



Rethinking Higher Education Teaching and Assessment In-Line with AI Innovations: A Systematic Review and Meta-Analysis

Joanne Nabwire Lyanda¹
Salmon Oliech Owidi²
Aggrey Mukasa Simiyu³

¹joannelyanda@gmail.com

²salmonowidi@gmail.com

³asimiyu@mmust.ac.ke

^{1,2,3}Masinde Muliro University of Science and Technology, Kenya

ABSTRACT

With the rapid advancement of artificial intelligence (AI) technologies, higher education institutions are increasingly exploring innovative ways to rethink teaching and assessment practices. This research paper examines the implications of AI on assessments in online learning environments. Specifically, the objectives of this study were to evaluate the effectiveness of AI-powered teaching methodologies in enhancing student engagement and learning outcomes in online education settings and, secondly, to analyze the impact of AI-driven assessment tools on the accuracy, reliability, and fairness of evaluating student performance in online learning environments through a systematic review and meta-analysis of existing literature. The study adopted activity theory to understand the issues around AI and assessment. The study adopted a mixed-methods design. The study adopted the use of meta-analysis in order to statistically combine results from multiple studies on a particular topic to provide a more comprehensive and reliable summary of the overall findings. The study found that to guarantee moral and just practices, there are issues with the integration of AI in online learning that need to be resolved. Key issues included data privacy, algorithmic prejudice, and the role of human instructors in the administration of the assessments online, carefully considered and addressed in a proactive manner. These findings provided insights on how AI can transform traditional teaching methods and assessment strategies, creating an AI-crowded environment that fosters student learning and academic success. Based on the findings, the study recommends that there is a need to integrate pedagogical strategies that leverage AI innovation, such as adaptive learning approaches, real-time feedback mechanisms, or interactive simulations, to improve teaching effectiveness and student performance in online settings.

Key words: Assessment, Artificial Intelligence (AI), Higher Education, Teaching

I. INTRODUCTION

Over the past few decades, artificial intelligence has advanced dramatically and affected many industries, including higher education. With the introduction of the first computer-assisted instruction (CAI) systems in the 1950s and 1960s, Artificial Intelligence (AI) in education had its beginnings (Atiyeh et al., 2023). Among the first attempts to use computers to improve educational processes were some early systems, such as Time-Shared, Interactive, Computer-Controlled Information Television (TICCIT) together with programmed logic for automated teaching operations (PLATO). Education approaches were further transformed throughout time by the emergence of AI technologies like intelligent tutoring systems (ITS) and expert systems (van der Vorst & Jelcic, 2019). Whereas ITS tried to deliver individualized teaching by adjusting to the demands of the student, expert systems attempted to replicate the decision-making skills of human experts (Kai et al., 2018). More complex AI applications in education were made possible by the expansion of the internet and improvements in machine learning techniques in the 1990s and early 2000s (Gamage et al., 2023). Among these were automated grading systems, which eased the workload on teachers by giving a prompt and reliable assessment of students' work, and adaptive learning platforms, which modified curriculum and assessments according to student performance (Murray, 2023).

In higher education, assessment is a complex and dynamic process that evaluates students' performance, comprehension, and learning (Perkins, 2023). It is essential for forming learning experiences, directing teaching methods, and guaranteeing academic standards. Validating educational outcomes and enhancing educational programs over time depend on efficient evaluation procedures. According to ClassPoint (2024), formative, summative, diagnostic, and authentic assessments have been used to evaluate the effectiveness of instruction in universities. Assessment methods and tools such as examinations, essays and research papers, projects and portfolios, presentations, and self-assessment have been used (Ibrahim et al., 2023). Ensuring the validity and reliability of assessment outcomes has, however, been a great challenge in online learning scenarios. Given the advancements in

technology, the higher education sector has been at the forefront of adopting such innovations (Scribes, 2024). The use of AI in learning and teaching should ensure academic integrity, equity, inclusion, and reliability.

The dependent variables of the study were teaching effectiveness and assessment accuracy, while the independent variables were AI technologies and higher education contexts. Various AI technologies, such as ChatGPT, Perplexity AI, robotics, Natural Language Processing (NLP), computer vision, and machine learning algorithms, have been integrated into various educational systems (Selwyn, 2022). With the rapid deployment of such a system, the education system must be monitored to meet its intended needs. Every technology has distinct uses and capacities in learning environments that impact how well teaching and evaluation strategies work. The knowledge, skills, and attitudes of higher institution educators towards AI significantly influence its successful implementation (Cardona et al., 2023). Instructors' willingness to adopt new technologies and their ability to effectively integrate AI into their pedagogical practices are critical factors (Chan & Tsi, 2023).

The integration of AI into educational systems has significantly influenced assessment and teaching in institutions of higher education (Halagatti et al., 2023). As AI continues to evolve, educators and institutions are faced with the challenge of rethinking traditional approaches to teaching and assessment to adapt to this AI-crowded environment (van der Vorst & Jelacic, 2019). This paper explores the potential benefits and challenges of incorporating AI into higher education settings, with a focus on how AI can enhance teaching effectiveness and assessment accuracy. By critically examining existing literature, methodologies, and findings, this paper seeks to shed light on the opportunities and implications of rethinking teaching and assessment in the era of AI.

1.1 Statement of the Problem

Despite the significant advancements and potential benefits of integrating artificial intelligence (AI) technologies in higher education, there remains a critical challenge in ensuring the validity, reliability, and equity of assessment outcomes in online learning environments. As AI technologies such as ChatGPT, Perplexity AI, and adaptive learning platforms continue to evolve and become more prevalent, higher education institutions must address these challenges to fully realize the potential of AI in enhancing teaching effectiveness and assessment accuracy. This study sought to explore how AI can be effectively integrated into higher education assessment practices while overcoming issues related to academic integrity, inclusion, and the reliability of assessment results.

1.2 Research Objectives

- i. To systematically evaluate and quantify the effectiveness of AI-powered teaching methodologies on student engagement and learning outcomes in higher education settings.
- ii. To analyze and assess the impact of AI-driven assessment tools on the accuracy, reliability, and fairness of student performance evaluations in higher education institutions.

1.3 Research Questions

- i. How do AI-powered teaching methodologies affect student engagement in higher education settings?
- ii. How accurate are AI-driven assessment tools in evaluating student performance in online learning environments?

II. LITERATURE REVIEW

2.1 Conceptual Review

2.1.1 The Impact of AI-Powered Teaching Methodologies on Student Engagement and Learning Outcomes in Online Education

The integration of AI tools, such as intelligent tutoring systems, chatbots, and automated grading systems, offers opportunities to personalize learning experiences, provide immediate feedback, and streamline assessment processes (Gamage et al., 2023). AI-powered tools can improve student engagement, performance, and satisfaction by tailoring instruction to individual learning needs and preferences (Selwyn, 2022). Teachers may monitor students' progress, pinpoint areas for growth, and decide on educational interventions based on data thanks to AI-driven analytics (Zootzky & Pfeiffer, 2024).

Assessment encompasses all actions carried out by teachers and students to evaluate learning, generating feedback used to adjust teaching and learning processes (Cardona et al., 2023). Formative assessment uses the gathered information to modify teaching methods to better address students' needs (Smith, 2022). The use of AI to help formative assessment presents several opportunities, including the ability to create more complex question types, measure higher-order skills, give immediate feedback, and integrate assessment into the learning process (Moqbel & Al-Kadi, 2023).

Promoting active involvement from educators and learners in the creation of feedback loops for formative assessments augmented by AI is crucial. Their direct expression of what modifications would make assessments more helpful and doable for them is essential (Halagatti et al., 2023). Adapting feedback techniques to fit local norms and preferences is important since feedback practices differ among communities and cultures (Pearce & Chiavaroli, 2023). Adaptive systems can also cater for individual learner needs, thereby improving engagements and contacts with the learners. Murgatroyd developed a conceptual framework for personalized learning enhanced by AI technologies (Murgatroyd, 2023). In the conceptual framework, he indicated that learning could improve if all infrastructural components are properly implemented in institutions of higher learning.

The impact of adaptive learning technology on student outcomes was examined by Deng (2018), who highlighted differentiated instruction and tailored learning pathways. They emphasized how AI-powered adaptive learning platforms customize educational experiences and content to meet the unique needs and learning preferences of each individual student. This customization is frequently accomplished using algorithms that evaluate real-time student performance data and modify the level of difficulty and pace of learning activities. The review also looked at how instantaneous feedback, self-regulated learning, and ongoing progress tracking are three ways that these technologies improve student engagement. In general, the potential of adaptive learning technologies to maximize learning experiences and enhance educational outcomes in a variety of academic settings is generally highlighted by systematic reviews and meta-analyses in this field.

2.1.2 The Impact of AI-Driven Assessment Tools on the Accuracy, Reliability, and Fairness of Evaluating Student Performance in Online Learning Environments

Ensuring validity, consistency, and fairness of automated grading systems is a concern, especially in subjective fields and challenging problem-solving activities (ClassPoint, 2024). Ethical issues, algorithmic prejudice, data privacy, and the replacement of human instructors are important considerations in AI integration. These findings suggest that continuous professional development is necessary to ensure teachers have the abilities and know-how to integrate AI tools effectively into their lesson plans. Furthermore, research has shown that AI can assist in giving feedback on more realistic and complex tasks, such as solving math problems, exploring scientific phenomena, understanding historical events, and discussing literature (Koh & Doroudi, 2023). AI can further highlight for both students and teachers which forms of help have been most effective recently, enabling educators to offer specific support tailored to each student's needs (Roll et al., 2011). This implies that it is the mandate of the institutions to ensure that appropriate technologies are put in place to enable successful implementation of AI technologies.

According to Trajtenberg (2018), the function of conversational agents, like chatbots, in educational settings can create individualized learning experiences by providing instant feedback, responding to questions from students, and assisting them in navigating adaptive content. They added that conversational agents in adaptive learning systems are made to converse in plain language with students, identifying areas of knowledge gaps and modifying the course material accordingly. Personalized learning paths are supported by this method, which also raises student engagement through ongoing communication and real-time, customized support (Cardona et al., 2023). This shows that these kinds of technologies are essential to contemporary learning environments in schools, as adaptive learning platforms are designed to maximize student experiences by dynamically adapting to their unique requirements and preferences.

Harrer (2023) investigated how AI technologies are revolutionizing evaluation methods in education. The study showed how AI is transforming assessment by using automated scoring and adaptive testing approaches to improve assessments' accuracy and fairness. They further found that Artificial intelligence (AI) algorithms are used by automated scoring systems to evaluate student answers to tests, assignments, and other assessments. This reduces the workload for human graders and allows for quick and consistent feedback. It can be verified through these findings that this approach increases grading reliability across a range of student groups and educational situations by standardizing assessment criteria and increasing efficiency.

2.2 Empirical Literature

2.2.1 Effectiveness of AI-Powered Teaching Methodologies on Student Engagement and Learning Outcomes in Online Education Settings

Considering the impact on student performance and engagement, AI can improve student engagement by tailoring instruction to individual learning needs (Selwyn, 2022). Research has shown that AI-powered tools such as intelligent tutoring systems can enhance learning outcomes by providing personalized and immediate feedback (Gamage et al., 2023). Furthermore, real-time feedback and adaptive learning can verbally interact with students about their essay responses, asking questions to help clarify their arguments without the need for reading a screen or typing (Nikolopoulou, 2024a). Embedding formative assessment within the learning process supports learning more effectively, as timely feedback is crucial (Lee & Soylu, 2023).

Gamage et al. (2023) investigated how AI-driven adaptive learning systems can improve student performance. Their focus was to find out how these platforms use AI to customize educational experiences. They determined that algorithms are used by adaptive learning platforms to evaluate student performance data, pinpoint strengths and shortcomings, and dynamically modify the level of difficulty and content of learning resources. They further indicated that by accommodating different learning styles and interests, this tailored method seeks to maximize engagement and foster a better comprehension of concepts. This seems to suggest that adaptive learning systems can help students achieve learning objectives more successfully than traditional one-size-fits-all methods by offering personalized interventions and real-time feedback. These technologies are foreseen as revolutionary in the field of education, providing teachers and students with strong instruments to improve instruction and learning outcomes in a variety of educational settings.

Kai et al. (2018) explored how learning analytics, fueled by artificial intelligence, can raise learning results and increase student engagement in online learning settings. They investigated the analysis of massive amounts of data produced by student interactions with digital learning platforms using AI-driven analytics tools. They found that these technologies use machine learning algorithms to find patterns and trends that reveal information about the performance and learning habits of students. These findings imply that learning analytics empowers teachers to make data-driven decisions that will help students succeed, such as tailored interventions and flexible teaching methods.

2.2.2 To Analyze and Assess The Impact of AI-Driven Assessment Tools on the Accuracy, Reliability, and Fairness of Evaluating Student Performance in Online Learning Environments.

Studies have shown that AI assistants can help reduce teachers' workload by handling the grading of simpler aspects of student responses, enabling teachers to concentrate their expertise on evaluating more significant qualities of entire essays or complex projects (Chen & Perez, 2023). AI-driven assessment tools can provide immediate feedback as students work through problems rather than only after they make mistakes (Lee & Soyly, 2023). The validity, consistency, and fairness of automated grading systems are concerns, especially in subjective fields (ClassPoint, 2024). AI can identify when a student is "wheel spinning," working hard without making progress, and assisting by highlighting which forms of help have been most effective recently (Kai et al., 2018).

An empirical review by Dogan et al. (2023) placed emphasis on how AI-supported collaborative learning tools affect student engagement and learning outcomes. The study thoroughly investigated the efficacy of these tools in online education. The review demonstrated how AI tools for collaborative learning improve student engagement by encouraging contact and teamwork among learners in virtual settings. They found that by customizing exercises and information to each student's requirements and interests, these AI solutions also provide individualized learning experiences. These findings imply that these tools support deeper conceptual comprehension through peer interaction and cooperative problem-solving, which in turn improves learning outcomes. Overall, the empirical data seems to point to the importance of AI-supported collaborative learning tools in improving learning outcomes and student engagement in online learning environments.

In an empirical study titled "Artificial intelligence in online higher education: A systematic review of empirical research from 2011 to 2020" (Ouyang et al., 2022), their findings were published in *Computers in Human Behavior*. With an emphasis on online learning settings, this study examines the effects of AI-powered personalized learning approaches on student engagement and learning outcomes in higher education. To evaluate how well AI can customize learning experiences to meet the needs and preferences of each individual learner, the researchers used quantitative methodologies. According to research, personalized learning enabled by AI greatly increases student engagement by customizing lessons and activities based on in-the-moment learner data analysis. These findings imply a beneficial effect on learning outcomes, indicating that tailored AI interventions enhance students' understanding and retention of the curriculum.

III. METHODOLOGY

3.1 Research Design

This study employs a mixed methods research design to analyze existing literature on the topic of AI in higher education, focusing specifically on teaching and assessment practices. A systematic review of peer-reviewed articles, conference papers, and reports published in academic journals and relevant databases was conducted to identify key themes, trends, and findings in the literature. Meta analysis followed which helped in statistical synthesis of the findings obtained. The methodology involves a comprehensive review and synthesis of empirical studies, theoretical frameworks, and practical insights related to the use of AI in teaching and assessment in higher education settings.

Systematic Review and Meta-Analysis: This process involves systematically searching, selecting, and critically appraising existing studies on a specific topic, followed by statistical synthesis of their findings. 22 studies were found unique and investigated. Comprehensive Meta Analysis (CMA) tool was used to help conduct the analysis.

To guarantee the relevance and comparability of research for the meta-analysis analyzing the efficacy of AI-driven assessment tools and AI-powered teaching approaches in higher education contexts, strict inclusion criteria were developed. Peer-reviewed journal articles, conference papers, dissertations, and theses with a focus on undergraduate, graduate, or professional education in online or mixed learning environments that were published between 2010 and 2024 were included. Research must have specified and assessed AI-powered interventions (e.g., chatbots, sophisticated tutoring programs, flexible learning environments, and computerized grading) precisely, either in experimental or quasi-experimental designs with quantifiable results concerning learning outcomes, student engagement, assessment accuracy, reliability, or fairness. Prioritization was given to comparative research versus alternative interventions or traditional procedures to determine their relative effectiveness.

Studies with unclear AI components, papers with just qualitative data, case studies, and those released prior to 2010 or in non-peer-reviewed forms were also excluded. The objective of this methodical approach was to compile and integrate solid empirical data to determine how AI technologies affect the methods of instruction and evaluation used in online higher education.

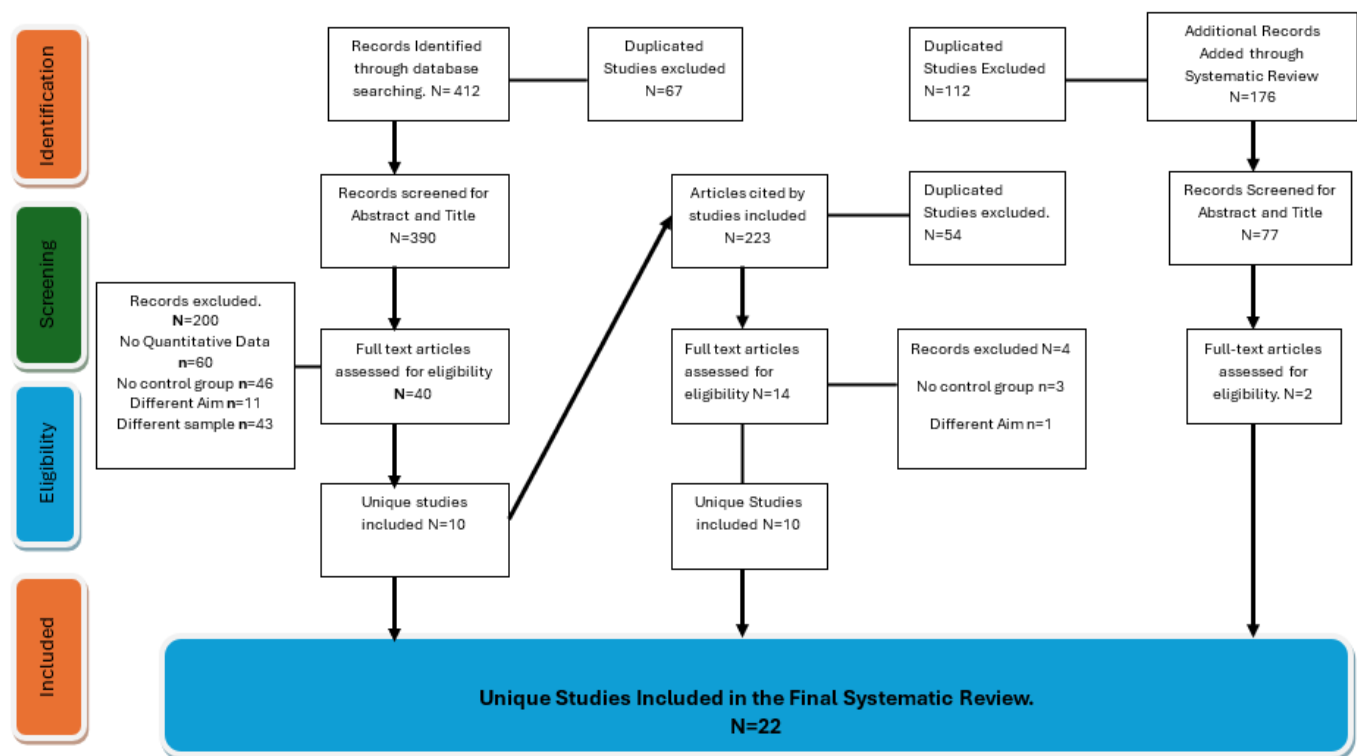


Figure 1
Selection Flowchart for Systematic Review
Source: Author (2024)

IV. FINDINGS & DISCUSSIONS

4.1 Effectiveness of AI-Powered Teaching Methodologies on Student Engagement and Learning Outcomes in Online Education Settings

4.1.1 Impact of AI on Teaching Methods

AI-powered solutions are freeing teachers from the tedium of lesson planning and grading, enabling them to devote more time to problem-solving and student interaction (Salinas-Navarro et al., 2024). This change is crucial because it allows educators to concentrate on the more complex parts of teaching that are impossible for computers to duplicate (Gamage et al., 2023). An important development in AI education is intelligent tutoring systems, which offer unmatched support for student learning (Cardona et al., 2023.). These artificial intelligence tutors function as an on-demand resource to enhance conventional teaching techniques by offering intelligent feedback and real-time assessment to assist students in navigating the intricacies of new content (Selwyn, 2022). From the perspective of an educational institution, utilizing technology in education can also significantly reduce costs if AI is fully deployed. AI



can automate a lot of tasks that are given to IT, education, administration, and other areas. AI, for instance, is capable of handling monotonous jobs like teaching, grading, scheduling, and data administration. Artificial intelligence (AI) in education enables educational institutions to make financial savings by lowering the resources required to operate efficiently. This makes things more cost-effective (Halagatti et al., 2023).

One of the primary concerns noted in the several articles analyzed was the possibility that AI may dehumanize the educational process (Zootzky & Pfeiffer, 2024). When AI algorithms develop the content and decide the speed of the course, students might not understand the nuanced instruction that a human teacher might offer (Lee & Soyulu, 2023). Because AI algorithms have the potential to promote prejudice, they may not be able to provide a broad, inclusive curriculum that meets the needs of every single kid. As schools employ an increasing number of AI-powered solutions, there is a risk that educators and learners could grow unduly reliant on technology. This dependence could ultimately result in a contempt for important traditional teaching methods (Greco & Cinganotto, 2023).

4.1.2 Impact of AI on Assessment Methods

Depending on the goal of evaluation in the course's learning environment, there are several ways to conduct an assessment. It could be an electronic assessment, formative, summative, or diagnostic (Ibrahim et al., 2023). Peer and self-assessments are two additional forms of assessment activities that are employed in higher education. The demand and the kind of learning outcomes required for the course will determine which assessment approach is best (Hooda et al., 2022). The need to uphold academic integrity is more than ever in the AI era (Martínez-Comesaña et al., 2023). Institutions of higher learning must enforce honor codes and put policies in place to stop students from exploiting artificial intelligence (AI) to cheat; furthermore, teachers may preserve the integrity of education by creating exams that prioritize original work and encouraging the moral application of AI (Nikolopoulou, 2024b).

Other academics, on the other hand, have contended that generative AI can improve education. According to Moore et al. (2023) there are six potential uses of artificial intelligence in education: learning tool; domain expert; administrator; student/tutor; peer/partner; instructor; and student. It has been discovered that conventional (non-generative) AI technologies have several advantageous applications in higher education. In a similar way, Rudolph et al. (2024) discovered that AI can assist educators in identifying and meeting the needs of their students, as well as in providing instantaneous feedback and automatic essay scoring.

Since the creation of generative AI, there has also been discussion on assessment design and methodology (Perkins, 2023). The legitimacy of the assessment process and the potential compromise of effective assessment attributes if students utilize GAI to complete assessment assignments have been the main grounds of disagreement in these discussions. For example, it was suggested by Roll et al. (2011) that assigning grades to students based on work that they had performed wholly or in part utilizing GAI tools could compromise the assessment process's validity, reliability, and equity.

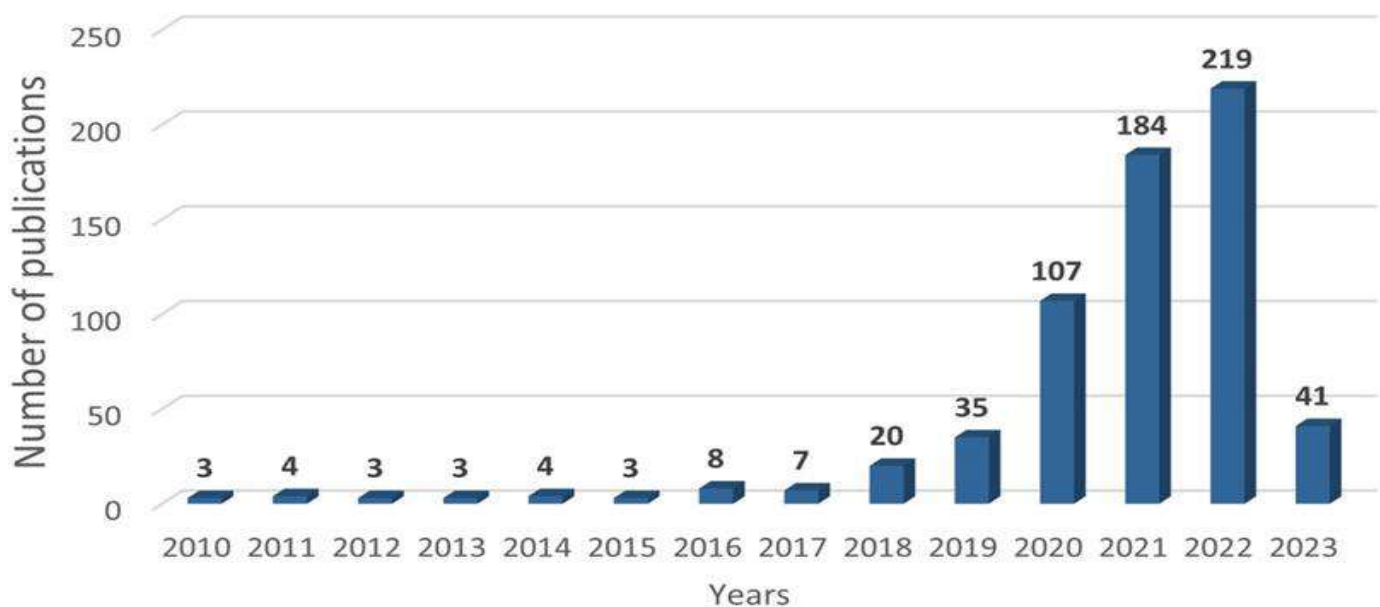


Figure 2
Publications on Assessment Using A.I. (Joanne et al., 2024)

4.2 Impact of AI-Driven Assessment Tools on the Accuracy, Reliability, and Fairness of Evaluating Student Performance in Online Learning Environments

4.2.1 Re-Designing Assessment for AI Environments

With the introduction of generative AI tools, all seventeen universities offered different suggestions for how instructors can re-model evaluation tasks (Perkins, 2023). The primary suggestions were giving students new ways to convey their knowledge outside of texts, creating real assessments, requiring originality and critical thinking, and providing evaluations with contextual information. Since the guidelines believe that generative AI tools are currently unable to "easily replicate" these kinds of tasks, teachers are advised to create evaluations that call for creativity and critical thinking (Crawford et al., 2023). It is, however, important to understand the reasons for assessment in higher education. The diagram below illustrates the reasons why we should assess:

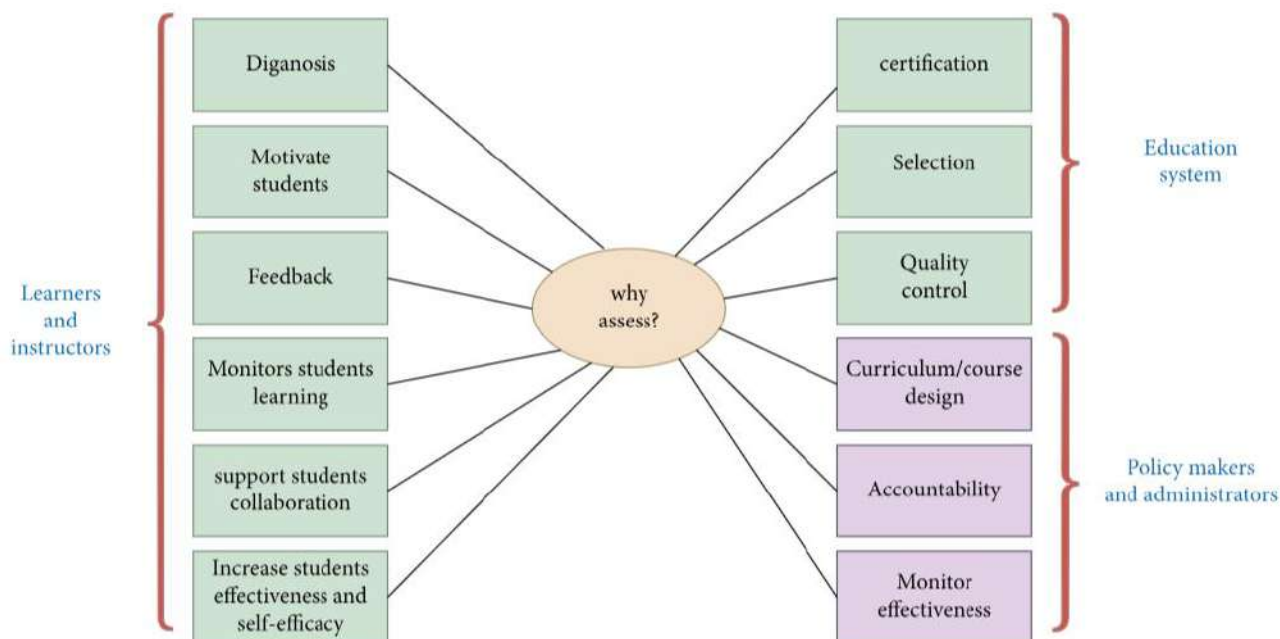


Figure 3
Purposes of Assessment in Higher Education
Source: Hooda et al. (2022, p.6)

Several studies recommend that lecturers include contextual components in the design of their assignments (Salinas-Navarro et al., 2024). Examples of this could be to "design essay and exam prompts that require close discussion or analysis of the materials used for your class, including images, video, and other media" and to "ask students to connect course content, class conversations, and lived experience." "Make assignments more personal, reflective, specific, local, based on scenarios, facts, or topics covered in class, or that address more complex cognitive skills" (Perkins, 2023). The recommendations emphasized that students may be more motivated to finish assignments that they find more applicable to their real-world experiences, while generative AI algorithms may find difficulty with these kinds of activities. Similarly, universities support authentic evaluations, which aim to help students apply course principles to real-world scenarios or issues (van der Vorst & Jelcic, 2019). A variety of authentic evaluation methods were recommended, such as "case studies, exhibitions, reflective portfolios, and problem-based inquiries."

According to Kusmawan (2023), educators should think about giving pupils a range of options and methods to demonstrate their knowledge outside of the classroom. These included creating visual aids such as drawings, slides, and infographics; leading discussions; submitting slides or presentations; creating logbooks or assessment notebooks; and conducting in-person interviews. Certain colleges have promoted teachers to allow students to choose how they want to demonstrate their learning. 14 of the 22 publications that offered guidance on assessment design emphasized that instructors should prioritize the process of completing an assessment assignment in their assessment design. This is a near-complete set of documents. This pushes pupils to consider the steps involved in doing a task more than just a final right answer (Atiyeh et al., 2023).

There are numerous approaches to ensuring that the student focuses on the process of solving a problem: Instructors have the authority to add "elements such as proposals, drafts, annotations, or feedback into your assignments" and to request that students "submit notes they took on sources to prepare their papers or presentations.". They can also "use more iterative processes of assessment, such as student peer review, which leads to revisions of the

work," which is something that instructors can do. Finally, students may be asked to submit "a list of specific steps they took, what they could have done differently, and why" by their instructors.

This emphasizes the necessity for instructors to ensure that assignments are carefully scaffolded to provide students adequate time and room to complete each stage as they come up. Consider whether giving pupils a lot of time-consuming assignments will demand more bandwidth than they have available. Students are more likely to employ ChatGPT and other generative AI technologies when they are pushed for time. Using in-class assessments is one way to cut down on the number of generative AI tools used in assignments. Students should finish their writing assignments in class whenever possible. Giving students a short reflection paper or a handwritten essay to write about a current subject while they are in class could be beneficial. There are two approaches to decreasing the use of ChatGPT in assignment and assessment design: either increase the amount of in-class or other synchronous tasks (written or oral) or change the weighting of your current grades to emphasize them. Therefore, the recommendation made in Figure 4 is meant to facilitate the process of reconsidering the most efficient way for institutions to carry out evaluation.

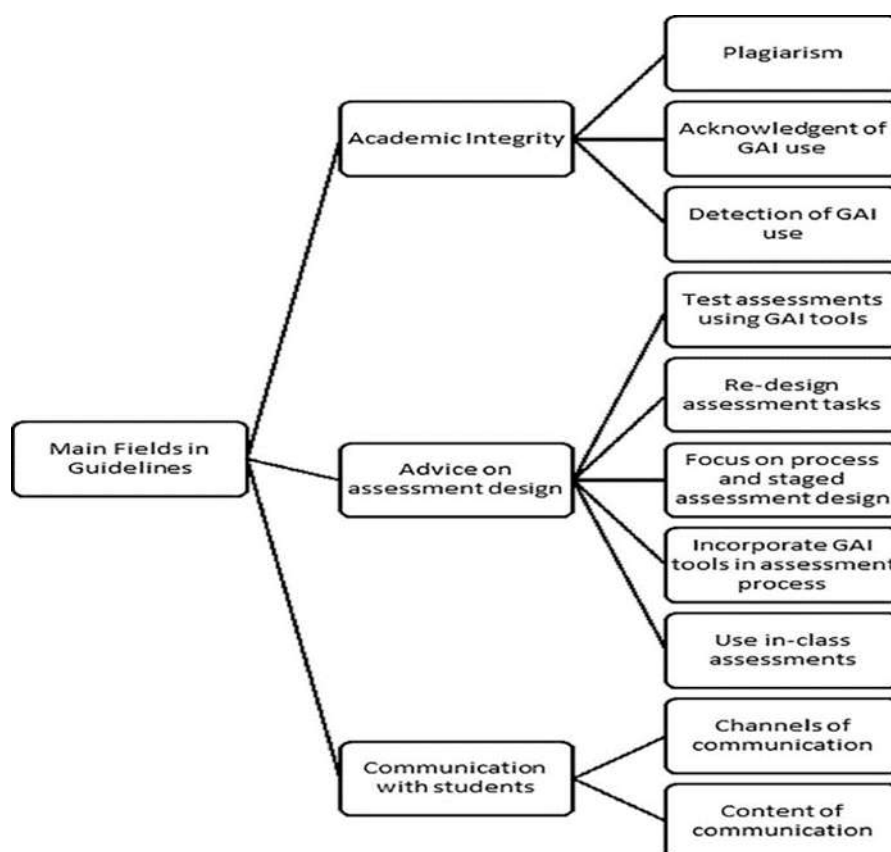


Figure 4
Guideline for Effective Assessment in a Generative AI Environment
 Source: Moorhouse et al. (2023).

4.2.2 Ethical Implications of AI while Rethinking Assessment in Universities

The risk of copyright infringement is one of the main worries in the academic sphere (Ibrahim et al., 2023). When an AI tool produces content, it makes use of information and expertise that already exists to produce something new. For example, ChatGPT and Perplexity AI are trained using a hand-picked version of the common crawl dataset, which is based on publicly available text. However, it can be deemed a violation of copyright laws if this work is not properly cited. For example, there has been a continuous conversation about stable dissemination in which numerous artists have brought up the fact that their creations have been utilized without their permission.(Murray, 2023).

There is a need for ethical accountability and application frameworks for generative AI (Perkins, 2023). This begins with educating users generally about the role and sensitivities associated with using AI technology, as well as its capabilities and risks. Eventually, this should result in the adoption of widely recognized conduct codes (Murray, 2023). Currently, the industry operates in a legally hazy environment where good scholars attempt to do the right thing, but bad scholars appear to get away with adopting the "ask for forgiveness, not for permission" paradigm, and many consumers misunderstand the nature and potential of AI.

AI developers require legal and ethical frameworks for the selection and management of AI training data. Scholarly disputes have been intense regarding the sources of data that generative AI uses, if not previously published

works. This has an impact on copyright concerns pertaining to works produced by Large Language Models (LLMs), which were trained on online literature without the authors' express authorization to allow such usage of their data (Harrer, 2023). OpenAI has made an attempt to prevent ChatGPT from producing explicit or suggestive content, but models like Perplexity AI that are trained on this data will naturally display similar biases (Greco & Cinganotto, 2023). Philosophical considerations concerning the nature of human creativity are also raised by ChatGPT and its inevitably more sophisticated successors (van der Vorst & Jelacic, 2019). Many have contended that employing AI to produce content detracts from the distinctive and original ideas of artists ever since these generative AI platforms were made available to the general public (Smith, 2022). It's hardly surprising that many people think AI technologies like ChatGPT should be prohibited from being used in creative and academic contexts, given these ethical and philosophical issues.

Current educational frameworks may encounter significant difficulties in confirming students' skills and knowledge if they remain unaltered. The current generative AI technologies are a warning flag for the era of AI-assisted homework and assessment. The extent to which AI is adopted in the university learning environment, as well as the rules and regulations governing its application, should be decided before it gets out of hand. In general, generative AI is still in its early stages of development. Numerous of its outputs are still faulty and imperfect because of errors, distortions, and "glitches." However, generative AI software has shown that, even at its current level, it is capable of unfairly outcompeting writers, academic authors, and musicians and forcing them out of business across a variety of mediums. They remain intelligent as long as more people use them, expanding their text-based outlay.

4.2.3 Teacher Training and Support

Given that teaching using AI is a relatively new field in technology education. Lin et al. (2022) proposed that teaching AI can be thought of as an extension of teaching technology. As a result, when participating in the construction of AI curricula, teachers may apply their knowledge of teaching technology to the direct teaching of AI, posing new and difficult difficulties for them. On the one hand, design challenges indicate that the current AI curriculum is not adequately supported by the way technology courses are designed, either historically or currently (Zawacki-Richter et al., 2019).

V. CONCLUSIONS & RECOMMENDATIONS

5.1 Conclusions

The findings of this research paper highlight the transformative potential of AI for rethinking teaching and assessment practices in higher education. AI-powered tools offer opportunities to enhance teaching effectiveness, improve learning outcomes, and increase efficiency in assessment processes. By providing personalized support, timely feedback, and data-driven insights, AI can empower educators and learners to adapt to diverse learning needs and preferences.

To guarantee moral and just practices, there are some issues with the incorporation of AI in higher education that need to be resolved. Data privacy and the role of human instructors are issues that need to be carefully considered and addressed in a proactive manner. The long-term effects of AI on teaching and learning, as well as the creation of best practices for incorporating AI into curricula in higher education, also require more investigation. In conclusion, the era of AI presents both opportunities and challenges for rethinking teaching and assessment in higher education.

Making sure everyone has equitable access to high-quality education using AI is a crucial future direction. Regardless of students' backgrounds or learning styles, AI can tailor learning experiences and offer focused support. To do this, though, requires addressing inequalities in digital literacy, access to technology, and socioeconomic issues that can limit students' capacity to make use of AI-powered educational tools.

5.2 Recommendations

Higher education institutions should give priority to integrating AI-powered teaching approaches and assessment technologies to improve student engagement and learning outcomes. Learning can be made more successful and interesting by implementing personalized learning environments, interactive AI-driven tools, and adaptive learning systems that can be tailored to the needs of individual students. Educators should be provided with the skills necessary to use AI technologies through training programs. Additionally, multidisciplinary methods should be encouraged to integrate AI literacy into the curriculum.

Institutions must create strong data privacy regulations and uphold transparency in AI algorithms and decision-making processes to guarantee the ethical application of AI. To ensure fairness in student evaluations, AI-driven assessment systems should be implemented to avoid biases and provide real-time feedback. By using predictive analytics, at-risk pupils can be quickly identified and given individualized support. In ensuring scalability and

sustainability of AI projects in higher education, it is imperative to conduct ongoing evaluations and feedback systems to track the effects of AI implementations and make the required adjustments.

REFERENCES

- Atiyeh, B., Emsieh, S., Hakim, C., & Chalhoub, R. (2023). A narrative review of artificial intelligence (AI) for objective assessment of aesthetic endpoints in plastic surgery. *Aesthetic Plastic Surgery*, 47(6), 2862–2873. <https://doi.org/10.1007/s00266-023-03328-9>
- Cardona, M. A., Rodríguez, R. J., & Ishmael, K. (2023). *Artificial intelligence and the future of teaching and learning*. Lumina Foundation.
- Chan, C. K. Y., & Tsi, L. H. Y. (2023). The AI revolution in education: Will AI replace or assist teachers in higher education? *arXiv:2305.01185* [cs.CY]. <https://doi.org/10.48550/arXiv.2305.01185>
- Chen, J. J., & Perez, C. (2023). Enhancing assessment and personalized learning through artificial intelligence. *Childhood Education*, 99(6), 72–79. <https://doi.org/10.1080/00094056.2023.2282903>
- ClassPoint. (2024, January 19). *The pros and cons of AI in education and how it will impact teachers in 2023*. <https://www.classpoint.io/blog/the-pros-and-cons-of-ai-in-education>
- Crawford, J., Cowling, M., & Allen, K.-A. (2023). Leadership is needed for ethical ChatGPT: Character, assessment, and learning using artificial intelligence (AI). *Journal of University Teaching & Learning Practice*, 20(3), 457–476. <https://doi.org/10.53761/1.20.3.02>
- Deng, L. (2018). Artificial intelligence in the rising wave of deep learning: The historical path and future outlook. *IEEE Signal Processing Magazine*, 35(1), 180–177. <https://doi.org/10.1109/MSP.2017.2762725>
- Dogan, M. E., Goru Dogan, T., & Bozkurt, A. (2023). The use of artificial intelligence (AI) in online learning and distance education processes: A systematic review of empirical studies. *Applied Sciences*, 13(5), 56–88. <https://doi.org/10.3390/app13053056>
- Gamage, K. A. A., Dehideniya, S. C. P., Xu, Z., & Tang, X. (2023). ChatGPT and higher education assessments: More opportunities than concerns? *Journal of Applied Learning and Teaching*, 6(2), 654–679. <https://doi.org/10.37074/jalt.2023.6.2.32>
- Greco, S., & Cinganotto, L. (2023). Re-thinking education in the age of AI. *Journal of E-Learning and Knowledge Society, I-IV* Pages. <https://doi.org/10.20368/1971-8829/1135873>
- Halagatti, M., Gadag, S., Mahantshetti, S., Hiremath, C. V., Tharkude, D., & Banakar, V. (2023). Artificial intelligence: The new tool of disruption in educational performance assessment. In P. Tyagi, S. Grima, K. Sood, B. Balamurugan, E. Özen, & T. Eleftherios (Eds.), *Smart analytics, artificial intelligence and sustainable performance management in a global digitalised economy* (Vol. 110A, pp. 261–287). Emerald Publishing Limited. <https://doi.org/10.1108/S1569-37592023000110A014>
- Harrer, S. (2023). Attention is not all you need: The complicated case of ethically using large language models in healthcare and medicine. *eBioMedicine*, 90, 104512. <https://doi.org/10.1016/j.ebiom.2023.104512>
- Hooda, M., Rana, C., Dahiya, O., Rizwan, A., & Hossain, M. S. (2022). Artificial intelligence for assessment and feedback to enhance student success in higher education. *Mathematical Problems in Engineering*, 2022, Article ID 5215722. <https://doi.org/10.1155/2022/5215722>
- Ibrahim, H., Asim, R., Zaffar, F., Rahwan, T., & Zaki, Y. (2023). Rethinking homework in the age of artificial intelligence. *IEEE Intelligent Systems*, 38(2), 24–27. <https://doi.org/10.1109/MIS.2023.3255599>
- Kai, S., Almeda, M. V., Baker, R. S., Heffernan, C., & Heffernan, N. (2018). Decision tree modeling of wheel-spinning and productive persistence in skill builders. *Journal of Educational Data Mining*, 10(1), 789–822. <https://doi.org/10.5281/zenodo.3344810>
- Koh, E., & Doroudi, S. (2023). Learning, teaching, and assessment with generative artificial intelligence: Towards a plateau of productivity. *Learning: Research and Practice*, 9(2), 109–116. <https://doi.org/10.1080/23735082.2023.2264086>
- Kusmawan, U. (2023, November 22). *Shaping the future assessment: The evolution of assessment and its impact on student learning and success*. Teaching and Learning Symposium 2023: The Future of Assessment, Universiti Malaya.
- Lee, J., & Soylu, M. Y. (2023). *ChatGPT and assessment in higher education*. Center for 21st Century Universities. https://www.c21u.gatech.edu/sites/default/files/publication/2023/03/C21U%20ChatGPT%20White%20Paper_Final.pdf
- Lin, X.-F., Chen, L., Chan, K. K., Peng, S., Chen, X., Xie, S., Liu, J., & Hu, Q. (2022). Teachers' perceptions of teaching sustainable artificial intelligence: A design frame perspective. *Sustainability*, 14(13), 675–698. <https://doi.org/10.3390/su14137811>

- Martínez-Comesaña, M., Rigueira-Díaz, X., Larrañaga-Janeiro, A., Martínez-Torres, J., Ocarranza-Prado, I., & Kreibel, D. (2023). Impact of artificial intelligence on assessment methods in primary and secondary education: Systematic literature review. *Revista de Psicodidáctica (English Ed.)*, 28(2), 93–103. <https://doi.org/10.1016/j.psicoe.2023.06.002>
- Moorhouse, B. L., Yeo, M. A., & Wan, Y. (2023). Generative AI tools and assessment: Guidelines of the world's top-ranking universities. *Computers and Education Open*, 5, 100151. <https://doi.org/10.1016/j.caeo.2023.100151>
- Moqbel, M. S. S., & Al-Kadi, A. M. T. (2023). Foreign language learning assessment in the age of ChatGPT: A theoretical account. *Journal of English Studies in Arabia Felix*, 2(1), 76–88. <https://doi.org/10.56540/jesaf.v2i1.62>
- Murgatroyd, S. (2023). Rethinking teaching in the age of artificial intelligence. *Revista Paraguaya De Educación A Distancia (REPED)*, 4(2), 4–10. <https://doi.org/10.56152/reped2023-vol4num2-art1>
- Murray, M. D. (2023). Generative AI art: Copyright infringement and fair use. *SMU Science and Technology Law Review*, 26(2), 259. <https://doi.org/10.25172/smustr.26.2.4>
- Nikolopoulou, K. (2024a). Generative artificial intelligence in higher education: Exploring ways of harnessing pedagogical practices with the assistance of ChatGPT. *International Journal of Changes in Education*, 1(2), 103–111. <https://doi.org/10.47852/bonviewIJCE42022489>
- Nikolopoulou, K. (2024b). Generative artificial intelligence in higher education: Exploring ways of harnessing pedagogical practices with the assistance of ChatGPT. *International Journal of Changes in Education*, 1(2), 103–111. <https://doi.org/10.47852/bonviewIJCE42022489>
- Ouyang, F., Zheng, L., & Jiao, P. (2022). Artificial intelligence in online higher education: A systematic review of empirical research from 2011 to 2020. *Education and Information Technologies*, 27(6), 7893–7925. <https://doi.org/10.1007/s10639-022-10925-9>
- Perkins, M. (2023). Academic integrity considerations of AI large language models in the post-pandemic era: ChatGPT and beyond. *Journal of University Teaching & Learning Practice*, 20(2), 345–367. <https://doi.org/10.53761/1.20.02.07>
- Roll, I., Alevén, V., McLaren, B. M., & Koedinger, K. R. (2011). Improving students' help-seeking skills using metacognitive feedback in an intelligent tutoring system. *Learning and Instruction*, 21(2), 267–280. <https://doi.org/10.1016/j.learninstruc.2010.07.004>
- Rudolph, J., Ismail, M. F. B. M., & Popenici, S. (2024). Higher education's generative artificial intelligence paradox: The meaning of chatbot mania. *Journal of University Teaching and Learning Practice*, 21(6), 1–35. <https://doi.org/10.53761/54fs5e77>
- Salinas-Navarro, D. E., Vilalta-Perdomo, E., Michel-Villarreal, R., & Montesinos, L. (2024). Using generative artificial intelligence tools to explain and enhance experiential learning for authentic assessment. *Education Sciences*, 14(1), 887–900. <https://doi.org/10.3390/educsci14010083>
- Scribes, S. (2024, April 2). *A discourse on generative AI*. Medium. <https://medium.com/@sundryscribes/a-discourse-on-generative-ai-4ca4a8911e1a>
- Selwyn, N. (2022). The future of AI and education: Some cautionary notes. *European Journal of Education*, 57(4), 620–631. <https://doi.org/10.1111/ejed.12532>
- Smith, J. (2022). International education trends: Shaping the future of higher education. *International Journal of Open Publication and Exploration*, 10(1), 1–5.
- Trajtenberg, M. (2018). AI as the next GPT: A political-economy perspective (Working Paper 24245). National Bureau of Economic Research. <https://doi.org/10.3386/w24245>
- van der Vorst, T., & Jelčić, N. (2019). Artificial intelligence in education: Can AI bring the full potential of personalized learning to education? <https://www.econstor.eu/handle/10419/205222>
- Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education – Where are the educators? *International Journal of Educational Technology in Higher Education*, 16(1), 39–55. <https://doi.org/10.1186/s41239-019-0171-0>
- Zootzky, G., & Pfeiffer, A. (2024). Educational transformation through AI: Preparing for a new era of learning. *INTED2024 Proceedings*, 1202–1207. <https://doi.org/10.21125/inted.2024.0382>