Rethinking teaching and Assessment in AI crowded Higher Education Environment. A Systematic Review and Meta Analysis

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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 in higher education environments, particularly in the context of teaching and assessment. By analyzing current literature, methodologies, and findings, this paper aims to provide insights into how AI can transform traditional teaching methods and assessment strategies, creating an AI-crowded environment that fosters student learning and academic success.

Key: Assessment, Artificial Intelligence,

Introduction:

In recent years, the integration of artificial intelligence (AI) technologies has significantly influenced various aspects of higher education, including teaching and assessment practices (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 & Jelicic, 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.

Literature Review:

According to (Cardona et al., n.d.), Assessment encompasses all the actions carried out by teachers and students to evaluate learning, which generate feedback used to adjust their teaching and learning processes. This type of assessment is termed "formative assessment" when the gathered information is utilized to modify teaching methods to better address students' needs (Smith, n.d.). In order to conduct proper assessment in AI crowded environment, seven approaches are regarded ideal: enabling enhanced question types, measuring high order competencies such as team work, self-regulation and work relevant skills; providing real time feedback; increasing access and support to collaborative tasks; adapting learning ability and knowledge; embed assessment in the learning process and finally assess for ongoing learning (Moqbel & Al-Kadi, 2023). The literature on AI in higher education emphasizes its potential to revolutionize teaching and assessment practices (Selwyn, 2022). AI-powered tools such as intelligent tutoring systems, chatbots, and automated grading systems offer opportunities to personalize learning experiences, provide immediate feedback, and streamline assessment processes (Gamage et al., 2023). Research has shown that AI can improve student engagement, performance, and satisfaction by tailoring instruction to individual learning needs and preferences. Furthermore, AI-driven analytics enable educators to track student progress, identify areas for improvement, and make data-informed decisions about instructional interventions(Zootzky & Pfeiffer, 2024).

An AI assistant can help reduce teachers' workload by handling the grading of simpler aspects of student responses, enabling teachers to concentrate their expertise on evaluating the more significant qualities of entire essays or complex projects(Chen & Perez, 2023). AI can also improve feedback accessibility, for instance, AI-enabled learning technology 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). Additionally, AI can be integrated into the learning process, providing immediate feedback as students work through problems rather than only after they make mistakes (Lee & Soylu, n.d.). Embedding formative assessment within the learning process supports learning more effectively, as timely feedback is crucial.

Key Opportunities for AI in Formative Assessment

There are key areas of opportunity in supporting formative assessment using AI. Firstly, ***there is need to focus on measuring what matters*** (Koh & Doroudi, 2023). The focus of education today extends beyond core academic content measured by large-scale summative assessments. It now

also emphasizes providing students and teachers with actionable feedback that cultivates the broader skills students need for success and well-being. Moreover, within core subjects, 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.

Secondly, there should be *a strong focus on improving help keeping and help giving* (Roll et al., 2011). Requesting and providing help are essential components of learning and practicing a growth mindset, which are central to the concept of human feedback loops (Moorhouse et al., 2023). Students might not always recognize when they need assistance. For instance, computer algorithms can identify when a student is "wheel spinning"; working hard without making progress(Kai et al., 2018). A diligent student might not realize they need help, and a teacher might not notice the struggle if the student appears to be "on task." AI can also assist by highlighting 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).

Thirdly, it is important to promote active involvement from educators and learners in the creation of feedback loops for formative assessments augmented by AI. Their direct expression of what modifications would make assessments more helpful and doable for them is made possible by this involvement (Halagatti et al., 2023). Prioritizing student viewpoints is just as important as involving teachers in the design, selection, and assessment of AI-enhanced technologies, as we discussed earlier in the Teaching section. Students have significant insights on what is safe and useful for them when they come into contact with AI on a regular basis. It's critical to adapt feedback techniques to fit local norms and preferences since feedback practices differ among communities and cultures (Pearce & Chiavaroli, 2023). However, the integration of AI into higher education also raises important challenges and concerns.

Challenges of AI integration in Assessment.

It is imperative to give considerable thought to ethical issues pertaining to algorithmic prejudice, data privacy, and the replacement of human instructors. Continuous professional development is also necessary to guarantee that teachers have the abilities and know-how to successfully integrate AI tools into their lesson plans. The validity, consistency, and fairness of automated grading systems are further concerns raised by the use of AI in assessment, especially in subjective fields and challenging problem-solving activities(ClassPoint, 2024).

Methodology:

This research paper employs a qualitative research methodology 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.
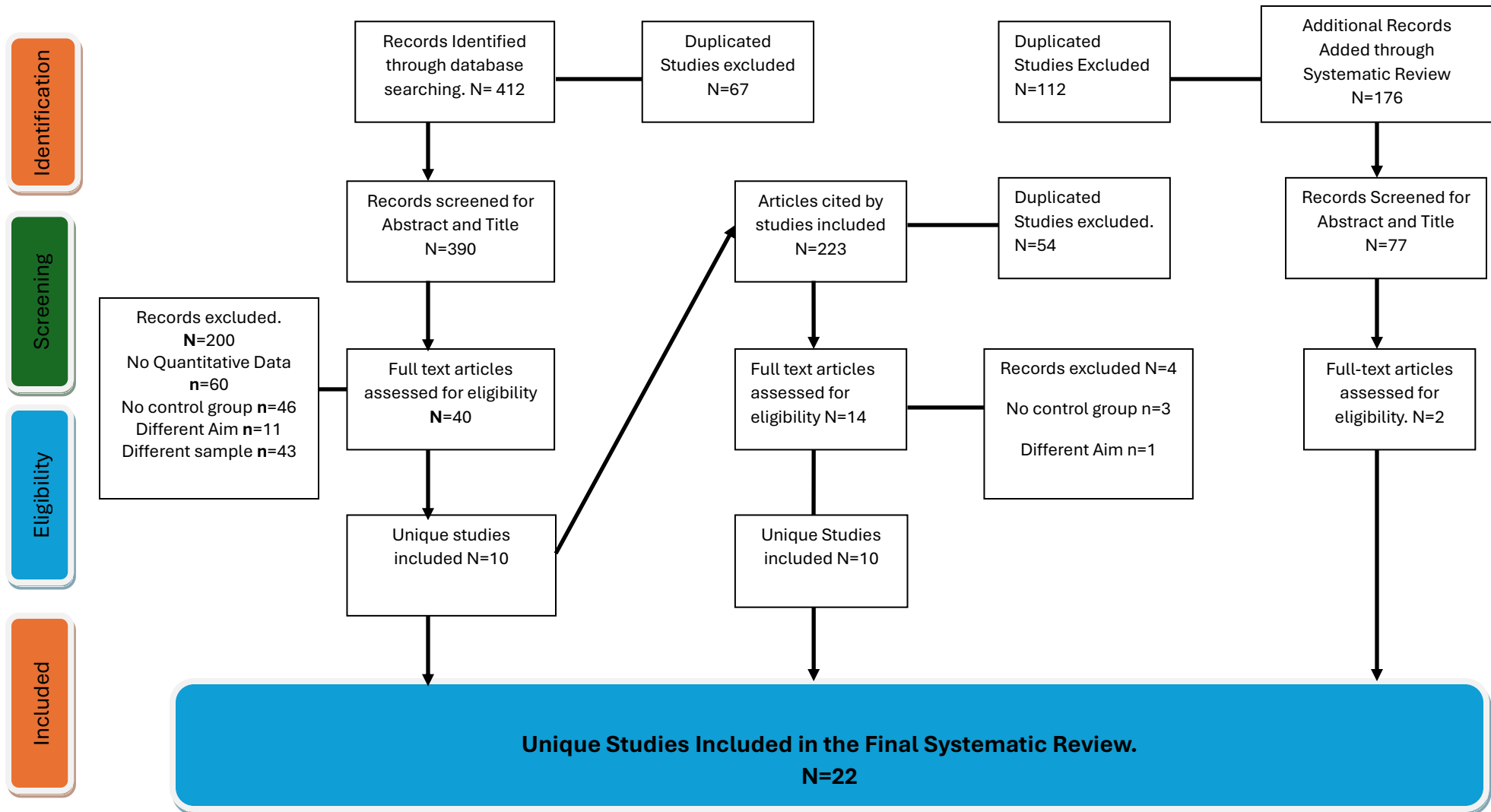
Figure 1: Selection Flowchart for Systematic Review

Findings and Conclusions:

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 are intelligent tutoring systems, which offer unmatched support for student learning (Cardona et al., n.d.). 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 the IT, education, administrative, 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). Students might not grasp the sophisticated instruction that a human teacher might deliver when AI algorithms create the content and set the course's pace. (Lee & Soylu, n.d.). AI algorithms might not be able to offer a diverse, inclusive curriculum that is suited to the needs of every single student since they might also reinforce prejudice. Teachers and students run the risk of becoming overly dependent on technology as schools use more and more AI-powered solutions. This reliance may eventually lead to a disdain for significant conventional teaching techniques. (Greco & Cinganotto, 2023).

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 of upholding 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 contend that generative AI can improve education. According to (Moorhouse 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.

The design and methods of assessments have also been discussed since the development of generative AI (Perkins, 2023). The primary points of contention in these debates have been the validity of the assessment procedure and the possible jeopardization of efficacious assessment attributes in the event that students use GAIs to fulfill assessment assignments. For instance, (Roll et al., 2011) proposed that grading students based on work completed entirely or in part using GAI tools may jeopardize the validity, dependability, and fairness of the assessment process.
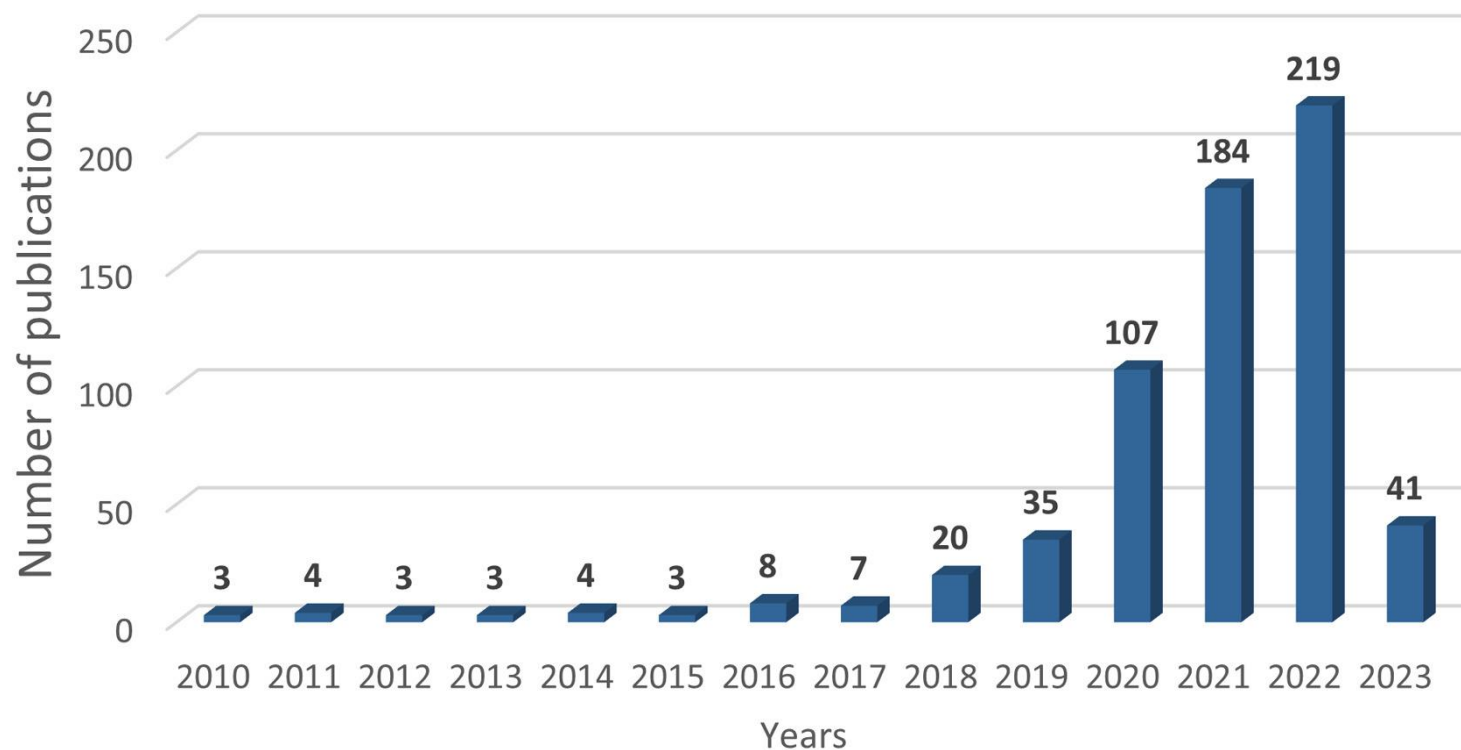

Figure 2: Publications on Assessment using A.I.

Re-designing Assessment for AI environments

With the introduction of generative AI tools, all seventeen universities offered different suggestions for how instructors can re-design assessment tasks (Perkins, 2023). The main recommendations were to: (1) provide assessments that demand originality and critical thinking; (2) include contextual information; (3) create authentic assessments; and (4) give students other means of expressing their knowledge outside of text. 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 reasons for assessment in higher education. The diagram below illustrates the reasons as to why assess:
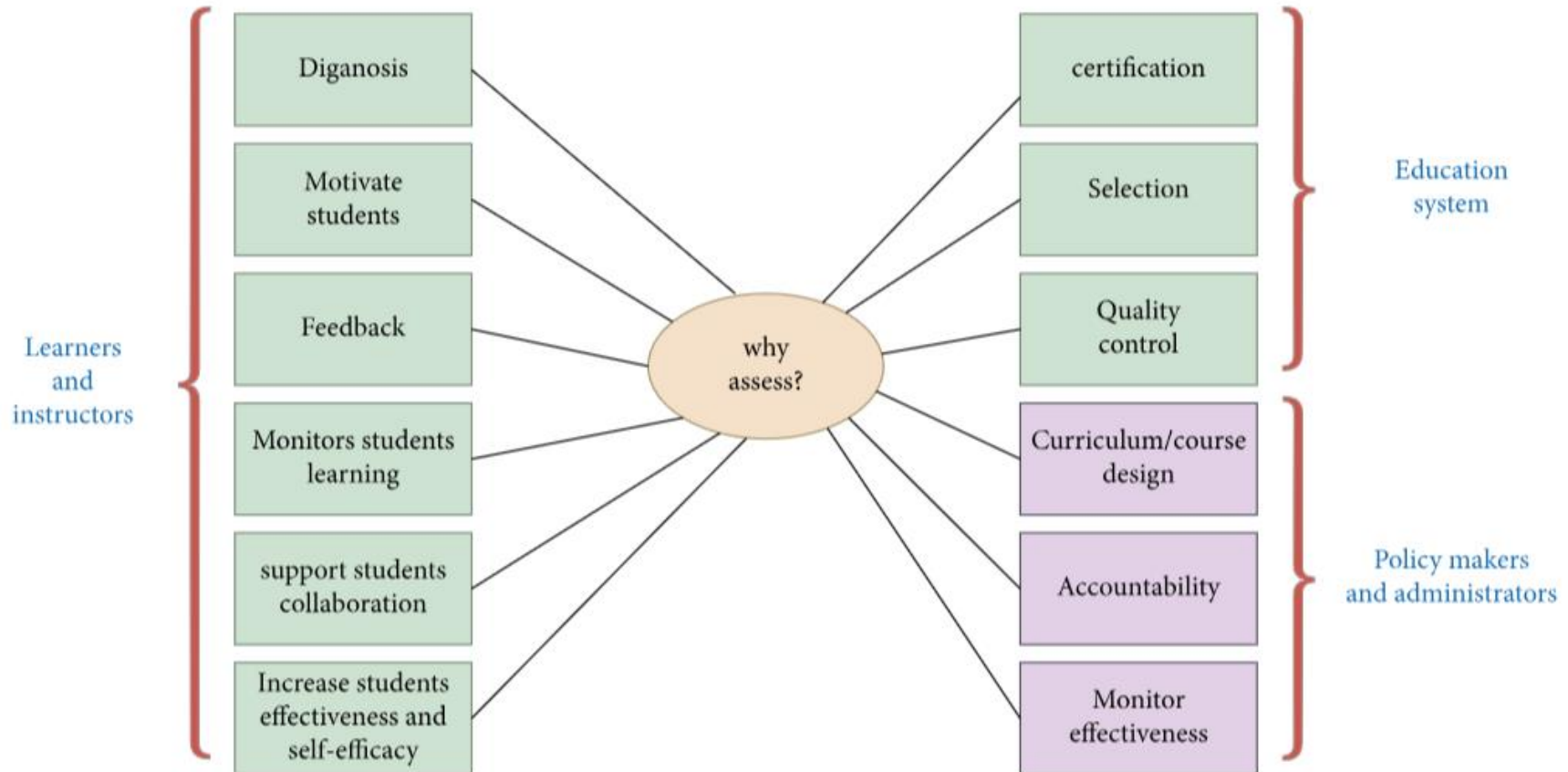

Figure 3: Reasons for Assessment in Higher Education

Several studies recommend that lecturers should 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/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 & Jelicic, 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 of the 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 focus on the process of solving a problem: Instructors have the authority to add "elements such as proposals, drafts, annotation, 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," 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.

In conclusion, there is need for the lecturers to make sure assignments are well scaffolded to allow students enough time and space to finish each step along the way. You should also think about whether assigning a lot of time-consuming tasks would require more bandwidth than students have available. When they are pressed for time, students are more likely to make use of ChatGPT and other generative AI technologies. One strategy to reduce the usage of generative AI tools in assignments is to employ in-class assessments. It is best if students complete their writing assignments in class. It could be beneficial to assign students to write a brief reflection paper or a handwritten essay about a current issue while they are in class. Increasing the number of in-class or other synchronous assignments—whether written or oral—or altering the weighting of your present grades to emphasize them are two ways to reduce the use of ChatGPT in assignment and assessment design. This guideline in Figure 4 is therefore proposed to aid the process of rethinking how assessment should be effectively conducted in universities.
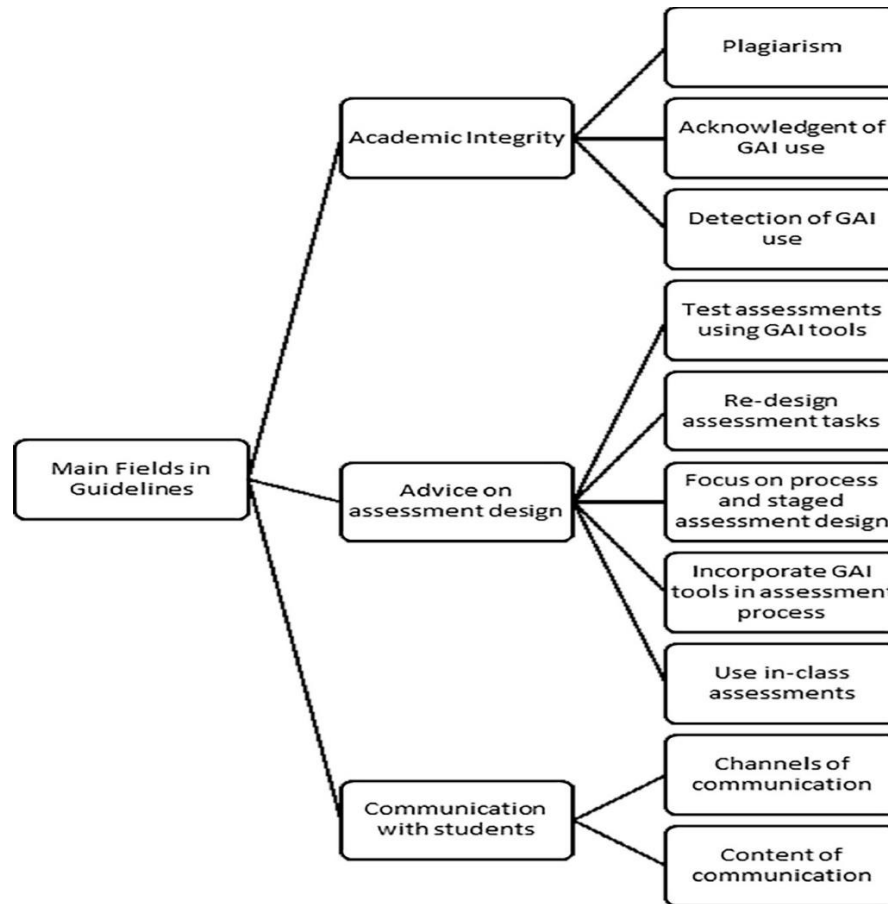
Figure 4: Guideline for effective assessment in a Generative AI environment.

Ethical Implications of AI while Rethinking Assessment in Universities

The risk for 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 of use 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 & Jelicic, 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, n.d.). 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 leaning 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 in its current level, it is capable of unfairly outcompeting writers, writers, academic authors, 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 base outlay.

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).

Future Direction and Recommendations

The findings of this research paper highlight the transformative potential of AI in 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, algorithmic prejudice, 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. By embracing innovative technologies and fostering collaborative partnerships between humans and machines, educators can harness the power of AI to create engaging, inclusive, and effective learning environments that prepare students for success in the 21st century.

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 has the ability to 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 take use of AI-powered educational tools.

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