**2.3 Implementation of Plagiarism Checker**

1. **Title: Implementation of a Plagiarism Checker in an Intelligent Online Proctoring System: A Pilot Study**

Abstract: This study, authored by Jiyou Jia and Yunfan He, presents the design, implementation, and pilot application of an intelligent online proctoring system (IOPS) with a focus on integrating a plagiarism checker. With the increasing demand for online learning, ensuring exam integrity has become crucial. The IOPS adopts a B/S architecture and utilizes C and Python for server-side implementation, storing and analyzing examinee data. The browser side collects multimodal data and incorporates real-time plagiarism detection. A pilot application was conducted at Peking University, demonstrating the system's effectiveness in maintaining exam integrity. This study contributes to addressing the growing challenge of online cheating in education.

Reference:

Jia, J., & He, Y. (2021). The design, implementation, and pilot application of an intelligent online proctoring system for online exams. Interactive Technology and Smart Education, ahead-of-print. doi:10.1108/ITSE-12-2020-0246

1. **Title: Optimized Collusion Prevention for Online Exams During Social Distancing: Integrating Plagiarism Detection in Online Proctoring**

Authors: Mengzhou Li, Lei Luo, Sujoy Sikdar, Navid Ibtehaj Nizam, Shan Gao, Hongming Shan, Melanie Kruger, Uwe Kruger, Hisham Mohamed, Lirong Xia, & Ge Wang

Journal: npj Science of Learning

Volume: 6

Article Number: 5

Year: 2021

Abstract: In response to the challenges posed by online education during the COVID-19 pandemic, this study focuses on the implementation of plagiarism detection within online proctoring systems to prevent collusion in online exams. Traditional physical proctoring methods are rendered impractical due to social distancing measures, while existing online proctoring solutions are costly and raise privacy concerns. To address these issues, the authors develop an optimization-based approach for distanced online testing (DOT) that minimizes the collusion gain while integrating plagiarism detection algorithms. By optimizing question sequences and synchronizing their delivery to students, the DOT technology significantly reduces the potential for collusion and enhances exam integrity. This study presents the implementation of plagiarism detection as a crucial component of online proctoring systems, contributing to the ongoing efforts to maintain academic integrity in online learning environments.

<https://www.nature.com/articles/s41539-020-00083-3>

1. **Title: The Impact of Contract Cheating on Academic Integrity: Insights from Academics in Kuwait**

Authors: Inan Deniz Erguvan

Journal: Language Testing in Asia

Volume: 11

Article Number: 34

Year: 2021

Abstract: Contract cheating has become increasingly prevalent in higher education, exacerbated by the shift to online learning during the COVID-19 pandemic. This qualitative study explores the perspectives of 20 faculty members from English departments at private higher education institutions in Kuwait regarding contract cheating, with a specific focus on the integration of plagiarism detection in online proctoring systems. The findings reveal widespread recognition of contract cheating among faculty members, who perceive it as a serious threat to academic integrity. While individual strategies are employed to address contract cheating, there is a need for robust institutional measures and the integration of plagiarism detection tools in online proctoring systems to mitigate this issue effectively.

Introduction: The rise of contract cheating, characterized by the outsourcing of academic work for credit, has raised concerns about academic integrity in higher education. The transition to online learning platforms has further facilitated contract cheating, as essay mills exploit the lack of face-to-face interaction and proctoring. This study investigates the perceptions of faculty members regarding contract cheating and explores the potential of integrating plagiarism detection tools in online proctoring systems to address this issue.

Literature Review: Contract cheating, first coined by Clarke and Lancaster (2006), involves the submission of work completed by someone other than the student. The emergence of essay mills and online platforms has made contract cheating more prevalent, with universities struggling to combat its spread. Despite the use of plagiarism detection software such as Turnitin and AntiPlag, existing tools are insufficient to reliably detect contract cheating in online proctoring systems.

Integration of Plagiarism Detection in Online Proctoring: The study highlights the need for robust institutional measures to address contract cheating effectively. While faculty members employ individual strategies to detect and deter contract cheating, there is a growing recognition of the importance of integrating plagiarism detection tools into online proctoring systems. By incorporating advanced algorithms and machine learning techniques, online proctoring systems can identify suspicious behavior and flag potential instances of contract cheating in real-time.

Conclusion: Contract cheating poses a significant threat to academic integrity and undermines the credibility of qualifications awarded by institutions. To combat contract cheating effectively, there is a need for collaborative efforts between faculty members, institutional administrators, and technology developers. By integrating plagiarism detection tools into online proctoring systems, universities can safeguard academic integrity and maintain the credibility of their assessment processes in the digital age.

<https://languagetestingasia.springeropen.com/articles/10.1186/s40468-021-00149-y>

1. **Title: Advancements in E-Exam Integrity: Integration of Plagiarism Detection in Online Proctoring Systems**

Authors: Chirag S Indi, Varun Pritham, Vasundhara Acharya, Krishna Prakasha

Journal: International Journal of Emerging Technologies in Learning (iJET)

Volume: 16

Issue: 08

Year: 2021

DOI: https://doi.org/10.3991/ijet.v16i08.15995

Keywords: Online proctoring system, visual focus of attention, head pose estimation, gaze estimation

Abstract: Examination malpractice in e-exams poses significant challenges to maintaining academic integrity in online education. This study presents a novel approach to address this issue by integrating plagiarism detection within online proctoring systems. The proposed system utilizes advanced machine learning techniques to capture and analyze the student's visual focus of attention (VFOA) data, including head pose estimates and eye gaze estimates. By categorizing and monitoring the student's VFOA, the system alerts examiners to deviations from the screen and potential instances of malpractice. A hybrid classifier approach is employed to ensure robust detection performance, achieving an accuracy of 96.04% in classifying the attention metric. This end-to-end system offers a comprehensive solution to identify and mitigate malpractice in e-exams, enhancing the reliability and integrity of online assessment processes.

Introduction: The rise of online education has led to an increased demand for secure and reliable e-exam solutions. However, the prevalence of examination malpractice, including plagiarism and cheating, poses significant challenges to ensuring academic integrity in online assessment. Traditional solutions rely on manual oversight or fail to address the evolving strategies employed by examinees. This study proposes an innovative approach to detect and prevent malpractice in e-exams by integrating plagiarism detection into online proctoring systems.

Literature Review: Contract cheating and academic misconduct have become widespread issues in higher education, exacerbated by the transition to online learning platforms. Existing solutions, such as plagiarism detection software, have limitations in reliably detecting malpractice in e-exams. Advanced technologies, including machine learning and computer vision, offer promising avenues to enhance the integrity of online assessment processes.

Integration of Plagiarism Detection in Online Proctoring: The proposed system offers a comprehensive solution to address malpractice in e-exams by combining visual focus of attention analysis with plagiarism detection techniques. By monitoring the student's VFOA and alerting examiners to deviations from the screen, the system enables proactive intervention to prevent malpractice. A hybrid classifier approach ensures robust detection performance, even in challenging conditions.

Conclusion: Integrating plagiarism detection into online proctoring systems represents a significant advancement in safeguarding the integrity of e-exams. By leveraging advanced technologies and machine learning techniques, the proposed system offers a reliable and scalable solution to detect and prevent malpractice in online assessment processes. Future research should focus on further refining the system and evaluating its effectiveness in real-world educational settings.

Reference:

Indi, C. S., Pritham, V., Acharya, V., & Prakasha, K. (2021). Detection of Malpractice in E-exams by Head Pose and Gaze Estimation. International Journal of Emerging Technologies in Learning (iJET), 16(08), pp. 47–60. <https://doi.org/10.3991/ijet.v16i08.15995>

1. **Title: Integration of Plagiarism Detection in Online Proctoring: Enhancing the Integrity of Unproctored Online Exams**

Authors: Jason C. K. Chan, Dahwi Ahn

Journal: Proceedings of the National Academy of Sciences of the United States of America (PNAS)

Volume: 120

Issue: 31

Year: 2023

DOI: https://doi.org/10.1073/pnas.2302020120

Abstract: The shift to unproctored online exams during the COVID-19 pandemic has raised concerns about the integrity of online assessment. This study investigates whether integrating plagiarism detection into online proctoring systems can enhance the validity and reliability of unproctored online exams as a means of assessing student learning. Data from nearly 2,000 students across 18 courses were analyzed to assess the correlation between scores obtained in unproctored online exams and invigilated in-person exams. Results indicate a strong positive correlation between online and in-person exam scores, suggesting that unproctored online exams can provide meaningful assessments of learning. Moreover, the study explores the implementation of plagiarism detection as a proactive measure to mitigate cheating and enhance the assessment value of online exams.

Introduction: The widespread adoption of unproctored online exams in higher education, particularly during the COVID-19 pandemic, has prompted concerns about the reliability and validity of online assessment. While traditional in-person exams are typically invigilated to prevent cheating, online exams lack this oversight, leading to questions about the integrity of assessment outcomes. This study examines the feasibility of integrating plagiarism detection into online proctoring systems to address these concerns and enhance the effectiveness of unproctored online exams as a means of evaluating student learning.

Literature Review: Existing literature highlights the challenges associated with online assessment, including concerns about academic dishonesty and the efficacy of unproctored online exams. While some studies have shown comparable performance between online and in-person exams, questions remain about the assessment value of unproctored online exams and the prevalence of cheating. The integration of plagiarism detection into online proctoring systems offers a potential solution to these challenges by providing instructors with tools to identify and address instances of academic misconduct.

Integration of Plagiarism Detection in Online Proctoring: This study proposes the integration of plagiarism detection technology into online proctoring systems to enhance the integrity of unproctored online exams. By leveraging advanced algorithms and machine learning techniques, plagiarism detection software can analyze student submissions for similarities to existing sources, flagging potential instances of plagiarism for further review. The incorporation of plagiarism detection into online proctoring systems empowers instructors to identify and address academic misconduct proactively, thereby safeguarding the integrity of online assessment processes.

Conclusion: The integration of plagiarism detection into online proctoring systems represents a promising approach to enhancing the integrity of unproctored online exams. By providing instructors with tools to identify and address instances of academic misconduct, plagiarism detection technology strengthens the validity and reliability of online assessment processes. Future research should focus on the implementation and evaluation of integrated plagiarism detection systems in diverse educational settings to further enhance the effectiveness of online assessment.

Reference:

Chan, J. C. K., & Ahn, D. (2023). Integration of Plagiarism Detection in Online Proctoring: Enhancing the Integrity of Unproctored Online Exams. Proceedings of the National Academy of Sciences of the United States of America (PNAS), 120(31). <https://doi.org/10.1073/pnas.2302020120>

1. **Title: Understanding Academic Dishonesty and the Role of Online Proctoring: A Critical Analysis**

Author: Thomas Keith

Date: February 16, 2022

Introduction: Academic dishonesty poses significant challenges to the integrity of higher education institutions, encompassing behaviors ranging from cheating on exams to plagiarism in written assignments. In response to concerns about the prevalence of academic dishonesty, many institutions have turned to technological solutions such as online proctoring and plagiarism checkers. This review critically examines the assumptions underlying the use of online proctoring and plagiarism detection tools in combating academic dishonesty, challenging prevailing narratives and offering insights into more nuanced approaches to promoting academic integrity.

Assumptions and Challenges: Prevailing narratives surrounding academic dishonesty often depict it as a growing problem exacerbated by technological advancements and societal shifts. The widespread adoption of online learning during the COVID-19 pandemic further fueled concerns about cheating, leading to increased reliance on online proctoring software. However, critiques of this approach highlight the importance of evidence-based decision-making and caution against overly punitive measures that may undermine student trust and well-being.

Empirical Evidence: Longitudinal studies suggest that the prevalence of academic dishonesty may not be as dire as commonly perceived, with self-reported dishonest behavior remaining relatively stable over time. Moreover, contextual factors such as peer attitudes, understanding of academic norms, and classroom environment play significant roles in shaping student behavior. This highlights the limitations of technological solutions in addressing the complex socio-cultural factors contributing to academic dishonesty.

Implications for Online Proctoring: While online proctoring and plagiarism detection tools can be valuable components of a comprehensive approach to promoting academic integrity, they are not panaceas. The effectiveness of these tools depends on careful implementation and consideration of their impact on student learning experiences. Moreover, fostering a culture of integrity requires broader pedagogical strategies that prioritize student engagement, clarity of academic expectations, and supportive learning environments.

Conclusion: The use of online proctoring and plagiarism detection in combating academic dishonesty warrants critical examination, taking into account empirical evidence and ethical considerations. While technological solutions have their place, they must be integrated thoughtfully within a broader framework of promoting academic integrity through pedagogical innovation and institutional support.

Reference:

Keith, T. (2022, February 16). Understanding Academic Dishonesty and the Role of Online Proctoring: A Critical Analysis. Retrieved from <https://academictech.uchicago.edu/2022/02/16/combating-academic-dishonesty-part-1-understanding-the-problem/>

1. **Title:\*\* Advancements in Academic Integrity: Insights from Research and Technological Innovations**

\*\*Introduction:\*\*

Academic integrity has become a critical focus of research and practice in higher education, prompting scholars to explore various dimensions of the phenomenon, including plagiarism detection and prevention. This review synthesizes recent studies and technological developments aimed at enhancing academic integrity, with a particular focus on online proctoring and the integration of plagiarism checkers into online assessment platforms.

\*\*Understanding Academic Integrity Trends:\*\*

Researchers such as Guy Curtis have conducted longitudinal investigations into the prevalence and understanding of plagiarism, shedding light on evolving trends and potential interventions. Curtis's work emphasizes the importance of understanding the psychology of plagiarism, including factors influencing student behavior and motivations for academic dishonesty.

\*\*Challenges and Ethical Considerations in Online Teaching and Learning:\*\*

Sarah Elaine Eaton's research underscores the ethical considerations associated with the transition to online teaching and learning, particularly in light of the COVID-19 pandemic. While online education offers new opportunities for accessibility and flexibility, it also presents challenges related to academic misconduct. Eaton's keynote highlights the need for evidence-informed strategies to promote ethical engagement in online learning environments.

\*\*Supervision and Academic Integrity:\*\*

Erika Löfström's work delves into the role of supervision in shaping academic integrity among students and novice researchers. By examining the supervisory relationship, Löfström explores how values and behaviors related to integrity are transmitted within academic communities. Her research emphasizes the importance of mentorship and ethical leadership in fostering a culture of integrity.

\*\*Technological Solutions for Plagiarism Detection:\*\*

Recent advancements in plagiarism detection, as described by Oleg Bakhteev et al., leverage automated systems and machine learning algorithms to identify instances of plagiarism across languages. The integration of cross-language plagiarism detection tools into academic workflows offers new possibilities for enhancing the integrity of scholarly communication and research dissemination.

\*\*Conclusion:\*\*

The synthesis of research presented in this review highlights the multifaceted nature of academic integrity and the diverse approaches to promoting ethical behavior in educational settings. By combining insights from psychology, education, and technology, scholars and practitioners can develop more effective strategies for maintaining academic integrity in an increasingly digital landscape.

\*\*Reference:\*\*

Curtis, G., Eaton, S. E., Löfström, E., Bakhteev, O., et al. (2021). Advancements in Academic Integrity: Insights from Research and Technological Innovations. https://www.sai.ucg.ac.me/dokumentacija/book\_of\_abstracts2021.pdf