Online Testing in Higher Education Institutions During the Outbreak of COVID-19: Challenges and Opportunities

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Abstract  This study aimed to investigate the challenges and opportunities of online testing during the outbreak of COVID-19. The main focus was on the under-graduate and post-graduate international students in various universities of India. This study employed a qualitative design as the data were collected through semi-structured interviews. The findings showed that the attitude of students towards online testing was positive even though they experienced worry and anxiety. Moreover, students used self-strategies to overcome such challenges such as improving their self-confident and motivating themselves during online tests. In terms of ICT skills, the findings showed that students did not face any challenges during the online testing, which supported the idea that online testing does not require professional skills, and students could improve their ICT skills as a main requirement for 21st century education. Additionally, the findings of the study showed that there were other online testing challenges faced by students, including the transmission from traditional tests into online tests, and the poor connection of the internet. However, online testing advantages outweighed the challenges, especially when online testing is considered to be a good alternative method in such
critical stations like the outbreak of COVID-19, and it would be suitable for future online learning. Accordingly, online testing should receive more focus by Higher Education Institutions (HEIs) to get along with the educational requirements of the 21st century.

**Keywords** Online testing · E-learning · HEIs · Challenges · Opportunities · COVID-19

1 Introduction

COVID-19 is an infectious disease caused by a newly discovered coronavirus, appeared in 2019 as a worldwide pandemic. The novel coronavirus disease has infected over nineteen million people globally and is taking a severe toll on individuals, families, and all aspects of life, including education [1–5] which is considered to be one of the most important aspects in our life, and it has been greatly affected by the outbreak of COVID-19 [6]. Many schools, universities and educational institutions all over the world have stopped their teaching and learning process for many months which highly effected students, educators/teachers as well as the educational institutions themselves and the whole educational process. For other educational institutions, they chose to suspend the final exams until this pandemic crisis subsides as final testing is very important aspect to evaluate students’ performance. Otherwise, so many Higher Education Institutions tried to find alternative solutions to adapt to the status quo and reduce the passive effects on the education sector such as using online learning and testing, which became necessary to make students linked with their institutions [7–9]. With all of those decisions made due to the outbreak of COVID-19 pandemic, the authors have been motivated to investigate more about the online testing, its challenges and opportunities from the perceptions of the HEIs’ students which is the main focus of the study. Besides, the area of investigation did not attract scholars during this pandemic period which motivated the authors of this study to fill the gap and investigate in the area of online testing.

Online learning can be defined as “learning that takes place partially or entirely over the Internet” [10], and it enables those who live in a distance from campus and in rural areas to join university courses and programs. Online learning systems are web-based software for distributing, tracking, and managing courses over the Internet [11]. They involve the implementation of advancements in technology to direct, design and deliver the learning content, and to facilitate two-way communication among students and their faculties [12, 13]. It is often referred to as “e-learning” among other terms. However, online learning is only one type of “distance learning” which is the umbrella term of any learning taking place over distance and not in a traditional classroom.

With the advancement of computer, multimedia and network technologies, alternatives to traditional classroom learning have been developed. Online testing is
one of such alternatives where students can access exams via online systems, especially from remoted places and due to critical situations. The outbreak of COVID-19 shows that online testing might become a must in critical situations, which requires students to carry out their tests online to accomplish their studies [14]. However, online testing might be a real challenge for all including students, teachers and educational institutions in terms of implementing the exams, making tests more reliable and protected to avoid any misconduct or dishonesty from the students’ side [15].

Even though COVID-19 has attracted many researchers from different disciplines, online testing, as an essential part of e-learning and education, has not received enough attention from scholars during the outbreak of COVID-19 like other issues, particularly the psychological well-being of students associated with the online testing. Hence, the present research study attempts to investigate the challenges and opportunities of online learning during the outbreak of COVID-19 pandemic. The main objective is to study the attitudes of students towards online testing; therefore, the study aims to answer the following questions:

1. What advantages do the learners realize from online exams?
2. What challenges do the learners face while taking online exams?
3. What are the possible solutions for online testing challenges from the perspective of students?

The focus of the study is centred on the students’ perceptions about the challenges and advantages of online testing. In this study, the authors begin with describing the contextual factors that motivated the study. Then, the study objectives and questions are presented, and briefly overview the study’s approach to investigate the research questions, with relevant research literature as well as the research methodology. Then, the discussion section is presented, followed by the findings and conclusion. Finally, the authors end with the implications and directions for future studies.

2 Literature Review

2.1 Online Learning

Online learning has become an essential learning and teaching method. The present situation caused by COVID-19 pandemic makes various higher education institutions all over the globe adopt online learning and testing. This makes students more positive towards online learning. A study was conducted to investigate the attitudes of students towards online learning in Australia [16]. The study included 120 university students as participants. Two phases were used in the study, including pre- and post-test, course participation in phase one and interviews in phase two. At the end of the course, the results showed that the attitudes of students towards
online learning were positive. Thus, online learning is very helpful for learners of various specializations, and it should be adopted in education. Joshi and Samir Thakkar [17] supported the same idea of students being positive during the online learning. In their study, they stated that E-learning would not be meaningful if the students do not adopt it in their learning process. The data were collected from fifty-four diploma students of information technology under the engineering program. So, it was found that the attitude of students toward e-learning was positive and not affected by differences in gender, locality or social category of students. The same students’ positive attitude towards online learning was found in different previous studies [16, 18, 19].

Moreover, some scholars discussed the awareness and advantages of online education. Kumar [20] examined and discussed the awareness, benefits and challenges of e-learning in Kurukshetra University, India. The findings showed that the awareness about e-learning among university students was good while their knowledge on the e-learning was poor as the main source of their knowledge is the internet. Students thought that e-learning enable them to acquire new ideas and provide them an alternative learning environment. Results showed that lack of support from e-learning, students’ non-familiarity with English Language, infrastructure problem, students’ low knowledge of computer skills, and lack of funding for research and encouragement are part of barrier elements of E-learning in KUK. This argument was supported by K. Mukhtar and others [21], who explored the perception of teachers and students regarding advantages, limitations and recommendations of online learning during COVID-19 in Pakistan. According to the teachers and students, online learning is flexible and effective source of teaching and learning. The results of the study showed that the advantages of online learning included remote learning, comfort, and accessibility. Authors concluded that online learning modalities encourage student-centered learning, and they are easily manageable during this lockdown situation [22–25].

Furthermore, the role of e-learning during the outbreak of COVID-19 crisis played a great role during the present crisis. Due to ongoing of COVID-19, there was a significant increase in the number of students who are using the platform and apps of ED-TECH [4, 26]. So, it is suggested that using e-learning is all about learning and taking a step that helps in moving toward higher education level. Learners need to be familiar with technology devices and their use to enhance their education and knowledge. The teachers should use e-learning tools and encourage students to download number of educational Apps to make the journey towards learning pleasing and interesting.

On the other hand, COVID-19 pandemic impacted the education. Jadhav et al. [27] stated in their study that the education issue has become very big and similarly in the future. Exams in all schools and colleges in Maharashtra (India) have been cancelled, mainly on traditional education. With the help of a few questions to know what the students think about online education during the lockdown period and its consequences, hundred undergraduate and post graduate students were the sample of the study. The study sought to know what students think about the impact of COVID-19 on education. The results showed that 90 percent of students stated
that lockdown has had a huge impact on education. Additionally, most of the students stated that exams should be done online. In the same regards, Sahu [28] highlighted the potential impact of the terrible COVID-19 outbreak on education and mental health of students and academic staff. The author casted the light on the challenges that universities and learners face due to COVID-19. The results reflected that the greatest challenge was the transition from the traditional method of teaching to the online mode as both teachers and learners should work from their homes. However, it was difficult for them to do so, particularly students of art and music departments, who needed to study practically. Further, many universities did not have enough infrastructure or resources to facilitate online teaching with immediate effort. Additionally, there were students who did not have access to the technological devices and/or internet at their homes [29]. Despite all of those challenges, and even though COVID-19 has impacted education in most of the world countries, online learning became the alternative method of learning, which mitigated the disruption of education and made students linked with their institutions.

Some scholars discussed the challenges of online learning during COVID-19 pandemic. According to Al-Madhagy [30], during COVID-19 pandemic outbreak, education faced many obstacles to continue the education process. The sudden closure created a chaotic situation not only for educational institutions but also for students. Additionally, educators faced challenges and parents had much new burdens upon their shoulders more than ever. Teachers had to deliver the lectures online and the problem resided in many institutions and teachers as well. However, education entities have to update their policies, procedures and practices to cope up with the emergent changes in life. The quality of education should be maintained and the emerging technologies should be updated. Thus, through Taufiq’s study it was clear that, there is a need to focus more on challenges that online learning facing to cope up with the 21st century educational systems. However, in this regard, [22], in his study about COVID-19 and online teaching in higher education, focused on a case of Peking University’s online education, and suggested five high-impact principles for online education: first, high relevance between online instructional design and student learning; second, effective delivery on online instructional information; third, adequate support provided by faculty and teaching assistants to students; fourth, high-quality participation to improve the breadth and depth of student’s learning; and finally, contingency plan to deal with unexpected incidents of online education platforms.

2.2 **Online Testing in Higher Education Institutions During the Outbreak of COVID-19**

During the outbreak of COVID-19, there are many things have affected the people and increased their fears from this novel virus and forced them to stay at home and
leave everything behind them including education. One of those things was the social media posts. Arpaci et al. [31] analyzed in their study about 43 million tweets collected from social media to know the effect of social media posts of public. The results suggested that social media posts may affect human psychology and behavior and increase his/her fears of death due to being sick with COVID-19 disease. The results of such study may help governments, health organizations and ministry of education to better understand the psychology of the public, and thereby, taking necessary decisions to communicate with people to prevent and manage the panic as well as to help the educational process to be continued. Thus, one of those decisions was to shift to the online learning and online testing.

Online testing, during the pandemic of COVID-19, has become a solution to help the continuation of educational process and save the teachers and learners from being affected with the disease. However, as online learning has positive effects, it has also negative effects. Arnold [32], stated that online testing increases the academic dishonesty because it takes place in un-proctored environment [14]. It was argued that students’ cheating at formative tests forsake the opportunity to enhance their learning and they may suffer the consequences in subsequent proctored summative tests. The author calculated a score of investigations that have been done in a large school of economics in the Netherlands and found that the likelihood of cheating, based on unexpected grade patterns is negatively related to academic progress. On the other hand, Arnold [33] stated that online test is one of the widespread methods of higher education in the 21st century. It can be valuable to the current technological era if used effectively. It was concluded that even though the online testing might be poorly designed, it is still an effective tool during the outbreak of COVID-19 pandemic.

Therefore, limitations appeared in online testing are not inherent features of online tests, but are a result of poorly conceived design, development, and deployment of online tests. Moreover, some universities worldwide have already suspended the final exams while some other universities made them online. In fact, it is clear that online testing is still in need for further investigation due to the need of HEIs for online testing currently and in the future. That is, online testing is still in need for further investigation in order to highlight its challenges and opportunities, for the benefit of Higher Education Institutions, educators, and students.

3 Methodology

3.1 Research Design

The research design used in the present study is the qualitative design. This design is suitable for the research, in terms of getting sufficient data, since the data were collected through semi-structured interviews. This qualitative data describes the experience of students while attending the external online testing, so the study
employed the phenomenological approach. Phenomenological approach is suitable
because it focuses on the commonality of a lived experience within a group of
participants. The fundamental goal of this approach is to arrive at a description
of the nature of the particular phenomenon [34]. In this study, the experience is
attending external online testing. The phenomenological approach is used because
the purpose is to study the attitudes of participants towards online testing, as well as
the challenges they faced and opportunities they got.

The researchers used semi-structured interviews method as it is suitable for the
research design, since it helps in getting an in-depth investigation for the experience
of the participants in the online testing. “Semi-structured interviews may be con-
ducted in various modes: face-to-face, by telephone, videophone” [35]. So, the
researchers use videophone and telephone to make the interview because of the
lockdown due to COVID-19, and the existence of the participants in remote places.

3.2 Sample

Semi-structured interviews were conducted with six international students from
various universities in state of Maharashtra, India. The researchers followed the
purposive sampling method to select six undergraduate and post-graduate partici-
pants from various universities to be as the study participants. The selected par-
ticipants’ information is shown as in Table 1.

3.3 Data Analysis

The researchers analysed the data from the interpretation of recordings. Before
starting the interviews, the researchers have taken permission from the participants
to record the interviews. The participants also have been informed that the data will
be used only for research purposes. The collected data were sent back to inter-
viewees for member-checking, then the interviews were analyzed into codes, which
were developed later into themes [34]. Hence, the qualitative data were analyzed in
the form of thematic patterns to have a clear picture concerning attitudes of students

| No. | Level of study | Major                        |
|-----|----------------|------------------------------|
| 1   | Postgraduate   | Accounting                   |
| 2   | Postgraduate   | Business Administration      |
| 3   | Postgraduate   | Computer Science             |
| 4   | Undergraduate  | Business Administration      |
| 5   | Undergraduate  | Business Administration      |
| 6   | Undergraduate  | Business Management          |
toward online testing, and challenges they face. However, to achieve the reliability, one of the authors did the analysis and the others revised it in order to reach an agreement concerning the final themes taken from the interviews.

### 3.4 Findings

The findings of the study showed that the attitudes of students towards online testing can be divided into four categories: (a) psychology, (b) ICT skills, (c) advantages of online testing to traditional testing, and (d) challenges of online testing.

#### 3.5 Psychological Effects of Online Testing During COVID-19

This category is divided into three themes. The first theme is that students’ self-confidence. Some participants were self-confident while doing the online testing while others were not. They stated that they were relaxed because the university has provided them with a summary for each subject a month before the exam and thirty questions from the summary are to be included in the exam. Participant 1 stated:

**P1:** “In fact I feel comfortable while doing the online testing because the university provided us with one hundred twenty questions for every subject a month before the exam. I answered those questions properly that helped me a lot to be self-confident. Thirty questions were included in the exam and all were MCQ, so when I read the question and choices, I could recognize the correct answer”

On the other hand, some participants were very anxious and unconfident. Attending online testing for the first time played a major role in making students worried about various things such as the style of the questions and time. Such anxiety affected the psyche of students especially in the first exam. Regarding this anxiety, participant 2 stated:

**P2:** “When they inform me that the exam will be conducted online, I was thinking of how to deal with it, how the questions will be and how much time we will get. However, the first exam was difficult because I don't know the style of the questions.”

The second theme under this category is motivation. Some participants had some worries before and while the online testing, but they tried to motivate themselves in order to pass the exam. Motivation was considered to be one of the most important factors to overcome difficulties and anxiety while doing the online testing. In this regards, participant 4 stated:
“Even though I was restless, I tried my best to motivate myself. Thinking of graduation motivates me as I am in the last semester and I should score good marks. I took it as a challenge of a self to overcome all worries.”

The third theme is time pressure. Time in online testing was different from the traditional testing. In online testing, students have to give more focus and divide time according to the questions. Some participants considered the time as an obstacle that affected their achievement. Regarding the time pressure, participant 2 stated:

P2: “There were thirty questions and thirty minutes. In fact, time was not that much enough. There is no time to review my answers, so that makes me confused and worried about my results”.

3.6 Effects of ICT Skills on Online Testing

This section is about the students’ skills in using ICT tools during the online testing. It is essential that students of all specializations should have knowledge in using computer. All participants of the present study stated that it was easy for them to use computer devices in online testing. The analysis showed that students did not face any problem in using computer during the online testing. In this regard, participant 6 stated:

P6: “Actually, I’m not perfect in using computer. I can use it for basic things like Word processing, Google search, and YouTube, etc. So, I could deal with computer while the online testing. The task was easy because the university sent us a link that we can log in into the exam directly.

3.7 Advantages of Online Testing to Traditional Testing

In this section the researchers discuss some advantages of online testing. Participants of the study argued that there were advantages for online testing. One of those advantages as the participant 1 stated is that the discussion of the final viva. Throughout the analysis it was shown that doing the final viva online is easier than presenting at university. Participant 1 stated:

P1: “I discussed my project with my supervisor via zoom programme. We were five students and we discussed one by one. In fact, it was easier because standing in front of students, teachers and professors in the classroom is fearful.”

Another advantage the participants stated was that the style of questions is easier. The analysis showed that students prefer MCQ style because it is easy to identify the correct answer and also faster than typing. In this regard, participant 3 said:
P3: “I prefer online testing to traditional because it is in MCQ style that depends on understanding the subject more than memorizing. Moreover, if the online testing in WHQ style, we will need too much time for typing the answer and that is a difficult task.”

However, some participants preferred the traditional testing to online testing. They argued that in traditional testing they could convey the answer much better, but with the present situation of COVID-19 pandemic, online testing is better. The analysis showed the satisfaction of participants in using online testing. Participant 4 mentioned that instead of wasting time, the choice of online testing is a very good solution which enables students to continue their study in a safer way and place. Participant 4 stated:

P4: “Because of the present situation in which Corona Virus is spreading in such a way, I’m satisfied with the online testing. It is a good way to continue our study rather than wasting time till unknown date. On the other hand, if the situation gets better and I have to options either to choose online testing or traditional, I will of course go for traditional”.

3.8 Challenges of Online Testing

This section is about the challenges that the students faced during the online testing. The participants argued that there were some challenges and obstacles related to internet connection. Participant 4 argued that he had a backlog in one subject and the test was orally. They used zoom program to conduct the exam where the connection was really poor, so after many failed attempts, the teacher used a WhatsApp video call as an alternative for zoom. Additionally, participant 2 said that if they lost the internet connection, they would have to restart the test again with new questions. Participant 2 commented:

P2: “In the first exam, it was raining so the connection got poor. I lost the connection when I was in question number eight. When I did refresh the page, I got shocked because I have to restart again from the first question”.

In the same regard, participant 5 noted that the students who were not studying computer science faced challenges because they used to use mobile phones to search the information related to their studies. He stated:

P5: “Of course as a student of B.B.A., I use the computer about once a month only. The major use is to watch movies in YouTube. So, when the university sent us the link of online testing, I couldn’t log in into the exam page then I asked my roommate to help me”.

To sum up, the analysis of the qualitative data showed different themes, including anxiety, worry and low-self-confidence, for which the students used to motivate themselves to overcome such psychological impacts of online testing during COVID-19 outbreak. Besides, ICT skills are not considered a major problem for the students; instead, online testing was easier for the students, especially that most of the questions are multiple choice questions, which made students prefer online testing to traditional testing. However, internet connection and other matters
related to online testing tool are still a challenge that might have a negative influence on online testing among students.

4 Discussion

This study aimed to investigate the attitude of the students towards online testing during the outbreak of COVID-19. The findings showed four categories of themes, namely psychology, ICT skills, advantages of online testing to traditional testing, and challenges of online testing. In terms of psychological effects, students experienced anxiety during online testing, because it was their first experience with the online testing mode. Novelty effect has been reported in previous studies as a factor that increases anxiety [36–38]. Besides, time pressure was a major challenge for students, which was attributed to the importance of online tests for the students’ academic achievement and grades, which might also has a relationship with self-confidence and learning anxiety [38]. That is, the students could overcome online testing anxiety and improve their self-confidence through motivating themselves to overcome such learning obstacle, which is in line with previous literature [39–41].

Furthermore, the attitudes of students towards online testing as well as online learning was positive, which supports the findings of [16, 17]. These studies showed that online learning is rapidly used, which makes the students have positive attitudes towards the use of technology in HEIs. This might be explained by that students were obliged to take online tests, and after their previous experience, they found it easier and more effective. The students commented that the questions in online tests were clear and easy to deal with, and this increased their positive attitude towards online testing.

In addition, online testing was not difficult for the participants students, since they have the ICT skills to deal with online tools, needed for informal and formal online learning, which supports previous studies [1, 42]. This can be noticed in the comments of the students who stated that online learning and testing do not require professional skills, if it is arranged well by institutions. Hence, it is clear that ICT skills were a challenge for students in past, but the rapid advancement of technology and its influence on education led students to improve such skills required for education in the 21st century.

In addition, COVID-19 pandemic affected education in all over the world so online testing has become the alternative and must solution. Participants in this study also faced online testing challenges due to the transmission from traditional learning into online learning, and due to poor internet connection. These findings are supported by Tamim [43], that is because IT infrastructure of online learning and unprofessional arrangement for online testing are important for students’ performance. Academic achievement is valued by students according to Abdul-Ghafour and Alrefaee [44]; however, lack of internet connections and weak online learning systems might increase the students’ concern concerning their
academic achievements. Therefore, the sudden change to online testing due to the outbreak of COVID-19 shows that infrastructure requirement is still a challenge for students [30].

Nevertheless, the outbreak of COVID-19 and the mandatory online testing shows that students prefer this type of learning to traditional learning. This attitude among students is due to the advantages of online testing since it saves time and also enables students to do their exams on time. Hence, online testing encourages students-centred learning, especially that is easily manageable during the lockdown [21]. Further, Arnold [32] argued that online testing negatively affected higher education because it increases dishonesty, especially that online testing takes place in un-proctored environment; however, Boitshwarelo et al. [33] stated that online testing can be valuable in critical situations if used effectively. The outbreak of COVID-19 made online testing a main trend worldwide, and a solution rather than an alternative practice, and students found it a practical, effective and easier method.

Finally, even though students face some challenges in online testing due to poor internet connection and lack of up-to-date tools that help them to carry out online tests perfectly, the attitude of the students shows that positive aspects of online testing outweigh its challenges. Accordingly, it is a good alternative method as it helps in continuing the educational process during lockdowns and critical situations such as the outbreak of COVID-19 pandemic.

5 Conclusion

Online testing became the alternative method during the outbreak of COVID-19 pandemic. Institutions in most of the countries all over the world arranged online testing for students in order to continue the educational process. Teachers and learners have been excited by the transmission from traditional learning into online mode. Universities started preparing for online learning as well as testing; however, there is a need for improving online learning and assessment in HIEs to meet the challenges of learning in digital era. Besides, there is a need to motivate students regarding online testing to take online learning seriously, especially students from least developed countries. This motivation could enable students to overcome the challenges and obstacles they face so that they could get more self-confidence in dealing with online testing, because it was found to be a fast and efficient solution during the outbreak of COVID-19 pandemic.

6 Implications

Based on the findings of the present study, it is recommended that online testing should have more focus on proctored environment. Institutions should encourage students and inform them in advance before the exam to be ready and make sure
that their computers are connected to the internet. In term of time pressure, it is recommended that educational institutions should give five minutes extra as an exception to enable the students to revise their answers. Thus, online testing becomes an alternative way to traditional testing, it should be improved by governments as well as institutions.

Moreover, lecturers and teachers should be adequate for the online testing by improving their skill in how to deal with online testing, because some of them might not have experience in designing online exams. Besides, HEIs and lectures need to take internet disruption into consideration, because some students might not submit their online tests due to electricity cut off or internet sudden disconnection. One more important point is that some students might not have the required tools to carry out online tests such as laptops or suitable hand tools. Therefore, the financial situation of students, especially in poor countries, need to be considered.

7 Directions for Future Research

Online testing during the outbreak of COVID-19 was carried out using simple online testing tools, which were dependent on lectures through the university systems. Accordingly, there is a need to investigate online testing that has been carried out through smart systems, which might make exams more reliable. That is, there is a need to investigate how online exams can be carried out without students’ cheating or manipulating during the process of exams. Besides, future studies might explore how technology can be used to improve the security and reliability of online exams instead of depending on lecturers’ use of traditional ways of monitoring such as using videos to monitor the process of online testing.

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