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Review Article

A Systematic Review on Pedagogical Trends and Assessment Practices during the COVID-19 Pandemic: Teachers' and Students' Perspectives

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The COVID-19 pandemic has had a wide range of effects on education at all levels worldwide. After an unexpected, emergency and forced move from face-to-face to online platform for teaching-learning and assessment, teachers and learners were left scrambling to adjust and adapt. Concerning the importance of the above matters, this systematic review paper would investigate different aspects of online pedagogical trends and online assessment practice from the teachers' and students' perspectives during the COVID-19 pandemic in the existing literature conducted from March 2020 to April 2021. For this purpose, 45 studies of 33.864 research studies were collected from the database of ScienceDirect, Scopus, and Web of Science and analyzed herewith. For inclusion and exclusion of studies, the guidelines of the PRISMA model were followed. The results show that there are 18 different advantages of online learning, 28 challenges of online learning, 15 different purposes of shifting to online learning, and 14 different platforms used for online learning under different aspects of online pedagogical trends. For online assessment practice, 5 different types of assessment and 15 challenges of implementing online assessment are found. The study's ramifications for online teaching and learning and assessment are examined. There are also suggestions for future research.

1. Introduction

COVID-19, a contagious virus, spread worldwide, wreaking havoc on all aspects of human life. Though it began as a health catastrophe, it has had a significant impact on other areas such as policy, economy, business, communication, tourism, and education. One of the most important effects of the pandemic is on education. According to United Nations (2020), the COVID-19 pandemic has wreaked havoc on education on a scale never seen before. By the middle of 2020, the pandemic would have impacted 94% of students globally. This equates to 1.58 billion children and youth in 200 nations, ranging from preprimary to higher education. When the pandemic spread around the world at the beginning of 2020, state governments suspended face-to-face campus-based teaching and learning activities in schools, colleges, and universities to curve its spread and save human lives. However, to keep educational activities ongoing, many educational institutions began to deploy technology to promote distance education, remote learning, and online learning during the COVID-19 pandemic, following the government's decision.

While online teaching is commonly known and practised, emergency remote teaching (ERT) is relatively new in

many parts of the world. Online teaching is initially planned and prepared to be provided virtually. By contrast, emergency remote teaching is a quick interim transition of instructional delivery to an online delivery mode due to a major disaster. ERT entails the full use of remote teaching tools to offer curriculum or educational resources that would otherwise be delivered physically or as hybrid or blended courses [1]. When educational institutions started ERT, in many cases, neither the teachers nor the students had been prepared for remote teaching with institutionally supported technologies. However, several institutions have made it mandatory for teachers to offer online sessions using open-source online educational platforms such as WhatsApp, YouTube, Skype, and Facebook [2].

Increasingly over the last one and half years, numerous papers have been published highlighting the changes in education as a consequence of the spread of the pandemic. Most of the articles have focused on pedagogy [3–5], the well-being of the learners/teachers [6], challenges [2, 7–9], and so on. For instance, Joshi, Vinay, and Bhaskar [2] used the interpretative phenomenological analysis (IPA) to identify the challenges experienced by teachers during online teaching and evaluation in various home environmental settings in India. Teachers confront four types of obstacles during online teaching and assessment, according to the research. Significant difficulties included a lack of basic facilities, external distraction, and family disruption. Personal issues among teachers included a lack of passion and technical understanding. Aliyyah et al. [10] investigated primary school teachers' perspectives of online learning in a program created in Indonesia during the COVID-19 pandemic. Data were gathered from 67 primary school teachers via surveys and semi-structured interviews. The findings revealed four primary themes: teaching tactics, difficulties, support, and teacher motivation. Using a qualitative methodology, Shamir-Inbal and Blau [11] looked into teacher experience leading emergency remote teaching (ERT) in K-12 to better understand the pedagogical, technological, and organizational obstacles and benefits of computer-augmented digital learning settings. Teachers used a variety of pedagogical remote learning tactics, according to the findings. The study emphasizes the importance of turning a curse into a blessing by regularly adding remote technology-enhanced learning and online activities into the school agenda. Ghasem and Ghannam [12] evaluated the impact of distance learning on chemical engineering students' educational performance at United Arab Emirates University during the pandemic period based on a survey and observations. Overall, the students who took part in the study had no major technical difficulties in completing all of the online exercises. During the online sessions, the majority of the students who participated experienced difficulty concentrating.

Nevertheless, there are few review studies found in existing literature during COVID-19 on the aspects of teaching and assessment through online practices. Kumar et al. [13] presented a review study discussing the various aspects of modern technology used to fight against the COVID-19 crisis at different scales, including medical image processing, disease tracking, prediction outcomes, computational biology, and medicines. Carrillo and Flores [14] provided a review of the literature on online teaching and learning practices in teacher education. Regmi and Jones [15] identified positive and negative factors that affect e-learning in health sciences education (el-HSE) in the medical literature. Again, Gamage et al. [16] reviewed the security of digital assessments, as well as the issues related to academic integrity. Thus, there is an explicit knowledge gap to investigate different issues of pedagogical trends, e.g., reasons for shifting online teaching, online teaching platforms, advantages, challenges, and online assessment practices during the COVID-19 pandemic.

For this purpose, studies that addressed the educational issues related to either country-specific or subject-specific or particular education level-specific empirical studies from teachers' or students' perspectives during the COVID-19 pandemic were under consideration of this study. Against this backdrop, reviewing empirical research articles systematically, the purpose of this study was to explore the following two research questions:

(1) What are the aspects of pedagogical trends in emergency remote teaching during the COVID-19 pandemic?

(2) What assessment practices are inculcated in emergency remote teaching during the COVID-19 pandemic?

The above two research questions have been explored from teachers' and students' perspectives based on a systematic literature review.

2. Methodology

The methodology of this study is based on the guidelines of the PRISMA model [17, 18] for conducting a systematic literature review. The guidelines consist of a method of literature review of available research studies found on the online pedagogical trends and assessment practices during the COVID-19 pandemic.

2.1. Study Searching and Inclusion Process. The searching and inclusion process of this study is based on the guidelines of the PRISMA model [18]. For selecting studies on the online pedagogical trends and assessment practices during the COVID-19 pandemic, the researchers have gone through the renowned global databases such as Web of Science, Scopus, and ScienceDirect from March 2020 to April 2021. The key search words were assessment and COVID-19, teaching and COVID-19, online leaning and COVID-19, and education and COVID-19. 33.864 research studies were identified in total in the databases mentioned above. The majority of them were discovered on ScienceDirect (11,210), followed by Scopus (10.310) and Web of Science (9528). Following a careful evaluation of the study types, their titles and abstracts, and the possibility of duplication, 127 papers were retained for full-text analysis, of

which only 45 satisfied the established criteria. The inclusion and exclusion criteria are as follows:

(i) The studies published between March 2020 and April 2021

(ii) The studies that dealt with online teaching and learning practices during the COVID-19 pandemic

(iii) The studies that dealt with online assessment practices in education during the COVID-19 pandemic

(iv) The studies that investigated teachers' and learners' perspectives

(v) The studies that were only conducted on the effect of the COVID-19 pandemic on teaching and learning

(vi) Only journal articles were under consideration

(vii) Only empirical studies were under consideration

(viii) Those studies conducted in the English language

2.2. Analysis Process. Figure 1 presents the analysis process of this study in response to each research question. Selected studies were 45 in total in alignment with the objectives of this study. These 45 studies were put into Zotero, the reference management software for making online database and studying part by part by the researchers. After screening through the Zotero database, all the selected studies ($N = 45$) were exported from Zotero as ris.file to import into NVivo. NVivo 12 version, the qualitative data analysis software, was used to build themes in response to the researcher questions. After securing themes as per research questions, the researchers exported the list of themes with the number of nodes (n) as an excel sheet. This excel sheet was imported into SPSS 25, the quantitative data analysis software for descriptive analysis. On the basis of the 50th quartile point, the results of this study were presented.

To present the findings, at first, under each major theme, we converted the individual observation number of each subtheme into a percentage compared with both total sample article numbers, $N = 45$, and total observation numbers of that respective major theme (n). Then, the 50th quartiles for each major theme have been calculated again based on both $N = 45$ and n. We found that, in both cases, the 50th quartiles divide the subthemes into the higher and lower parts similarly. Thus, finally, based on the 50th quartiles, for each major theme, we categorized our findings of subthemes into the higher group (above 50th quartile)—factors that have been identified and discussed most frequently, and the lower group (from the 50th quartile to below)—factors that have been identified and discussed less frequently.

3. Results

Table 1 presents the summary of the reviewed studies ($n = 45$). The results show that all the studies deal on two issues, e.g., pedagogical trends and assessment practice through online teaching platform during the COVID-19 pandemic.

Of 45 studies, the majority of the studies were conducted through the quantitative research design ($n = 21$). The qualitative research design was employed in 15 studies ($n = 15$), and rest of 9 studies were conducted through the mixed-methods research design. The majority of the studies used survey questionnaire. These studies dealt with teachers ($n = 14$), students ($n = 21$), teacher-students ($n = 7$), teachers-students-educators ($n = 1$), teachers-parents ($n = 1$), and teachers-students-administrators ($n = 1$).

3.1. RQ1: Pedagogical Trends. In response to research question 1, of 45 articles, for the pedagogical trends, the findings explored 40% of discussions on the advantages ($n = 18$), 62.22% on the challenges faced ($n = 28$), 33.33% on the purposes of shifting ($n = 15$), and 31.11% on the platforms used ($n = 14$) for online teaching-learning (Table 2).

For our first research question, "What are the aspects of the pedagogical trends in emergency remote teaching during the COVID-19 pandemic?" we described the findings based on four major themes—advantages of online learning, challenges of online learning, purposes of shifting to online learning, and platforms used for online learning.

3.1.1. Major Theme 1: Advantages of Online Learning. Table 3 presents the 50th quartile values of the major theme, namely, advantages of online teaching.

Table 4 shows a total of 18 subthemes ($n = 18$) that have been identified as advantages for our first major theme, "Advantages of Online Learning," where the 50th quartile $= 0.033$. Therefore, among these 18 advantages, teachers'-students' positive experience (13%), cost-saving (7%), flexible learning (7%), time-saving (7%), collaborative learning (4%), conducive learning (4%), effectiveness (4%), good medium (4%), and synchronous teaching methods (4%) are the upper-level subthemes. On the other hand, academic support (2%), freedom in learning (2%), manageable (2%), safety (2%), self-directed learning (2%), student-centeredness (2%), synchronous and asynchronous (2%), timely response from teachers (2%), and ubiquitous learning (2%) belong to the lower group.

3.1.2. Major Theme 2: Challenges of Online Learning. Table 5 presents the 50th quartile values of the major theme, namely, challenges of online learning.

Table 6 presents subthemes related to the second major theme, "Challenges of Online Learning," and we have identified a total of 18 subthemes ($n = 18$) as challenges, where the 50th quartile $= 0.033$. Among these 28 challenges, course integration with technology (24%), Internet issues (24%), lack of interaction (13%), lack of technical infrastructure (20%), lack of devices (9%), lack of training (9%), lack of motivation (9%), external distraction (7%), lack of time management (7%), lack of online teaching knowledge (7%), increase workload (4%), lack of organizational preparedness (4%), limited communication (4%), and not having equal chance of learning (4%) are of the higher-group subthemes. However, confusing messages (2%), difficult to
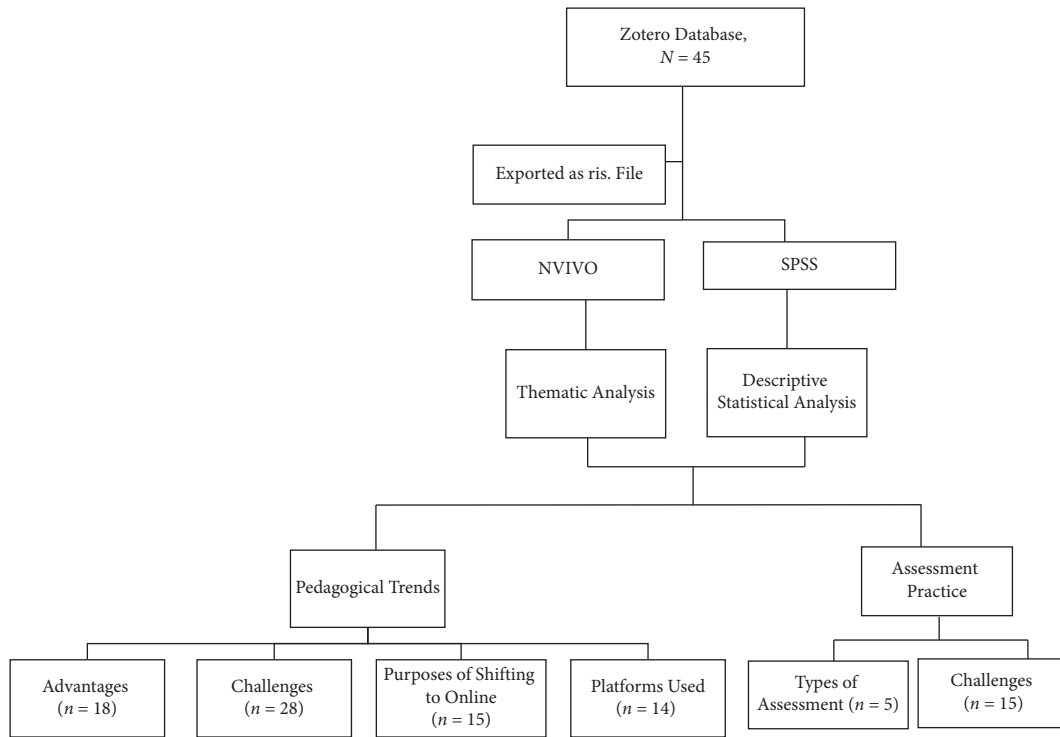
Figure 1: Analysis process.

Table 1: A summary of the findings from the selected studies.

Author	Objective	Type	Data collection instrument	Participants
[19]	To observe how technology education teachers think emergency remote teaching (ERT) transitions to blended learning will affect their profession in the coming academic year.	Qualitative	Interview	Teachers
[20]	Investigating difficulties that EFL teachers face to implement online teaching during a coronavirus pandemic, particularly in Iran.	Mixed-methods	Survey and interview	Teachers
[1]	Investigating how teacher educators and student teachers dealt with the unprecedented circumstances.	Qualitative	Reflections	Teacher-educators-student
[21]	Investigating teachers' experiences during the early COVID-19 lockdown.	Quantitative	Survey	Students
[22]	To demonstrate digital disruption at UK institutions, as well as the consequences and benefits of emergency online migration during COVID-19.	Quantitative	Survey	Teachers
[23]	To look at the problems and issues that EFL students encounter as a result of restricted resources.	Quantitative	Survey	Students
[24]	Investigating teachers' preparation, curriculum equipment, and teacher-students with the social-emotional competencies for dealing with such situations.	Qualitative	Interview	Teachers-students
[25]	To measure and elaborate pre-COVID-19 pandemic literature notions of faculty online preparation.	Mixed-methods	Survey, focus group	Teachers
[26]	To investigate how pedagogies changed as learning communities moved to new online spaces after the practicum was removed.	Qualitative	Online survey	Teachers
[27]	Investigating the impact of COVID-19: sharing stories, sharing practice.	Qualitative	Presentation and chat box thread	Teachers
[28]	This article offers professional perspective on this online learning-related PCK, with the objective of assisting nonexpert university teachers (i.e., those with minimal expertise with online learning) in navigating through these difficult times.	Qualitative	Interview	Teachers

Table 1: Continued.

Author	Objective	Type	Data collection instrument	Participants
[29]	To examine how early career teachers maintained social contact with students while also mastering core teaching challenges.	Quantitative	Survey questionnaire	Teachers
[30]	To examine the experiences of students in Zoom meeting rooms, mercury education platforms, and online assessment systems used by lecturers.	Quantitative	Survey questionnaire	Students
[31]	Investigating the impact of e-evaluation on job motivation among teachers during the movement control order (MCO) in COVID-19, as well as the influence of stress as a mediating factor.	Quantitative	Online survey	Teachers
[32]	To investigate the elements that influence students' preference for remote examinations, course assessment/ evaluation techniques, and factors.	Quantitative	Online survey	Teachers-students
[33]	To give a genuine and relevant manner to share the understanding of the need of including employability skills into assessment practice.	Qualitative	Anecdotal evidence	Teachers-students
[34]	To see how the coronavirus disease (COVID-19) pandemic affected university students during the movement control order (MCO) and recovery movement control order (RMCO).	Quantitative	Survey	Students
[35]	To create a theoretical model that highlights the factors that influenced the adoption of online learning during the COVID-19 pandemic.	Quantitative	Online survey	Teachers
[36]	Investigating how health science students felt about e-learning and how satisfied they were with it during the COVID-19 lockdown.	Quantitative	Online survey	Students
[37]	To examine students' learning experiences and attitudes during the pandemic.	Qualitative	Interviews	Students
[38]	To highlight stakeholder views from the academic and student communities, ending in a mock examination to measure infrastructure, and student population readiness during the implementation of remote examination.	Quantitative	Survey	Teachers-students
[30]	To investigate the elements that influence students' happiness with online learning during the COVID-19 epidemic.	Quantitative	Survey	Students
[39]	To reveal the essential characteristics that influence students' adoption of e-learning during the COVID-19 era.	Quantitative	Survey questionnaire	Students
[40]	To learn about student instructors' perspectives on the online academic assistance e-tools that were implemented during the COVID-19 lockdown.	Mixed-methods	Online survey	Students
[41]	To examine the challenges that teachers experience when teaching and assessing online in various home environments in India.	Qualitative	Interviews	Teachers
[42]	To gain a better understanding of the important issues, approaches, and lessons learned by higher educational institutions (HEIs) in the context of COVID-19.	Mixed-methods	Survey	Students
[43]	To investigate difficulties with online learning among Malaysian university students during the epidemic.	Mixed-methods	Online interview	Students
[44]	To outline objectives for post-COVID-19 planning in order to achieve a better balance of distance and face-to-face learning.	Qualitative	Mapping focus group	Teachers
[45]	To compare hurdles and constraints to producing excellent distant learning and the usage of electronic tests during the coronavirus epidemic, with the goal of attaining success in the distance educational system (COVID-19).	Mixed-method	Online survey—open questionnaire	Teachers-students

Table 1: Continued.

Author	Objective	Type	Data collection instrument	Participants
[46]	To investigate Internet platforms that were used in teaching and learning throughout the COVID-19 pandemic's lockdown phase.	Mixed-methods	Survey	Students
[47]	To find an answer to the question of how can we make the learning process as easy as possible for everyone involved? How can we assess the relevance of knowledge and skills acquired at a distance?	Quantitative	Practical work, lectures, projects	Students
[48]	To see whether universities are employing the appropriate assessment methods during pandemics and other times of crises.	Qualitative	Online discussion	Students
[49]	To investigate the use of Chegg, a website that offers "homework help" and other academic services to students during the COVID-19 pandemic.	Quantitative	Subject-level menu on Chegg	Students
[50]	To investigate India's "exam emergency" through an entertaining discussion of the importance, division, and disagreement surrounding the resumption of all annual admission examinations that had been postponed owing to a statewide lockdown owing to the COVID-19 outbreak.	Qualitative	Interviews	Students
[51]	To investigate how open educational resource (OER) materials help teachers and students during the COVID-19 time.	Quantitative	Survey	Teachers-students
[52]	To give a case study describing the use of an automated student-centered assessment tool to transition the assessment method of a programming course in higher education to a totally online format during the COVID-19 pandemic.	Mixed-methods	Students' interactions and survey	Students
[53]	To observe how the COVID-19 outbreak and its attendant quarantine influenced university students' perceptions of online learning in Jordan.	Quantitative	Online survey	Students
[54]	To learn about undergraduate students' reactions to emergency online learning during the first two weeks of COVID-19 mandated shift to online learning.	Qualitative	Texts	Students
[55]	To provide examples from Australian teachers of how high-stake examinations influence their implementation of senior secondary history curriculum.	Qualitative	Interview	Teachers
[56]	To create the periodontal senior case clinical challenge (PSCCC), which would provide fourth-year students with an alternative to senior case presentations and serve as a formative evaluation in which student opinions would be collected and analyzed.	Quantitative	Survey	Students
[57]	To investigate students' experiences with remote examination delivery and compared test performance in remote vs invigilated campus-based forms of equivalent assessments over two academic years.	Quantitative	Online survey	Students
[58]	To provide light on the effects of COVID-19 on the teaching and learning processes at Sri Lanka's southeastern university, as well as the obstacles the university had in maintaining its online educational system throughout the conference.	Mixed-methods	Survey and interview	Teachers-students-administrators
[59]	To look into how colleges have handled knowledge flow during lockdowns.	Quantitative	Survey	Teachers-students
[60]	To investigate the effects of the COVID-19 epidemic on preschool education, including how it is conducted, what types of activities are held, what problems must be faced, and what actions must be made to ensure that preschool education continues.	Qualitative	Interview	Preschool teachers-parents
[31]	To find out how university students feel about online classes and how satisfied they are with them.	Quantitative	Online survey	Students

TABLE 2: Pedagogical trends during COVID-19.

Major themes	N	% (of $N = 45$)
Advantages of online learning	18	40
Challenges of online learning	28	62.22
Purposes of shifting to online learning	15	33.33
Platforms used for online learning	14	31.11

TABLE 3: 50th quartiles for advantages of online learning.

Major theme 1	n	50th quartile (of $N = 45$)	50th quartile (of $n = 18$)
Advantages of online learning	18	0.033	0.083

TABLE 4: Percentage of each advantage of online learning and their groups based on 50th quartile.

Advantages	Observation (in number)	% (of $N = 45$)		% (of $n = 18$)		Group
Teachers'-students' positive experience	6	0.133	13.33	0.333	33.33	
Cost-saving	3	0.067	6.67	0.167	16.67	
Flexible learning	3	0.067	6.67	0.167	16.67	
Time-saving	3	0.067	6.67	0.167	16.67	
Collaborative learning	2	0.044	4.44	0.111	11.11	Higher
Conducive learning	2	0.044	4.44	0.111	11.11	
Effectiveness	2	0.044	4.44	0.111	11.11	
Good medium	2	0.044	4.44	0.111	11.11	
Synchronous teaching methods	2	0.044	4.44	0.111	11.11	
Academic support	1	0.022	2.22	0.056	5.56	
Freedom in learning	1	0.022	2.22	0.056	5.56	
Manageable	1	0.022	2.22	0.056	5.56	
Safety	1	0.022	2.22	0.056	5.56	
Self-directed learning	1	0.022	2.22	0.056	5.56	Lower
Student-centeredness	1	0.022	2.22	0.056	5.56	
Synchronous and asynchronous	1	0.022	2.22	0.056	5.56	
Timely response from teachers	1	0.022	2.22	0.056	5.56	
Ubiquitous learning	1	0.022	2.22	0.056	5.56	

TABLE 5: 50th quartiles for challenges of online learning.

Major theme 2	n	50th quartile (of $N = 45$)	50th quartile (of $n = 28$)
Challenges of online learning	28	0.033	0.054

TABLE 6: Percentage of each challenge of online learning and their groups based on 50th quartile.

Challenges	Observation (in number)	% (of $N = 45$)		% (of $n = 18$)		Group
Course integration with technology	11	0.244	24	0.393	39	
Internet issues	11	0.244	24	0.393	39	
Lack of interaction	6	0.133	13	0.214	21	
Lack of technical infrastructure	9	0.200	20	0.321	32	
Lack of devices	4	0.089	9	0.143	14	
Lack of training	4	0.089	9	0.143	14	
Lack of motivation	4	0.089	9	0.143	14	
External distraction	3	0.067	7	0.107	11	Higher
Lack of time management	3	0.067	7	0.107	11	
Lack of online teaching knowledge	3	0.067	7	0.107	11	
Increase workload	2	0.044	4	0.071	7	
Lack of organizational preparedness	2	0.044	4	0.071	7	
Limited communication	2	0.044	4	0.071	7	
Not having equal chance of learning	2	0.044	4	0.071	7	
Confusing messages	1	0.022	2	0.036	4	
Difficult to manage class schedule	1	0.022	2	0.036	4	Lower
Expensive	1	0.022	2	0.036	4	
Eye straining	1	0.022	2	0.036	4	

manage class schedule (2%), expensive (2%), and eye straining (2%) are of the lower-group subthemes.

3.1.3. Major Theme 3: Purposes of Shifting to Online Learning.
Table 7 presents the 50th quartile values of the major theme, namely purposes of shifting to online learning during the COVID-19 pandemic.

We have identified a total of 15 subthemes ($n = 15$) as purposes for our third major theme, "Purposes of Shifting to Online Learning," where the 50th quartile = 0.022 (Table 8). Among these 15 purposes, emergency remote teaching (ERT) transitions (11%), facilitating conditions (9%), hedonic motivation (4%), moving with agility (4%), and social influence (4%) belong to the upper group, but effect expectancy (2%), entering "disembodied spaces" (2%), facilitating leadership (2%), multiple digital protocols (2%), navigating larger groups (2%), performance expectancy (2%), price value (2%), project team capability (2%), regulator's support (2%), and transferring to home working (2%) belong to the lower group.

3.1.4. Major Theme 4: Platforms Used for Online Learning.
Table 9 presents the 50th quartile values of the major theme, namely platforms used for online learning during the COVID-19 pandemic.

We have identified a total of 14 subthemes ($n = 14$) as platforms for our fourth major theme, "Platforms Used for Online Learning," where the 50th quartile = 0.022 (Table 10). Among these 14 purposes, Zoom (16%), learning management system (7%), Google Classroom (4%), Microsoft Teams (4%), and WhatsApp (4%) are the frequently used platforms, whereas Chegg (2%), Discussion Forum (2%), email (2%), Facebook (2%), Google Hangouts (2%), Learning Central (2%), Teleconferencing Software (2%), Telegram (2%), and telephone (2%) are of the lower group.

Then, to describe our second research question, "What assessment practices are inculcated in emergency remote teaching during the COVID-19 pandemic?" we categorized our findings into two major themes—types of assessment in online learning and challenges of assessment in online learning.

3.2. RQ2: Online Assessment.
In response to research question 2, for the assessment practices, 11.11% of the discussions were found on the assessment types ($n = 5$) and 33.33% on the challenges faced ($n = 15$) (Table 11).

3.2.1. Major Theme 1: Types of Assessment in Online Learning.
Table 12 presents the 50th quartile values of the major theme, namely types of assessment in online learning during the COVID-19 pandemic.

In the first major theme, "Types of Assessment in Online learning," a total of five subthemes ($n = 5$) have been identified where the 50th quartile = 0.022 (Table 13). Among these five assessment types, remote online delivery (4%) and time-limited remote examinations (4%) belong to the upper group. On the other hand, automated student-centered assessment (2%), interim presentation

Table 7: 50th quartiles for purposes of shifting to online learning.

Major theme 3	n	50th quartile (of $N = 45$)	50th quartile (of $n = 15$)
Purposes of shifting to online learning	15	0.022	0.067

(2%), and video assessment (2%) belong to the lower group.

3.2.2. Major Theme 2: Challenges of Assessment in Online Learning.
Table 14 presents the 50th quartile values of the major theme, namely challenges of assessment in online learning during the COVID-19 pandemic.

For our second major theme, "Challenges of Assessment in Online Learning," a total of 15 subthemes ($n = 15$) have been identified as challenges, where the 50th quartile = 0.022 (Table 15). Among these 15 challenges of assessment in online learning, lack of preparedness (7%), lack of students' interest (7%), challenging online assessment (4%), facilitating cheat (4%), importing marking system (4%), lack of students' mental preparedness (4%), dissatisfactory examination system (4%), and limited time (4%) are upper-level subthemes. However, external distraction (2%), family interference (2%), Internet issue (2%), item leakage (2%), lack of government's preparedness (2%), limited resources (2%), and test anxiety (2%) are the lower-level subthemes.

4. Discussion

The themes related to the different aspects of pedagogical trends and assessments during pandemic were categorized into the upper and lower groups. Those who had high frequency within these studies fell into the upper group, and those who had low frequency were put into the lower group.

4.1. RQ1: Pedagogical Trend.
In response to research question 1, there were four identified aspects of the pedagogical trends of online teaching during COVID-19 such as advantages of online learning, challenges of online learning, purposes of shifting to online learning, and platforms used for online learning.

Under the theme of advantages of online teaching, there were 18 different types of advantages found. The most frequent advantages were teachers'-students' positive experience, cost-saving, flexible learning, time-saving, collaborative learning, conducive learning, effectiveness, good medium, and synchronous teaching methods. Teachers-students' positive experience was the most important advantage. On the other hand, academic support, freedom in learning, manageable, safety, self-directed learning, student-centeredness, synchronous and asynchronous, timely response from teachers, and ubiquitous learning were in the group of least frequent group.

From the perspectives of challenges of implementing online as a pedagogical trend, there were 28 different issues. Course integration with technology, Internet issues, lack of interaction, lack of technical infrastructure, lack of devices,

TABLE 8: Percentage of each purpose of shifting to online learning and their groups based on 50th quartile.

Purposes	Observation (in number)	% (of $N = 45$)		% (of $n = 15$)		Group
Emergency remote teaching (ERT) transitions	5	0.111	11	0.333	33	
Facilitating conditions	4	0.089	9	0.267	27	
Hedonic motivation	2	0.044	4	0.133	13	Higher
Moving with agility	2	0.044	4	0.133	13	
Social influence	2	0.044	4	0.133	13	
Effect expectancy	1	0.022	2	0.067	7	
Entering "disembodied spaces"	1	0.022	2	0.067	7	
Facilitating leadership	1	0.022	2	0.067	7	
Multiple digital protocols	1	0.022	2	0.067	7	
Navigating larger groups	1	0.022	2	0.067	7	Lower
Performance expectancy	1	0.022	2	0.067	7	
Price value	1	0.022	2	0.067	7	
Project team capability	1	0.022	2	0.067	7	
Regulator's support	1	0.022	2	0.067	7	
Transferring to home working	1	0.022	2	0.067	7	

TABLE 9: 50th quartiles for platforms used for online learning.

Major theme 4	n	50th quartile (of $N = 45$)	50th quartile (of $n = 14$)
Platforms used for online learning	14	0.022	0.071

TABLE 10: Percentage of each platform used for online learning and their groups based on 50th quartile.

Platforms	Observation (in number)	% (of $N = 45$)		% (of $n = 14$)		Group
Zoom	7	0.156	16	0.500	50	
Learning management system	3	0.067	7	0.214	21	
Google Classroom	2	0.044	4	0.143	14	Higher
Microsoft Teams	2	0.044	4	0.143	14	
WhatsApp	2	0.044	4	0.143	14	
Chegg	1	0.022	2	0.071	7	
Discussion Forum	1	0.022	2	0.071	7	
Email	1	0.022	2	0.071	7	
Facebook	1	0.022	2	0.071	7	
Google Hangouts	1	0.022	2	0.071	7	Lower
Learning Central	1	0.022	2	0.071	7	
Teleconferencing Software	1	0.022	2	0.071	7	
Telegram	1	0.022	2	0.071	7	
Telephone	1	0.022	2	0.071	7	

TABLE 11: Major themes identified for assessment practices in emergency remote teaching during COVID-19.

Major themes	n	% (of $N = 45$)
Types of assessment	5	11.11
Challenges of assessment	15	33.33

TABLE 12: 50th quartiles of types of assessment in online learning.

Major theme 1	n	50th quartile (of $N = 45$)	50th quartile (of $n = 5$)
Types of assessment in online learning	5	0.022	0.200

lack of training, and lack of motivation was the most prominent. Course integration with technology was the most frequent problem of applying online teaching pedagogy during the COVID-19 pandemic, whereas confusing messages, difficult to manage class schedule, expensive, and eye straining were found under the least frequent group.

The rationale behind shifting to online learning was 15 different types. Among them, emergency remote teaching

TABLE 13: Percentage of each type of assessment in online learning and their groups based on 50th quartile.

Types of assessment	Observation (in number)	% (of $N = 45$)		% (of $n = 5$)		Group
Remote online delivery	2	0.044	4	0.400	40	
Time-limited remote examinations	2	0.044	4	0.400	40	Higher
Automated student-centered assessment	1	0.022	2	0.200	20	
Interim presentation	1	0.022	2	0.200	20	Lower
Video assessment	1	0.022	2	0.200	20	

TABLE 14: 50th quartiles for challenges of assessment in online learning.

Major theme 2	n	50th quartile (of $N = 45$)	50th quartile (of $n = 15$)
Challenges of assessment in online learning	15	0.022	0.071

TABLE 15: Percentage of each challenge of assessment in online learning and their groups based on 50th quartile.

Challenges	Observation (in number)	% (of $N = 45$)		% (of $n = 15$)		Group
Lack of preparedness	3	0.067	7	0.200	20	
Lack of students' interest	3	0.067	7	0.200	20	
Challenging online assessment	2	0.044	4	0.133	13	
Facilitating cheat	2	0.044	4	0.133	13	
Importing marking system	2	0.044	4	0.133	13	Higher
Lack of student's mental preparedness	2	0.044	4	0.133	13	
Dissatisfactory examination system	2	0.044	4	0.133	13	
Limited time	2	0.044	4	0.133	13	
External distraction	1	0.022	2	0.067	7	
Family interference	1	0.022	2	0.067	7	
Internet issue	1	0.022	2	0.067	7	
Item leakage	1	0.022	2	0.067	7	
Lack of government's preparedness	1	0.022	2	0.067	7	Lower
Limited resources	1	0.022	2	0.067	7	
Test anxiety	1	0.022	2	0.067	7	
Lack of preparedness	3	0.067	7	0.200	20	
Lack of students' interest	3	0.067	7	0.200	20	
Challenging online assessment	2	0.044	4	0.133	13	

(ERT) transitions, facilitating conditions, hedonic motivation, moving with agility, and social influence were the prominent. On the other hand, effect expectancy, entering "disembodied spaces," facilitating leadership, multiple digital protocols, navigating larger groups, performance expectancy, price value, project team capability, regulator's support, and transferring to home working were dealt less in these studies.

For using platforms for teaching online, there were 14 different types of tools were found. Among these 14 platforms, Zoom, learning management system, Google Classroom, Microsoft Teams, and WhatsApp were the frequently used platforms. The most used platform was Zoom, whereas, Chegg, Discussion Forum, email, Facebook, Google Hangouts, Learning Central, Teleconferencing Software, Telegram, and telephone were the least used platforms.

4.2. RQ-2: Assessment Practice. In response to the assessment practice, 5 different types of online assessment were found. Among these, remote online delivery and time-limited remote examinations were used most, whereas

automated student-centered assessment, interim presentation, and video assessment were used less frequently.

15 different types of challenges were found to conduct online assessment practice. Among these 15 challenges of assessment in online learning, lack of preparedness, lack of students' interest, challenging online assessment, facilitating cheat, importing marking system, lack of students' mental preparedness, dissatisfactory examination system, and limited time had high frequency. On the other hand, external distraction, family interference, Internet issue, item leakage, lack of government's preparedness, limited resources, and test anxiety had the least frequency.

The findings of this study in response to research questions 1 and 2 are different from the existing review studies. For example, Kumar et al. [13] presented a review study discussing the various aspects of modern technology used to fight against COVID-19 crisis at different scales, including medical image processing, disease tracking, prediction outcomes, computational biology, and medicines. Secondly, Carrillo and Flores [14] provided a review of the literature on online teaching and learning practices in teacher education. Thirdly, Regmi and Jones [15] identified the positive and negative factors that affect e-learning in

health sciences education (el-HSE) in the medical literature. Finally, Gamage et al. [16] reviewed the security of digital assessments, as well as the issues related to academic integrity.

5. Further Research and Limitations

This study has made shreds of evidence that some areas of research deserve further attention. First, more attention needs to be paid to practical strategies for equitable distance learning that should be considered during and beyond emergency remote teaching (see also [61]). Although this study has highlighted the issues related to online pedagogy that were likely to lead to teaching and learning impact, these were not the primary focus of the studies examined. Second, more attention needs to be directed towards the pedagogical underlying issues leading to universities to facilitate adoption, acceptance, and use of online teaching during a healthcare emergency leading to campus lockdowns or the imposition of restrictions on the physical movement of people [35]. Concentration should be on incorporating principles into the course that could be applied and/or modified to increase students' engagement and performance [20, 62]. Moreover, developing state of Internet connectivity, adequate training, and workshop on the usage of e-learning should be emphasized to optimize the maximum benefits of e-learning [63].

In regard to assessment, the process used during the COVID-19 pandemic may remain in the post-pandemic context, so test developers need to pay attention to using technologically delivered assessments for delivering construct representative in the new era of technology-driven language assessments [64]. Further research needs to be carried out for evaluating automated student-centered assessment tool for learners' evaluation in any context to minimize the absence of physical examinations [52, 65]. Additional research can be carried out to investigate post-examination living experiences of learners to formulate an online assessment system for any context in the globe [50]. More focus needs to be placed on procedural support, resourcing and preparation in raising awareness and disseminating information on academic integrity policy, practices, expectations, disciplinary action, and developmental tools to mitigate academic misconduct for online assessment [21].

Moreover, this study has reviewed the literature on different issues, e.g., advantages, challenges, shifting rationale, online platforms of pedagogical trends, and assessment challenges and practices synthesized in the existing literature during the COVID-19 pandemic in the area of teaching and learning. However, due to a large number of studies under examination and the constraints in terms of word limitation, this study has focused on the most common themes or characteristics that have been determined to be the most relevant for this study and has left out several essential concerns, e.g., impacts of COVID-19 pandemic on learners' physical and mental health and academic performance. Further, a review study can highlight these issues to present a complete scenario of online pedagogy in education from the global perspectives.

Data Availability

No empirical data were used for this study. Only published articles were used for this study.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

References

[1] N. Mohamad Nasri, H. Husnin, S. N. D. Mahmud, and L. Halim, "Mitigating the COVID-19 pandemic: a snapshot from Malaysia into the coping strategies for pre-service teachers' education," *Journal of Education for Teaching*, vol. 46, no. 4, pp. 546–553, 2020.

[2] A. Joshi, M. Vinay, and P. Bhaskar, "Impact of coronavirus pandemic on the Indian education sector: perspectives of teachers on online teaching and assessments," *Interactive Technology and Smart Education*, vol. 18, no. 2, pp. 205–226, 2020.

[3] S. Mahmood, "Instructional strategies for online teaching in COVID-19 pandemic," *Human Behavior and Emerging Technologies*, vol. 3, no. 1, pp. 199–203, 2021.

[4] M. P. A. Murphy, "COVID-19 and emergency ELearning: consequences of the securitization of higher education for post-pandemic pedagogy," *Contemporary Security Policy*, vol. 41, pp. 1–14, 2020.

[5] T. D. Oyedotun, "Sudden change of pedagogy in education driven by COVID-19: perspectives and evaluation from a developing country," *Research in Globalization*, vol. 2, no. September, Article ID 100029, 2020.

[6] R. H. Dodd, K. Dadaczynski, O. Okan, K. J. McCaffery, and K. Pickles, "Psychological wellbeing and academic experience of university students in Australia during covid-19," *International Journal of Environmental Research and Public Health*, vol. 18, no. 3, pp. 1–12, 2021.

[7] A. Hashemi, "Online teaching experiences in higher education institutions of Afghanistan during the COVID-19 outbreak: challenges and opportunities," *Cogent Arts and Humanities*, vol. 8, no. 1, 2021.

[8] T. Karalis and N. Raikou, "Teaching at the times of COVID-19: inferences and implications for higher education pedagogy," *International Journal of Academic Research in Business and Social Sciences*, vol. 10, no. 5, 2020.

[9] R. Khan, M. Hasinur, and H. Ahmed, "COVID-19 outbreak situations in Bangladesh: an empirical analysis," *medRxiv*, 2020.

[10] R. R. Aliyyah, R. Reza, S. Achmad et al., "The perceptions of primary school teachers of online learning during the COVID-19 pandemic period : a case study in Indonesia," *Journal of Ethnic and Cultural Studies*, vol. 7, no. 2, pp. 90–109, 2020.

[11] T. Shamir-Inbal and I. Blau, "Facilitating emergency remote K-12 teaching in computing-enhanced virtual learning environments during COVID-19 pandemic - blessing or curse?" *Journal of Educational Computing Research*, vol. 59, pp. 1–29, 2021.

[12] N. Ghasem and M. Ghannam, "Challenges, benefits & drawbacks of chemical engineering on-line teaching during Covid-19 pandemic," *Education for Chemical Engineers*, vol. 36, pp. 107–114, 2021.

[13] A. Kumar, P. K. Gupta, and A. Srivastava, "A review of modern technologies for tackling COVID-19 pandemic," *Diabetes & Metabolic Syndrome: Clinical Research Reviews*, vol. 14, no. 4, pp. 569–573, 2020.

[14] C. Carrillo and M. A. Flores, "COVID-19 and teacher education: a literature review of online teaching and learning practices," *European Journal of Teacher Education*, vol. 43, no. 4, pp. 466–487, 2020.

[15] K. Regmi and L. Jones, "A systematic review of the factors - enablers and barriers - affecting e-learning in health sciences education," *BMC Medical Education*, vol. 20, no. 1, p. 91, 2020.

[16] K. A. A. Gamage, K. Erandika, and G. Nanda, "Online delivery and assessment during COVID-19: safeguarding academic integrity," *Education Sciences*, vol. 10, no. 11, pp. 1–24, 2020.

[17] I. Seraj, P. Mahbub, and H. Habil, "A systematic overview of issues for developing EFL learners ' oral English communication skills," *Journal of Language and Education*, vol. 7, no. 1, pp. 229–240, 2021.

[18] D. Moher, A. Liberati, J. Tetzlaff, and D. G. Altman, "Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement," *PLoS Medicine*, vol. 6, no. 7, 2009.

[19] J. Code, R. Ralph, and K. Forde, "Pandemic designs for the future: perspectives of technology education teachers during COVID-19," *Information and Learning Science*, vol. 121, no. 5–6, pp. 409–421, 2020.

[20] S. Khatoony and M. Nezhadmehr, "EFL teachers' challenges in integration of technology for online classrooms during coronavirus (COVID-19) pandemic in Iran," *AJELP: Asian Journal of English Language and Pedagogy*, vol. 8, no. 2, pp. 89–104, 2020.

[21] N. Peimani and H. Kamalipour, "Online education and the COVID-19 outbreak: a case study of online teaching during lockdown," *Education Sciences*, vol. 11, no. 2, p. 72, 2021.

[22] R. Watermeyer, T. Crick, C. Knight, and J. Goodall, "COVID-19 and digital disruption in UK universities: afflictions and affordances of emergency online migration," *Higher Education*, vol. 81, no. 3, pp. 623–641, 2021.

[23] T. Akhter, "Problems and challenges faced by EFL students of Saudi arabia during COVID-19 pandemic," *Rupkatha Journal on Interdisciplinary Studies in Humanities*, vol. 12, no. 5, pp. 1–7, 2020.

[24] L. L. Hadar, B. Alpert, and T. Ariav, "The response of clinical practice curriculum in teacher education to the covid-19 breakout: a case study from Israel," *Prospects*, vol. 51, 2020.

[25] R. M. Cutri, J. Mena, and E. F. Whiting, "Faculty readiness for online crisis teaching: transitioning to online teaching during the COVID-19 pandemic," *European Journal of Teacher Education*, vol. 43, no. 4, pp. 523–541, 2020.

[26] W. Kidd and J. Murray, "The covid-19 pandemic and its effects on teacher education in england: how teacher educators moved practicum learning online," *European Journal of Teacher Education*, vol. 43, no. 4, pp. 542–558, 2020.

[27] J. Cleland, J. McKimm, R. Fuller, D. Taylor, J. Janczukowicz, and T. Gibbs, "Adapting to the impact of COVID-19: sharing stories, sharing practice," *Medical Teacher*, vol. 42, no. 7, pp. 772–775, 2020.

[28] C. Rapanta, L. Botturi, P. Goodyear, L. Guàrdia, and M. Koole, "Online university teaching during and after the covid-19 crisis: refocusing teacher presence and learning activity," *Postdigital Science and Education*, vol. 2, no. 3, pp. 923–945, 2020.

[29] J. König, D. J. Jäger-Biela, and N. Glutsch, "Adapting to online teaching during COVID-19 school closure: teacher education and teacher competence effects among early career teachers in Germany," *European Journal of Teacher Education*, vol. 43, no. 4, pp. 608–622, 2020.

[30] M. A. K. Basuony, R. EmadEldeen, M. Farghaly, N. El-Bassiouny, K. Ehab, and A. Mohamed, "The factors affecting student satisfaction with online education during the COVID-19 pandemic: an empirical study of an emerging muslim country," *Journal of Islamic Marketing*, vol. 12, 2020.

[31] T. Sulaiman, A. Ibrahim, S. Motevalli, K. Y. Wong, and M. Nazrul Hakim, "Effect of e-evaluation on work motivation among teachers during the movement control order in COVID-19: the mediating role of stress," *Interactive Technology and Smart Education*, vol. 18, 2020.

[32] L. Elsalem, N. Al-Azzam, A. A. Jum'ah, and N. Obeidat, "Remote E-exams during Covid-19 pandemic: a cross-sectional study of students' preferences and academic dishonesty in faculties of medical sciences," *Annals of Medicine and Surgery*, vol. 62, pp. 326–333, 2021.

[33] M. Dyki, M. Singorahardjo, and S. Valeria, "Preparing graduates with the employability skills for the unknown future: reflection on assessment practice during COVID-19," *Accounting Research Journal*, vol. 34, 2020.

[34] C. Tan, "The impact of COVID-19 pandemic on student learning performance from the perspectives of community of inquiry," *Corporate Governance*, vol. 21, 2021.

[35] A. Mittal, A. Mantri, U. Tandon, and K. D. Yogesh, "A unified perspective on the adoption of online teaching in higher education during the COVID-19 pandemic," *Information Discovery and Delivery*, https://files/111/10-1108_IDD-09-2020-0114.pdf, 2020.

[36] S. Abbasi, T. Ayoob, A Malik, and S. I. Memon, "Perceptions of students regarding E-learning during covid-19 at a private medical college," *Pakistan Journal of Medical Sciences*, vol. 36, pp. S57–S66, 2020.

[37] T. Piyatamrong, J. Derrick, and N. Abel, "Technology-mediated higher education provision during the COVID-19 pandemic: a qualitative assessment of engineering student experiences and sentiments," *Journal of Engineering Education Transformations*, vol. 34, 2021.

[38] V. J. Bhute, J. Campbell, A. Kogelbauer, U. V. Shah, and C. Brechtelsbauer, "Moving to timed remote assessments: the impact of COVID-19 on year end exams in chemical engineering at imperial college london," *Journal of Chemical Education*, vol. 97, no. 9, pp. 2760–2767, 2020.

[39] N. T. T. Ho, S. Sivapalan, H. H. Pham, T. M. N. Lan, T. V. P. Anh, and V. D. Hung, "Students' Adoption of e-learning in Emergency Situation: The case of a Vietnamese University during COVID-19," *Interactive Technology And Smart Education*, vol. 18, 2020.

[40] M. M. V. Wyk, "Academic support under COVID-19 lockdown: what students think of online support e-tools in an ODeL course," *Interactive Technology and Smart Education*, vol. 13, 2020.

[41] S. Joshi, "Rising importance of remote learning in India in the wake of COVID-19: issues, challenges and way forward," *World Journal of Science, Technology and Sustainable Development*, vol. 18, no. 1, pp. 44–63, 2021.

[42] T. Izumi, V. Sukhwani, A. Surjan, and R. Shaw, "Managing and responding to pandemics in higher educational

institutions: initial learning from COVID-19," *International Journal of Disaster Resilience in the Built Environment*, vol. 12, no. 1, pp. 51–66, 2020.

[43] A. Ilias, N. Baidi, E. K. Ghani, and F. M. Razali, "Issues on the use of online learning: an exploratory study among university students during the COVID-19 pandemic," *Universal Journal of Educational Research*, vol. 8, no. 11, pp. 5092–5105, 2020.

[44] S. A. Ahmed, N. N. Hegazy, H. W. Abdel Malak et al., "Model for utilizing distance learning post COVID-19 using (PACT)™ a cross sectional qualitative study," *BMC Medical Education*, vol. 20, no. 1, 2020.

[45] R. Bashitialshaaer, M. Alhendawi, and Z. Lassoued, "Obstacle comparisons to achieving distance learning and applying electronic exams during COVID-19 pandemic," *Symmetry*, vol. 13, no. 1, p. 99, 2021.

[46] D. Emetarom and O. Mayowa-Adebara, "Online platforms used for teaching and learning during the COVID-19 era: the case of LIS students in delta state university, abraka," *The International Information & Library Review*, pp. 1–36, 2020.

[47] S. Jacques, A. Ouahabi, and T. Lequeu, "Remote knowledge acquisition and assessment during the COVID-19 pandemic," *International Journal of Engineering Pedagogy (iJEP)*, vol. 10, no. 6, p. 120, 2020.

[48] M. Halaweh, "Are universities using the right assessment tools during the pandemic and crisis times?" *Higher Learning Research Communications*, vol. 11, no. 0, pp. 1–9, 2020.

[49] T. Lancaster and C. Cotarlan, "Contract cheating by stem students through a file sharing website: a covid-19 pandemic perspective," *International Journal for Educational Integrity*, vol. 17, no. 1, p. 3, 2021.

[50] B. Roy and A. Roy, "Conducting examinations in India: emergency, contention and challenges of students amidst covid-19 pandemic," *Children and Youth Services Review*, vol. 120, Article ID 105768, 2021.

[51] H. H.-J. Chen, "Developing an OER website and analyzing its use during the COVID-19 pandemic," *English Teaching and Learning*, vol. 44, no. 4, pp. 451–461, 2020.

[52] E. Barra, S. López-Pernas, A. Alonso, J. F. Sánchez-Rada, A. Gordillo, and J. Quemada, "Automated assessment in programming courses: a case study during the COVID-19 era," *Sustainability*, vol. 12, no. 18, 2020.

[53] E. Y. Almomani, A. M. Qablan, F. Y. Atrooz, A. M. Almomany, R. M. Hajjo, and H. Y. Almomani, "The influence of coronavirus diseases 2019 (COVID-19) pandemic and the quarantine practices on university students' beliefs about the online learning experience in Jordan," *Frontiers in Public Health*, vol. 8, Article ID 595874, 2021.

[54] E. Hussein, S. Daoud, H. Alrabaiah, and R. Badawi, "Exploring undergraduate students' attitudes towards emergency online learning during COVID-19: a case from the UAE," *Children and Youth Services Review*, vol. 119, no. August, Article ID 105699, 2020.

[55] R. Cairns, "Exams tested by covid-19: an opportunity to rethink standardized senior secondary examinations," *Prospects*, vol. 51, 2020.

[56] M. N. Garcia, S. J. Whitener, A. Ghassemi et al., "The periodontal senior case clinical challenge: students' opinions of A formative virtual assessment during the COVID-19 emergency," *European Journal of Dental Education*, vol. 25, 2021.

[57] A. Jaap, A. Dewar, C. Duncan, K. Fairhurst, D. Hope, and D. Kluth, "Effect of remote online exam delivery on student experience and performance in applied knowledge tests," *BMC Medical Education*, vol. 21, no. 1, p. 86, 2021.

[58] A. Rameez, M. A. M. Fowsar, and N. Lumna, "Impact of covid-19 on higher education sectors in Sri Lanka: a study based on south eastern university of Sri Lanka," *Journal of Educational and Social Research*, vol. 10, no. 6, p. 341, 2020.

[59] S. Tejedor, L. Cervi, A. Pérez-Escoda, F. Tusa, and A. Parola, "Higher education response in the time of coronavirus: perceptions of teachers and students, and open innovation," *Journal of Open Innovation: Technology, Market, and Complexity*, vol. 7, no. 1, p. 43, 2021.

[60] B. Yıldırım, "Preschool education in Turkey during the covid-19 pandemic: a phenomenological study," *Early Childhood Education Journal*, vol. 49, 2021.

[61] L. Peterson, C. Scharber, A. Thuesen, and K. Baskin, "A rapid response to COVID-19: one district's pivot from technology integration to distance learning," *Information and Learning Science*, vol. 121, no. 5–6, pp. 451–459, 2020.

[62] E. Smith and A. Boscak, "A virtual emergency: learning lessons from remote medical student education during the COVID-19 pandemic," *Emergency Radiology*, vol. 28, 2021.

[63] N. Gyimah, "Assessing technological innovation on education in the world of coronavirus (COVID-19)," *SSRN Electronic Journal*, 2020.

[64] G. J. Ockey, "An overview of COVID-19's impact on English language university admissions and placement tests," *Language Assessment Quarterly*, vol. 18, no. 1, pp. 1–5, 2021.

[65] L. Wong and Y. Zhang, "COVID-19 pivot: a reflection on assessments," *Accounting Research Journal*, vol. 34, 2020.