# AI in Higher Education: IRIS and Turnitin Challenges and Opportunities

**Nothando C. Shiba[1], Ilunga Masengo[2] and Linda L. Jewell[1]**
[1]Department of Chemical and Materials Engineering, Florida Campus, University of South Africa, Roodepoort 1710, South Africa
[2]Department of Civil Engineering, Florida Campus, University of South Africa, Roodepoort 1710, South Africa

eshibanc@unisa.ac.za

**Abstract:** The emergence of advanced educational technologies such as Artificial Intelligence (AI) has revolutionised learning and teaching methods. For example, at the University of South Africa (UNISA), IRIS is used for exam invigilation. This tool provides educators assurance of assessment integrity during online and remote assessment. It monitors students' movement during the exam by recording a video of their face, audio, and taking screenshots of their computer screens at regular intervals and reports any alleged misconduct. However, IRIS often does not detect, where AI such as ChatGPT was used to generate answers. Furthermore, the university policies currently allow the use of Grammarly and Quillbot apps, which are increasingly incorporating AI features. These apps generate real time writing suggestions and rephrasing information from the internet to prevent any plagiarism. In addition, the University uses Turnitin's AI detection software that gives false positives if the student has written well in the passive voice. Considering that apps constantly evolve, the university needs to regularly check and mandate their use based on the latest features of the app. ChatGPT is amongst the latest AI writing apps, it enables students to easily access pre-written content without actively engaging in critical thinking and learning, potentially leading to widespread plagiarism, which poses a threat to education. In this paper, we present a concise overview of the use of IRIS and Turnitin invigilation and detection tools for online assessments. In an action study, the co-authors reflect on the implications of the use of these AI apps on the integrity and validity of the assessments. Directions for further research are suggested.

**Keywords:** Detection of Cheating, AI in Education, AI Detection, Online Invigilation

## 1. Introduction

Accelerated by the COVID-19 pandemic, artificial intelligence (AI) has opened up new opportunities for educational advancement and innovations (Mphaga, 2024). The urgent need to strengthen the education sector during the pandemic, prompted a widespread use of technology in education. This included moving to online teaching and learning platforms for assessment, leveraging internet access, AI and mobile technology. Open distance e-learning (ODeL) institutions embraced digital integration and technological innovations, while staying ethically grounded (Tsindoli 2025). AI information and communication technology has long been at the forefront of technological advancements in education in the global north (Kuleto et al. 2021), however, African countries like South Africa have not yet fully harnessed its potential.

New technologies are important for lecturers to facilitate and reshape teaching and learning paradigms for online classes in ODeL institutions. ODeL emphasizes independent learning through a facilitator via an acceptable medium or platform to one or a group of learners (Tanyanyiwa and Madobi 2021). Platforms like Microsoft Teams™ (n.d), Zoom™ (n.d.) and Google Meet™ (n.d.) have become important tools to conduct online lessons, with platforms like Moodle™ (n.d.) and Blackboard (n.d.), for course management, student participation, and assessment (Yen et al. 2021, Aswir et al. 2021). AI-based proctoring tools such as IRIS (n.d.), Proctorio (n.d.) and Honorlock (n.d.) are used to monitor student behaviour during exams and online assessments to prevent cheating (Dash et al. 2022). Other widely used tools in ODeL include: Turnitin, Grammarly Premium and Copyscape to check the originality of content in assessment scripts (Bahuguna et al. 2024).

While researchers argue that embracing these technologies can lead to professional growth for lecturers, particularly through the integration of AI applications with traditional teaching methods, AI in education is said to lessen cognitive growth. Lecturers have not been trained to integrate AI into traditional pedagogy and institutions do not have the necessary infrastructure and policies in place. This paper considers staff perceptions of AI detection and the impact of reporting false positives in students' work when using IRIS invigilation and Turnitin (Tii) AI detection software, for online assessments. The authors' reflections suggest that AI detection and monitoring tools are not completely reliable, and that human-based judgement is still required for assessment evaluations.

## 2. Literature Review

### 2.1 AI in Education

With the advent of AI in the mid-1950s up to the present day, AI has become smarter, in parallel with growth in knowledge, and has become increasingly relevant in education and training (Owoc et al. 2019). The inevitable development and adoption of AI not only impacts the effect of the far-reaching technological progress such as data storage, microprocessors, and global networking, but also changes in business strategies. While the debate on how AI will change business is at the top of the present-day agenda (Bullock 2019), education is also being challenged to reconceptualize the existing teaching and learning methods by putting AI tools and techniques into service (Garrett et al. 2020).

Intelligent technologies are gradually being implemented in universities, usually as part of the strategy that sets up a framework of priorities for mobile learning (Owoc et al. 2019). This opens up new opportunities to teach and learn anytime and anywhere by providing new methods and systems that aim to stimulate innovative teaching and ultimately improve learning outcomes (Verma et al. 2021). One of the crucial objectives of AI in education is the provision of personalized learning guidance. AI simulates human intelligence to make inferences, judgments, or predictions, to provide personalized support or feedback to students as well as teachers or policymakers (Owoc et al. 2019). According to Hwang et al. (2020) the roles of AI in education include problem solving, serving as an intelligent tutor, learning tool/partner, or policy-making advisor. Verma et al. (2021) reported the four main aspects of using AI in higher education to be learning, management, evaluation, and teaching, with the main objective being to provide a new education model that teaches in innovative ways. This includes overcoming the limitations of the traditional classroom and realizing the free, open, and mixed education and teacher efficiency, avoiding the repetition of simple work.

Recently, higher education institutions and companies in first world countries have embraced and supported the use of AI and machine assisted learning (MAL). Good examples of AI adoption come from the University of Murcia in Spain that began testing an AI-enabled chatbot to answer students' questions about the campus and areas of study. This AI was able to answer more than 38,708 questions, answering correctly more than 91% of the time (Rouhiainen 2019). The University of Derby, in England, introduced a system that could monitor data to predict when students are likely to drop out, to signal timely interventions (Owoc et al. 2019). A high-tech company from Burlington, USA implemented a speech recognition software that can be used both by students and faculty. This application is useful for students with limited mobility or a disability, i.e. struggle with writing, as it can transcribe up to 160 words per minute (Owoc et al. 2019). Teachers can apply this software to prepare homework and schedule recurrent tasks, on average teachers spend about 11 hours preparing a weekly task which could be done in 6 hours using AI assistance (Rouhiainen 2019). These examples confirm that many repetitive tasks and routines could benefit from the assistance of AI-enabled systems, offering teachers more time to focus on educating their students or to engage in research pursuits.

### 2.2 Challenges of AI in Education

Transformative learning allows learners to use their understanding and the information at their disposal to contribute constructively according to their ability (Khedkar and Nair 2016). AI tools have the potential to enhance pedagogy and promote learning; however, they present significant ethical concerns associated with maintaining academic integrity, including the risk of plagiarism, the stifling of critical thinking, and data privacy (Owoc et al. 2019). To emphasize the current situation at a global level, UNESCO launched global standards for AI ethics in November 2021, which have been endorsed by 193 member states, recognising the dynamic impacts of AI on societies, environment, ecosystems and human lives, including the human mind (UNESCO 2022). The global standards stipulate a universal framework of values for ethics, which provides stakeholder-driven guidelines in adopting AI, but at an individual level, challenges range from critical societal drawbacks such as systemic bias, discrimination, inequality for marginalized groups of students, and xenophobia (Nguyen et al. 2023). Little is known about what ethical principles should guide the design, development, and deployment of ethical and trustworthy AI in education.

The emergence of studies with conflicting ethical ideas regarding the use of AI in the education can be a driving force towards establishing effective and inclusive governance and regulations for the responsible use of AI. For example, Homes et al. (2022) addressed the issue of AI in research, where responses revealed that researchers are not trained to tackle the emerging ethical questions. Fu and Weng (2024) did a cognitive readiness case study for students and teachers and found that many teachers were concerned about their jobs being completely

replaced by AI and how technologies might shape their roles and human interactions. However, ethics is not the only area in which AI poses a threat to, another challenge is fairness and equity, which is further connected to the quality of education. In a study by Jabar et al. (2024) a respondent raised the issue on equity and quality of education in the use of AI systems, stating that "not everyone has access to both the internet and the AI-assisted technology." Furthermore, privacy and security, which mainly refer to the governance of data, including data collection, control, storage, access, and usage. Data storage, security confidentiality and loss of privacy were regarded as the elements most exposed to hackers and those who have criminal intentions in the virtual environment by Nguyen et al. (2022).

Validity is also a challenge in the context of AI enabled assessments. For example, the use of facial-recognition software packages such as IRIS and Talview to prevent cheating or copying during an exam by capturing data based on head and eye movements (Lee and Fanguy 2022, Nurpeisova et al. 2023). Real life data indicate that the software may report false positives and negatives, thus making the results unreliable. Recent research also indicates that facial-recognition software packages performed much worse at identifying the gender of women and people of colour than male, white faces (Castelvecchi, 2020). Also, AI cannot perceive what a teacher can observe: for example, the health of a student. If a student gives a wrong answer, it is recorded as such, but if the teacher notices that the student is not feeling well and still participates in the test, the teacher may consider rescheduling the test. Therefore, when the human component is missing, the results of such assessment can be misinterpreted (Pisica et al. 2023). According to Holmes et al. (2022) AI enabled systems can only detect and score responses which they have been trained to recognize.

Despite the possible advantages of integrating AI into education, both from a pedagogical point of view and for learning analytics and administration, there are substantial obstacles to be overcome (Neo 2025). A significant issue being the high cost of developing and implementing AI technologies, which requires substantial infrastructure, such as robust data management systems and skilled staff. The pace and scope of implementation AI into the core operations of educational institutions vary widely, with recent studies highlighting the potential of AI to revolutionize administrative processes (Aithal and Maiya 2023), generate interactive learning materials and improve educational outcomes (Saxena et al. 2023). However, financial constraints, infrastructure and limited qualified personnel to manage and maintain AI systems remain significant hurdles. The financial aspect introduces another level of complexity, as the cost of maintaining AI systems can be exorbitant for some institutions, potentially limiting accessibility for students and educators (Kaouni et al. 2024).

Educators are continuously exploring new approaches and refining existing systems for effective AI implementation, but limitations arise from the complexity of natural language processing, contextual understanding, and the knowledge domain of AI teachers (Tian 2023). To generate human-like interactions, AI teachers mostly rely on natural language processing (NLP) technologies. NLP algorithms, however, may not correctly decipher ambiguous or sophisticated learner input. AI teachers could give inaccurate answers or misunderstand the intended meaning when presented with regional dialects, slang, or linguistic nuances. This restriction makes it more difficult for the AI LLM to interact and communicate with students in their normal language (Kaouni et al. 2024). Neo (2025) reported concerns about the accuracy of feedback in technical and scientific subjects involving models like GPT-4, i.e. fabricated concepts, such as incorrect physical formulas, which can confuse learners and disrupt their understanding. Furthermore, while advanced NLP models can facilitate mental health support by offering accessible and immediate assistance to students, they cannot be a substitute for human interaction or expert medical counsel as mental health issues are intricate, necessitating tailored treatment strategies that consider the individual's unique circumstances and requirement (Alqahtani et al. 2023).

Infrastructure, which encompasses all the hardware, software entities and an ecosystem of thriving innovators to incorporate and provide training on AI related skills in the educational curricula, is still a challenge (Nguyen et al. 2023). For instance, countries such as Finland, China, USA, and the UK have launched strategic policies of education in order to integrate intelligent technologies into education, providing higher institutions with grants and resources to develop AI learning platforms and train academic staff (Pedro et al. 2019). In the United Arab Emirates (UAE), the Ministry of Education rolled out an advanced data analytics platform with over 1,200 schools and over 70 higher education institutions, totalling over 1.2 million students. This data analytics system contains data on curricula, teachers' professional development, learning resources, financing, operations, performance reports, student and parent feedback (UNESCO 2019, Pedro et al. 2019). But, what about the urgency of introducing AI in developing countries which have financially struggling institutions? This leads to inequality as teachers lack the necessary training to perform their tasks and with the continuous upgrading of software,

universities will constantly face the need to adapt to the ever-changing technological solutions and require more funds to keep up to date.

Education goes beyond imparting knowledge to learners but is also a transformational force capable of shaping individuals into conscious and responsible agents of change (Nguyen et al. 2023). The possibility of AI dehumanisation, causing a digital and social divide, may also lead to lack of critical thinkers and innovators. In addition, there is a need for a global consensus and standard guidelines for the regulation and ethical consensus of these technologies, utilizing their various capabilities in education.

## 3. Research Methodology

The methodology followed in this article is action research. The main reflective characteristic of action research should be acknowledged since action research allows the lecturers and students, as key players in teaching and learning, to evaluate the instructional teaching methodology to improve the learning process. In this way, online pedagogy can be re-examined to identify areas of strengths and weaknesses. This leads to opportunities in narrowing the latter and enhancing the former. New approaches to assessment and marking were designed in response to changes in the online teaching landscape, specifically the implementation (in 2020) of invigilation for online assessments in the face of the Covid-19 pandemic and then response to the advent of an LLM called Chat GPT in November 2022.

As these new approaches were implemented, lecturers responded by adjusting their assessments and then observations of the results have been recorded and analysed as reflections. The data collected in this study is based on the practices and perceptions of the academics to evaluate the impact of these changes on the effectiveness of the assessments. To guide the action research reflections, each of the three authors (LLJ (scenario 1) and MI (scenario 2) and 2022 and 2025 for NCS (scenario 3)) completed the table and then wrote reflections on which tool had been used with a particular type of assessment, how the assessment was marked, how AI LLM usage was detected, the estimated incidence of this and what action was taken consequently.

Although the community of inquiry (CoI) has been discussed at length in the literature (Swan et al. 2009), aspects related to student misconduct during online examinations has not been dealt with and seems to be almost non-existent in the current literature. This study intends to bridge the gap by using action research, as a methodological approach.

## 4. Results and Discussion

In 2020, when the Covid-19 pandemic forced the university to move its assessments from traditional venue-based exams with invigilation to online exams, online authentication and monitoring was necessary to ensure the credibility of the assessments and the university's qualifications. The university adopted IRIS® which authenticates the student prior to the exam by using face recognition technology and the student's ID card. It records sound, movement and takes screenshots during the assessment which are uploaded at the end of the examination. These recordings are evaluated, and suspicious activity is flagged.

In November 2022, a large language model (LLM) called Chat GPT was released on the internet. It was immediately obvious that this constituted a monumental disruption in assessment and marking, in particular, for higher education. Initially there were no detection tools, besides the academic who was marking the script. As evidence of the lack of sophistication, we received a couple of handwritten scripts which included general phrases (Scenario 1). Students would copy the "answer" of an LLM without any critical evaluation of the answer. However, the LLMs quickly became more polished and avoided self-revealing phrases. This is a demonstration that students who cheat by copying work from one another will do the same with an AI LLM without applying their minds and unwittingly copying blatant errors.

Lecturers responded by adapting questions to be able to detect the use of LLMs. LLMs cannot answer specific questions, like "Where do you live?" "What is the distance between your home and the chemical facility that you have selected?" A blank answer for such a question is a red flag for the use of an LLM. The other aspect of critical thinking that LLMs are programmed to avoid is firm conclusions. To avoid bigotry, an LLM will fence-sit, "weighing" the options when asked to draw a conclusion. By marking with a rubric, one can allocate a failing mark for scripts with these characteristics, where students are told not to use LLMs. In this case, the question was structured so that students had to use given information to calculate a reactor volume for two different reactor models and compare the two answers, explaining the difference (scenario 1). One of the students did

the calculation part by hand, and since the LLM did not have the gist of the question, it gave a generic answer for the comparison, which was blatantly wrong.

IRIS can only detect the use of an AI if the student opens it on the same device and then re-writes the answers onto the script. Handwritten scripts are an obstacle for the similarity checking tool to detect any form of plagiarism, Scenario 2. A question rises, will computer vision technology advancements be coupled with LLM detection to identify scanned scripts in future? Surprisingly, IRIS did not detect the transfer of an identical screenshot between a few students for the same question; there was no evidence of misconduct in the invigilation report. Human intelligence was necessary to detect this behaviour. Since then, typing of assessments has been enforced. Beyond the use of AI or intelligent tools in education, this situation shows that human judgment still plays a major role. The non-use of Turnitin would make it difficult to detect similarity aspects between projects, unless the class is relatively small or similarities among projects are prominent.

There are a number of instances where students' IRIS reports were acceptable, only to find out that there was clear evidence of cheating in-the recordings, Scenario 3. The use of IRIS in online assessment is double work for lecturers, they must review all the recorded videos to identify unfamiliar or suspicious behaviour. Enormous time is often spent in analysing the performance metrics of the video surveillance, especially when there are hundreds of students for that module, taking extra hours to evaluate each assessment and give feedback, which is a very inefficient and un-economical approach. Some of the recordings show only a black screen due to students' cameras not working. Moreover, students only become aware at the end of the assessment that their recording did not upload and therefore they will be failed. IRIS does not give real time updates and warning to students while they are writing. There is also the issue of the limited internet service or bandwidth, which can interrupt the recording and fail the session. This results in an accessibility issue, since the students in remote rural areas are more likely to experience this problem. Failure to submit the IRIS recording automatically equates to a zero grade. The risk of false accusations using IRIS invigilation raises critical concerns around technical reliability and equity.

In an evaluation of data for 271 students in an online assessment, Judi (2022), concludes that there are the persisting challenges of integrity and security in digital assessment. One of the functionalities of an e-assessment system is to offer secure exams that are void of intrusions (Khalil et al. 2022). IRIS proctoring does not require room checking at the beginning of the test through the webcam in order to ensure security, and this alone brings into question the reliability of the assessment. Employing physical proctors and making it mandatory for the students attend for timed assessments, might still be the most reliable option to ensure the fairness and validity of the assessments. However, this increases the burden and cost on both the teacher/inspector and the student, as well as generally limiting access for distance education and training in remote areas. A more viable solution is to change the assessment design, use context-based questioning, or authentic assessments.

The University responded with Turnitin similarity and AI detection in 2024 for written assessments which must be typed. The Turnitin similarity detection not only detects similarity for published material that is online but also runs similarity against other submissions in the same batch of scripts. However, evaluating these reports is slow, each report takes about 30 seconds to open, Scenario 3. There is no "acceptable" percentage for similarity and AI detection gives a percentage for a particular paragraph which is identified as LLM generated, rather than for the script as a whole. This means that human skill is required to interpret the reports, and each script ends up having to be evaluated twice: once for similarity and AI detection and then again for the assessment criteria. I decided to test the AI detection, by requiring my students to include LLM AI summaries of their references in an Appendix, Scenario 1. I identified three scripts which have acknowledged their summaries as being written by Copilot. The AI detection scores for these scripts are 0%, * and * (below 20%), however, I expected these paragraphs to be identified as 100% AI generated. In conclusion, Turnitin AI detection software may not be good at detecting Copilot summaries of academic articles.

Turnitin is widely used for detecting plagiarism, but it has several limitations that educators should be aware of. In online assessments, we found that Turnitin can flag common phrases, references, and human written work as plagiarised even when properly cited or acknowledged, Scenario 3. This leads to a high percentage of plagiarism thus giving a false positive for that work. Another observation is that Turnitin cannot detect similarity in content that has been paraphrased using AI tools. This raises questions about good practice for academic integrity.

**Table 1: Reflections on online assessment by LLJ**

| Detection/Invigilation Tool | Without IRIS and Tii | IRIS no Tii | Tii no IRIS |
|---|---|---|---|
| Type of assessment | Written and calculations | Calculations | Written |
| Type of marking (rubric, simple direct grading (SDG) | Calculations: SDG<br>Written: rubric | Calculations: SDG | Written: rubric |
| How is suspected AI LLM usage detected | Mathematical Errors; Generic, conclusions.<br>Blank answers for easy questions about specifics | Mathematical Errors; Generic, conclusions; | AI detected for certain paragraphs; but false positives and false negatives |
| Estimated incidence | 8 out of 240 used Chat GPT | 2 out of 120 used Chat GPT | 2 out of 37 used Chat GPT |
| Action taken<br>(e.g. way questions set up) | Change the way questions are set and marked | Use randomised Cloze or calculation-based questions | Detection is always playing catch-up; uncertainty about accuracy of the tool |

**Table 2: Reflections on online assessment by MI**

| Detection/Invigilation Tool | Without IRIS and Tii | IRIS no Tii | Tii no IRIS |
|---|---|---|---|
| Type of assessment | Calculations | Written | Written |
| Type of marking (rubric, simple direct grading (SDG) | Rubric | SDG | SDG |
| How is suspected AI LLM detected | Project submitted presented a lot of similarities.<br>Copying from the same source most likely. | IRIS failed to identify such behavior, from the report generated. | No detection was observed.<br>Turn It In failed to detect some scanned parts the assessment. |
| Estimated incidence | 30% of the students submitted project reports with identical literature review and calculations, covering the previous year project scope. | Identical Screenshots for a specific question. | Student scanned the script to avoid Tii detection. |
| Action taken<br>(e.g. way questions set up) | Students were penalised by a zero mark. This forced them to re-write the assessment. Scope was different from the first opportunity. | Students were penalised by awarding a zero mark for the specific question. | Answer to the specific question was nullified.<br>Students were required to strictly type their assessments. |

**Table 3: Reflections on online assessment by NCS**

| Detection/Invigilation Tool | Without IRIS and Tii | IRIS no Tii | Tii no IRIS |
|---|---|---|---|
| Type of assessment | Calculations and written | Written | Written |
| Type of marking (rubric, simple direct grading (SDG) | Rubric & SDG | SDG | SDG |
| How is suspected AI LLM detected | Percentage of the class with one generic answer | IRIS cannot detect AI, it is designed to detect suspicious behaviours therefore, detection will have to be manual | Turnitin detection, similarity index percentage. |
| Estimated incidence | Students submitting the same generic answer, using a certain level of proficiency with a significantly advanced vocabulary, | Similar answers. Students scoring higher marks than usual. | Flagging human written content as AI, |

| Detection/Invigilation Tool | Without IRIS and Tii | IRIS no Tii | Tii no IRIS |
|---|---|---|---|
| | work that lacks specific personal insights in topics that require subject-specific interpretation, work with no references. | | Giving a false positive or false negative such as a student using ChatGPT to generate 30% of the text, add personal reflections and references, the work passes undetected. |
| **Action taken**<br>**(e.g. way questions set up)** | Set questions in the context of SA, ask open-end questions: ask questions that require personal or situation-related reflections | Use an AI detector together with IRIS | Ask students to lower the similarity index, rephrase and rewrite their work. |

Our study has highlighted that students may find ways to circumvent plagiarism and proctoring tools. Students bypass these tools, by exploring cheating and using unauthorised resources (Lancaster & Clarke, 2016). The authors are of the view that students should not be left outside designing anti-cheating tools rather a co-design process should be adopted, and they should understand how these tools work and express their own opinions freely. In this way, one would get a deep understanding of the anti-cheating mechanisms and make an effort for areas of improvement in the implementation of such tools (Waltzer & Dahl, 2023). Despite the benefits of proctoring systems, some students experienced a sense of violating their privacy by being monitored by electronic devices, as opposed to face-to-face setting they were used to before. This could align with the criticisms for proctoring by Lee and Fanguy (2022). To make the final decision on the assessment script, it should be emphasised that plagiarism and proctoring tools should not be used ultimately as sole deciding mechanisms, rather human experts (academics), should assess critically the outcome of such tools. It should be emphasised one of the limitations of this preliminary study, i.e. the non-inclusion in a narrative way of students' perceptions to enhance/validate some aspects, as this would require the process of acquiring the adequate ethical clearance. To strengthen the validity of the findings of the study, this should be done in future so that the conclusions will be data-driven.

## 5. Conclusion

This study has demonstrated that the use of AI software and related technologies that are necessary, but not sufficient to prevent unethical student behaviour during online examinations. Students find ways to bypass detection technologies, therefore, lecturers should assess critical thinking in the assessments and revise how they set questions to minimise cheating during online assessments. Nonetheless, the action research approach used in this study sheds light on important aspects. False positives and true positives coexist during detection. However, the proportion of the former compared to the latter is high, too high for lecturers to be confident about prosecuting student cheating via disciplinary processes. Aligning with Ellis et al. (2020), we propose that Turnitin and IRIS should be used as a support tool rather than for decisive verdicts. Educators should always combine the results derived from these two technologies with student engagement and a follow up assessment. Whereas this preliminary study has its merit, it is suggested that opinions of students should be elicited, through surveys (interviews or questionnaires), for triangulation to validate the findings of this study.

## Ethics and AI Declaration

Ethical clearance was not required for this research. AI tools were not used in creation of this paper.

## References

Aithal, P.S. and Maiya, A.K. (2023). Development of a new conceptual model for improvement of the quality services of higher education institutions in academic, administrative, and research areas. International Journal of Management, Technology, and Social Sciences (IJMTS), 8(4), pp.260-308. https://dx.doi.org/10.2139/ssrn.4770790.

Alqahtani, T. Badreldin, H.A. Alrashed, M. Alshaya, A.I. Alghamdi, S.S. Bin Saleh, K. Alowais, S.A. Alshaya, O.A. Rahman, I. Al Yami, M.S. and Albekairy, A.M. (2023). The emergent role of artificial intelligence, natural learning processing, and large language models in higher education and research. Research in social and administrative pharmacy, 19(8), pp.1236-1242. https://doi.org/10.1016/j.sapharm.2023.05.016.

Aswir, A. Hadi, M.S. and Dewi, F.R. (2021). Google meet application as an online learning media for descriptive text material. Jurnal studi guru dan pembelajaran, 4(1), pp.189-194. doi.org/10.30605/jsgp.4.1.2021.533.

Bahuguna, R. Nainwal, N. Banerjee, S. Saharan, V.A. and Singh, A. (2024). Software and Tools for Plagiarism and English Grammar Check. In Principles of Research Methodology and Ethics in Pharmaceutical Sciences, pp.311-335. CRC Book Press.

Bullock, L. (2019). The Top 6 Ways that Artificial Intelligence will affect your business in the near future. Forbes Magazine.https://www.forbes.com/sites/lilachbullock/2019/02/25/. Accessed05/05/2025.

Castelvecchi, D. (2020). Is facial recognition too biased to be let loose? *Nature*, *587*(7834), pp.347-350. Doi:10.1038/d41586-020-03186-4.

Dash, S. Samadder, S. Srivastava, A. Meena, R. and Ranjan, P. (2022). Review of online teaching platforms in the current period of COVID-19 pandemic. Indian Journal of Surgery, 84, pp.12-17. doi.org/10.1007/s12262-021-02962-4.

Ellis, C. Van Haeringen, K. Harper, R. Bretag, T. Zucker, I. McBride, S. Rozenberg, P. Newton, P. and Saddiqui, S. 2020. Does authentic assessment assure academic integrity? Evidence from contract cheating data. Higher Education Research & Development, 39(3), pp.454-469. https://doi.org/10.1080/07294360.2019.1680956.

Fu, Y. and Weng, Z. (2024). Navigating the ethical terrain of AI in education: A systematic review on framing responsible human-centered AI practices. Computers and Education: Artificial Intelligence, pp.100306. doi.org/10.1016/j.caeai.2024.100306.

Garrett, N. Beard, N. and Fiesler, C. (2020). More than" If Time Allows" the role of ethics in AI education. In Proceedings of the AAAI/ACM Conference on AI, Ethics, and Society, pp.272-278.

Holmes, W. Porayska-Pomsta, K. Holstein, K. Sutherland, E. Baker, T. Shum, S.B. Santos, O.C. Rodrigo, M.T. Cukurova, M. Bittencourt, I.I. and Koedinger, K.R. (2022). Ethics of AI in education: Towards a community-wide framework. International Journal of Artificial Intelligence in Education, pp.1-23. doi.org/10.1007/s40593-021-00239-1.

Hwang, G.J. Xie, H. Wah, B.W. and Gašević, D. (2020). Vision, challenges, roles and research issues of Artificial Intelligence in Education. Computers and Education: Artificial Intelligence, 1, pp.100001. https://doi.org/10.1016/j.caeai.2020.100001.

Jabar, M. Chiong-Javier, E. and Pradubmook Sherer, P. (2024). Qualitative ethical technology assessment of artificial intelligence (AI) and the internet of things (IoT) among Filipino Gen Z members: implications for ethics education in higher learning institutions. Asia Pacific Journal of Education, pp.1-15. doi.org/10.1080/02188791.2024.2303048.

Judi, H.M. (2022). Integrity and security of digital assessment: Experiences in online learning. Global Business and Management Research, 14(1), pp.97-107.

Kaouni, M. Lakrami, F. and Labouidya, O. (2024). The use of Artificial Intelligence and Natural language processing In E-learning Platforms: An Exploration of Potentials and Limitations. International Journal of Information Science and Technology, 8(4), pp.1-9. http://dx.doi.org/10.57675/IMIST.PRSM/ijist-v8i4.258.

Khalil, M. Prinsloo, P. and Slade, S. (2022). In the nexus of integrity and surveillance: Proctoring (re) considered. Journal of Computer Assisted Learning, 38(6), pp.1589-1602. https://doi.org/10.1111/jcal.12713.

Kuleto, V. Ilić, M. Dumangiu, M. Ranković, M. Martins, O.M. Păun, D. and Mihoreanu, L. (2021). Exploring opportunities and challenges of artificial intelligence and machine learning in higher education institutions. Sustainability, 13(18), pp.10424. https://doi.org/10.3390/su131810424.

Rouhiainen, L. 2019. How AI and data could personalize higher education. Harvard Business Review, 14, pp.2-6.

Khedkar, P.D. and Nair, P. (2016). December. Transformative pedagogy: A paradigm shift in higher education. In Proceedings of Third International Conference on Multidisciplinary Research & Practice, pp. 332-337.

Lancaster, T. and Clarke, R. (2016). Contract cheating: The outsourcing of assessed student work. Handbook of academic integrity, pp.639-654.

Lee, K. and Fanguy, M. (2022). Online exam proctoring technologies: Educational innovation or deterioration? British Journal of Educational Technology, 53(3), pp. 475-490. 10.1111/bjet.13182.

Mphaga, J.M. (2024). The significance of media in education and its integration in open distance learning (odel) institutions: the influence of the digital era. Edulearn24 Proceedings, pp.889-898.

Neo, K.K. (2025). Current Limitation of AI in Education. Master's thesis, Rensselaer Polytechnic Institute.

Nguyen, A. Ngo, H.N. Hong, Y. Dang, B. and Nguyen, B.P.T. (2023). Ethical principles for artificial intelligence in education. Education and information technologies, 28(4), pp.4221-4241. doi.org/10.1007/s10639-022-11316-w.

Nurpeisova, A. Shaushenova, A. Mutalova, Z. Ongarbayeva, M. Niyazbekova, S. Bekenova, A. Zhumaliyeva, L. and Zhumasseitova, S. (2023). Research on the development of a proctoring system for conducting online exams in Kazakhstan. Computation, 11(6), pp.120. https://doi.org/10.3390/computation11060120.

Owoc, M.L. Sawicka, A. and Weichbroth, P. (2019), August. Artificial intelligence technologies in education: benefits, challenges and strategies of implementation. In IFIP international workshop on artificial intelligence for knowledge management. Cham: Springer International Publishing, pp. 37-58.

Pisica, A.I. Edu, T. Zaharia, R.M. and Zaharia, R. (2023). Implementing artificial intelligence in higher education: Pros and cons from the perspectives of academics. Societies, 13(5), pp.118. https://doi.org/10.3390/soc13050118.

Pedro, F. Subosa, M. Rivas, A. and Valverde, P. (2019). Artificial intelligence in education: Challenges and opportunities for sustainable development. Minister of Education. Peru. https://hdl.handle.net/20.500.12799/6533.

Saxena, P. Singh, S.K. and Gupta, G. (2023). Achieving effective learning outcomes through the use of analogies in teaching computer science. Mathematics, 11(15), pp.3340. https://doi.org/10.3390/math11153340.

Swan, K. Garrison, D. R. & Richardson, J. C. (2009). A constructivist approach to online learning: The community of inquiry framework. In Information technology and constructivism in higher education: Progressive learning frameworks, pp. 43-57. IGI global.

Tanyanyiwa, V.I. and Madobi, R. (2021). Challenges to the Effective Teaching and Learning of Geography through ODeL at the Zimbabwe Open University. Journal of Learning for Development, 8(2), pp.364-382. https://doi.org/10.56059/jl4d.v8i2.427.

Tian, Y. (2023). Limitations and Advancements of AI Teachers in Classroom Instruction. Education and Teaching Research, 3, pp.66-72.

Tsindoli, S. (2025). Fostering a Conducive Open and Distance E-Learning (ODEL) Environment in the 21st Century in Higher Learning Institutions in East and South Africa. In Artificial Intelligence, Digital Learning, and Leadership: Redefining Higher Education (pp. 147-176). IGI Global.

United Nations Educational, Scientific and Cultural Organization (UNESCO). (2019). Teaching and learning transformative engagement. Scientific and Cultural Organization, 7, place de Fontenoy, 75352 Paris 07 SP, France. https://unesdoc.unesco.org/ark:/48223/pf0000368961. Accessed05/05/2025.

United Nations Educational, Scientific and Cultural Organization (UNESCO) 2021 report. (2022). Recommendation on the Ethics of Artificial Intelligence. Accessed 05 June 2025. https://unesdoc.unesco.org/ark:/48223/pf0000381137. Accessed05/05/2025.

Verma, A. Kumar, Y. and Kohli, R. (2021). Study of AI techniques in quality educations: challenges and recent progress. SN Computer Science, 2(4), p.238. doi.org/10.1007/s42979-021-00635-3.

Waltzer, T. and Dahl, A. (2023). Why do students cheat? Perceptions, evaluations, and motivations. Ethics & Behavior, 33(2), pp.130-150. https://doi.org/10.1080/10508422.2022.2026775.

Yen, T.V.M. and Nhi, N.T.U. (2021). The practice of online English teaching and learning with microsoft teams: From students' view. AsiaCALL Online Journal, 12(2), pp.51-57.