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Emergency remote learning (ERL) in the COVID-19 era: perceived experience of Indian learners of higher education

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Abstract

Purpose – The COVID-19 pandemic compelled the education system to switch over to emergency learning-teaching that is organised remotely. The present study investigated the experience of emergency remote learning (ERL) provided to higher-education learners. The study explores learners' perceived experience regarding the quality of learning resources, the effectiveness of teaching in a virtual climate and the scope of interaction in ERL.

Design/methodology/approach – Utilising a snowball sampling method, data were obtained from 470 Indian students of higher education through a cross-sectional online survey using a questionnaire through social media platforms. Data were analysed with relevant statistics.

Findings – The majority of students agreed that they had benefited from ERL. The overall impression of the ERL is positive; nevertheless, the students are perplexed and lack confidence in many aspects of the ERL. The Quality of ERL Resources, Teaching Effectiveness, Peer Interaction and Workloads were found to be significant factors in determining the quality of ERL.

Originality/value – Learning from the crisis of a pandemic is paramount for the education system. The education system could not go back to what was considered normal before the pandemic; rather it is time to assess and finalise strategies from the experience during this pandemic that could be taken by the higher-education institutions to make the ecosystem better equipped to create 21st-century learning climate. Accommodating the components of remote learning-teaching and engaging technology towards hybridisation are the needs of the time. Hence, assessing the quality of ERL from the learner's perspective might contribute to redesigning future remote learning.

Keywords COVID-19 pandemic, Emergency remote learning, Technology adoption, Learning resources, Teaching effectiveness, Peer interaction

Paper type Research paper

Introduction

The current pandemic is unprecedented, and educators and educational institutions are the most affected. The mitigation measures taken to prevent the contagious virus in the COVID-19 context pushed educators into a sudden and unexpected world of remote learning. The global pandemic catastrophe abruptly turned the educational landscape into an emergency distance

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learning-teaching situation (UNESCO, 2020a). To ensure the continuity of education, most countries have adapted to emergency learning-teaching using existing technologies (UNESCO, 2020b). These efforts, on the other hand, unlocked a slew of new possibilities, shined a light on current and future disparities and brought to light many new educational challenges (UNESCO & RCEP, 2020; Rapanta *et al.*, 2020). As a result of the COVID-19 outbreak, conventional education institutions were obliged to convert to technology-enabled online learning-teaching (Ali, 2020; Daniel, 2020; Murphy, 2020). During the shutdown of their classrooms, teachers continue to adapt to available technologies and pedagogy.

Such radical shift contributes to the innovation of new virtual platforms and applications, virtual learning management systems, live video communication for synchronous interactions, several new massive open online courses and many user-friendly tools for designing the learning content (UNESCO, 2020b). Some institutions at the tertiary level offered asynchronous learning opportunities through faculty-prepared audio-video lectures and pre-designed assignments (Crawford *et al.*, 2020; Hodges *et al.*, 2020), while others were able to provide a more interactive learning experience through the specific virtual platform (Aguilera-Hermida, 2020). In India too, different government agencies and institutions have explored and employed the readily available Moodle-based learning management systems in higher education to mitigate the challenges of disrupted learning-teaching. The context of emergency remote learning (ERL) teaching in virtual format is further extended after the introduction of Google Meet, Google Classroom, Zoom, SteamYard, Cisco Webex and other applications, which are learner friendly, easy to use and mostly free of cost (Future Learn, 2020).

The lack of teachers' pedagogical skills in the virtual environment is a major hurdle, and students' psychosocial adaptability to such a virtual climate is also a major concern in such remote learning-teaching. Hence, the stakeholders of education need to put their hard work to devise a framework so that the existing gap between access and usage of technology both for learners and faculty members could be addressed. Simultaneously, capacity building of higher-education faculty members to compensate for the pedagogical skill gap is also a pertinent area which demands policy intervention (Mukherjee *et al.*, 2021).

Background of the study

In the context of education, suffering due to institutional closure was characterised as a disruption, and therefore, it was considered an emergency (Reimers and Schleicher, 2020). The research findings published until the time of the onset of COVID-19 revealed the limitations and constraints in perception, while most were engaged in emergency learning-teaching with its unstructured unique format than the proper online or blended learning-teaching (Hodges *et al.*, 2020). Considering the gravity and urgency of accessibility issues, the Government of India through its educational agencies undertook a lot of initiatives to respond to the new demands in virtual emergency learning-teaching. The existing machinery of the Study Webs of Active-Learning for Young Aspiring Minds, the Annual Refresher Programme in Teaching and the e-PG Pathshala further strengthened to offer diversified Massive Open Online Courses and e-learning content that includes collaborative learning modules, enthralling learning videos and different kinds of games prepared in a multidisciplinary approach along with assignments and tests with a provision of credit transfer. Moreover, these contents were developed in multiple regional languages (Bhatia and Juneja, 2021).

ERL is a learning experience that might be constructed through the effective use of technology by students through negotiation with the teacher and fellow students in a virtual climate (Bower, 2019; Botero *et al.*, 2018; Gonzalez *et al.*, 2020). Teachers and students can ensure their presence in a virtual climate with their unique identity and remain involved in

cognitive interaction through effective technology and pedagogy. This kind of successful transition depends upon teachers' and learners' intentions and the efficacy of the technology (Yakubu and Dasuki, 2019; Kemp *et al.*, 2019). In ERL, the instructional design, whether asynchronous or synchronous-live group interaction is being offered, the puzzle remains how far such learning-teaching is being actualised in reality. In this transition paradigm, institutions need to reassess the curricular structure, pedagogy and assessment for remote virtual learning-teaching (Hayashi *et al.*, 2020). "*The general principles of effective pedagogy remain valid, but remote learning presents additional challenges*" (McAleavy and Gorgen, 2020, p. 2). Learning design (Miyazoe and Anderson, 2010), quality of learning resources (Miyazoe and Anderson, 2010), interaction with the teacher and peer interactions are the determinants of the overall satisfaction of the remote learning experience (Goh *et al.*, 2017; Broadbent and Poon, 2015; Paechter *et al.*, 2010). Peltier *et al.* (2007) also considered some other determinants like teaching quality, course content and teacher support and mentoring that influence ER differently in different contexts and cultures.

Most Indian higher-education institutions accept the need for the adoption of technology and alternative viable modalities for a continuation of learning-teaching and to provide governance in the last part of 2020, during the reoccurrence of newer strain-mediated infections. There have been barriers to adoption in such a sudden shift of paradigm, but those have been managed through multiple strategic interventions. But many of the higher-education institutions, which can be marked as so-called "laggards" in technology adoption, struggled in multiple forms like inability to provide personal suitable gadgets for every teaching and non-teaching entity and not having the appropriate digital infrastructure to support remote emergency learning (Agha, 2020). It has been revealed by contemporary studies that the overall satisfaction with remote distance teaching in higher education was intensely correlated with course curriculum and quality of faculties in higher education (Kulkarni, 2021). The studies further revealed that while Indian higher education was trying to switch over to remote virtual teaching, initially teachers were at loss to address the student satisfactorily, but gradually the teachers learn to adapt and apply techno-pedagogical design along with ensuring their social presence and teaching presence (Mukherjee and Das Mollick, 2021).

In the ERL, how students perceive this virtual teaching is very influential. In such a process, the success of the learner majorly depends on their affectionate sense of teachers' presence in virtual format. Well-sequenced authentic tasks in ERL would involve frequent and diverse scope for the teacher to demonstrate "presence" to learners, including their assessment activities (McAleavy and Gorgen, 2020). On the contrary, lack of interaction ultimately leads to "unmotivating learning experiences" (Huang *et al.*, 2020). Examining remote learning-teaching from learners' perspectives is an urgent research need in the present scenario. How the nature of the institutional management, academic programme and level of study influence learners' perceived experience of ERL is an interesting subject for policymakers across the globe. Therefore, the current study investigated what kind of learning exposure the students are being offered by their institution and learners' perceptions of the ERL offered by their institution.

There is a rapidly growing body of knowledge, which has scrutinised the present practice of ERL in the context of institutional closure. Studies examined students' learning experiences that could be constructed by learners via effective use of technology and interaction with teachers and peers in a virtual climate. Any kind of learning-teaching that may occur in distance mode on an emergency basis, engaging different grades of technology and instantly evolved pedagogy, may be considered here as ERL. As students are the primary stakeholders in any educational transformation, examining remote learning-teaching from their perspective is an urgent research need in the present scenario.

Recent studies have investigated the perceptions of students towards their adoption and acceptance of such emergency virtual learning-teaching with a focus on motivation, perceived behavioural management and cognitive engagement (Aguilera-Hermida, 2020). Therefore, the current study was conducted with the following objectives:

(1) To investigate learners' general perceptions of the learning provided to them via virtual mode as an emergency arrangement in a distance setting.

(2) To explore learners' experience in terms of the quality of remote learning resources, the effectiveness of teaching in a virtual climate and the scope of opportunities for interaction in such an emergency learning design.

(3) To investigate how demographic categories are associated with students' perceptions of ERL.

(4) Moreover, to explore the new factors that have emerged from the reflection of the ERL's perceived experience and whether these factors have any inter-correlation to the overall quality of the ERL.

Methodology

Participants

From the 16th to the 30th of November 2020, a cross-sectional online survey was conducted to collect data from Indian university students (age ≥18 years) during emergency learning exposure owing to the complete institution shutdown. The participants included here are the students enrolled in undergraduate (UG) and postgraduate (PG) programmes at central government, state government-aided or private institutions, including general degree, engineering, management, law and medical colleges affiliated with University Grants Commission (UGC)–approved universities and accredited by other relevant regulatory apex bodies, situated in West Bengal, a state of India. The participants represented the overall population of the study.

Recruitment procedure

The study used a social media–based (Facebook and WhatsApp) snowball sampling method (Mukherjee and Maity, 2021). Google Forms was used to create the response schedule, and the survey link was shared on the aforementioned social media platforms. The respondent was automatically redirected to the study's informed consent information by clicking on the link. After that, participants responded to a series of items presented in the survey schedule. To spread the survey schedule beyond the first point of contact, participants were also asked to share and circulate the link within their own or other college and university student groups so that the survey schedule could be distributed apart from the first point of contact. The participants had to be students pursuing a UG or PG programme, over the age of 18 years and able to understand the English language. Students who have access to an appropriate electronic device and internet connectivity, as well as have an account on either Facebook or WhatsApp, have taken part in the survey. Finally, 470 respondents were considered for the study.

Study instrument

A structured survey questionnaire was designed and validated through expert opinions to meet the objectives of the study. The first part of the questionnaire contained information on the respondents' sociodemographic characteristics. The next section contained information on their institutions' current ERL practices in the context of the COVID-19 pandemic. The last

section contained a standardised Likert-type "e-Learning Experience Questionnaire" (Ginns and Ellis, 2007), with options of "disagree" and "agree" as two extreme responses and "neutral" as an intermediate response for data capture concerning students' perceived experience of ERL.

Statistical analysis

All 470 responses were found valid and thus considered for analysis through SPSS (Version 16.0). For assessing the pattern of response, descriptive analysis focused on frequencies and percentages, and chi-square test statistics were employed to investigate whether there was any association of demographic variables with the students' e-learning experiences. The exploratory factor analysis was done to identify the smaller number of coherent subsets with minimal cross-loadings on the basis of students' responses against each item of the scale. Again, the identified subsets and the overall e-learning experience of the students were further analysed to estimate the relationship between them. The threshold level for statistical significance was set at $p < 0.05$ where applicable.

Findings

There are 26 public (25 state and one centrally funded) and 11 private universities in the Indian state of West Bengal. There are 32 general universities (both public and private) offering education in various disciplines such as arts, humanities, science, mathematics, pharmacy, commerce, engineering and business administration; two public agricultural universities; one public medical and health allied university; one law university (public) and one engineering university (public). However, respondents in the study came from 14 public and 6 private general universities, with the rest coming from other universities except the agricultural university. No students of agricultural universities had participated.

The demographic data of the participants in the study (see Table 1) indicated that the respondents' ages ranged from 18 to 30 years ($N = 470$, mean = 21.33, standard deviation = 2.79). Female respondents (54.7%) outnumbered male respondents by a large margin. The survey received no responses from intersex individuals. The majority of the students (65.3%) were undergraduates. Students in general and professional courses had nearly identical numbers (about 50%). The majority of the participants (83.4%) were from state-aided public institutions.

General information regarding the nature of ERL exposure was reflected in different ways (refer to Table 2). When all the Indian institutions were closed, over 93% of higher-education students reported that they received full or partial academic support from their institution. According to the findings, 63% had used a smartphone or tablet, 5.7% had used a desktop and 31.3% had used both mobile and non-mobile devices. Almost 68% of students participated in interactive video conferencing for synchronous learning, while the rest were

Table 1. Sample demographics ($N = 470$)

Variables		Sample	Percentage (%)
Gender	Male	213	45.3
	Female	257	54.7
Education	Undergraduate	307	65.3
	Postgraduate	163	34.7
Course nature	General	231	49.1
	Professional	239	50.9
Institute category	Public	392	83.4
	Private	78	16.6

Item	Description	Category	*N*	Percentage
1	In response to the crisis of the pandemic caused by the COVID-19, while the institute remains closed, do you get academic support from your institution?	Mostly	286	60.9
		Partially	149	31.7
		Not at all	35	7.4
2	What devices do you use for online classes?	Phone/tablet	296	63.0
		Desktop	27	5.7
		Both	147	31.3
3	In which mode do you receive online classes?	Synchronous class	321	68.3
		Asynchronous Recorded video lecture	67	14.3
		Providing learning materials and assignments	82	17.4
4	If you receive a synchronous class then what was the duration of synchronous online classes?	45–60 min	257	80.0
		61–90 min	52	16.2
		>1.30 h	12	3.8
5	Does the online classless provide enough scope for exploring simulations and resources?	Mostly	246	52.3
		Partially	161	34.3
		Not at all	63	13.4
6	Do you have the scope to clear your doubts on the topic on which classes were going on?	Mostly	221	47.0
		Partially	180	38.3
		Not at all	69	14.7
7	Do you think such online classes are needed to continue before you return to your campus?	Yes	386	82.1
		No	84	17.9

Table 2.
Nature of exposure in ERL

given asynchronous recorded movies or were exposed to online learning materials and tasks. The majority of students chose to participate in 45- to 60-min online lessons, which is consistent with the findings of Rafi *et al.* (2020). Of all, 52.3% said online tools were mostly successful and 34.2% said they were partly effective, while the remainder said they were ineffective; 13.5% of respondents believed that emergency distance classes lacked adequate and appropriate resources. Furthermore, 47% of students said they had an adequate chance to clear their doubts most of the time, 38.3% said there was only a partial scope of such a facility in online classrooms and the remaining 14.7% said there was none at all. Before returning to their institution, 82.1% of participants felt that the ERL via digital platforms is highly significant for continuing their education.

The students' perceived experience of the ERL has been recorded through Ginns and Ellis's (2007) e-learning experience scale by analysing each item with options of "disagree" "neutral" and "agree". The participants' percentage-wise response patterns against each item are presented in Table A1. Here, the percentage of agreeableness indicates the positive experience of remote learning, except for item 15, in which agreeableness denotes a negative experience. Thus, the student's experience was not negative for any aspects of remote learning-teaching, but the pattern of response revealed that students' perception of all the items was not overly positive. Among 32 items, students showed agreeableness towards 18 items, which the maximum number of respondents reacted positively towards. For the rest of the 14 items, the majority of responses were in favour of the neutral option which indicates they were not confident about their degree of satisfaction regarding these aspects of the ERL experience. Thus, the overall responses ($N = 470$) for the entire scale were 44.04% for agreeing, 37.02% for neutral and only 18.94% for disagreeing. The items of the above-mentioned scale are used to assess the quality of ERL. More than half of the respondents do not show confidence in the quality of the perspectives.

To investigate the nature of associations between demographic attributes of the respondent higher-education students and the pattern of reflection of the perceived experience of ERL, i.e. how far the different demographic factor is associated with their choice of options (respectively disagree, neutral and agree), the chi-squared analysis was done (see Table 3). This analysis revealed that gender and institutional category have significant associations ($p < 0.05$) with the perceived experience of ERL. Males and females have shown a different pattern of association with their perceived experience of ERL as female respondents showed a significantly higher degree of agreeableness towards ERL than their male counterparts. Learners of the public institutions showed significantly different kinds of responses in terms of the perceived experience of ERL in comparison to the learners of privately managed institutions. Students of public institutions showed significantly higher agreeableness to the ERL than students of private institutions. On the contrary, the level of education and nature of the courses did not have any significant influence ($p > 0.05$) in this context. Concerning the degree of agreeableness to the perceived experience of ERL, the difference between the students of undergraduate and postgraduate and that between the student of general and professional courses were insignificant.

Males in comparison to females have chosen the neutral option as the preferred one, and similarly, PG category students have chosen the neutral option over the UG category. Students who belong to professional courses have favoured the neutral option over students of general courses, while students of private institutions have favoured the neutral option over their counterparts in public institutions.

The researchers investigated the degree of variability in learner acceptance at the item level; still, it was needed to determine whether a smaller number of underlying factors might be able to explain such variability. As items were not cohered to the previous dimensions of the scale, the present study needs to identify a core set of dimensions from the first 31 items of the ERL Experience Questionnaire. To develop a coherent set of scales with minimal cross-loadings between latent factors, exploratory factor analysis (EFA) was done by principal axis estimation with Varimax-Kaiser normalisation rotation. The total variation explained was 55.12, which is quite greater than the minimum acceptance value, i.e. 50% (Streiner, 1994). Items with loadings of less than 0.4 have been discarded (Samuels, 2017; Field, 2013), and ultimately, a simple structure with four clear factors was identified, which comprises only 23 items (see Table A2). The factors were labelled as Quality of ERL Resources (I), Teaching Effectiveness (II), Peer Interaction (III) and Workloads (IV).

Variable	Agree	Neutral	Disagree	F	p
Gender					
Male	67, 31.5	87, 40.8	59, 27.7	31.35	0.00*
Female	140, 54.5	87, 33.9	30, 11.7		
Education level					
UG	133, 43.3	111, 36.2	63, 20.5	1.46	0.48
PG	74, 45.4	66, 38.7	26, 16.0		
Course nature					
General	101, 43.7	95, 41.1	35, 15.2	5.51	0.06
Professional	96, 40.2	105, 43.9	38, 15.9		
Institution type					
Public	182, 46.4	144, 36.7	66, 16.8	8.60	0.01*
Private	25, 32.1	30, 38.5	23, 29.5		

Note(s): *Significant ($p < 0.05$)

Table 3. Demography-based category-wise association with the perceived experience of ERL

The final step in this study was to find out whether the different factors or subscales of the whole unit are associated with the whole experiences of the students about ERL. Based on the EFA, the factors were already explored and identified as the Quality of ERL Resources, Teaching Effectiveness, Peer Interaction and Workloads. To ascertain the relationship between the explored factors and the overall quality of the ERL activities in virtual format (only item 32), the Pearson product–moment correlation was calculated. The result of the different correlations is presented in the correlation matrix in Table 4. Before conducting the said calculation, the reliability of the factors was estimated. The Cronbach's α for the first three factors ranged from 0.76 to 0.89, which indicates the acceptance of reliability. The Spearman–Brown predicted reliability was estimated since there were only two items in the fourth factor, i.e. Workloads (Eisinga *et al.*, 2013) and the value ($\rho = 0.61$) is also within an acceptable range (George and Mallery, 2016).

The correlation matrix (see Table 4) revealed that the inter-relationship between different subscales was statistically significant ($p < 0.05$) in all cases. The correlation ranged here from 0.15 to 0.77, which indicates a moderate to strong level of correlations. Similarly, the overall quality of e-learning activities (V) has a moderate to strong relationship (0.58–0.70) with the three subscales, i.e. Quality of ERL Resources (I), Teaching Effectiveness (II) and Peer Interaction (III). but unlike above, the correlation between Workloads (IV) and the overall quality of e-learning activities (V) was not significant ($p > 0.05$) at all.

Discussion

The present study has captured relevant data that assess the quality of ERL as offered by higher-education institutions to complement face-to-face learning on an emergency basis. The findings are significant in many ways in the context of digital learning as they have addressed the quality issues of remotely organised teaching-learning in terms of teaching effectiveness.

The finding suggested that a higher proportion of students either are not satisfied with the quality of ERL resources or express their partial satisfaction with it. Hence, teachers need to think that learning resources for distance learning-teaching cannot be mere replicas of conventional classrooms. The learning resources must have the potential to provoke learners to engage in virtual engagement and need to have self-explanatory value. Disciplinary and interdisciplinary negotiation among teachers may be an effective way to design and run a pilot test of learning resources before using them in a distance learning environment. The learning resources of asynchronous and synchronous classes would be different because in synchronous classes, the teacher would have the opportunity for interpretation and instant dialogue with students, while the asynchronous mode needs to be more programmed in such a manner that learners can interact with resources and assess their progress.

Students' experience of their opportunity to clear their doubts was not positive, and they expressed their dissatisfaction with this aspect of ERL. Learners expressed their demands for such an emergency venture of continued learning-teaching, while the majority were not

Table 4. Correlation matrix of identified factors with overall perceived experience of the quality of ERL ($N = 470$; and α = Cronbach's α, and ρ = Spearman–Brown reliability)

Factors	I	II	III	IV	V
I. Quality of ERL Resources ($\alpha = 0.88$)	1				
II. Teaching Effectiveness ($\alpha = 0.89$)	0.77**	1			
III. Pear Interaction ($\alpha = 0.76$)	0.69**	0.74**	1		
IV. Workload ($\rho = 0.61$)	0.18**	0.15**	0.24**	1	
V. Overall quality	0.70**	0.70**	0.58**	0.02	1

Note(s): **Significant at 0.01 level

convinced about the scope and quality of virtual interactions. Such limitations of the ERL indicate a lack of pedagogical planning. If any learning-teaching method can create doubts among learners, that is pedagogically significant (Panda, 2020), but the online pedagogy must have a sincere plan, time budget and design so that learners may raise their doubts. Discussion of doubts and further input both from teachers and peers may lead to relearning. Teachers need to show the desired pedagogical maturity in this context to create space for negotiation and doubt clearing. Organising dynamic peer interaction is extremely challenging in a virtual climate. Given the length of class time, the nature of the learning and the concept addressed, teachers must plan ahead of time for learner–teacher and peer interaction to ensure a dynamic didactic learning environment.

In the contemporary research literature, the association of students' perceived experience with such ERL with their demographic factors is not very prominent. The present study revealed that the gender of the respondents and the nature of the institution they belong to (private and public) significantly differ in their perceived experience of ERL, while their engagement with the level of the programme that is UG and UG above remains insignificant as far as their perceived experience of ERL is concerned. It was also revealed that despite the difference in the curriculum in general and professional programmes of study, the respondents belonging to both the categories have shown identical patterns regarding their perceived experience of the ERL. Thus, as either a learner pursuing a general programme of study or a professional, they are identical and have similar experiences in reflecting on ERL. So, the present study has thrown light on the need for such demographic category-based research in assessing the perception of the learner in higher education about ERL.

It is obvious that in a remote virtual climate, the quality of learning resources, teaching effectiveness and dynamic interaction between peer groups are major influencers of the quality of the ERL, which remain unsolved challenges. Above 50% of respondents in the present study also raised their concerns about the quality of remotely organised learning-teaching. Thus, the need of refocusing on a unique pedagogical perspective in a remote learning context has emerged from the pattern of reflection of learners. The learning content design and delivery need to be appealing to the learners. Teachers may conduct demand surveys or action research to gain an understanding of the nature of the demands of learners of respective grades and courses about their expectations of the quality of resources for remotely organised learning. Facilitating learners in the construction of knowledge demands the sound pedagogical exposure of teachers. Constructivism, especially social constructivism, in a virtual distance climate is further challenging. Teachers need to have a meaningful understanding of how to present themselves in a socially cohesive manner in a distance virtual climate. Allowing everyone to be projected as a real person in a virtual climate helps open communication, affective expression and group cohesion. Teachers need to encourage students to share relevant anecdotes, experiences and beliefs during discussions in a virtual climate.

Apart from social presence supported by the theory of behaviourism, teaching presence is also crucial to make learning effective. Teachers should promote active and collaborative learning in virtual spaces. The teacher has to organise instructional design for remote teaching to engage learners in authentic academic tasks. Teachers should learn to design a kind of remote learning ecosystem through which they will be able to provide personalised feedback that can motivate students to learn.

Social presence and teaching presence lead to cognitive presence, the most crucial input in making learning and teaching effective in a virtual climate while organising learning remotely. According to social cognitive theory, pre-defined learning objectives, a sound instructional process, a planned design of reinforcement and continuous guidance in a virtual environment can provide learners with an effective experience. To overcome the lack of motivational factors in distance learning-teaching, teachers should encourage students to

experiment and engage in divergent thinking. For engaging learners, self-testing, practice assignments, simulations and other interactive activities with frequent opportunities for testing and feedback are essential. Hence, teacher capacity building is felt to be needed.

In the context of such emergency education, the purpose of the present study was to develop a coherent approach to assess the quality of the ERL when such remote learning is being organised to complement conventional programmes of learning-teaching. The present study has identified four factors: the extent to which the quality of such remote digital learning resources was effective, the extent of teaching effectiveness, the degree of peer interactions and the intensity of workload in the ERL context. The experience perceived by the students about the ERL is influenced by such determinants that are somehow unique, except for peer interaction, which is likely common to other studies of virtual remote learning experiences (Goh *et al.*, 2017; Paechter *et al.*, 2010; Broadbent and Poon, 2015). The unique factors that have emerged here as determinants of the quality of the ERL may be due to the different learning environments and cultures in emergencies. The Quality of the ERL Resources has a positive relationship with teaching effectiveness at the highest level and a higher degree of relationship with peer interaction. Teaching Effectiveness and Peer Interaction are also found to have a higher degree of positive relationships. Similarly, the overall quality of the ERL also has a more or less strong association with the quality of learning resources, teaching effectiveness and peer interaction. Finally, the workload has very poor interaction with the overall quality of the ERL, which is similar to the research findings of Widyanti *et al.* (2020), and showed a lower degree of association with the other three attributes. Henceforth, it is found that the dynamic interaction of these factors determines the overall quality of ERL during the pandemic situation.

The findings of the study have general implications for education at a global level, irrespective of the grades of learners and societal context. More clearly speaking, this finding may also be instrumental for adopting a policy in higher education as well as school education. The quality of ERL may be effective if the essential components of appropriate pedagogy – structure, adaptation and assessment – are ensured in a remote learning context. The drastic shift to ERL in education may have failed to touch the desired level of success as teachers are not provided with capacity-building programmes (Hayashi *et al.*, 2020).

The present study diagnosed the challenges of the ERL that spontaneously developed in the Indian context during pandemic-mediated institutional closure. These findings could be used as immediate input in designing virtual professional learning programmes for practising faculties of higher education. The virtual professional capacity-building programme would allow the practising faculty members of higher education to learn skills and strategies to ensure the quality of learning resources, peer interaction and thereby effective teaching. Learning through virtual platforms will facilitate the faculties to teach effectively on virtual platforms. The findings will facilitate the higher-education faculty members to prepare technology-enhanced instructional models befitting the virtual climate that could be readily embraced in an emergency-like situation.

The pedagogy in the context of ERL is evolving (Karalis and Raikou, 2020), which leads us to understand the need for designing continuous professional development (CPD) programmes for faculty members at all levels. In-service teacher education is becoming a much more crucial agenda on a global scale and in India too. In-service teachers' education may not be confined to effective technology adaptation in regular classroom teaching-learning, but considering the alternative evolving reality of "neo normal", teacher education is liable to prioritise capacity building to prepare the mindset and skills for ERL. Thus, the present study might lead to providing a more transparent workable foundation of a systemic framework to design CPD that will ensure effective ERL. Hence, herein, the present research further shows the need for in-depth exploration of the effects and possible consequences of

the expansion of engagement of virtual technologies in learning-teaching, which could help policymakers to design future learning management systems along with the capacity building of teachers and learners for virtual remote learning.

Conclusion

It is doubtless that whatever normalcy we can expect shortly in education, it must have a broader provision of virtual learning, at least in the blended format of a hybrid combination of on-campus and off-campus. Thus, the development of student-centeredness in virtual learning-teaching is a priority in pedagogical research. The present study explored one of the major areas of remotely organised virtual learning-teaching, which is how learners are appreciating their perceived experience of a new paradigm of the culture of remote learning-teaching. The study is delimited in terms of sample size, and it also failed to incorporate the other major issues of virtual learning-teaching pedagogy. The findings of the present study open up a new area of research, which ultimately helps policymakers and curriculum developers frame CPD policy in both higher education and school education. Therefore, in-depth research in pedagogical modelling on virtual remote learning in education opens up new scope.

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Supplementary material

No	Item	Scale response [(*N*), (%)] Disagree	Neutral	Agree
1	To do well in the online quizzes all you really need is a good memory	71 (15.1)	203 (43.2)	196 (41.7)
2	The teacher used the online environment when appropriate to keep students informed about results	62 (13.2)	193 (41.1)	215 (45.7)
3	I received too much feedback online from my teacher	121 (25.7)	199 (42.3)	150 (31.9)
4	The teacher's responses online motivated me to learn more deeply	103 (21.9)	169 (36.0)	198 (42.1)
5	The teacher helped to guide online discussions between students	85 (18.1)	139 (29.6)	246 (52.3)
6	The teacher used the online environment to regularly update students about the relevant unit of study information	72 (15.3)	143 (30.4)	255 (54.3)
7	Reading other students' online submissions clarified some of my ideas	85 (18.1)	189 (40.2)	196 (41.7)
8	The online teaching materials in this unit of study are extremely good at explaining things	112 (23.8)	198 (42.1)	160 (34.0)
9	The teacher's interaction with me online encouraged me to get the most out of my learning	118 (25.1)	172 (36.6)	180 (38.3)
10	Online quizzes helped me to learn effectively	115 (24.5)	160 (34.0)	195 (41.5)
11	The workload for the online component of this unit of study is too heavy	98 (20.9)	202 (43.0)	170 (36.2)
12	The teacher's online responses motivated me to do more online learning than I would have done otherwise	109 (23.2)	185 (39.4)	176 (37.4)
13	Information needed to understand the purpose and contents of the unit was integrated into one place online	73 (15.5)	213 (45.3)	184 (39.1)
14	I generally had enough time to understand the things I had to learn online	89 (18.9)	167 (35.5)	214 (45.5)
15*	I didn't receive enough helpful online feedback from my teacher	196 (41.7)	151 (32.1)	123 (26.2)
16	I interacted with students' online postings/submissions even if they weren't assessed	79 (16.8)	248 (52.8)	143 (30.4)
17	The online activities are designed to get the best out of students	125 (26.6)	190 (40.4)	155 (33.0)
18	Other students' online submissions helped me understand my ideas from a new perspective	101 (21.5)	186 (39.6)	183 (38.9)
19	The guidelines for using e-discussions were clear to me	75 (16.0)	149 (31.7)	246 (52.3)
20	The online teaching materials are designed to try to make topics interesting to students	119 (25.3)	160 (34.0)	191 (40.6)
21	Other students' online submissions encouraged me to investigate further sources of knowledge	100 (21.3)	173 (36.8)	197 (41.9)
22	The sheer volume of work for the online component of this unit of study means it can't all be thoroughly comprehended	69 (14.7)	271 (57.7)	130 (27.7)
23	The online learning materials helped me to learn during the face-to-face situations in this unit of study	112 (23.8)	184 (39.1)	174 (37.0)
24	It was clear if online resources were related to assessment	61 (13.0)	197 (41.9)	212 (45.1)
25	The online activities helped me to understand the face-to-face activities in this unit of study	102 (21.7)	180 (38.3)	188 (40.0)
26	The online materials supported some key assessment items in this unit	63 (13.4)	184 (39.1)	223 (47.4)

(*continued*)

Table A1. Reflection of participants on their perceived experience of ERL

No	Item	Scale response [(*N*), (%)] Disagree	Neutral	Agree
27	The relationship between the online resources and the whole unit of study was clarified on the unit's website	101 (21.5)	195 (41.5)	174 (37.0)
28	The teacher helped to focus on online discussions between students	92 (19.6)	158 (33.6)	220 (46.8)
29	Information needed for assignments was integrated into one place online	82 (17.4)	201 (42.8)	187 (39.8)
30	It was clear to me how the website for this unit related to the whole unit of study	80 (17.0)	188 (40.0)	202 (43.0)
31	The teacher ensured continuous access to the relevant online materials throughout the semester	83 (17.7)	149 (31.7)	238 (50.6)
32	Overall, I was satisfied with the quality of the online materials and activities of this unit of study	125 (26.6)	159 (33.8)	186 (39.6)

Note(s): *Negative item
Source(s): Items were adopted from Ginns and Ellis (2007)

Table A1.

No	Item	Factor loading I	II	III	IV
I. Quality of ERL Resources					
30	It was clear to me how the website for this unit related to the whole unit of study	0.71			
29	Information needed for assignments was integrated into one place online	71			
24	It was clear if online resources were related to assessment	0.68			
19	The guidelines for using e-discussions were clear to me	0.66			
26	The online materials supported some key assessment items in this unit	0.66			
27	The relationship between the online resources and the whole unit of study was clarified on the unit's website	0.62			
13	Information needed to understand the purpose and contents of the unit was integrated into one place online	0.59			
31	The teacher ensured continuous access to the relevant online materials throughout the semester	0.51			
20	The online teaching materials are designed to try to make topics interesting to students	0.46			
II. Teaching Effectiveness					
4	The teacher's responses online motivated me to learn more deeply		0.73		
5	The teacher helped to guide online discussions between students		0.72		
12	The teacher's online responses motivated me to do more online learning than I would have done otherwise		0.64		
9	The teacher's interaction with me online encouraged me to get the most out of my learning		0.64		
28	The teacher helped to focus on online discussions between students		0.58		
6	The teacher used the online environment to regularly update students about the relevant unit of study information		0.58		
3	I received too much feedback online from my teacher		0.57		
17	The online activities are designed to get the best out of students		0.45		
III. Pear Interaction					
18	Other students' online submissions helped me understand my ideas from a new perspective			0.75	

(*continued*)

Table A2.
Structure of the exploratory factor analysis (EFA) of the items of perceived ERL experience

No	Item	Factor loading I	II	III	IV
7	Reading other students' online submissions clarified some of my ideas			0.64	
21	Other students' online submissions encouraged me to investigate further sources of knowledge			0.62	
16	I interacted with students' online postings/submissions even if they weren't assessed			0.61	
IV. Workloads					
11	The workload for the online component of this unit of study is too heavy				0.85
22	The sheer volume of work for the online component of this unit of study means it can't all be thoroughly comprehended				0.47

Table A2.

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