Exploring the Impact of Covid-19 on Higher Education in India: A Systematic Review of Online Teaching –Learning and Examination Practices

Lopamudra Gochhayat[1], Soumya Ranjan Das[2]

Article Info	Abstract
  	The Covid-19 pandemic has affected every sphere of the society. The sector of education & especially higher education is not an exception from this. Facing and resolving problems and issues can help us gain competence and knowledge through the learning experience they offer. So the Covid-19 Pandemic also forced us to be empowered with new technologies, which will serve our purpose soon and at present. When it started, all the higher education institutions in India were closed, and the online teaching-learning system commenced. From 2020 to 2022, we were in the crisis of the Pandemic. In between that period, many research reports on online teaching-learning and online examination have been published. Therefore, now the need of the time is to analyze the impact of the Pandemic on teaching-learning & also online examination as it was new for us. So the paper aims to give a comprehensive report of the scenario of online teaching-learning & online examination during Covid-19 in Higher Education in India. The result of the study will be helpful for researchers and education stakeholders to understand the state of the crisis and the measures taken to address it, including the strategies to mitigate the situation.
Keywords:	

[1]Research Scholar, University of Delhi, CIE, New Delhi, India. lopamudra85988@gmail.com, Orcid ID: 0000-0002-2864-9691

[2]Corresponding Author, Research Scholar, University of Hyderabad, Department of Education & Education Technology, Hyderabad, India. soumyaranjandas630@gmail.com, Orcid ID: 0000-0002-0668-1981

Introduction

Before 2019 all sectors such as education, economy, politics, the overall lifestyle, and ways of the human being and society were ordinary. However, when the Pandemic came, then it made all the ways of doing things abnormal. As it was an infectious disease, all instructions were given to keep social distance. Therefore, according to these conditions the education of the students is very much affected in all levels such as primary, secondary and higher. All institutions worldwide that offer face-to-face instruction have been forced to close because of the COVID-19 pandemic. In the Pandemic, the UGC in India ordered all of its colleges offering conventional courses to offer online courses (Mishra & Mohanty, 2021).

This Pandemic has impacted all facets of society, and the educational system is no exception. In this emergency time all the people of the world, including educationists, scientist thought about what to do and how we can provide education? Then we have only one way to deal with the situation, i.e. technology. We were not completely unknown and not fully competent at that time but we adopted some of the ways of teaching online.

Then all the institutions all over India and abroad followed the online teaching and learning platform. They have also used platform like Google meet, Zoom cloud meeting etc. As we know, our country is a developing country and is now facing problems with technological infrastructure and access to technology, so education during the Pandemic had greatly affected. Hence, the time needs to consider and analyze the techniques we managed the situation and what we experienced by providing online education and examination. So the present paper focuses deeply on the teaching-learning scenario and the examination scenario amid Covid-19 in India by considering the previous published studies of India in various journals. Therefore, the main aims of the study are to find out the effect of the Pandemic on India's higher education system and also what are the effects of the Pandemic on teaching-learning, as well as online examination. Hence, the following research questions were raised by the investigator:

Research Questions

1. What is the impact of Covid-19 on online teaching-learning in terms of its benefits and challenges?
2. What is the impact of Covid-19 on online examination regarding its feasibility and challenges?

Related Studies

Due to Covid-19 Pandemic the whole world faced the challenges related to teaching-learning and examination. Some related researches on the above aspects show how higher education institutions have taken measures to tackle the crisis situation. By reviewing online teaching and learning practices in teacher education from January 2000 and April 2020. Carrillo and Flores (2020) purposed to explore why and how online teaching and learning in teacher education takes place. The review brought attention to the complexity of the online teaching-learning model by talking about concerns with social learning, cognitive learning, and teaching, as well as the necessity for a thorough understanding of the pedagogy of online technology-based education utilised to assist teaching and learning (Carrillo & Flores, 2020).

From the previous literature, Di Pietro et al. (2020) examined how Covid-19's effects on education included the following: learning is anticipated to experience an average setback, the effect on academic performance is likely to vary with socio-economic status, inequality in socio-economic status may manifest as an emotional response because those from less privileged backgrounds may be under more environmental stress; and the widening social gap may persist and have long-term implications (Di Pietro et al., 2020). Studies also show that immediate implementation of online learning has posed many challenges like poor pedagogy, privacy, its effect on students' lives and best practices (Hodges et al., 2020; Harwell, 2020).

Another review study by Bansal and Pruthi (2023) has identified the student engagement strategies in online learning during the Pandemic like "team-based learning, problem-based learning, design your exam, gamified flipped learning etc. Mseleku, (2020) conducted a literature review on "E-Learning and E-Teaching in the Era of Covid-19 Pandemic" and found some challenges like difficulties in adjusting by "lectures, internet connectivity issues, unconducive physical environment, mental health related issues, lack of basic needs, lack of teaching and learning resources". Some opportunities also explored like innovation and capacity building. Additional study like "Learning during COVID-19 pandemic: A systematic literature review" by (Kurnia et al., 2022) explored that education institution was not ready for online education at that time and other problems are poor internet connection as well as infrastructural problems.

A review study on students' motivation, engagement, and acceptance in online learning (Mohtar & Yunus, 2022) found that "the primary factors influencing motivation and acceptance are a sense of ownership and accessibility." Studies focused on online examination by (Mahbub et al., 2022) explored that there are five types of online examinations practices, "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" as well as fifteen challenges of assessment faced by the stakeholders in online learning like "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 preparedness, limited resources, and test anxiety had the least frequency." A study on "Adoption of online proctored examination by university students" (Raman et al., 2021) explored that "relative advantage, compatibility, ease of use, trialability, and observability were found to be positively related to acceptance of OPE."

Montenegro-rueda et al. (2021) conducted a systematic literature review on "Assessment in higher education during Covid-19". They found some challenges & opportunities like lack of training of students and teachers related to the online system of examination, students misconduct during the exam, internet disconnection, power outage, family emergency, and privacy issues. However, on the other hand, it had some benefits, like it promotes motivation of the students, satisfaction, and skills. Another study, "Online Assessment in Higher Education: A Systematic Review, "conducted by (Heil & Ifenthaler, 2023), explores that there are "four main categories of online assessment modes: peer, teacher, automated, and self-assessment. The synthesis of findings supports the assumption that online assessments have promising potential in supporting and improving online learning

processes and outcomes. A summary of success factors for implementing online assessments includes instructional support as well as clear-defined assessment criteria."

The researcher has gone through much-related research on this theme and found that there is a lack of research in terms of online teaching-learning and online examination during the Covid-19 pandemic crisis, which explores its impact regarding its benefits and challenges faced by students and teachers of higher education. This study explores how and in which way students and teachers of higher education in India tackle the Pandemic and which factors affect them during online teaching-learning and online examination. Therefore, this study systematically analyses the existing literature regarding online teaching-learning and online examination and looks into its benefits & challenges with particular reference to the Indian higher education context.

Purpose & Importance

The importance of this article lies in its potential to provide insights into how educators and institutions can adapt to the new realities of online teaching and learning in higher education. With the COVID-19 pandemic forcing a rapid shift to online instruction, many educators and institutions have struggled to deliver quality education and assessment remotely in the world and in India. This article can help educators and institutions better understand their challenges and develop effective strategies for online teaching, learning, and assessment.

This article will benefit many stakeholders, including educators, administrators, policymakers, students, and researchers. Educators and administrators can benefit from the insights provided by this article to develop effective strategies for online teaching-learning & examination, to ensure that students continue to receive a quality education in the face of the Pandemic. Policymakers can use this article to inform their decisions regarding allocating resources and support for online education. Students can benefit from this article by better understanding the challenges faced by their educators, and by learning about the best practices and strategies employed to deliver quality online education. Finally, researchers can use this article to identify gaps in the existing literature and to develop further research on online teaching–learning & online examination during the COVID-19 pandemic in Indian higher education.

Online Teaching-Learning

The high spread of Covid-19 impacted education institutions at all levels, like-primary, secondary, and higher-to close and search for alternate teaching and learning methods (Liguori & Winkler, 2020). While traditional classroom-based instruction is forbidden under COVID-19 regulations, higher education institutions worldwide are urged to experiment with e-learning (Demuyakor, 2020; Ratten, 2020). Most governments have mandated that in-person instruction end immediately, forcing students and educators to quickly switch to online learning and virtual education (Daniel, 2020).

The delivery of educational content via the Internet while facilitating communication between teachers and geographically distant students is known as online teaching (Simonson, Smaldino & Zvacek, 2015, p.34). Online

learning is also related to the concept of e-learning. Online learning is education that occurs partially or wholly online and makes information or knowledge accessible to users regardless of time constraints or proximity to the instructor (Sun et al., 2008).

Online teaching, also known as virtual learning, cyberlearning, and e-Learning, is a type of education in which students are not physically present in a classroom and in which the majority of the instruction and information are delivered via the Internet (Schwirzke et al., 2018; Thoms & Eryilmaz, 2014). In formal post-secondary educational contexts, the use of interactive telecommunications platforms to link students, resources, and instructors has increased the prevalence of online learning (Simonson, 2003, as cited in Simonson et al., 2009). Over the past 20 years, online teaching and learning have developed due to technological improvements, including its ubiquity and flexibility. Its acceptance by several higher education institutions worldwide as well as to a lesser but growing level in the K–12 educational system, is the result of this (Barbour, 2018).

Online learning helps distance education students by using the Internet, computer, and other devices (Sindre & Vegendla, 2015). UNESCO argued that making online learning and evaluation (examinations) available should not be disregarded because tertiary institutions (universities) serve as a training ground for students' intellectual, social, and psychological growth. Online education for higher-education students is a helpful way to advance research and scholarship (Manathunga, 2005). Therefore, during Covid-19, it played a significant role by providing education to all.

Online Examination

One of the critical components of the transition to higher education is student assessment. Giuseppad'Aostino de Cersosimo (2007) states that educational evaluation is viewed as a process intended to confirm the effectiveness and quality of all the components that come together to create the educational event to evaluate this level against reference parameters and make decisions regarding what to do about it. In developed countries, the online examination is efficient as they have better internet accessibility and proctored system functions (Mohammad, 2015; Sunar et al., 2015; Amigud et al., 2017). The development of evaluation mechanisms that are fragmented or disconnected from the teaching modality poses a severe didactic danger because assessment is an essential component of the educational process. When this occurs, evaluation becomes burdensome for learning and assumes a punishing tone that is inconsistent with its original intent (De Vincenzi, 2020).

Online platforms help build collaborative and authentic assessments (McVey, 2016). However, research has emphasized complex assessment issues, including homework and formative evaluation in online education (Amasha et al., 2018; Eichler & Peeples, 2013; Espasa & Meneses, 2010; Tinoca & Oliveira, 2013). Teaching and assessment are very closely intertwined, according to Anderson (1998), who relates teachers' choice of assessment procedures to their teaching-centeredness. More recently, a conceptual framework for assessment in an online setting based on four dimensions—authenticity, consistency, transparency, and practicality—was presented by Pereira et al. (2010, as mentioned in Tinoca & Oliveira, 2013).

To make online assessment effective, teachers must use regular and more assessment techniques (Dipietro et al., 2008). Student diversity and inclusion should be addressed in the online assessment (Barril, 2018; Loertscher & Koechlin, 2013). To improve interaction with the course materials, the online examination must add quizzes and innovative assessment techniques like immediate feedback, peer assessment, self-assessment, portfolio, and projects (Gaytan & McEwen, 2007). Teachers can conduct formative assessments by using the online platforms such as LMSs. Furthermore, prompt feedback is linked to greater student performance and happiness (Espasa & Meneses, 2010). This is essential for teachers to reflect on their online practises and for students to achieve their learning goals (Faber et al., 2017).

Eichler and Peeples (2013) claim that adaptive learning systems—generally called technology that gives students immediate feedback while engaged in a learning activity—have improved student performance. The authors also point out that adaptive systems can differentiate instruction by changing the tempo and degree of difficulty of the work assigned to advanced and challenged students. In contrast, responsive systems include learners in the same set of exercises while giving them feedback, tutorials, or tips. It is encouraging to see that prestigious testing organizations, including the GMAT (Graduate Management Admission Test), TOEFL (Test of English as a Foreign Language), AIMA MAT (All India Management Association Management Aptitude Test), NLAT (National Law Admission Test), and others, have adopted OPE. Online exams that are not proctored are not credible, according to the research by Alessio et al. (2017). As a result, university distance learning programs increasingly use Online Proctored Examinations (OPE) for assessment and evaluation. During the Pandemic, all the higher education institutions conducted the examination online. For some institutions it was new, and they experienced it when fully implementing it. They faced some challenges and also learned technological skills about online examinations.

Method

Design of the Study

In the present study, to find out the results of the above research questions, the investigator has employed the systematic literature review (SLR) method (Abu et al., 2021) by following the PRISMA technique, which includes three essential stages like search, eligibility, data collection and extraction (Moher et al., 2015). The researcher has gone through some systematic stages to conduct this study, like in the first stage, research questions raised by the researcher. In the second phase, the researcher collected the relevant articles which have been published & significant for the current topic. After this, exclusion and inclusion norms were applied to downloaded papers for selection according to the need of the research questions. In the next stage, the result is extracted from selected papers by going through it thoroughly. In the last stage, the extracted results have been synthesized meaningfully in terms of the need for research questions. The following steps comprehensively define the strategy of the present paper.

Framing the Research Questions

The present paper aims to explore the impact of Covid-19 on online teaching-learning & online examination in higher education in India. Therefore, to find this, the following research questions were raised by the researcher:

1. What is the impact of Covid-19 on online teaching-learning in terms of its benefits and challenges?
2. What is the impact of Covid-19 on online examination regarding its feasibility and challenges?

Searching relevant works

In this stage, relevant research articles have been searched by the help of the above research questions and by making keywords from this. Keywords synonymous with the research questions' terms are also included in the search. Google Scholar was used for the searching of relevant articles which has been published between 2020 to 2022 by using the keywords and their variations with Boolean operators like: "Covid-19 OR Pandemic" AND "Impact" OR "Effects" AND "Higher Education" "Online teaching" OR "Online learning" OR "e-learning" OR "Digital learning" OR "Virtual learning" AND "India." "Covid-19" OR "Pandemic" AND "Online examination" OR "e-assessment" OR "e-exam" OR "e-test" AND "higher education" OR "university education" OR "tertiary education" AND "India" etc. The total number of articles, around 200-300, from the search varied according to the keywords.

Sorting and Selecting the Relevant Studies

From these 200-300 results based on varied keywords, only 20 articles for the online teaching-learning and 09 articles for the online examination have been selected to find the research questions based on the inclusion and exclusion criteria listed below.

Table1. Inclusion and Exclusion Criteria

Criteria	Inclusion	Exclusion
Study type	Empirical	Not empirical
Language	English	Not English
Publication year range	2020 -2022	Before and after the range
Region	India	Outside India
Context	Covid-19	Not Covid-19
Education type	Higher education	Other than higher education
Main focus	Online Teaching-learning & Online examination	Teaching-learning which not include online context

The above inclusion and exclusion criteria have been applied to answer the research questions. The researcher has gone through each article to check its eligibility in terms of the need for the research questions.

Interpreting the Result

The total 20 articles for online teaching-learning and 09 for the online examination have been interpreted by extracting the result. The following Table no 2 reports the review in a comprehensive way about its title, method, and results.

Reporting the Review

Table 2. Impact of Covid-19 on Online Teaching and Learning

Study & Authors	Method	Results
"Students' perception and preference for online education in India during COVID-19 pandemic" (Muthuprasad et al., 2021)	Quantitative	Study revealed that 70% of the respondents are ready for online classes and majority of students favoured to use Smartphone but they faced internet connectivity in rural areas for online classes. Teaching practical subjects in online was difficult for teachers.
"Experiences of teachers on online teaching at higher education level during covid-19 pandemic" (Mishra & Mohanty, 2021)	Quantitative	Found benefits of online classes i.e., reduce course covering time and give students more exposure to "collaborative technology" while also improving their "presentation, communication, and interpersonal skills".
"Impact of Covid-19 and its opportunities and challenges" (Mukharjee & Kuri, 2021)	Quantitative	Found online learning as second alternative but could not achieved cent percent aim of e-learning. Absence of face-to-face classes created some problems like "digital divide, learning gap, lack of digital literacy etc".
"Attitudes of teachers towards virtual teaching" (Kar, 2021)	Quantitative	Revealed attitude towards online teaching is not satisfactory, Male teachers have a more positive attitude than female. Also found that "more experienced teachers show less interest in virtual teaching-learning than less experienced teachers."
"Teachers' perception on online teaching during Covid-19" (Gurung, 2022)	Quantitative	Found that online teaching develops all round efficiency of teachers (technology skills) and also found that

		motivating students in online is very challenging.
"Attitude of undergraduate students on online classes" (Sungjeminla, 2022)	Quantitative	Most students (77%) disliked the online platform of instruction because of "poor mobile network connectivity (79%), electricity outages (81%) and causing eye problems (64%)." But (91.83%) preferred using their Smartphone over other devices to access online courses.
"Challenges faced by B.Ed. Student-teachers in online classes during Covid-19 in Nadia and Murshidabad district of west Bengal" (Mondal & Das, 2022)	Quantitative	Found some challenges i.e., internet connectivity, difficulty in focusing, technological difficulties, problems with time management, and a lack of desire for online classes. Some students were delighted with online classes despite the difficulties they encountered.
"Perception of student teacher on online learning and taking online learning as panacea" (Saha, Bagchi & Bairagya, 2022)	Quantitative	Due to the complete lack of physical interaction with their peers and teachers, students and teachers are feeling lonely. Some people struggle to pay the internet fees required for online programmes because they lack the necessary computer abilities. Positive influences include those who are satisfied with online programmes and have digital abilities. However, more than half of the student teachers have trouble understanding the material when learning online and lack of practical experience as well.
"Pre-service trainee teachers' experiences on computer-mediated learning during the Covid-19 Pandemic" (Roy & Mohaptra, 2022)	Quantitative	About one-third (30.6%) of pre-service trainee instructors were unsure about online classes, while more than one-third (36.6%) said that online classes were a bad method of instruction.

"Self-regulated online learning self-efficacy & Covid-19: a higher education perspective" (Shrama & Chintalapati, 2022)	Quantitative	Students who engage in online self-regulated learning still experience difficulties with task management and goal planning. They find it very challenging to set both short-term and long-term learning objectives. The main challenges students have are their struggles to put their learning strategies into practise, such as taking handwritten notes while learning online, finding it difficult to pay attention, asking questions, and getting immediate answers to their questions.
"Impact of Covid-19 on higher education in India" (Jena, 2020)	Quantitative	Found some impacts i.e., it increased the gap between rich and underprivileged students, for example, by promoting personalised learning, lowering student attendance, reducing national and international student mobility for higher education. Blended learning may take the lead, according to the researcher. It is anticipated that the unemployment rate will rise, etc.
"Challenges and Opportunities for Higher Education amid COVID-19 Pandemic" (Ramola, 2021)	Quantitative	Revealed that it was difficult for all academic staff and students to engage in online teaching and learning. Students frequently grumble, despite the best efforts made by colleges and universities. About 30% of students expressed dissatisfaction over not having internet connection or the proper equipment (Computer/Smartphone) for online learning.
"Impact of Digital Social Media on Indian Higher Education: Alternative Approaches of Online Learning during COVID-19 Pandemic Crisis in online classes" (Dutta, 2020)	Quantitative	Found that adopting social media as an alternate online learning technique is beneficial for over 80% of the study's student participants.

"Impact of Covid-19 on Indian Higher Education in India" (Kantipudi et al., 2021)	Quantitative	Revealed that there is lack of computer, internet facility in village. Some positive as well as negative impacts are: it reduces the effort on international education, passive learning, unprepared teachers for virtual class and low students enrolment and as a result of virtual class there is the rise of blended learning, strengthening of LMS, collaborative teaching and retention of knowledge.
"Online Teaching and Learning of Higher Education in India during COVID-19 Emergency Lockdown" (Naik et al., 2021)	Quantitative	Study revealed that lack of infrastructure, technological tools, and internet access are hurdles in online classes during Covid-19.
"Online Teaching amidst COVID-19 in India: An Outlook" (Joshi, 2020)	Qualitative	When instructing students online, teachers faced a number of challenges, such as a lack of technology resources, family disturbances, a lack of training, a lack of clarity and direction, a lack of technical experience, etc.
"Higher Education in India in the Time of Pandemic" (Roy & Brown, 2022)	Quantitative	Revealed that institutional leadership and readiness are lacking.
"Higher Education in India: Challenges and Opportunities of the COVID-19 Pandemic" (Gope et.al., 2020)	Quantitative	The study found that a hybrid (online and offline) teaching mode is the students' preferred option for weaker or poorer students who lack access to computers or the Internet. 81.4% of students support conducting instruction offline.
"Covid -19 Lockdown-Challenges to Higher Education" (Harsha & Bai, 2020)	Qualitative	The student's internet connectivity was the first problem, strong internet connectivity even in urban areas, problems in teaching practical subjects in online.

"Students' perception towards e-learning and effectiveness of online sessions amid Covid-19 Lockdown Phase in India: An analysis" (Nagar, 2020)	Quantitative	Found smart phones are being used. Some challenges faced by students are internet connectivity, the availability of the right equipment, comfort with technology, and the availability of the necessary infrastructural facilities have been highlighted as the main factors to determine the efficiency of e-learning in India.

Results

The result indicates the above outcome of the total collected reviews related to the online teaching-learning and online examination during Covid-19. All the studies focused on how the students and teachers faced the Covid-19 pandemic and the challenges encountered while shifting the teaching-learning from offline to online mode as well as online examination. Papers are also finding that teachers and students experienced some improvements in their technological skills, which greatly empowered them. Therefore, researchers are naming it as an opportunity to shift teaching-learning and examination modes. The results of this paper are discussed in terms of research questions, which are discussed below. The above literature shows the common essence is the teaching-learning process during Covid-19. The researcher has discussed the result of the first research question below:

1. What is the impact of Covid-19 on online teaching-learning in terms of its benefits and challenges?
a) Impact of Covid-19 on Online teaching-learning

When the covid-19 came and the educational institutions closed, everybody started to think how to run the educational process. Then online classes started as per the UGC's (University Grants Commission) guidelines. As we were novice to the sudden adoption of online mode of education, we faced many problems & challenges with that. It not only led us into a problematic situation, but also empowered us with the new technologies in educational technology. The merits and common problems faced by the teacher & students of higher education in India due to online classes during Covid-19 are as follows:

Merits of Online Teaching-Learning

Let's have focus on the various advantages of the effect of the sudden adoption of online classes.

It Saves Time

Studies show that online teaching-learning saves time regarding course coverage (Mishra & Mohanty 2020). The result of the study revealed that some students have satisfied with online classes as it saves time (Sungjeminla, 2022; Mishra & Mohanty, 2020). With virtual classes, students no longer have to spend hours traveling to attend lectures, which has freed up more time for studying, research, and other important activities. Lectures and other

course materials were available online, and students could access them at any time, from anywhere. This has enabled students to manage their time better and prioritize their work during Covid-19 Pandemic.

Increase Skill of Communication

With online teaching-learning, students have used digital communication tools such as email, chat, video conferencing, and discussion forums to communicate with their peers and teachers. This has helped students to become more proficient in using these tools and communicating effectively in a digital environment (Kantipudi et al. 2021; Sungjeminla, 2022). According to Mishra and Mohanty (2020), students developed their communication skills through online presentations.

Strengthens LMS (Learning Management System)

Higher education institutions as well as students and teachers have been forced to rely more heavily on LMS during the Pandemic, which has led to an increased focus on improving the functionality and features of these systems. LMS has become more integrated with other educational technologies, such as video conferencing platforms, assessment tools, and digital libraries due its huge use during the Pandemic (Kantipudi et al. 2021).

Collaborative Teaching-Learning as well as Personalised Learning

Literature focused that both collaborative and personalised teaching-learning has been taken place during the Pandemic. Online education platforms and Learning Management Systems (LMS) have enabled virtual collaboration tools that allow students and instructors to work together in real-time. These tools include video conferencing, chat, online whiteboards, and collaborative document editing. Through these tools, students could collaborate with their peers and instructors to share knowledge, brainstorm ideas, and complete group assignments during the Pandemic (Kantipudi et al. 2021). By using e-learning materials as well as LMS students studied according to their own pace during the Pandemic (Jena, 2020).

Improvement of Technological Skills

With the shift to online education, students have had to develop digital literacy skills. These skills include basic computer skills, the ability to use different software applications and online tools, and the ability to navigate different online learning platforms. The integration of technology in online education has enabled students to develop skills in the use of various software and applications such as Learning Management Systems (LMS), video conferencing platforms, collaborative tools, and online assessment tools.

As we practically saw that the sudden forced adoption made us empowered, learned and now we are more aware about the E-learning as well as also given the exposure to varieties of materials and also increased the common technology skills. We all know that a circumstance has both the sides such as positive and negative, so the Covid-19 and online teaching-learning has its own pros and cons in the field of higher education.

Problems & Challenges of Online Teaching and Learning

We have seen the above merits experienced by teachers and students of higher education during the Covid-19 Pandemic in teaching and learning. All the studies are giving a relative result which is aligning with each other. They have come up with the problems and the positive impacts of the Pandemic and online teaching-learning in higher education in India.

Digital Divide

One of the most significant challenges of online learning in India is the digital divide, where students from low-income families or rural areas may not have access to the necessary technology, such as laptops or stable internet connectivity, to participate in online classes. This divide has widened the gap in education and further marginalized students who were already at a disadvantage. As study reports that by the effort of both central & state governments we could not achieve 100% e-learning. The absence of offline classes has some effects such as gap among students & digital divide (Mukharjee & Kuri, 2021).

Lack of Motivation among Students

Online learning has resulted in a lack of motivation among some students due to the lack of face-to-face interaction and a sense of isolation. Students may find it challenging to stay motivated and engaged, especially when they were studying from home and are easily distracted by other activities or responsibilities. It is also found that male teachers have favourable attitude than the female towards online teaching, lack of motivation among students & also less concentration also found (Kar, 2021; Sungjeminla, 2022).

Technological Challenges

Online teaching-learning also posed technological challenges during the Pandemic, such as internet connectivity issues, electricity problems, eye problem, lack of digital skills and training , lack of devices such as computers, internet facility, high data consumption at home in villages, high internet charges software compatibility, and limited technical support. (Gurung, 2022; Mondal & Das, 2022: Dutta, 2020; Kantipudi et al. 2021; Joshi 2020; Roy & Brown 2022 & Mishra & Mohanty, 2020). These challenges can hinder the learning process and created frustration among both students and teachers.

Time Management by Students and Teachers

The sudden shift from offline to online mode of teaching-learning affected in time management of both students and teachers in higher education. Online learning requires a significant amount of self-discipline and time management skills from students and teachers. Students could not balance their study time with other responsibilities, such as household chores, while teachers could not manage their online classes, grading, and communication with students (Sungjeminla, 2022).

Lack of Training: Many teachers may not have received adequate training to deliver online classes effectively, which can lead to ineffective teaching practices and a lack of engagement among students (Mishra & Mohanty, 2020).

Passive Learning: Online classes can create a passive learning environment, where students may not actively engage with the content or participate in discussions. This passive learning could hinder the development of critical thinking and problem-solving skills that are essential for a quality education (Roy & Brown 2022). Gope et al. (2020) in his study finds that 84.4 % of students are in support of conducting offline mode of teaching for weaker section students. Reviews in relation to online examination has been reported in the following Table 3.

Table 3. Studies on Online Examination System

Study & Authors	Method	Results
"Experiencing e-assessment during COVID-19" (Kundu & Bej, 2021)	Quantitative	Showed that students' perceptions of e-assessment were generally of a moderate level and that these perceptions varied depending on their gender, academic standing, the type of stream they were studying, and their financial situation. Students performed better in the perceived utility, perceived ease of use, compatibility, subjective norms, and self-efficacy domains of the eight researched areas, but they did poorly in the awareness, resource facilitation, and information technology (IT) support domains. Their comments made it clear that COVID-19 played a key role in increasing their interest in e-assessment.
"Learners' Perspective towards e-Exams during COVID-19 Outbreak: Evidence from Higher Educational Institutions of India and Saudi Arabia" (Khan et al. 2021)	Quantitative	Found that online examination is advantageous, some obstacles faced in online examination were concerning validity , security, and impartiality.
"A survey on Online examination during Covid-19 Pandemic: Perception of Management Students" (Phadke et al.,2020)	Quantitative	Revealed that all pupils are prepared to embrace an online format in the future because students opined that it ensures accuracy, there is very rare chances of fraudulence, saves time, money and energy also.

"Adoption of online proctored examinations by university students during COVID-19: Innovation diffusion study" (Raman et al.,2021)	Quantitative	Found that 55% of students had a favourable opinion of Online Proctored Examination (OPE). According to the findings of our study, the adoption of OPE was favourably correlated with innovation features including relative advantage, compatibility, ease of use, trial-ability, and observe-ability.
"Open Book Examination and Higher Education During COVID-19: Case of University of Delhi" (Ashri & Sahoo,2021)	Quantitative	Revealed that students typically perform better on Open Book Examination than on closed-book exams.
"Experience of Conducting Online Test During COVID-19 Lockdown: A Case Study of NMIMS University" (Idnani et al.,2021)	Qualitative	The results demonstrate that the online computer-based test operates well, and the pupils' overall test scores have improved.
"Online Exams in the Time of COVID-19: Quality Parameters" (Wahid & Farooq, 2020)	Qualitative	Most educators believe it is feasible to evaluate the students in one part after a spoken exam or other type of engagement with the online exam when various assessment methods are employed, objective and subjective questions are combined, and random blocks of one question paper are generated. Interactive, continuous, innovative, and alternative evaluation throughout the semester is another technique to defend students' performance on online tests.
"Post-graduate exams during COVID-19 pandemic" (Gupta, Mohammad, & Kapur,2020)	Qualitative	Found that candidate's experience making a diagnosis without physically inspecting a patient was difficult and unpleasant, and that it is very difficult for the examiner to gauge the student's practical expertise. The main problems are a network problem and improper IT department operation. The researcher added that taking exams online is less stressful.
"A survey on online assessment during COVID 19 pandemic: Perception of Management Students" (Tilak et al.,2020)	Quantitative	Revealed that majority of students think that pre-exam preparations involve more work than traditional exam procedures, especially when using the online examination system. However, the majority also believes that the benefits of online testing exceed the disadvantages. Online testing would not only save time

		but also provide prompt and reliable results.

The process of formal education consists the instructional objectives, teaching-learning, & achievement of the learning outcomes. On the basis of that, examination plays a vital role as it is a part of the measurement and evaluation. Hence, due to this big pandemic crisis, the examination in the entire sector of education also been affected as reported by the various studies in India in the following discussion.

1. What is the impact of Covid-19 on online examination, regarding its feasibility and challenges?

Online Examination during Covid-19 in Higher Education of India

As we know, during Covid-19, we faced some exam problems and challenges. According to the existing studies, the, online exams has both positive and negative impact. The findings from the existing literature have been discussed in the following points.

Moderate Perception of Students

Studies reveal that higher education students have a moderate perception of online exams & also viewed that online exam is more advantageous than conventional exams (Kundu & Bej, 2021). Due to some challenges and personal benefits students have moderate views, in appearing in the exam during the Pandemic.

Essential for Formative Assessment

Another benefit of online assessment, as found by the studies, is that online examination is essential for formative assessment because teachers can use these exams to identify areas where students may be struggling and provide targeted support to help them improve. Additionally, students can receive immediate feedback on their performance, which can help them better understand the material and adjust their studying habits (Khan et al. 2021).

Flexibility

Online examination conducted during the Pandemic was flexible as opined by the students and has authenticity and security also (Khan et al. 2021). It reduces stress of the students also. Online examinations offer greater flexibility than traditional paper-based exams. Students can take the exam from any location with an internet connection, which can be especially beneficial for those who live far from campus or have other scheduling constraints during the Pandemic. Additionally, online exams can be taken at any time, which can be helpful for students who work or have other commitments outside of the institution. It also saves time, money and energy (Phadke et al.,2020).

Better for Pandemic Like Situation

Online examinations have proven to be a valuable tool during the Pandemic. With many schools and universities closed or offering remote learning, online exams have allowed for continuity of learning and assessment. However, online exams eliminate the need for in-person contact, which can help to reduce the spread of the virus at the time of the Pandemic.

Reduce Stress

Online examinations can help to reduce stress among students. Students can take the exam from the comfort of their own homes, which can help to reduce test anxiety. In addition, online exams are typically timed, which can help reduce the stress of having to complete the exam within a specific time frame. Overall, online examinations can be a valuable tool for both students and teachers, offering flexibility, convenience, and increased accuracy in assessment.

Open Book Examination

The open book examination was emphasized and practiced during the pandemic due to its significance. Students also get high marks in open-book exams than in closed-book exams. 55% of students have a positive attitude toward open book exams because of compatibility, ease of use etc. (Ashri & Sahoo, 2021). These are some benefits that higher education students utilised during the Pandemic; it is only one way to tackle that situation. However, the sudden application of the online examination created some problems, and also we faced some challenges, as revealed by the existing literature. Therefore, online examinations have become necessary during the COVID-19 pandemic, as educational institutions have been forced to adapt to remote learning. However, online examinations have also presented several challenges, including:

Network Issue

One of the main challenges of online examinations was network issues. Students have experienced internet connectivity problems or interruptions during the exam, which could cause them to lose precious time or even result in a loss of answers. Similarly, if the exam platform or servers experience network problems, students may lose access to the exam or experience technical issues (Gupta, Mohammad, & Kapur, 2020).

IT Problems

Another challenge is the possibility of IT problems during the examination. This could include issues with the exam platform, software compatibility issues, or technical glitches during the exam. Students may also face challenges with logging in or accessing the exam due to IT-related issues (Tilak et al., 2020).

Poor Invigilation

Another challenge is the issue of poor invigilation during online examinations. It can be challenging for teachers to monitor students and ensure they are not cheating, especially when the exam is being taken remotely. This can lead to questions about the integrity of the examination and the validity of the results. It is challenging for the examiner to gauge the student's practical expertise in online examinations (Tilak et al., 2020).

Affordability

Online examination has posed financial challenges for some students. Not all students may have access to a computer or a stable internet connection at home, which could impact their ability to take the exam due to the digital divide. It is also not suitable for science subjects that have practical examinations (Gupta, Mohammad, & Kapur, 2020).

Infrastructural Facilities

Finally, online examinations may pose infrastructural problems for educational institutions. Educational institutions must ensure they have the necessary infrastructure and resources to conduct online examinations successfully. This includes investing in online examination platforms, training invigilators to conduct online exams, and ensuring that students have the necessary infrastructure to take the exam remotely (Kundu & Bej, 2021).

Overall, online examinations have presented several challenges during the COVID-19 pandemic, including network issues, IT problems, poor invigilation, affordability, and infrastructural problems. Educational institutions need to work towards addressing these challenges to ensure that online examinations are a fair and reliable mode of assessment. However, the Pandemic has allowed us to tackle this type of problem to be more empowered in technological application in education. So overall, we have seen that moderately the online exam is good for the Pandemic, like a situation with various problems. However, we have to strengthen ourselves by giving training learning and improving the infrastructure relating to educational technology.

Discussion

In the present study, students are better managing their time and prioritizing their work during Covid-19 Pandemic. Lectures and other course materials were available online, and students could access them at any time, from anywhere. This result aligned with the study of (Sungjeminla, 2022; Mishra & Mohanty, 2020), who found that students have satisfied with online classes as it saves time. Results found that during covid-19, students have used various communication tools to develop their communication skills. These results aligned with (Kantipudi et al. 2021; Sungjeminla, 2022; Mishra & Mohanty, 2020), who found that students become more proficient in using tools such as email, chat, video conferencing, discussion forums and communicating effectively in a digital environment.

Higher education teachers and students faced challenges like digital divide (not having digital devices), affecting e-learning during Covid-19 (Mukharje & Kury, 2021). Due to the sudden shift of face to face to online classes, students faced many problems that affected their motivation to concentrate on online learning (kar, 2021& Sungjeminla, 2022) and also the result shows that we faced various technological challenges during Covid-19, such as; internet connectivity, electricity, lack of digital skill, training etc. which supported by (Gurung, 2022; Mondal & Das, 2022: Dutta, 2020; Kantipudi et al. 2021; Joshi 2020; Roy & Brown 2022 & Mishra & Mohanty, 2020). Therefore, due to this problem, learning became passive, and also study found that more students are supported by offline classes who are from weaker sections, which result is similar (Roy & Brown, 2022; Gope et al., 2020).

During the Covid-19 situation, higher education institutions adopted online examinations, and we faced both positive and negative impacts. And due to its new adoption, students found to be have moderate perception towards it found by (Kundu & Bej, 2021) & it is also found that online examination is suitable for formative assessment and it is flexible by saving time, money & energy (Khan et al., 2021; Phadke et al., 2020). Open book examination became popular as found by (Ashri &Sahoo, 2021) due to its compatibility. Students and teachers of higher education encounter some challenges in conducting online examinations like, network problem, IT problem, poor invigilation, affordability, lack of infrastructure etc. (Gupta, Mohammad, and Cappor, 2020; Tilak et al., 2020; Kundu and Bej,2021)

Conclusion

This study, "Exploring the Impact of Covid-19 on Higher Education in India: A Systematic Review of Online Teaching–Learning and Examination Practices," concludes that maximum review studies of India concerning higher education show the negative aspects of online teaching & learning rather than positive. Various studies show that less number of students are in favor of online teaching-learning as it saves time and they have the necessary devices for online classes & accessibility also. Many studies also revealed that redesign the curriculum into a project-based curriculum will make it activity-based. As per the survey result, 38 % of Indian use the internet. So we can assume that we are now struggling to access technology. Also, the literature informs that India's higher education needs to adopt the blended learning format. Some studies reported that the smartphone is more used in conducting the online classes.

During the Pandemic, the online examination was conducted in the Indian higher education context & the overall result shows that the students have positive attitudes towards online exams but, to some extent, have negative attitudes due to the problems mentioned above. Therefore, in India, the covid-19 crisis has very much affected both teaching-learning and examination as it has both positive and negative impacts with more and less. The quality of online teaching-learning and examination is a question mark in higher education in India during Covid-19 like pandemic situation because the Pandemic has dramatically affected the education sector of India. The result of the study will be helpful to for researchers and education stakeholders to understand the state of the crisis and the measures taken to address it, including the strategies to mitigate the situation.

Recommendations

As it is found from the existing literature that in India, we face many problems related to online teaching-learning & examination, like the digital divide, lack of technical training, and internet connectivity, therefore steps need to be taken by government and policymakers to eradicate these challenges through providing different facilities and giving training also. Further research may need to be conducted using more sources to arrive at a better conclusion. The present review has been taken by taking two dimensions, i.e., online teaching-learning and examination. Future research can be undertaken by various dimensions like students' learning experience, academic achievement, academic procrastination etc., during the Pandemic. Future studies can be conducted by taking other aspects of online teaching-learning & examination like teachers' and students' preparedness, job burnout, invigilation, and assessing quality parameters of online teaching-learning & examination. This study is limited to only twenty-nine articles drawn from Google Scholar, but the study can be carried out by taking many articles from different databases.

References

Abu, M., Anissa, T., & Razan, M. B. (2021). Analytical study on the impact of technology in higher education during the age of COVID-19 : Systematic literature review. *Education and Information Technologies*, 6719–6746. https://doi.org/10.1007/s10639-021-10507-1

Alessio, H. M., et al. (2017). Examining the effect of proctoring on online test scores. *Online Learning, 21*(1). https:// doi. org/ 10. 24059/ olj. v21i1. 885.

Amasha, M. A., Abougalala, R. A., Reeves, A. J., & Alkhalaf, S. (2018). Combining online learning & assessment in synchronization form. *Education and Information Technologies, 23*(6), 2517–2529. https://doi.org/10.1007/s10639-01 8-9728-0

Amigud, A., Arnedo-Moreno, J., Daradoumis, T., & Guerrero-Roldan, A. E. (2017). Using learning analytics for preserving academic integrity. *International Review of Research in Open and Distributed Learning, 18*(5), 192-210. https:// doi. org/ 10. 19173/ irrodl. v18i5. 3103.

Anderson, R. S. (1998). Why talk about different ways to grade? The shift from traditional assessment to alternative assessment. *New Directions for Teaching and Learning, 1998*(74), 5–16. https://doi.org/10.1002/tl.7401

Ashri, D., & Sahoo, B. P. (2021). Open Book Examination and Higher Education During COVID-19: Case of University of Delhi. *Journal of Educational Technology Systems, 50*(1), 73–86. https://doi.org/10.1177/0047239521013783

Bansal, R., & Pruthi, N. (2023). A Systematic Literature Review on Student Engagement in Online Learning Amid COVID-19. January. https://doi.org/10.4018/978-1-6684-7639-0.ch011

Barbour, M. K. (2018). A history of K-12 distance, online, and blended learning worldwide. In *Handbook of research on K-12 online and blended learning*, (pp. 21–40). ETC press

Barril, L. (2018). Assessment for culturally inclusive collaborative inquiry-based learning. In *Handbook of distance education*, (pp. 311–320). Routledge.

Carrillo, C., & Flores, M. A. (2020). COVID-19 and teacher education: a literature review of online teaching and learning practices. *European journal of teacher education, 43*(4), 466-487.

Daniel, J. (2020). Education and the COVID-19 Pandemic. *Prospect 49*, 91-96. https://doi.org/10.1007/s11125-020-09464-3

De Vincenzi, A. (2020). Del aula presencial al aula virtual universitaria en contexto de pandemia de COVID-19. Avances de una experiencia universitaria en carreras presenciales adaptadas a la modalidad virtual. *Debate Univ. 8*, 67–71.

Di Pietro, G., Biagi, F., Costa, P., Karpiński, Z., & Mazza, J. (2020). The likely impact of COVID-19 on education: Reflections based on the existing literature and recent international datasets. In publica- tions Office of the European Union, Luxembourg: Vol. EUR, 30275(Issue JRC121071). https:// doi. org/ 10. 2760/ 126686.

Dipietro, M., Ferdig, R. E., Black, E. W., & Preston, M. (2008). Best practices in teaching K-12 online: Lessons learned from Michigan Virtual School teachers. *Journal of Interactive Online Learning, 7*(1), 10–35

Dutta, A. (2020). Education: Alternative approaches of online learning during COVID-19 pandemic crisis. *International Journal of Scientific and Research Publications, 10*(5), 604-611.

Eichler, J. F., & Peeples, J. (2013). Online homework put to the test: A report on the impact of two online learning systems on student performance in general chemistry. *Journal of Chemical Education, 90*(9), 1137–1143.

Espasa, A., & Meneses, J. (2010). Analysing feedback processes in an online teaching and learning environment: An exploratory study. *Higher Education, 59*(3), 277–292. https://doi.org/10.1007/s10734-009-9247-4

Faber, J. M., Luyten, H., & Visscher, A. J. (2017). The effects of a digital formative assessment tool on mathematics achievement and student motivation: Results of a randomized experiment. Computers & Education, 106,83–96.

Gaytan, J., & McEwen, B. C. (2007). Effective online instructional and assessment strategies. *American Journal of Distance Education, 21*(3), 117–132. https://doi. org/10.1080/08923640701341653

Giuseppad'Aostino de Cersosimo (2007). *Aspectos teóricos de la evaluación educacional*. EUNED: San José, Costa Rica.

Gope, P. C., Gope, D., & Gope, A. (2021). Higher Education in India: Challenges and Opportunities of the COVID-19 Pandemic. *Asian Journal of Distance Education, 16*(1), 54-73.

Gupta, V. S., Kapur, M., Naik, M., & Mohammad, A. (2020). Post-graduate exams amidst COVID-19 Pandemic: Our experience. *Indian journal of ophthalmology, 68*(11), 2630–2631.

Gurung, S,. (2022). Study of teachers' perception about online teaching during the covid-19 Pandemic. *The Online Journal of Distance Education & E-learning, 10*(1), 11-18.

Harsa, R & Bai, T. (2020). Covid -19 Lockdown-Challenges to Higher Education. An International Multidisciplinary Double-Blind Peer-reviewed Research Journal, 2(4). Retrieved from https://capecomorinjournal.org.in/Special-issue-view-abstract?Id=82

Harwell, D. (2020). Mass school closures in the wake of the coronavirus are driving a new wave of stu- dent surveillance. Washington Post. Retrieved March 2020, from https:// www. washi ngton post. com/ techn ology/ 2020/ 04/ 01/ online- proct oring- colle ge- exams- coron avirus/

Heil, J., & Ifenthaler, D. (2023). Online Assessment in Higher Education: A Systematic Review. *Online Learning, 27*(1), 187-218. DOI: 10.24059/olj.v27i1.3398

Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020). *The difference between emergency remote teaching and online learning*. Retrieved March 2021, from https:// er. educa use. edu/ artic les/ 2020/3/ the- diffe rence- betwe en- emerg ency- remote- teach ing- and- online- learn ing

Idnani, D., Kubadia, A., Jain, Y., & Churi, P. P. (2021). Experience of Conducting Online Test During COVID-19 Lockdown: A Case Study of NMIMS University. *Int. J. Eng. Pedagog., 11*(1), 49-63.

Jena, K. (2021). Impact of Covid-19 on higher education in India. *International Journal of Advanced Education and Research, 5*(3), 77-81.

Joshi, A., Vinay, M., & Bhaskar, P. (2020). Online Teaching amidst COVID-19 in India: An Outlook. *Asian Journal of Distance Education, 15*(2), 105-111. https://doi.org/10.5281/zenodo.4294477

Kantipudi,. et al. (2021). Impact of Covid-19 on Indian Higher Education. *Library Philosophy and Practice e-journal*, 4991. Retrieved from https://digitalcommons.unl.edu/libphilprac/4991

Kar, S,. (2021). Teachers' attitudes towards virtual teaching during covid-19 Pandemic. *The Online Journal of Distance Education & E- learning, 9(*4), 491-496.

Khan,. et al. (2021).Learners' Perspective towards E-Exams during COVID-19 Outbreak: Evidence from Higher Educational Institutions of India and Saudi Arabia. *International Journal of Environmental Research and Public Health, 18*(12), 6534. Retrieved from https://doi.org/10.3390/ijerph18126534

Kundu, A., & Bej, T. (2021). Experiencing e-assessment during COVID-19: an analysis of Indian students' perception. *Higher Education Evaluation and Development, 15*(2), 114-134. https://doi.org/10.1108/HEED-03-2021-0032

Nasution, A. K. P., Nasution, M. K., Batubara, M. H., & Munandar, I. (2022). Learning during COVID-19 Pandemic: A systematic literature. *Int J Eval & Res Educ, 11*(2), 639-648.

Ibna Seraj, P. M., Chakraborty, R., Mehdi, T., & Roshid, M. M. (2022). A systematic review on pedagogical trends and assessment practices during the COVID-19 pandemic: Teachers' and students' perspectives. *Education Research International*, *2022*, 1-13.

Manathunga, C. (2005). Early warning signs in postgraduate research education: A different approach to ensuring timely completions. *Teaching in Higher Education, 10*(2), 219–33. https:// doi. org/ 10. 1080/ 13562 51042 00033 7963

McVey, M. (2016). Preservice teachers' perception of assessment strategies in online teaching. *Journal of Digital Learning in Teacher Education, 32*(4), 119– 127. https://doi.org/10.1080/21532974.2016.1205460.

Mishara, S,. & Mohanty, A. (2021).Experiences of teachers on online teaching at higher education level during covid-19 Pandemic. *The Online Journal of Distance Education & E-learning, 9*(4), 434-442.

Mishra, L., Gupta, T., & Shree, A. (2020). Online teaching-learning in higher education during lockdown period of COVID-19 pandemic. *International Journal of Educational Research Open*, https://doi.org/10.1016/j.ijedro.2020.100012

Mishra, S., & Mohanty, A. K. (2020). Status of online teaching at higher education level during Covid-19 pandemic. *University News, 58*(35), Retrieved from https://www.aiu.ac.in/documents/aiu_publications/university_news/university%20news%20vol-58,%20no-35,%20august%2031-september%2006,%202020.pdf

Mohammad, H. (2015). Choice-based credit system in India: Pros and cons. *Journal of Education and Practice, 6(*25), 30-33.

Mohtar, M., & Md Yunus, M. (2022). A systematic review of Online Learning during COVID 19: Students' motivation, Task Engagement and Acceptance. *Arab World English Journal (AWEJ)* 2nd Special Issue on Covid, 19.

Mondal, N. & Das, A. C. (2022). Challenges faced by B.Ed. Student-teachers in online classes during Covid-19 in India and Murshidabad district of West Bengal. *The Online Journal of Distance Education & E-learning, 10*(1) 62-68.

Montenegro-Rueda, M., Luque-de la Rosa, A., Sarasola Sánchez-Serrano, J. L., & Fernández-Cerero, J. (2021). Assessment in higher education during the COVID-19 pandemic: A systematic review. *Sustainability, 13*(19), 10509.

Moore, M. G., & Kearsley, G. (2012). *Distance education: A systems view of online learning* (3rd ed.) Wadsworth.

Mseleku, Z. (2020). A Literature Review of E-Learning and E-Teaching in the Era of Covid-19 Pandemic. *International Journal of Innovative Science and Research Technology, 5*(10), 588-597.

Mukherjee, A., & Kuri, P. K. (2021). Impact of covid-19 on education system in India: challenges, opportunities and task ahead. *The Online Journal of Distance Education & E- learning, 9*(4), 461-470.

Muthuprasad, T., Aiswarya, S., Aditya, K. S., & Jha, G. K. (2021). Students' perception and preference for online education in India during COVID-19 pandemic. *Social Sciences & Humanities Open, 3*(1), 100101.

Nagar, S (2020). *Students' perception towards e-learning and effectiveness of online sessions amid Covid-19 Lockdown Phase in India: An analysis*. Retrieved from https://www.fergusson.edu/upload/document/86850__Dr.ShrutiNagar(IMDR).pdf

Naik, G. L., Deshpande, M., Shivananda, D. C., Ajey, C. P., & Manjunath Patel, G. C. (2021). Online teaching and learning of higher education in India during COVID-19 emergency lockdown. *Pedagogical Research, 6*(1), 1-14

Phadke, D. S. S. D., Hakim, D. S. S. K., Deshmukh, D. M., & Tilak, D. P. (2020). Comparison of Physiotherapy and Management Students' Perception Towards Online Examination Introduced During Covid-19 Pandemic. *International Research Journal of Engineering and Technology* (IRJET) eI SSN, 2395-0056.

Raman, R., Sairam, B., Veena, G., Vachharajani, H., & Nedungadi, P. (2021). Adoption of online proctored examinations by university students during COVID-19: Innovation diffusion study. *Education and Information Technologies, 26*(6), 7339–7358. https://doi.org/10.1007/s10639-021-10581-5

Ramola, R. C. (2021). Challenges and Opportunities for Higher Education amid COVID-19 Pandemic. *International Journal of Computer Engineering in Research Trends. 8*(2), 29-32.

Roy, A., & Mohapatra, A. K. (2021), Pre-service trainee teachers' experiences on computer-mediated learning during the covid-19 Pandemic revealed the need of revamping online pedagogy in India. *The Online Journal of Distance Education & E- learning. 10*(1), 119-133.

Roy, S., & Brown, S. (2022). Higher education in India in the time of pandemic, sans a learning management system. *AERA Open, 8*. https://doi.org/10.1177/23328584211069527

Saha, Bagchi & Bairagya,. (2021). Online learning as a panacea in Pandemic: perception of student-teachers. *The Online Journal of Distance Education & E- learning, 10*(1), 99-112.

Schwirzke, K., Vashaw, L., & Watson, J. (2018). A history of K-12 online and blended instruction in the United States. In Handbook of research on K-12 online and blended learning (pp. 7–20). Pittsburgh: ETC Press.

Sharma, G. S., & Chintalapati, N. (2021), Self-regulated online learning self-efficacy & covid-19: a higher education Perspective, *The Online Journal of Distance Education & E- learning*, *10*(1), 148-161.

Shen, R.; Tang, Y.Y.; Zhang, T.Z. The intelligent assessment system in Web-based distance learning education. In *Proceedings of the Frontiers in Education Conference*, 31st Annual, Reno, NV, USA, 10–13 October 2001.

Simonson, M. R., Smaldino, S., Albright, M., & Zvacek, S. (2009). *Teaching and learning at a distance: Foundations of distance education*, (4th ed.,). Boston: Allyn & Bacon/Pearson.

Simonson, M., Smaldino, S., & Zvacek, S. (2015). *Teaching and learning at a distance: Foundations of distance education* (6th ed.). Information Age Publishing

Sindre, G., & Vegendla, A. (2015). *E-exams and exam process improvement*, in UDIT 2015. Bibsys OJS:Ålesund. 13.

Smith, A. C., Warren, J. M., & Ting, S. M. R. (2018). Developing online learning in the helping professions: Online, blended, and hybrid models. New York: Springer Publishing Company.

Sunar, A. S., Abdullah, N. A., White, S., & Davis, H. C. (2015). Personalisation of MOOCs – The state of the art. In M. Helfert, M. T. Restivo, S. Zvacek, & J. Uhomoibhi (Eds.), *Proceedings of the seventh international conference on computer supported education (CSEDU'15)* (pp. 88–97). Setúbal: Science and Technology Publications.

Sungjeminla, (2022). Attitude of under graduate students towards online classes. *The Online Journal of Distance Education & E-learning, 10*(1) 57-61. Retrieved from https://tojdel.net/journals/tojdel/articles/v10i01/v10i01-07.pdf

Thoms, B., & Eryilmaz, E. (2014). How media choice affects learner interactions in distance learning classes. *Computers and Education, 75*, 112–126. https://doi. org/10.1016/j.compedu.2014.02.002

Tilak, P., Deshmukh, M., & Phadake, S. (2020). A survey on online examination during COVID 19 pandemic: Perception of Management Students. *Mukt Shabd Journal, 9*(8), 285-290.

Tinoca, L., & Oliveira, I. (2013). Formative assessment of teachers in the context of an online learning environment. *Teachers and Teaching, 19*(2), 214–227. https://doi.org/10.1080/13540602.2013.741836

Vonderwell, S., Liang, X., & Alderman, K. (2007). Asynchronous discussions and assessment in online learning. *Journal of Research on Technology in Education, 39*(3), 309–328. https://doi.org/10.1080/15391523.2007.10782485.

Wahid, R. & Farooq, O. (2020). Online exams in the time of COVID-19: Quality parameters. *International Journal of Social Sciences and Educational Studies, 7*(4), 13-21.