the higher education field, guidelines were established through Resolution no. 085-2020, which emphasize the adaptation of the syllabus content and the design of a learning guide that includes the content integration, digital tools, required time and the assessments methods (Ministerio de Educación [MINEDU] 2020). In this sense, it is necessary to guide, train and monitor the actions of the academic planning proposed by teachers.

However, in the higher education field, the beginning of the classes coincides with the isolation measures in the second week of March 2020. According to Figallo and Sharma (2020), in April of the same year, 72.7 % of public universities did not start operating since they were still making adjustments. The educative system, universities and teachers were not prepared to adapt the educational process to the situation. A palpable example is shown in the document of MINEDU (2020) by indicating that it is necessary to

transfer the teaching activity on-campus to a virtual one. This requires a further organization to provide students (6) the quality of service they deserve, which evinces the inexistence of a different alternative to traditional education.

In addition, it is recognized the necessity to strengthen the digital competencies of teachers through training, mentoring and assessment (MINEDU 2020). Reaffirming in the proposal of Ascayo (2015), that pointed out universities should boost and implement extension courses about digital competencies for teachers of higher education and other educational levels.

As in every activity field of human beings, the effects of the pandemic have generated important changes in the educational processes. One of them was the remaking of multiples activities and educative experiences on-campus to redesigned and adapt in real-time for the online modality (Pardo and Cobo 2020). Currently, emergency remote education must be carried out by all teachers and not only for a group interested in digital culture since technology is a teaching tool. Despite the implementation of technology in the curriculum for more than 20 years, it has not been given the importance it deserves, possibly due to the lack of a common frame of reference (Tejada and Pozos 2018).

One relevant aspect to consider is the different educative strategies of male and female teachers regarding the capacity of organization and planning ($p = 0.0089$), in contrast to other categories such as academic support, the increase of the capacity of learning in the student, innovative activities and the use of Microsoft Teams as a tool (Zamora-Antuñano et al. 2021). This shows that gender doesn't influence the adaptation process of teachers' strategies for remote education during the pandemic.

On the other hand, this adaptation process has been discussed indistinctly about emergency remote education, online and digital education (Bustamante 2020). However, each one of the modalities presents unique characteristics. Distance education is characterized by the distance in time and space between students, teachers and learning resources. While remote education refers to spatial distance with a further emphasis on synchronous modalities (Bozkurt and Sharma 2020; Shim and Lee 2020).

Regarding the planning in distance education, besides adapting the contents, it should present the different interactions produced in the process (Ferri et al. 2020). By contrast, the adaptation process of emergency remote education has been difficult because there is no design of a planned approach (Shim and Lee 2020). However, in both modalities, the objective is not limited to the transmission of information through digital media but requires the interaction of elements such as the technological infrastructure, technological competencies of the teacher, digital skills of students and other tools that facilitate effective learning outcomes.

In this regard, the emergency remote education faces the same challenges of online learning, specifically in the technological dimension about the access to infrastructures such as technological devices and Internet connection, skills and training of teachers and students in the use of technologies, and interactive, versatile and motivating didactical materials. Thus, it can contribute educative models when considering the role of technology to develop the teaching-learning process, analyze the limitations and potentialities (Ferri et al. 2020).

In this way, the limits of emergency remote education are assumed as a group of restrictions of technological, educational, personal, and social character that does not allow normal development of the learning process during the pandemic. The potentialities and variations of emergency remote education are assumed as the group of aspects that emerge through the process and contribute positively to the integration of this teaching modality (Whittle et al. 2020), generating ways, methods, means, and scenarios that are not possible in a face-to-face scenario.

Regarding the conditions and characteristics of the educative systems of each country, it was necessary to know both potentialities and national limitations to generate plans of action that allow carry out the remote teaching according to the context. For instance, in Spain, the initial research made by Fernández-Regueira (2020) demonstrated the inexperience of teachers of higher education to teach through the virtual platform. Findings of the paper indicated that 68.07 % of teachers had never given classes in this modality. Moreover, the predominant methodology is based on the transmission of contents and the absence of a pedagogical and didactic coherent analysis, noticing a series of weaknesses and gaps that makes the execution of emergency remote education difficult. In Chile, the educative system changed more than 1.2 million students to emergency remote education since the beginning of the pandemic and the lack of technological skills by teachers, students and other agents of the education system (Ruz-Fuenzalida 2021).

Meanwhile, in New Zealand, the educational transformations caused by the COVID-19 were linked to social agreements, the development of carefully organized tasks and even new educative designs like the one proposed by Green et al. (2020) for nursing faculty with an emphasis on the learning activities, physical, social and epistemic nature of the learning. Virtual happy hour was also included to familiarize the educative agents with the new tools of communication, interaction, tasks, assessment and new planning of the academic semester.

In this way, more than 20 years of continuous progress of the digital network allows the use of communication, information exchange, education and scientific elaboration. However, according to Pardo and Cobo (2020),

many universities still cannot adapt to the restrictions imposed by the health measures to teach remotely (4). This is accentuated in public institutions, where the analogical teaching predominates in a reality that was hybrid before the pandemic (Fernández-Regueira et al. 2020). Despite the changes that have been generated for the necessity, the digital transformation in the educative and professional fields, and other areas has been slow and, currently, it has turned into a principal objective (Coeckelbergh 2020).

In the same manner, although the literature part is from different positions, it is considered to determine the potentialities and limitations of emergency remote education in the Peruvian higher education as a consequence of the COVID-19 pandemic, specifically, from the teachers' experience. Therefore, the research question was to determine what are the potentialities and limitations of emergency remote education in Peruvian higher education as a consequence of the COVID-19 pandemic based on the teachers' experience of Hermilio Valdizan National University (UNHEVAL)

Research objectives

The objective of this research is to identify the potentialities and limitations of emergency remote education in Peruvian higher education as a consequence of the COVID-19 pandemic based on the teachers' experience of Hermilio Valdizan National University (UNHEVAL).

In this regard, this research is distributed in four sections. First, the literature review is based on emergency remote education and the positions of other authors on the possible potentialities and limits that exist in this context. Second, Materials and Methods provides a description of the variables and indicators as well as the instruments and the characteristics of the sample used in this study. Third, the Results section details the discoveries based on teachers' experience and emergency remote education. In the Discussion and Conclusions section, the findings in this research are compared with the previous research related to the study subject. It also allows to validate and consolidate the findings and contributions of this research as a contribution to the knowledge in the educational area in the context of the emerging product of the new normality.

II. Materials and methods

This research is framed as descriptive research. According to Arias (2006), it consists in the characterization of a fact, phenomenon, individual or group to establish the structure or behavior (24), since there is a description

of the characteristics considered as the potentialities and limits of emergency remote education from the teachers' perspectives. In addition, a non-experimental design was performed at a specific time and the variables were not manipulated (Hernández et al. 2014).

The sample consisted of 179 teachers of higher education from the Faculty of Education of Hermilio Valdizan National University (UNHEVAL) in Huánuco during the 2020-I academic period. The number of participants was determined by the sample size recompiled by Martinez (2019), through a confidence level of 99%, 0.18 of the proportion of the sample and an error of 5%. In this way, a sample of 123 teachers was obtained. In the process of the sample units, a proportionate stratified sampling (Otzen and Manterola 2017) was used since there is no alteration in the data of population to the sample (Table 1).

Table 1
Stratified sampling of teachers

Faculty	Population	Sample
Mathematics and Physics	29	20
Elementary school	18	12
Physical education	54	37
Biology, Chemistry and Environmental sciences	39	27
Language and Literature	39	27
Total	179	123

The principal variables of this research were the limits and potentialities of emergency remote education. For its measurement and description, a questionnaire based on the advantages and disadvantages of emergency remote education studied by Vásquez et al. (2020) and Shima and Yi (2020) was used. In addition, the demographic variables such as gender, age and academic level of teachers of higher education were considered (Table 2).

Table 2
Distribution of gender, age and academic level

Variables		f	%
Gender	Masculine	71	57,72
	Feminine	52	42,48

Variables		f	%
Age	<35 – 41	11	8,94
	42 – 48	89	72,36
	49 – 55>	23	18,70
Academic level	Bachelor	18	14,63
	Magister	69	56,10
	Doctor	36	29,27

The instrument was a five-level Likert item: strongly agree, agree, neutral, disagree, strongly disagree. It was distributed in 2 sections of 20 items. The first section addresses the potentialities of emergency remote education and the second section about their limits. Hence, the established dimensions and their indicators were evaluated (Table 3). The instrument's validation was supported by three researchers specializing in the technology field who expressed an agreement index of V = 0.96 (95 % IC [0.71; 0.99]) considered acceptable (Charter 2003). The four aspects considered for the evaluation were: clarify, congruency, coherence and relevance. Finally, the instrument's reliability was carried out through Z-test.

Table 3
Distribution of variables and dimensions

Variables	Dimensions	Description
Potentialities	Flexibility in the distribution of the subjects	Access to the additional information available 24/7 for students
	Variability of times for each objective	Possible follow-up of the development of abilities.
	Flexibility of time	Courses may be accomplished at the student's own pace, by completing easy lessons and focusing on the complex lessons.
	Interest of the participants	The use of digital tools boosts the interaction, the interest in learning and the development of competencies.
	Opportunity for the mistake	It makes the practice easier through digital tools that simulate real scenarios.

Variables	Dimensions	Description
Limitations	Necessity of infrastructure	Availability of necessary electronic devices to perform the didactic process.
	Distractors	Easy access to different applications and websites does not contribute to the development of the learning session.
	Study Habits	The change of modality can be assumed as a flexibility of the educative requirements.
	Use of new technology	New technologies can be restricted by the competencies limits of teachers and students.
	Social interaction	The necessity of expressing ideas, emotions and experiences to others individuals or people.

The email address to share the Google Forms were sent to 123 teachers of Hermilio Valdizan National University (UNHEVAL). The consent informed letter was attached to ensure the reliability of the information collected in conforms with the ethics for the research by the Internet (Domínguez-Lara and Torres-Villalobos 2020). The data collected were imported into an Excel datasheet.

Regarding the data analytics, the Google Forms database was downloaded and the database pruning was conducted to check the missing values. The IBM SPSS 25 statistical software was used to analyze the data through contingency tables to identify the potentialities and limitations of emergency remote education in Peruvian higher education as a consequence of the COVID-19 pandemic from the teachers' experience.

III. Results

The findings show important variations of the potentialities detected by the teachers in their context (Table 4). Items 1 and 2 accumulate Strongly agree with 86.17% and Agree 86.16%. These indicators are associated with the flexibility dimension in the distribution of the topics since it's considered an important volume of additional information for students.

In this regard, it is important to note the possibility of students to study through lessons and time for courses seemed complex. It is stated in the items of times' flexibility as a potentiality in the emergency remote education: items 5 (74.78%) and 6 (78.85%) of teacher respondents.

Table 4

Teachers' opinion about the probabilities of the emergency remote education

No.	Item	Strongly agree		Agree		Neutral		Disagree		Strongly disagree	
		f	%	f	%	f	%	f	%	f	%
1	Emergency remote education provides the access to additional information in anytime and everywhere.	50	40,65	56	45,52	15	12,19	1	0,81	1	0,81
2	The distribution can be different from the one planned in on-campus classes.	53	43,08	53	43,08	14	11,38	2	1,62	1	0,81
3	The available digital tools provide the analysis of individual development.	9	7,31	11	8,943	19	15,44	47	38,21	37	30,08
4	The emergency remote education provides autonomy so students can work on a self-paced course	10	8,13	19	15,44	17	13,82	39	31,70	38	30,89
5	The emergency remote education has generated flexibility in the time spent for each learning session.	43	34,95	49	39,83	18	14,63	7	5,691	6	4,87
6	It is possible that participants work the emergency remote education on their own paced	53	43,08	44	35,77	15	12,19	9	7,317	2	1,62
7	Participants show motivation through the emergency remote education	46	37,39	47	38,21	14	11,38	11	8,943	5	4,06
8	The emergency remote education boosts the interaction between participants	50	40,65	45	36,58	13	10,56	10	8,130	5	4,06
9	The emergency remote education allows to simulate real scenarios related to the course	24	19,51	26	21,13	19	15,44	33	26,82	21	17,07
10	The assessment can be performed many times, allowing the student to correct the possible mistakes.	7	5,69	17	13,82	18	14,63	36	29,26	45	36,58

Teachers don't perceive potential in the variability of time in each objective as shown on items 3 and 4. Those items obtain a percentage accumulated of 68.29 % and 62.59 % in the categories of Disagree and Strongly disagree.

In the interest dimension, participants perceive the emergency remote education as a potential to motivate their students and interact between them. This shows in items 7 (75.60 %) and 8 (77.23 %). Meanwhile, the dimension of opportunity for the mistake would not be considered as a potential, since only 40.64% of teachers consider Strongly agree and Agree with the real scenarios associated with their courses. On the other side, regarding Item 10, teachers state that the repetition of tests as a correction of deficiencies of students is a limitation (65.84 %).

Regarding the limits of emergency remote education (Table 5) in the necessity of the infrastructure, in Item 1, teachers perceive the Internet connection for the educational process (59.34 %) as a difficulty. However, the availability of electronic devices for the current programs may not be considered as a limitation, since it represents less than 50% of Strongly agree and Agree (44.711 %) in Item 2.

In the dimension of distractors (Item 3 and 4), two findings partially opposed were determined. In Item 3, teachers perceived the external distractors in a classroom represent a limit (56.91 %). Item 4, would not determine if the access to the Internet during classes is a limit for students since it doesn't exist a definitive contrast between Strongly agree (45.52 %) and Disagree (39.83 %) values.

Concerning the change of modality as flexibility of new educative requirements, in Item 5, teachers are in favor (47.15 %) and against (36.58 %) of the implementation of new study habits of study during the on-campus to virtually. By contrast, in Item 6 there is a consensus in considering the limits to the practice that require habits for remote modality (79.67 %); while, 2.43 % of teachers disagree with their implementation.

Another limited aspect in emergency remote education is the competencies levels of teachers and students. In Item 7, teachers considered the limits of the technological skills of teachers to develop didactic processes (67.47 %). There is not an agreement about the deficiencies in the technological competencies of students, of which 37.39 % Strongly agreed and Agree. By contrast, in Item 8, 43.08 % of respondents are between Disagree and Strongly disagree.

Finally, regarding the necessity to express ideas, emotions and experiences to other individuals or groups of people, in Item 9, teachers agree on the problems in the communication process (78.04 %), and in Item 10, the

Table 5
Teachers' opinion about the limitations of emergency remote education

No.	Item	Strongly agree		Agree		Neutral		Disagree		Strongly disagree	
		f	%	f	%	f	%	f	%	f	%
1	Internet connection limits the normal development of the didactive process	30	24,39	43	34,95	19	15,44	9	7,31	22	17,88
2	The available electronic devices accomplish the minor characteristics to perform the current programs	28	22,76	27	21,951	21	17,073	26	21,138	21	17,073
3	The emergency remote education allows external distractors to the classroom	50	40,65	20	16,26	24	19,51	19	15,44	10	8,13
4	The Internet access during the lessons represent a distractor for the student	29	23,57	27	21,95	18	14,63	27	21,95	22	17,88
5	Student can apply the same study habits as the ones used in on-campus learning modality	30	24,39	28	22,76	20	16,26	21	17,07	24	19,51
6	The modality of emergency remote education requires exclusive study habits	51	41,46	47	38,21	13	10,56	9	7,317	3	2,43
7	Technological competencies by teachers are not enough to performed the emergency remote education	46	37,39	37	30,08	20	16,26	16	13,00	4	3,25
8	Students do not have enough digital abilities to learn through the emergency remote education	20	16,26	26	21,13	24	19,51	25	20,32	28	22,76
9	The emergency remote education makes difficult the process between students	45	36,58	51	41,46	11	8,943	11	8,943	5	4,06
10	The emergency remote education does not contribute to the development of communicational competencies in the participants	53	43,08	45	36,58	7	5,69	8	6,50	10	8,13

lack of contribution of emergency remote education for the development of communicational competencies (79.66 %). Both are considered as limits.

IV. Discussion

Results show teachers consider the potential of emergency remote education in the flexibility in the distribution of subjects, this affirmation is supported by Vásquez (2020), thus, it allows to strengthen the theoretical basements before the development of the subject (16). Therefore, it is an important factor in the transformation of Peruvian education, since the education is based on the flexibility that requires changes from an educative practice focused on the teacher and the student (Ñañez et al. 2016).

Teachers perceive the students' participation based on the learning and management of time as potential. These results are similar to the results of Shim and Lee (2020), who state that management time represents a positive characteristic in emergency remote education. In their study, 26.02 % of respondents shows as benefit the fact of moving to the campus. This demonstrates that the time flexibility of time represents a potentiality that benefits both teachers and students since it contributes to minimizing the contagion risk, transportation costs and the possibility to invest that time in other productive tasks.

On the other side, it was identified in the variability of times for each objective as a no potential. This can be due to the perception of teachers about the variability in times that shows the use of educative assessment tools by the Information and Communication Technology (ICT). According to Dapozo et al. (2020), the tasks contribute students to knowing the relevant and necessary aspects for the accomplishment of objectives, besides the responsibility of the student as an active actor in their process (Hidalgo 2020).

The category of teachers' perception about the interest of participants for the emergency remote education, is considered as a potential. These results are supported by Vásquez (2020), who affirms the use of interactive digital tools boosts the interest of actors, consolidates the acquisition of knowledge and allows them to apply actively in their context. Finally, the chance of errors is perceived as potential by teachers, since they don't consider the benefits of active learning, in special, the autoregulation process as an effective method to help students to overcome the academic difficulties through a cognitive style independently of the field (Hidalgo 2020; Rosário et al. 2014).

In the limitation analysis of the emergency remote education, the necessity of infrastructure was considered as a limitation by the teachers in higher education. In this sense, results present important implications in the

development of emergency remote education. This is supported by Shim and Lee (2020), who state that this limitation generates unstable access to the educative platforms and also affects the synchronization of didactic materials and the teachers' voices. The results obtained by Huanca-Arohuanca et al. (2020) confirm the limitations related to Internet access in Peru where 45 % of students can't access the Internet. In addition, only 36 % of the houses have a computer and the 5.7 % uses for educative, labors and entertainment tasks (Instituto Nacional de Estadística e Informática [INEI], 2020). Therefore, it is considered a limitation for the emergency remote education and generates the necessity of the Peruvian government includes in their annual budget the implementation of Internet coverage in remote or rural areas as well as the educative politics that allow minimizing the gap (Leiva-Reyes et al. 2020).

The findings based on the distractor dimension as a limitation in the implementation of emergency remote education stand out teachers consider the Internet access could interrupt the educational process. In the words of Vásquez (2020), there is no control by teachers regarding the use of other devices unrelated to the lesson learning. This aspect is linked to the dimension of study habits, both connect each other with the maturity and awareness level of the participant.

In this way, study habits could be considered a limitation when requiring exclusive actions in the remote modality. This result agrees with the results of Herrera-Robaina et al. (2021) who identified the use of taking notes and summary as a new modality of study habits during the pandemic in contrast to previous years where individual conclusion and flowcharts were predominant. Therefore, emergency remote education requires the adaptation of study habits towards the online modality.

In this context, levels of digital competencies of teachers in the didactic process were a limitation aspect. The deficiencies in the technological competencies limit the access to new technologies for the development of courses (Vásquez 2020). In this way, the diversity of digital tools available on the Internet for developing the instrumented assessment to impulse the cooperative learning (Ocaña-Fernández 2020).

In the last dimension, results show teachers consider social interaction as a limit to implement in emergency remote education. These results coincide with the results of Shim and Lee (2020), who indicate that is one of the more frequent objections with a response rate of 17.29 %. This shows the lack of interaction, the difficulty to express thinking and a deep emphasis on individual progress could interfere in the educative strategies in a remote education program.

Finally, based on the obtained results, it is important to note a reflection about it. Due to the issues related to the emergency remote education and the COVID-19 pandemic, the education overview has changed into new modalities. In other words, education has changed in a new perspective focused on the importance of the current context where the educative practice is developed. This shows the resilience indicators through discussions and proposals by teachers and students to boost and generate a quality of education focused on the objectives of sustainable development (Rosales and Cárdenas 2021).

V. Conclusions

This research summarized the potentialities and limits of emergency remote education from the teachers' perspective. The variability in times of each objective and the opportunity for the mistake is not perceived as a potentiality. On the other side, the difficulties in the access to electronic devices for programs, the Internet access as a distractor, the application of the study habits of on-campus and online learning as well as the digital abilities of students do not represent a limitation of the emergency remote education.

In this way, this research allows knowing in what potential aspects of the didactic strategies in the emergency remote education could be improved. It also discards indicators perceived as a limitation to teachers and students, in both cases, to achieve a better adaptation of teachers and students, from a systematic and programmed didactic sequence of specific instructional designs. The evidence in this research suggests elaborating a higher education plan that includes the formation necessity of students based on their potentialities and limitations in the context. According to Bozkurt and Sharma (2020), the design of learning systems is based on wrong assumptions that generate more vulnerability to drawbacks to the educational practice. Therefore, it is important to highlight that identifying and achieving the knowledge of the potentialities and limitations of emergency remote education, can lead to creating future journals to give responses to possible interruptions in the educative context.

In this regard, the future perspectives that adopt the education will be based on the emergency remote education actions, thus, the educative politics won't be the same. For this reason, it is important to conduct educative research that transforms the teaching methods and models in all educative levels, modalities and teacher training programs.

This research acknowledges its limitation of being conducted during the pandemic and only teachers' perspective was considered. Hence, for future

researchers, longitudinal assessment in teachers and other educative parties and contrast with others post-pandemic research should be conducted. The strategies on the selection of options can represent a bias of the instrument since it stops the contrast of the performance of participants in a specific construct. The future research streams could include instruments for the competencies level in the adaptation of emergency remote education as well as consider a wider sample that generalize the findings.

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