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Online Mode of Engineering Education during Pandemic: Merits and Demerits

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Abstract. The epidemic COVID-19 has forcibly transformed the manner of teaching and learning in India's higher education from face-to-face to online, resulting in new experiences and practices for many professors and students. In this context, this research examines the benefits, problems, and tactics of online and offline education in India's higher education during and after COVID-19. The study found that online education is beneficial in terms of time management skills, as well as more freedom for professors and students. However, obtaining reliable internet access at work is one of the most difficult tasks. According to the findings, practitioners who want to participate in online education must be technologically proficient and computer literate. In the context of India, only online teaching and learning cannot be effective, hence blended learning is a preferable alternative in terms of technical education. According to the conclusions of the study, online education can be a viable alternative to traditional education. Thus, in environments such as India, a hybrid approach would make the educational process more effective and successful.

Keywords. COVID-19, Offline Education, Online Education

1. Introduction

Digital transformation has been accelerated by the mandatory lockdown of organizations due to COVID-19. Many educational institutions have started using different distance education systems and tools. The flexible use of these digital learning management systems has turned into a necessity transforming educational organizations, educators, and students' habits [1]. The COVID-19 pandemic and lockdown profoundly altered our view of the normal. It has had a massive impact on the field of education, resulting in a significant shift away from traditional four-walled classrooms. The ambiguity of the lockdown generated confusion and a lack of productivity among the children. After COVID-19, academic institutions around the world encouraged school and college professors to complete the remaining curriculum through virtual instruction. Many professors were hesitant to adopt online

platforms for teaching. However, as they gained experience with video platforms such as Zoom and Google Classrooms, the outcome was ultimately favorable [2]. The IIMs use a computer-based test paradigm for their annual Common Aptitude Test (CAT) and AICTE decided to conduct Graduate Aptitude Test in Engineering (GATE) since long back. CBT examinations can be taken at any of the specified test centers around an area, while online tests are taken from students' computers.

2. Merits and Demerits

While online education is not a new phenomenon, its importance came to light after the pandemic. While it has immensely helped in the continuation of education despite the closure of many educational institutions, there is considerable debate between online education and offline education. Table 1 highlights the main differences between online education and offline education.
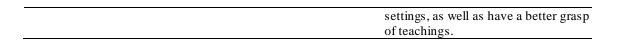
Table 1. Comparison between online and offline exam

Particulars	Online Education	Offline Education
Method of Teaching	Digitalized tools and methods of teaching	Traditional tools and methods of teaching
Cost and Time	Cost-effective and timesaving	More expensive than online education and consumes more time
Location	Virtual classrooms	Physical classrooms
Flexibility	Online classes have a flexible schedule	Offline classes have a fixed and strict schedule
Pace of Learning	Students largely determine the pace of learning	Teachers largely determine the pace of learning
Level of Commitment	Students are less likely to remain serious and committed to their studies	Students remain more serious and committed to their studies
Accessibility	Students can access study materials from the comfort of their own homes by logging in from anywhere.	Students may have to travel a long distance to get to their respective educational institutions, which might be inconvenient.
Time Management	This mode can cause them to search the web for distractions or check their social media pages instead of focusing on the material they are studying.	In this mode, they are less distracted within the confines of a physical classroom and learn to do their assigned work more efficiently.
Student-Teacher Interaction	there is less interaction between students and teachers in online education	There is face-to-face interaction in the case of offline classes, especially because teaching is synchronous. it allows students to immediately address their doubts and receive quick feedback
Technical Issue	Access to proper electronic equipment such as webcams, microphones, headphones, and computers along with a proper internet connection is a mandatory requirement for online classes.	Students and teachers are not required to be exceptionally tech-savvy and since most learning occurs within the physical classroom
Practical Learning	This scarcely allows students to take part in the practical aspects of learning which is an equally important part of engineering education	Unlike online classes, offline classes provide a stimulating setting that incorporates both academic and practical components of learning. Practical learning enables you to adapt quickly to daily obstacles and

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settings, as well as have a better grasp of teachings.

3. Exams

3.1. Online Exam

Online exams are the best substitute for traditional exams, and they come with a variety of processes and features that make it easier to accomplish all of the tasks associated with giving exams in an online environment [3]. Online learning, web-based learning, blended learning, e-learning, learning management systems (LMS), computer-assisted instruction (CAI), massive open online courses (MOOCs), virtual learning environments (VLE), and other terms have emerged as a result of the widespread use of digital technology in various educational contexts [1, 4]. The advantages of online tests are presented in Table 2. Online tests, on the other hand, are not appropriate for everyone. They do have certain disadvantages. For example, (a) internet access limitations, (b) typing abilities limitations, and (c) limitations linked to creating figures or diagrams.

Table 2. Advantages of online exams

Particulars	Online Exam
Location and time	The online exams are created especially for home-based education which is not restricted to any particular location.
Exam security	Security features such as secure browser, suspicious object detection, audit logging, chatbots, etc. also provide additional security. Remote proctoring mechanisms such as image-based, audio-based, and video-based do not allow candidates to cheat during an online exam.
User-friendly and error-free	The exams are very easy to conduct and to appear for. Even the candidates or teachers who are not much techno-savvy can operate the software and can appear or evaluate the online exams quite easily.
Question Bank Management	A question bank is a virtual space where questions are created, saved, and edited by an examiner, paper setter, or subject matter expert. Only a few selected people have access to this question bank. The questions created and saved in the question bank are further added in the exam.
Onscreen Evaluation System	A special tool known as Onscreen Evaluation System is developed to make the process of answer sheet checking easier. Candidates can appear for the exam from anywhere and examiners can evaluate the answers from any location. The identity of the candidate is also masked in the system
Cost-effective	Adopting online classes and exams can help cut down the costs spent on infrastructure such as classrooms, question papers, answer sheets, exam invigilators, etc. The candidates and supervising faculty do not need to travel to the exam center which again helps in saving their expenditure.
Performance analysis	After every exam, schools/colleges need to analyze the performance of candidates. Performance analysis is made easy with the help of online exam platforms. Online platforms offer tools that can be used to collect data and perform calculations. It can also generate reports based on different filters showing different results.
Data management	The question papers, answer sheets, and other documents related to the candidate's identity are stored on the Cloud. Every document presented by the student is scanned and stored during the registration of the exam. This type of data management system is helpful not only to the candidates but also to the educational institutes

3.2. Offline Exams

Conducting exams in classrooms is the traditional way which is being followed since ancient times. But it is necessary to change the methods of giving exams with the changing times. There are a few issues related to offline exams shown in Table 3.

Table 3. Disadvantages of offline exams

Particulars	Demerits
Investments in infrastructure and logistics	Offline exams cannot be conducted in the absence of classrooms. Institutions need to find a proper examination hall or center to conduct offline exams. These exam centers must be well-equipped with facilities needed by students and invigilating faculty. The institutes are responsible for transporting question papers and answer sheets to the exam center.
Issues related to identity verification	In offline exams, candidates need to carry their hall ticket and identity proofs every day to the exam center. The supervisors check each identity proof individually before allowing them to start the exam. Changing names, photographs, and signatures or creating fake documents has become easy due to technology

4. Online Degree vs Campus Degree

Since they are poles apart in terms of their approaches to learning, cost, and other issues, the debate between an Online Degree and a Campus Degree is a popular one. The following are the benefits and drawbacks of an online degree versus a traditional degree. Distance learning has been available for around 60 years. Students who are unable to enroll in full-time courses due to a number of reasons can benefit greatly from part-time and remote learning programs. For many years, online degrees have been undervalued due to the emphasis on traditional learning. When the pandemic struck in 2020, however, online learning proved to be the most effective approach to acclimate to the lockdown without foregoing school or college education. The pros and cons are discussed in Table 4.

Table 4. Online vs. Offline degree

	Pros	Cons
Online Degree	Cost-Effective, Flexible, Easy access, No geographical barriers, Available in short-term and long-term options.	Lack of practical exposure, Restrained to textual study materials, fewer subject options, Lack of interaction.
Campus Degree	Enhances social skills, Holistic Development of students, Practical exposure, Access to resources on campus, In-person support, and acknowledgment.	Expensive, Rigid schedules, No flexibility for those pursuing a job or facing other restraints, Admission process, and eligibility requirements can be complicated.

5. Conclusion

Candidates can appear for the exam from any location and answer sheets can be evaluated at any time. Online exams use Cloud technology to save the questions papers, answer sheets, and other data. The identity of the candidate can be verified using different methods which are secure and reliable. The use of remote proctoring options increases the security of online exams. Even the tiniest risk of cheating is eliminated, and the exam's integrity is 100% guaranteed. As a result, online tests are multifunctional and may be utilized for any form of examination. Online mode of education provides a plethora of advantages that are just unavailable in the case of offline mode. Online exam creating is one of the best alternatives to be implemented because it addresses all issues associated with offline exams. Thus, online modes of education are somewhat superior to offline mode for any educational institution as far as theoretical subjects are concerned. However, skill development and practical understanding can be

gained through offline mode of education only.

Conflicts of Interest

The authors declare no conflict of interest.

References

[1] Korkmaz, G. and Toraman, C. (2020). Are we ready for the post-COVID-19 educational practice? An investigation into what educators think as to online learning. *International Journal of Technology in Education and Science*, 4(4), 293-309.

[2] Serhan, D. (2020). Transitioning from face-to-face to remote learning: Students' attitudes and perceptions of using Zoom during COVID-19 pandemic. *International Journal of Technology in Education and Science*, 4(4), 335-342.

[3] Paudel, P. (2021). Online education: Benefits, challenges and strategies during and after COVID-19 in higher education. *International Journal on Studies in Education*, 3(2), 70-85.

[4] Daniel, J. (2014). Foreword to the special section on massive open online courses MOOCs: Evolution or revolution? Journal of Online Learning and Teaching, 10(1), i–iv. Retrieved from http://jolt.merlot.org/vol10no1/daniel_foreword_0314.pdf.