Ijfans International Journal Of Food And Nutritional Sciences
ISSN PRINT 2319 1775 Online 2320 7876
 Journal UGC CARE Listed (Group-I) Volume 10 , Issue 08, 2021

Role of AI in Enhancing Online Exam Monitoring, Security and Efficiency

Rakesh Kumar Giri

Associate Professor, Department of Computer Science & Engineering,Saisha Institutions, Chennai, India, Email: rakeshgiriap@gmail.com

Abstract: Artificial intelligence (AI) plays a quintessential role in transforming how institutions conduct online exams since it not only enhances efficiency but also its security and ensures personalisation. AI reduces manual effort and human error since it automates various tasks such as question generation, proctor exam, and instant grading and further monitors student's behavior throughout the exams by detecting potential cheating to maintain exam integrity.AI's adaptive testing feature adjusts questions based on student's performance to create a more personalized assessment experience and also improves accessibility with various features to ensure that online exams are scalable, fair, and inclusive. The education landscape has undergone a dramatic transformation in recent years, with digital learning and online examinations becoming mainstream. However, this shift brought new challenges — from ensuring academic integrity to managing large-scale assessments efficiently. That's where Artificial Intelligence (AI) steps in.AI-driven exam monitoring and assessment tools are revolutionizing how exams are conducted, evaluated, and secured. By combining automation, data analytics, and computer vision, AI ensures fairness, accuracy, and accessibility across various education systems and professional testing environments. The objectives of the educational system change with social needs, which, in turn, increases the need for examination processes that are effective and, most importantly, secure. Online education has increased the need for remote proctoring services simply to facilitate the quality of online assessments. In this article, we will focus on how AI Remote Proctoring is made more secure to allow for an equitable examination process to both the teachers and the learners.

Keywords: Artificial Intelligence (AI), Proctoring, Block Chain, Security, Efficiency, Adaptive Testing

1. INTRODUCTION

1.1 HOW AI ENHANCES ONLINE EXAMS

(a) Smart Question Generation

AI plays an imperative role in the enhancement of online exams since it automates the creation of online exams. The technology uses algorithms for the creation of diverse, dynamic and complex questions, analysis of course material and learning objectives for the generation of questions that are tailored in accordance with the exam's difficulty level and subject matter. This type of automation not only reduces human efforts but also ensures the availability of a wide range of questions that not only improves the test's quality but also prevents predictability. Use Of Artificial Intelligence In Online Exam is capable of randomising questions, which ensures that the students encounter a unique set of queries, promotes fairness and minimises cheating opportunities.

(b) Real-time Monitoring and Proctoring

AI uses advanced algorithms for monitoring in real-time by detecting unusual behaviours such as eye movement, suspicious sounds, presence of unauthorized materials, to not only enhance online exams but also ensure the integrity of the exam process. Realtime exam proctoring software use the device's webcam, microphone and screen for monitoring and alerts human proctors in case of potential cheating. AI by way of automation not only reduces the need for human invigilators to continuously invigilate but also provides a smooth experience for students by making the exams secure, and scalable.

(c) Instant Grading and Feedback

AI further streamlines the assessment processes by automatically grading the exams by evaluating responses to multiple-choice, short-answer, and essay questions, in an accurate and efficient manner. The automated grading also enables users to provide immediate feedback to the students on correct and incorrect answers by offering explanations and techniques for improvement. This instant grading saves significant time for the instructors and provides them with an opportunity to work on other aspects that can improve a student's performance.

(d) Plagiarism Detection and Content Analysis

AI-powered tools analyze student's submissions against a vast database of online content, academic papers and past exams to identify similarities and thus flag potential instances of plagiarism. It uses advanced algorithms, for detecting subtle forms of plagiarism such as paraphrasing, and improper citation and plays a crucial role in the maintenance of exam integrity. Furthermore, AI also helps educators maintain high academic standards since it analyzes the quality and relevance of content to offer insights into the originality and depth of a student's work.

(e) Adaptive Testing for Personalized Assessments

With its adaptive testing feature, AI enhances online exams since it enables the users to adjust the difficulty level of the questions on the basis of a student's performance. While the students are answering the questions, the AI adopts a dynamic approach for evaluating their responses and thus selects subsequent questions that match their knowledge level.This approach gives instructors the permission to undertake a personalized assessment, tailoring the tests as per the strengths and weaknesses of an individual and also measuring the abilities of students more accurately. It also aids in the creation of meaningful results since it gives educators valuable insights into the learning gaps of students.

1.2 ENSURING EXAM INTEGRITY WITH AI

(a) Biometric Authentication and Facial Recognition

AI plays an imperative role in enhancing exam integrity through features such as biometric authentication and facial recognition which ensures that the exam is taken by the correct person. Before the exam starts, AI mandates students to scan their faces or fingerprints for verification of their identity and its facial recognition system monitors the students continuously during exams to ensure consistency in identity.

This method additionally, also eliminates the chances of impersonation or identity fraud and thus adds an extra layer of security to online exams. These also reduce the chances of cheating since it ensures that only those students participate in the exam, who have registered themselves, thus promoting fairness and accountability.

(b) Behaviour Analysis for Anomaly Detection

To detect anomalies pointing towards cheating, and suspicious activities, AI uses behaviour analysis to continuously monitor the actions of students during online exams by tracking their eye movements, typing patterns, and gestures. In case the system detects unusual patterns such as looking away frequently, excessive keyboard activity, or interaction with unauthorized devices, it flags the same for further review thus giving human proctors the chance to investigate further. With this automated monitoring, AI ensures the maintenance of exam integrity since it not only identifies potential cheating attempts in real time but also ensures a secure testing environment.

(c) Secure Browser Environments and Locking Mode

AI during online assessments integrates secure browser environments and locking browser modes to prevent students from accessing websites, apps or files which are unauthorized and further monitors browser activity to ensure that students do not use external resources such as search engines or messaging apps. The locking mode further restrains students from copying or taking screenshots of the questions. AI by creating a controlled, distraction-free digital environment, ensures that the students are assessed on the basis of their knowledge and ability.

(d) Anti-cheating Algorithms and Red Flag Indicators

AI-driven anti-cheating algorithms have the capability of scanning student behaviour, analyzing patterns such as identical or unusually similar answers among multiple students, suspicious timing of answers and exam responses to check signs of dishonesty. In case it detects red flags, it quickly flags them for further probe. Besides undertaking this analysis, AI can also analyse linguistic patterns in essay answers to detect unnatural or inconsistent styles of writing. With its proactive monitoring, AI ensures early identification of cheating which aids in the preservation of online assessment's integrity.

1.3 AI-POWERED ACCESSIBILITY AND INCLUSIVITY

(a) Customized Accommodations for Diverse Learners

To enhance accessibility in online exams, AI offers customised accommodations in the form of font sizes, screen colours and timings that are tailored as per the learning needs of various individuals including one having visual impairments, dyslexia, or ADHD. These adjustments aid in the creation of an inclusive environment since AI also provides personalized support by identifying learning patterns. This form of technology thus ensures equity in education since it automates and scales accommodations and allows institutions to support a wide range of students and learners without any manual intervention.

(b) Language Translation and Accessibility Features

AI with its language translation tool enables non-native speakers to understand the instructions and content in their preferred language during online exams since it breaks down the language barrier and ensures real-time translation. With this, organisations can conduct online exams accurately, without any misunderstanding.

It also enhances accessibility features such as screen readers, closed captioning, and text-to-speech support for the creation of an inclusive digital exam environment where students belonging to different linguistic and physical backgrounds can perform to their full potential. With this, AI ensures fairness, comprehensiveness and accessibility to all the learners in exams, irrespective of their individual challenges.

(c) Voice Recognition for Oral Assessments

AI has voice recognition which is beneficial for students with physical disabilities, learning disorders, or limited literacy skills since it gives them an opportunity to speak their responses instead of typing. Its tool not only transcribes spoken answers accurately in real-time but also assesses pronunciation, fluency, and comprehension and further supports multiple languages, making it more inclusive for people belonging to various linguistic backgrounds. AI by using voice as an input method, expands the demonstration of knowledge and thus allows students to express themselves more naturally.

2. CONCERNS AND ETHICAL CONSIDERATIONS OF USING AI IN THE ONLINE EXAM

2.1 Data Privacy and Consent

The use of AI in online exams raises concerns regarding data privacy since the systems collect sensitive personal information such as biometric data, behaviour patterns, and audio-visual recordings which are susceptible to being accessed by third parties for unauthorized use, data breaches and misuse.

Before the students take the test, they must be informed about the manner in which their data would be collected, used and accessed but educational institutions must adopt robust data governance practices to protect student's rights and maintain their trust in AI-driven assessments. The organisations additionally must also ensure that participation is voluntary.

2.2 Bias Mitigation in AI Algorithms

AI algorithms unintentionally reinforce biases present in their training data which can lead to unfair treatment of certain students during online exam, and result in inaccurate flags or assessments that have the likelihood of harming students and their academic records. To ensure fairness, developers must thus use diverse data sets and conduct regular audits to identify correct bias.

2.3 Transparency and Explain ability in AI-driven Assessments

AI in online exams lacks transparency as students never get to know the behaviour which was flagged as suspicious or the manner in which their score was calculated, which can lead to confusion and mistrust. In high-stakes assessments, the presence of black box algorithms

makes it difficult to challenge or verify outcomes. In order to build confidence in assessments and ensure accountability,AI systems must provide clear and understandable explanations with regard to the processes and criteria that they follow. This is because a transparent design not only provides for a fair review mechanism but also empowers students to understand and engage with technology for assessing performance.

3. HOW AI IS REVOLUTIONIZING EXAM MONITORING AND ASSESSMENTS

In this we'll explore how AI is transforming exam monitoring and assessments, its benefits, key technologies involved, and what the future holds for AI-driven education.

3.1 The Evolution of Exam Monitoring

Traditional exams required in-person invigilators to monitor students, verify identities, and prevent malpractice. With the rise of remote learning and online test platforms, this model became impractical.
Institutions began adopting AI proctoring systems that use machine learning algorithms to detect suspicious behavior and maintain the integrity of online exams.AI monitoring doesn't just replicate human invigilation — it enhances it. From verifying identities through facial recognition to tracking eye movements, background noise, and multiple screen usage, AI ensures that examinations are conducted under secure and fair conditions, even remotely.

3.2 How AI Works in Exam Monitoring

AI-based exam monitoring combines several technologies to create a seamless and secure testing experience. The process typically includes:

a) Identity Verification

Before an exam begins, AI verifies the candidate's identity using facial recognition, document scanning, and biometric validation. This eliminates impersonation and ensures that only authorized students can access the test.

b) Behavior Tracking

During the exam, AI tools analyze candidate behavior using computer vision and audio analytics. It can detect eye movement patterns, background noises, body posture changes, and even if a candidate leaves the test window.

c) Real-Time Alerts

If AI identifies unusual activity — like multiple people appearing in the frame, switching tabs, or speaking during the test — it flags these events in real time for review by human proctors.

d) Data Analytics and Reporting

After the test, AI generates a detailed report highlighting potential red flags and provides insights on overall test integrity. This hybrid model allows human invigilators to make the final call based on AI's findings.

3.3 AI in Exam Assessments

While monitoring ensures exam security, AI-driven assessment systems enhance how tests are graded and analyzed. Traditionally, grading large volumes of tests — especially descriptive answers — was time-consuming and prone to human bias.

AI automates the grading process by analyzing text patterns, keywords, logical structure, and conceptual understanding. Natural Language Processing (NLP) models can evaluate essays, short answers, and open-ended responses just as effectively as objective questions.

Key Features of AI-Based Assessment Systems

- Automated Scoring: AI evaluates both objective (MCQs) and subjective (essay-type) responses quickly and accurately.
- Bias Reduction: AI models are trained to ensure uniform scoring, minimizing the impact of human subjectivity.
- Performance Insights: Data analytics provides educators with performance trends, topic-level strengths, and areas needing improvement.
- Adaptive Testing: AI personalizes test difficulty based on the candidate's performance, ensuring a more accurate skill evaluation.

4. THE ROLE OF AI IN ENHANCING REMOTE PROCTORING SECURITY

4.1 An Overview of Remote Proctoring

Remote Proctoring means using a proctoring service to ensure that candidates stay ethical and expand during the event of an online test. A range of proctoring tools and proctoring solutions utilise a variety of approaches aimed at inhibiting candidates from academic misconduct during examinations. Here's where AI steps in, bringing in ultra-modern security features that are not available in the legacy system.

The Benefits of AI in Remote Proctoring

1. **Increased Accuracy in Candidate's Identity Verification:** For the duration of the exam, the candidates' identities are confirmed sequentially using the proctoring software equipped with a facial recognition system. This feature avoids the practice of impersonation since the given exam will only be attended to by the ready to take exam candidates. In addition to the AI ID verification, there is also biometrics whereby everyone has different unique features which helps especially in ensuring no cheating takes place in regard to assessments carried out online.
2. **Satellite Proctoring and Monitoring:** The AI systems possess the ability to monitor the candidates at all times of the examination and mark out atypical behaviour which can be presumed to be the candidates attempt to cheat. The advancement of this feature enhances online proctoring services as the exam supervisor is able to act on any malicious dealings witnessed within the examination period.
3. **Smart Monitoring With Recording of Examination:** By using smart monitoring with recording of examination, the whole exam session can be recorded for review by the proctor or administrator at a later time. This function serves to enhance the examination process by giving a detailed description about the examination setting and helps in detecting any misconduct which may happen during the examination.

4. **Simple And Uninterrupted Experience For Online Exams:** When security is put in place for the online examinations there is always that tendency for a candidate to experience discomfort. The candidate is not worried thanks to the non-invasive AI work monitoring system which focuses on their output.

5. THINK PROCTOR: A REVOLUTIONARY REMOTE EXAM SECURITY SOLUTION:

Think Exam, the creator of Think Proctor, is one of the various innovations regarding remote proctoring that addresses the growing needs of educational institutions, government and corporate gears. Think Proctor addresses all the proctoring requirements in regard to online assessment together with its promising delivery for the test administrators and the applicants.

Here's what makes Think Proctor a revolution in security of remote exams:

AI-powered Image Proctoring: With Think Proctor, there is more to facial recognition than meets the eye. In every exam, the identities of the applicants are verified accurately and in real-time throughout the duration of the exam. Any attempts of impersonation are being verified at that very moment allowing only the legitimate user to proceed with the exam.

AI-based ID Verification: This highlights the use of artificial intelligence to ensure that there is appropriate verification of candidates before the examination starts and during the examination, hence decreasing chances of impersonation or cheating.

Recorded Monitoring: This feature enables recording of all the activities that are performed during the examination. The recorded examination can be reviewed by proctors or administrators in order to examine if there has been any misconduct, thus making it applicable for examinations that do not allow real time supervision.

Live Monitoring: For high stakes tests that require constant oversight, Think Proctor includes live monitoring, which allows human proctors to monitor the exam as it is happening. This allows immediate action if any cheating or misconduct is observed.

Think Proctor eliminates any concerns of academic dishonesty in institutions as they ease the transition from physically administered tests to online assessments. The intuitive design of the system and artificial intelligence features ensure that candidates have a conducive yet non intrusive environment that enables them to sit for an examination while strict measures are in place.

6. BENEFITS OF USING AI IN EXAM MONITORING AND ASSESSMENT

a) Enhanced Security and Integrity

AI-powered systems detect and prevent cheating, impersonation, and unauthorized access — maintaining exam credibility.

b) Scalability

Institutions can conduct large-scale online exams simultaneously across the globe without compromising security or fairness.

c) Cost and Time Efficiency

AI reduces administrative efforts in invigilation and grading, saving time and operational costs for institutions and organizations.

d) Fair and Unbiased Evaluation

AI eliminates grading inconsistencies caused by fatigue or human bias, ensuring every student is assessed purely on merit.

e) Accessibility and Flexibility

Students can take exams from any location, and AI ensures equitable access through multilingual support and adaptive interfaces for differently-abled candidates.

f) Data-Driven Insights

AI analytics helps educators and organizations identify trends in learning behavior, predict future performance, and make informed curriculum decisions.

7. CHALLENGES AND ETHICAL CONSIDERATIONS

While AI offers immense potential, its implementation in exam monitoring and assessments comes with challenges that must be addressed responsibly.

a) Privacy Concerns

AI systems often require webcam access, screen monitoring, and biometric data — raising privacy and data protection issues. Transparency in how data is collected and used is essential.

b) Algorithmic Bias

AI models are trained on data that may carry inherent biases, potentially leading to unfair results. Continuous auditing and human oversight are crucial to maintaining fairness.

c) Over-Reliance on Technology

Technical glitches, poor internet connectivity, or software errors can disrupt exams. A robust backup mechanism and hybrid human-AI monitoring are necessary.

d) Student Anxiety

Continuous camera monitoring and automated alerts can make students feel anxious or uncomfortable. Designing empathetic AI systems that respect privacy and emotional well-being is key.

8. SCOPE AND FUTURE TRENDS

AI's role in exam monitoring and assessment is still evolving. The future promises even more advanced capabilities powered by generative AI, emotion recognition, and predictive analytics.

Key Future Trends

- AI-Driven Personalized Learning Paths: Exams will adapt in real-time based on individual performance, ensuring customized learning outcomes.

- Voice and Emotion Analytics: AI may soon assess emotional engagement and confidence levels during exams or oral assessments.
- Blockchain Integration: To ensure transparency and immutability, exam results and academic credentials will be stored securely using blockchain.
- AI Tutors and Feedback Systems: Post-assessment, AI will provide personalized feedback and study recommendations to enhance learning outcomes.

As education continues to digitize, AI will play a pivotal role in creating secure, fair, and intelligent testing ecosystems.

Future Trends in AI and Online Exams

(a) Advancements in Natural Language Processing (NLP)

Advancements in natural language processing have the capability of enhancing online exams since it would not only ensure a deeper analysis of written and spoken responses but also understand their context, tone and intent and thus allow for accurate grading of essays, short answers as well as oral assessments.

Advancement in NLP would also impact automated feedback, thus offering students detailed insights and suggestions for improvement in real-time, and also support interactive assessments in the form of conversational exams and scenario-based questions. With NLP becoming more sophisticated, it would aid in bridging communication gaps, supporting multilingual assessments and ensuring human-like interactions in digital learning environments.

(b) Integration with Virtual Reality (VR) for Immersive Assessments

Integrating virtual reality with AI would help in revolutionising online exams since it would aid in the creation of immersive, interactive testing environments by allowing institutions to place students in realistic simulations to give them an opportunity of making decisions by getting a hands-on assessment of practical skills. AI would also evaluate students' performance in real-time by tracking their behaviour, actions and responses and play an imperative role in various fields that require experiential learning. Merging AI with VR would result in assessments being more engaging, authentic, and effective.

(c)AI-driven Personalized Learning Paths based on Exam Insights

AI in the future will increasingly use exam data for creating personalized training paths that are tailored to a student's strengths, weaknesses and learning style. AI would ensure the same by analysing performance patterns, and then recommending targeted resources, exercise as well as study plans.

9. CONCLUSION

Incorporating AI in online exams is one of the best decisions that organisations can make for enhancing the experience of conducting assessments remotely for instructors as well as test takers. This is because its use would automate the creation of online exams, detect unusual behaviours such as eye movement, suspicious sounds, presence of unauthorized materials, in

real-time, streamlining the assessment processes by automatically grading the exams, and detecting subtle forms of plagiarism thus maintaining exam integrity.

Besides its features, the advancement of natural language processing in future would enhance online exams by ensuring deeper analysis of written and spoken responses and integrating virtual reality with AI would aid in revolutionising online exams as it would create immersive, interactive testing environments.

The application of Artificial Intelligence in remote proctoring software has improved the way online examinations are conducted and made them more secure, efficient, and credible than before. In view of the fact that many educational institutions have turned to online proctoring tools as well as proctor exam solutions, it will be important to migrate to AI tools like that offered by Think Proctor – to retain the quality of the online tests. Using such capabilities, it will be possible to make sure that there is no injustice in education in the coming days and it will be safe for all the students.

The role of AI in exam monitoring and assessments goes far beyond automation — it's about enhancing trust, efficiency, and inclusivity in the education system. By leveraging advanced technologies like machine learning, computer vision, and natural language processing, AI ensures integrity in examinations while enabling faster, more accurate evaluations. However, human oversight remains essential. The future of assessments lies in a collaborative human-AI approach that combines technology's precision with human judgment and empathy.AI has already redefined how exams are conducted and evaluated — and as innovation continues, it will reshape the entire learning journey from preparation to certification.

REFERENCES

1. A. Sharma, K. Tanaka, and M. Rodriguez, "Adaptive question generation for personalized online assessments using large language models," in Proc. Int. Conf. Educational Data Mining, pp. 1–10, 2021.
2. J. Doughty, Z. Wan, and A. Bompelli, "A comparative study of AI- generated and human-crafted multiple- choice questions in programming education," in Proc. ACM Conf. Computing Education, pp. 45–54, 2021.
3. P. Shah, U. Faquih, R. Devkar, and Y. Shahare, "An intelligent question paper generator using randomized algorithm," International Journal of Computer Applications, vol. 185, no. 12, pp.22–27, 2021.
4. Woldeab D, & Brothen T. (2019). OnlineProctoring, TestAnxiety, and Student Performance. International Journal of E-Learning & Distance Education, 34(1).
5. Zhang, M. Z., Zhang, M. M., Chang, Y., Esche, D. S. K., & Chassapis, D. C. (2016). A Virtual Laboratory System with Biometric Authentication and Remote Proctoring Based on Facial Recognition.
6. Alessio, H. M., Malay, N., Maurer, K., John Bailer, A., & Rubin, B. (2017). Examining the Effect of Proctoring on Online Test Scores.
7. Arora, P. (2021). Is Remote Proctoring The Future Of Academia? - eLearning Industry.
8. Atoum Y, Chen L, Liu AX, Hsu SDH, Liu X. Automated Online Exam Proctoring. IEEE Transactions on Multimedia. 2017;19(7):1609–1624. doi: 10.1109/TMM.2017.2656064.
9. Beust, P., Duchatelle, I., & Cauchard, V. (2018). Exams taken at the student's home.
10. Bilen, E., & Matros, A. (2020). Online Cheating Amid COVID-19.

11. Butler-Henderson, K., & Crawford, J. (2020). A systematic review of online examinations: A pedagogical innovation for scalable authentication and integrity. Computers and Education, 159.10.1016/ j.compedu. 2020.104024
12. Caveon, D. F., Security, T., & Layman, H. (2013). Online Proctoring Systems Compared.
13. Chua, S. S., Bondad, J. B., Lumapas, Z. R., & Garcia, J. D. (2019). Online Examination System with Cheating Prevention Using Question Bank Randomization and Tab Locking.
14. Coghlan, S., Miller, T., & Paterson, J. (2020). Good proctor or "Big Brother"? AI Ethics and Online Exam Supervision Technologies. ArXiv Preprint.
15. Dendir S, Maxwell RS. Cheating in online courses: Evidence from online proctoring. Computers in Human Behavior Reports. 2020;2:100033. doi: 10.1016/j.chbr.2020.100033.
16. Draaijer S, Jefferies A, Somers G. Online proctoring for remote examination: A state of play in higher education in the EU. Communications in Computer and Information Science. 2018;829:96–108. doi: 10.1007/978-3-319-97807-9_8.
17. Emerging Technology and the Future of Online Proctoring. (2020).
18. Furby L. Are You Implementing a Remote Proctor Solution This Fall? Recommendations from NLN Testing Services. Nursing Education Perspectives. 2020;41(4):269–270. doi: 10.1097/01.NEP.0000000000000703.
19. Ghizlane, M., Hicham, B., & Reda, F. H. (2019, December). A New Model of Automatic and Continuous Online Exam Monitoring. Proceedings - 2019 4th International Conference on Systems of Collaboration, Big Data, Internet of Things and Security, SysCoBIoTS 2019. 10.1109/SysCoBIoTS48768.2019.9028027
20. Golden, J., & Kohlbeck, M. (2020). Addressing cheating when using test bank questions in online Classes. Journal of Accounting Education, 52. 10.1016/j.jaccedu.2020.100671
21. Hussein MJ, Yusuf J, Deb AS, Fong L, Naidu S. An Evaluation of Online Proctoring Tools. Open Praxis. 2020;12(4):509. doi: 10.5944/openpraxis.12.4.1113
22. Hylton K, Levy Y, Dringus LP. Utilizing webcam-based proctoring to deter misconduct in online exams. Computers and Education. 2016;92–93:53–63. doi: 10.1016/j.compedu.2015.10.002.
23. Ilgaz H, Afacan Adanır G. Providing online exams for online learners: Does it really matter for them? Education and Information Technologies. 2020;25(2):1255–1269. doi: 10.1007/s10639-019-10020-6.
24. Joshy, N., Ganesh Kumar, M., Mukhilan, P., Manoj Prasad, V., & Ramasamy, T. (2018). Multi-factor authentication scheme for online examination.
25. Karim, N. A., & Shukur, Z. (2016). Using preferences as user identification in the online examination. International Journal on Advanced Science, Engineering and Information Technology, 6(6), 1026–1032. 10.18517/ijaseit.6.6.1412
26. Langenfeld, T. (2020). Internet-Based Proctored Assessment: Security and Fairness Issues (Vol. 39, Issue 3).
27. Li, X., Chang, K. M., Yuan, Y., & Hauptmann, A. (2015). Massive open online proctor: Protecting the credibility of MOOCs Certificates. CSCW 2015 - Proceedings of the 2015 ACM International Conference on Computer-Supported Cooperative Work and Social Computing, 1129–1137. 10.1145/2675133.2675245
28. Metzger, R., & Maudoodi, R. (2020). Using Access Reports and API Logs as Additional Tools to Identify Exam Cheating.
29. Milone AS, Cortese AM, Balestrieri RL, Pittenger AL. The impact of proctored online exams on the educational experience. Currents in Pharmacy Teaching and Learning. 2017;9(1):108–114. doi: 10.1016/j.cptl.2016.08.037.

30. Moreno-Guerrero, A. J., Rodríguez-Jiménez, C., Gómez-García, G., & Ramos Navas-Parejo, M. (2020). Educational Innovation in Higher Education: Use of Role Playing and Educational Video in Future Teachers' Training. In Sustainability (Vol. 12, Issue 6). 10.3390/su12062558
31. Norris, M. (2019). University online cheating-how to mitigate the damage.
32. O'reilly, G., & Creagh, J. (2016). A Categorization of Online Proctoring.
33. Pandey, A. K., Kumar, S., Rajendran, B., & Bindhumadhava, S. B. (2020). E-parakh: Unsupervised online examination system. IEEE Region 10 Annual International Conference, Proceedings/TENCON, 2020-Novem, 667–671. 10.1109/TENCON50793.2020.9293792
34. Peterson, J. (2019). An Analysis of Academic Dishonesty in Online Classes. In ACADEMIC DISHONESTY IN ONLINE CLASSES Mid-Western Educational Researcher · (Vol. 31).
35. Pimple, O. (2021, January). Digital Education For All - Is Mobile Learning The Way Ahead? The Media Bulletin.
36. Pozo Sánchez, S., López-Belmonte, J., Moreno-Guerrero, A. J., Sola Reche, J. M., & Fuentes Cabrera, A. (2020). Effect of Bring-Your-Own-Device Program on Flipped Learning in Higher Education Students. In Sustainability (Vol. 12, Issue 9). 10.3390/su12093729
37. Prathish S, Narayanan S A, & Bijlani K. (2016). An Intelligent System For Online Exam Monitoring.
38. Raj, R. S. V., Narayanan, S. A., & Bijlani, K. (2015). Heuristic-based automatic online proctoring system. Proceedings - IEEE 15th International Conference on Advanced Learning Technologies: Advanced Technologies for Supporting Open Access to Formal and Informal Learning, ICALT 2015, 458–459. 10.1109/ICALT.2015.127
39. Remote Proctoring. (2020).
40. Rios JA, Liu OL. Online Proctored Versus Unproctored Low-Stakes Internet Test Administration: Is There Differential Test-Taking Behavior and Performance? American Journal of Distance Education. 2017;31(4):226–241. doi: 10.1080/08923647.2017.1258628.
41. Singh R, Timbadia D, Kapoor V, Reddy R, Churi P, Pimple O. Question paper generation through progressive model and difficulty calculation on the Promexa Mobile Application. Education and Information Technologies. 2021 doi: 10.1007/s10639-021-10461-y.
42. Sinha, P., Dileshwari, & Yadav, A. (2020). Remote Proctored Theory And Objective Online Examination. International Journal of Advanced Networking and Applications, 11(06). /10.35444/ijana.2020.11068
43. Slusky, L. (2020). Cybersecurity of Online Proctoring Systems. In Journal of International Technology and Information Management (Vol. 29).
44. Ullah, A., Barker, T., & Xiao, H. (2017). A Focus Group Study: Usability and Security of Challenge Question Authentication in Online Examinations.
45. Ullah A, Xiao H, Barker T. A Multi-factor Authentication Method for Security of Online Examinations. Lecture Notes of the Institute for Computer Sciences, Social-Informatics and Telecommunications Engineering, LNICST. 2019;256:131–138. doi: 10.1007/978-3-030-05928-6_13.
46. Vincent-Lancrin, S., & van der Vlies, R. (2020). Trustworthy artificial intelligence (AI) in education. OECD Education Working Papers, 218. 10.1787/a6c90fa9-en
47. Weiner JA, Hurtz GM. A Comparative Study of Online Remote Proctored versus Onsite Proctored High-Stakes Exams. Journal of Applied Testing Technology. 2017;18(1):13–20.