



Rethinking Assessment in the Age of Generative AI: A Theoretical Framework for Academic Integrity, Deep Learning, and Responsible AI Use in Higher Education

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ABSTRACT

Generative AI has quickly permeated higher education, presenting opportunities and challenges for teaching, learning, assessment, and academic honesty. While generative AI tools can assist students with tasks like explanations, feedback, drafting, translation, and idea generation, they also pose a threat to the traditional assessment systems that are heavily reliant on unsupervised written assignments. While existing literature has explored generative AI as a learning tool, as an academic integrity concern, and as a policy issue, there has been less conceptual work that brings together AI literacy, redesigning assessment, academic integrity climate, teacher AI competence, responsible AI use, and deep learning engagement. To bridge this, the present paper proposes a theoretical framework to understand how responsible use of generative AI can improve deep learning in higher education. The paper is based on the constructivist learning theory, self-regulated learning theory, assessment for learning, and technological pedagogical content knowledge. It presents seven theoretical propositions connecting generative AI literacy, assessment redesign, academic integrity climate, responsible AI use, teacher AI competence and deep learning engagement. The study makes a significant contribution to educational studies by moving the conversation from the prohibition and detection of AI use to ethical integration, evaluation change and learning-focused academic integrity.

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1. Introduction

AI is one of the most impactful technologies in today's higher education landscape. While earlier digital tools focused on communication, information access or classroom management, generative AI systems can generate essays, summaries, explanations, lesson plans, literature review, computer code, feedback, and much more in mere seconds. The abilities have transformed how students learn, the way in which teachers design instruction, and the way in which universities assess academic performance. This has introduced a new dimension of assessment, ethical, and educational concerns regarding generative AI.

The increasing adoption of Generative AI in Universities has brought significant opportunities in teaching and learning. These tools can help students gain better understanding of concepts that are difficult, enhance their writing, get feedback quickly, translate academic language, and ideate for future research. AI can also help teachers create teaching materials, plan formative activities, design assessment rubrics and facilitate differentiated learning. In this context, generative AI can transform learning experiences to be more personalized, flexible and inclusive, especially for the students who need more academic assistance and those who face language-related issues during college-level education. Simultaneously, there are major concerns about academic honesty and validity of assessments with the advent of generative AI. AI can assist with portions or all of many traditional assessments including take-home essays, reflective reports, summaries, and written assignments. It is challenging for teachers to tell if a completed product is the student's own understanding, reasoning, and work. Students who simply use AI without engaging in their own thinking instead of learning may cease to be able to demonstrate learning outcomes by means of assessment. Many universities have started thinking about the role, design and control of assessment in the age of AI. The use of generative AI tools in higher education is currently a topic of debate, with two primary paths emerging. The first one is defensive and it's about restricting, detecting and punishing. Universities that take this route could outright prohibit the use of AI, implement AI-detection software, or revert to closed-book exams. These measures may be warranted in some situations but cannot be enough to be a long-term educational approach. The accuracy of the AI-detection tools, students using AI in ways that are hard to detect, or the strong prohibition of students using AI encouraging no open dialogue with teachers may lead to inaccuracy or limitations.

The second direction is developmental, and it is about responsible integration, redesign of assessment and learning. This acknowledges that generative AI is now an integral aspect of the academic and professional landscape. Hence, it is important to educate students on the responsible, critical, and ethical use of AI in universities. In this regard, the challenge is not if students use AI but how and why they use AI. AI can assist in deep learning when it is used for brainstorming, giving feedback, revising, reflecting, and explaining. However, if it is used as outsourcing of academic work, then it can have an adverse effect on learning and academic integrity. This paper takes a developmental perspective and contends that there is a need for a theory-based framework regarding the transformation of using and assessing AI in higher education institutions. Students should be informed about the constraints, risks, biases, ethical concerns, and academic rules surrounding generative AI usage. This will lead to a new academic ability: generative AI literacy. Likewise, teachers must also have pedagogical skills and competencies related to the use of AI in order to develop suitable learning activities, set clear guidelines for acceptable AI use, and create assessment tasks that demand process, reflection, authenticity, and critical thinking. Although there is growing research investigating generative AI, assessment, and academic honesty, the literature is still disjointed. Some studies are on the pros of AI in teaching and learning, whereas others are on cheating, plagiarism, and threats to assessment. There is also a body of literature on AI literacy, teacher competence and educational policy, which is not explored in this article. There is, however, little theoretical work that links these areas together into an integrated educational framework. This gap is significant because universities need to be more than just policy statements – they need to clarify their understanding of the relationship between AI literacy, assessment redesign, integrity climate and teacher competence on the one hand and student learning on the other.

For this reason, the present paper proposes a theoretical framework for the responsible use of generative AI in Higher Education. The framework provides insights into how generative AI literacy can foster responsible AI use, how the redesign of assessment can reinforce the academic integrity environment, and how responsible AI use can improve deep learning engagement. This paper is based on the theories of constructivist learning theory, self-regulated learning theory, assessment for learning, and technological pedagogical content knowledge. By doing so, it paves the way for a shift in the paradigm of AI detection to the realm of educational assessment reform. The paper makes three major contributions. First, it adds to the theory by considering generative AI as not merely the technology, but as a pedagogical and assessment phenomenon. Second, it helps to develop assessment scholarship by reminding readers the importance of authentically assessing, reflecting, and documenting thinking processes. Thirdly, it offers a set of theoretical propositions that can spur future empirical studies in higher education, especially in education systems of the

developing countries and emerging societies where the use of AI is growing, but where institutional guidelines are still being formed.

2. Literature Review

2.1. Generative AI in Higher Education

Generative AI is the intelligence behind systems that generate new content like text, images, code, explanations or feedback, from patterns in massive amounts of data. However, in higher education these tools have garnered great interest and promise to aid many educational activities. Research indicates that generative AI can help students gain a deeper understanding of complex topics, enhance their academic writing skills, brainstorm research ideas, and provide personalized support in their learning process (Kasneci et al., 2023; Lo, 2023; Tlili et al., 2023). When used in a critical and responsible manner, AI proves to be a valuable educational tool, offering these benefits and more. But the learning potential of generative AI isn't a given. The information provided may be incorrect, contain invented references, biased statements or superficial explanations. Students who are unable to do such an assessment may take these outputs for granted. This raises the possibility of misinformation and diminishes independent learning. Hence scholars recommend adopting a critical thinking, ethical sensibility, and disciplinary sensibility when using AI in education (Chan & Hu, 2023; Dwivedi et al., 2023; Walter, 2024). The concerns emphasize the need for AI literacy as a first step in responsible use.

2.2. Academic Integrity in the AI Era

Academic integrity has always been linked to the qualities of honest, original, fair, responsible, and respectful academic work. Academic integrity is more nuanced in the era of generative AI, as it's hard to define the difference between helping and cheating. Students can leverage AI to help them with grammar corrections, ideation, summarization or creating an entire assignment. Students might not know what kinds of usage are permitted and which kinds are a violation of academic integrity, if there is no clear institutional guidance. The introduction of generative AI has brought into question the traditional definition of authorship and originality (Cotton, Cotton, & Shipway, 2024; Perkins, 2023). Questions arise concerning ownership, acknowledgement, transparency, and assessment fairness when AI aids in students' work. These problems may not be resolved by a purely punishment-based approach since students require education, guidance, and clear expectations. Hence, academic integrity in the era of AI must be seen as a responsibility of students, teachers, departments and institutions.

2.3. Assessment Redesign and Assessment Validity

In higher education, there is an important role for assessment, which has the power to influence learning and, thus, values. Standard examinations focus on the final written product (essay, report, take-home). These types of formats are susceptible to careless usage of AI as students can produce polished responses without engaging in the learning process. This is a concern about the validity of the assessment since what students submit might not be what they know, think, or can do. In today's era of generative AI, however, assessment redesign is needed. Assessment should be focussed on the process, reflection, authenticity, application and higher order thinking, in the context of AI. This could be in the form of oral defence, staged submission, reflective commentary, annotated drafts, local case analysis, portfolio assessment and in class problem solving. These strategies don't just stop misbehaving; they make learning more apparent. Assessment redesign also underlies the concept that assessment is a tool for learning, not just a measure of learning (Cotton, Cotton, & Shipway, 2024; Hattie & Timperley, 2007; Nikolic et al., 2023).

2.4. AI Literacy and Responsible AI Use

AI literacy is defined as an understanding and ability to utilize, assess, and act responsibly with AI technologies. In higher education, AI literacy involves understanding the functioning of AI systems, their limitations, the assessment of AI outputs, and the recognition of AI assistance. Students who have higher AI literacy levels are more likely to leverage AI tools to enhance their learning processes than to completely replace them with AI (Long &

Magerko, 2020; Ng et al., 2021). Responsible AI usage refers to the way generative AI is used that is transparent, ethical, critical, and learning-focused. It asks students to critically assess the quality of AI-generated text, check information accuracy, recognize the use of AI assistance, and take responsibility for their own work. Self-regulation is also crucial in responsible AI use as students need to determine when and how AI can help their learning and when it might hinder it. Thus, the concept of AI literacy and SRL is tightly linked in higher education.

2.5. Teacher AI Competence

AI is fundamentally changing the way teachers support student learning. Teacher AI competence is defined as an understanding of AI tools, assessing their educational usefulness, creating learning tasks that incorporate AI, and providing guidance on ethical use. Teachers need to be aware of the existence of AI tools, but that's not enough. They need to be aware of the impact of these tools on disciplinary learning, academic writing, assessment validity and student engagement. Technological pedagogical content knowledge serves as a useful lens to consider teacher AI competence. It is important for teachers to "fuse technology, pedagogy, and subject matter" so that students will have a meaningful learning experience (Mishra & Koehler, 2006). In the AI era, this translates to creating assessment tasks that communicate what is acceptable with AI, where students should reflect on their actions, and will be expected to show reasoning. Teachers with higher levels of AI competence are more likely to change assessment practices than to just prohibit or detect.

2.6. Deep Learning Engagement

Deep learning engagement includes knowledge being learned, analysed, evaluated, applied, and reflected on by the students. It is different from surface learning that is characterized by memorization or task completion. Deep learning can be enhanced or undermined using generative AI by students. When students utilise AI tools to investigate concepts, provide comparisons, strengthen arguments, and engage in self-reflection on feedback, AI can aid learning. If they use it to get around thinking, it could get them only superficial results. So, generative AI and deep learning are therefore dependent on each other. AI is not going to make education better; it's not going to doom learning. The impact will depend on the students' AI literacy, the guidance provided by teachers, the assessment design, and the institutional integrity climate. This paper suggests that responsible AI utilization is the mechanism by which generative AI can help contribute to deep learning engagement.

3. Theoretical Foundations

3.1. Constructivist Learning Theory

According to the constructivist learning theory, learners make sense of their experience, reflect on it, interact with it, and build knowledge from it. In this context, students engage in deep learning when they relate new knowledge to existing knowledge and actively interpret rather than only receive ideas. Generative AI can be helpful in constructivist learning when students ask questions, compare perspectives, test their explanations, and construct their arguments. But the learning takes place only if students critically engage with the responses generated by AI. The theory has been presented as a reason not to use generative AI as a substitute for students' thinking. Rather, the focus should be on it being a learning tool to facilitate inquiry and reflection. Students are active learners when they assess, adapt, and use AI-generated text. Thus, it can be understood that the theory of constructivist learning is one of the theories that can explain the use of responsible AI that can help to create deep learning engagement.

3.2. Self-Regulated Learning Theory

Self-regulated learning theory places a high priority on the importance of students planning, monitoring, controlling, and evaluating their own learning. Self-regulation is an essential part of AI-assisted learning, where students can use tools to complete academic tasks for them. Students must navigate using AI, how much, if any, assistance to take, the validity of the output and the responsibility for maintaining academic integrity. Teaching students about Generative AI literacy is a way to assist in self-regulated learning by enabling

students to make informed choices about the use of AI. Students who know about the limitations of AI will be more likely to monitor, verify and reflect on their understanding of AI. The theory thus aligns with the hypothesized connection between AI literacy, responsible AI usage, and deep learning engagement. The responsible use of AI is transformed into self-regulated academic use.

3.3. Assessment for Learning

Assessment for learning is not just an evaluation of what students have learned, but a process for helping students learn. It focuses on feedback and reflection, formative assessment, and consistency of assessment and learning outcomes. This theory is especially applicable in the context of the AI age, where traditional end-of-course evaluation methods might not be as effective. For teachers, there is a need for assessment techniques that expose students' thinking and learning processes. Assessment for learning is an effective tool to assist with assessment redesign through staged submissions, reflective writing, feedback cycles, oral explanation and authentic tasks. These strategies minimize the potential for covert AI abuse and maximize the learning from assessment. In addition, they want students to show the process of their thinking and not just an answer. Hence, the assessment for learning has a strong theoretical foundation for AI-aware assessment reform.

3.4. Technological Pedagogical Content Knowledge

Technological pedagogical content knowledge is the knowledge that teachers need to understand how to combine technology, pedagogy, and content. This framework can be beneficial in the context of generative AI because teachers don't just need to know how to use AI tools; they need to know how to apply them to support teaching and learning. They should be aware of the impact of AI on learning activities, expectations of assessment, academic writing, and academic reasoning. The competence of teachers as AIs is thus technological and pedagogical. AI competent teachers can create assessment tasks that will help students develop their ethical and meaningful use of AI. They can also describe when it is appropriate to use AI and how to recognize the use, and how students can use it to assist and not supplant learning. The teacher AI competence plays an important role in supporting the effectiveness of assessment redesign, consistent with this theory.

4. Review and Conceptual Development Approach

This paper adopts a theoretical and conceptual review approach. The aim is not to test the hypotheses empirically, but to create a framework that illuminates how to use generative AI responsibly in higher education. The review is based on literature regarding generative AI, academic integrity, assessment redesign, AI literacy, teacher competence, self-regulated learning, constructivist learning and assessment for learning. These areas were chosen because they show first-hand the impact of AI on teaching, learning, assessment, and student behaviour. The conceptual development followed four steps. First, a literature review of generative AI in higher education was conducted to pinpoint key opportunities and challenges. Secondly, a review of literature on assessment and academic integrity was conducted to gain insight into the issues facing traditional assessment. Thirdly, educational theories were employed to understand the potential of responsible AI use in learning. Fourth, the constructs were embedded within a proposed framework that includes the constructs of generative AI literacy, assessment redesign, academic integrity climate, responsible AI use, teacher AI competence, as well as deep learning engagement.

5. Proposed Conceptual Framework

The proposed framework suggests that the responsible adoption of generative AI is critical to deep learning in higher education. Students' generative AI literacy and the academic integrity climate within institutions shape responsible AI use. The redesign of assessment supports academic integrity climate by clarifying expectations, minimizing ambiguity and fostering authentic learning tasks. Teacher AI competence helps reinforce the correlation between assessment redesign and deep learning by helping teachers carry out institutional policy in the classroom context. The framework assumes that the problem is not AI itself, but rather the various ways in which AI might be used. AI can have a significant impact on

education, but it is not without its limitations. Generative AI can support deep learning when it comes to preparational expectations, teacher competencies, classroom assessments, and integrity expectations. In the absence of these, AI can foster superficial learning, reliance, and cheating in students.

Table 1: Core Constructs of the Proposed Framework

Construct		Conceptual Meaning	Role in the Framework
Generative AI Literacy	AI	Students' ability to understand, evaluate, and ethically use AI tools	Promotes informed and responsible AI use
Assessment Redesign		Modification of assessment tasks to emphasize authenticity, process, reflection, and higher-order thinking	Strengthens assessment validity and integrity
Academic Integrity Climate		Shared institutional norms of honesty, fairness, transparency, and responsibility	Guides ethical student behavior
Responsible AI Use	AI	Transparent, critical, and learning-oriented use of AI tools	Links AI access with meaningful learning
Teacher Competence	AI	Teachers' ability to integrate AI into pedagogy, assessment, and ethical guidance	Supports effective implementation
Deep Learning Engagement		Students' active effort to understand, evaluate, apply, and reflect	Main educational outcome

6. Theoretical Propositions

6.1. Generative AI Literacy and Responsible AI Use

Students with higher levels of generative AI literacy are more likely to understand the strengths and weaknesses of generative AI tools. They can understand that AI-generated content can be misleading, biased, incomplete, or lack verified sources. These students are also more likely to use AI for providing explanations and feedback and revising their work, but not as a substitute for their own work. As a result, AI literacy will foster ethical and learning-centred generative AI usage.

Proposition 1: Generative AI literacy positively influences responsible AI use among higher education students.

6.2. Assessment Redesign and Academic Integrity Climate

Academic integrity climate can be enhanced by assessment redesign that helps to minimize uncertainty of acceptable academic behaviour. Process evidence, reflection, oral explanation and authentic application in assessment tasks provides a better message that learning is more important than the finished product. Such assessment practices also send a message of institutional fairness, transparency and meaningful assessment. Hence, redesigning assessments can contribute to building a better integrity climate.

Proposition 2: Assessment redesign positively influences academic integrity climate in higher education.

6.3. Academic Integrity Climate and Responsible AI Use

An academic integrity climate ensures students have a clear sense of norms regarding honesty, acknowledging others, and acceptable sources of AI assistance. Once students know the rules of the school's institutions, they have less reason to use and abuse AI or cover for its use. A positive integrity climate also promotes open communication between students and teachers. This encourages students to pose questions about the use of AI prior to submission of assessment items.

Proposition 3: Academic integrity climate positively influences responsible AI use among higher education students.

6.4. Responsible AI Use and Deep Learning Engagement

AI can facilitate deep learning, provided that the tool is used responsibly by students to explain concepts, make comparisons, analyse evidence, and enhance educational work. In this instance, AI can be a learning partner, not a thinker. Students have responsibility for

judgements, interpretation and final academic decisions. As a result, the use of AI responsibly is expected to lead to a greater engagement with more profound learning in students.

Proposition 4: Responsible AI use positively influences deep learning engagement.

6.5. Assessment Redesign and Deep Learning Engagement

Redesigning assessments can help students engage in deep learning by asking them to apply, reflect, and reason. Authentic and process-based assessment tasks discourage mechanical completion and promote active understanding. Students will have the opportunity to explain their development of ideas, evaluate evidence, and respond to feedback when they are required to do so, which will lead to increased engagement in learning. Thus, we would anticipate that assessment redesign would facilitate deep learning engagement.

Proposition 5: Assessment redesign positively influences deep learning engagement.

6.6. Mediating Role of Responsible AI Use

Students' knowledge gained from Generative AI literacy does not necessarily lead to deep learning, unless they put that knowledge into a responsible action. Students may have awareness and knowledge of AI tools but not apply them in a manner that diminishes learning. Thus, it is expected that responsible AI use will mediate the relationship between AI literacy and deep learning engagement. This mediation provides an understanding of the reason why knowledge of AI is linked to ethical and self-regulated use.

Proposition 6: Responsible AI use acts as a mediator between generative AI literacy and deep learning engagement.

6.7. Moderating Role of Teacher AI Competence

The use of teacher AI competence can enhance the effectiveness of the assessment redesign process. Teachers who are knowledgeable about AI will be able to formulate more precise tasks, define limits of AI use, develop stronger rubrics and encourage responsible use. However, teachers having low competence on AI can only use prohibition or detection. As a result, it is hypothesized that the positive impact of assessment redesign on deep learning will be greater if teacher AI competence is high.

Proposition 7: Teacher AI competence strengthens the positive relationship between assessment redesign and deep learning engagement.

7. Discussion

The suggested framework is also beneficial for educational research because it moves from the debate over forbidding the use of AI to responsible and responsible use. The first wave of reactions to generative AI was cheat, catch, and punish. Academic honesty is relevant but insufficient to solve the broader educational problem, this paper proposes. The overall challenge is to transform learning and assessment spaces in a way that students engage with AI to facilitate learning, not to circumvent it. The framework also contributes to the literature of assessment, by clarifying why traditional assessment might be inadequate in the age of AI. When assessment is only about the final written products, students can rely on AI to create something that looks good but is not truly reflective of learning. For this reason, assessment redesign is crucial to ensure that it remains valid. Student thinking can be made more visible with process, authentic, reflective, and dialogic assessment methods, and can minimize reliance on final products created by AI. One other contribution that is very important is the academic integrity climate. Academic honesty shouldn't be defined by rules and penalties. In an AI-enhanced learning context, learners must have specific objectives, models, instructions, and questions to ask. An integrity climate supports students' awareness of responsible use of AI as part of scholarly conduct. This is a learning-based perspective of students as academic citizens but not just a potential wrongdoer. The framework also emphasises the need for teacher competence in AI. It is the responsibility of the teacher to ensure that the institutional AI policies are implemented at the course level. Even good institutional policies can fail if they are not backed by teachers' competence. Teachers require

professional development in knowledge, evaluation, design of assessment with AI awareness, and guidance on ethics of using AI in assessment. Thus, teacher training plays a pivotal role in any effective strategy for integrating AI.

7.1. Practical Implications

The framework has significance for universities. First, institutions must establish guidelines for the use of AI. Institutions need to have guidelines for the use of AI, and it is important that these guidelines clearly define how AI can be used and what should not be done. These policies should be approachable to students and adaptable to the discipline. There should be a university-wide policy that gives general principles, with task-level expectations being defined by departments and teachers. This can help to minimize confusion and make courses fairer. Second, the assessment practices in universities need to be restructured, not relied solely on AI detection devices. Oral work, reflective explanation, draft work, supervised activities, authentic case studies and portfolio-based tasks should be included in the assessment. These methods help make students' learning more transparent. They also assist teachers with an assessment of reasoning, judgment, and application rather than just written fluency. Thirdly, introduce a formal course in AI literacy in education. Pupils should be educated about AI, its applications, potential risks, and its recognition. AI literacy should not be restricted to the fields of computer science. It is now relevant for students in education, business, social sciences and humanities, engineering, and health sciences. Fourth, professional development of teachers should be a priority. Teachers should be provided with practical training on prompt design, AI evaluation, ethical guidelines, and AI-aware evaluation. They need to be able to have open conversations with students about using AI, too. This training can alleviate anxiety and worry for teachers and enable them to effectively leverage AI in instructional purposes.

7.2. Future Research Agenda

The proposed framework can be tested in future empirical studies, either quantitatively, qualitatively, or both. The relationships between generative AI literacy, assessment redesign, academic integrity climate, responsible AI use, teacher AI competence, and deep learning engagement can be explored in a quantitative study using structural equation modelling. This type of research can give empirical support to the propositions formulated in this paper. Further studies could also benefit in comparing different educational settings. For instance, researchers could examine the differences between public and private universities, undergraduate and postgraduate students, or between courses in education, business, engineering, and social studies. Multi-group analysis can be used to determine if proposed relationships vary by academic discipline, gender, level of access to digital resources or level of study. These comparisons can guide universities to crafting policies that are more contextually relevant. Additionally, qualitative research is required to explore the lived experience of the teacher and student with AI-supported assessment. Students' perceptions of responsible use of AI and teachers' vision on redefining the assessment tasks can be discussed through interviews and focus groups. The implementation of AI policies in practice can also be studied in the classroom. This research can help shed light on the social and ethical aspects of AI within the higher education sector. Educational equity is another aspect which should be researched further. There is not equal access to digital tools, reliable internet, English-language proficiency or training on AI. If left unchecked, generative AI can exacerbate inequalities. Future research should focus on how universities can promote equitable access, inclusive AI literacy, and assessment.

8. Conclusion

Generative AI has ushered in a significant paradigm shift in higher education. It has challenged traditional views on student work and originality, assessment, and academic honesty. But the right answer is not to ban AI or rely on detection tools. It is essential for universities to adopt a more balanced perspective that includes responsible AI usage, redesigning assessments, educating for academic integrity, and teacher professional development. This paper created a theoretical model that outlines the mechanisms for how generative AI literacy, assessment redesign, academic integrity climate, responsible uses of AI, and teacher AI competence can help facilitate deep learning engagement. The framework proposes that AI could either enhance or hinder learning, depending on its usage and

management. The solution is not simply to oppose AI, but to reimagine the learning process, to create a new type of education for the future, where AI is not just a tool but a fundamental element of the learning experience. The paper's contribution to theory in education is linked to four theories; constructivist learning theory, self-regulated learning theory, assessment for learning, and technological pedagogical content knowledge. It also offers propositions for empirical test in the future. The universities' core message is that generative AI should be guided ethically, assessed in a transparent manner, handled by competent teachers and learned as a student-centred process.

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