# Unstoppable Advance of Artificial Intelligence: Emergence of a New Learning Environment

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**Abstract:** This phenomenological inquiry was based on the significance of disruptions caused by Artificial Intelligence in educational settings. The study explored the experiences of five graduate students using ChatGPT-4 to develop a literature review assignment in an online research course. Three textual datasets included 1) analytic memos; 2) student reflections; and 3) instructor-student conversations following assignment completion. Findings regarding analytic memos revealed that teaching students how to use AI proved invaluable as it created pressure-free learning, leading to improved cognitive transformation. Student reflections and conversations indicated that using AI responsibly and ethically resulted in intentional and reliable knowledge creation; and necessitated an informed understanding of its advantages as well as its practical limitations. While limited to five students with one course activity, this study highlighted the value of teaching students responsible use of AI which promoted metacognition, ethical judgment, and research literacy, as students critically evaluated rather than uncritically adopted AI-generated content. Importantly, when students face intellectually demanding yet attainable tasks, responsible AI integration helps them embrace the complexity and ambiguity of the new learning environment instead of bypassing these critical learning opportunities.

**Keywords:** ChatGPT-4, Learning and AI, New Learning Environment, Teaching AI.

## INTRODUCTION

Generative Artificial Intelligence (AI) continues to advance in a relentless manner, drastically defining the educational ecosystem. As teaching and learning are transformed, new pathways with diverse values and approaches come into view. While certain educators effortlessly adopt and adapt to AI as *technology takers* (Flanding et al., 2019) with the belief that AI will create new competencies and opportunities; others struggle or resist, thinking AI will erode learning and cognition, and will negatively affect all walks of life ranging from elimination of jobs en masses to diminishing societal values.

With the emergence of a new learning environment, there are major discrepancies in the two components of education including teaching and learning: "Many Artificial Intelligence in Education (AIED) tools are questionable, whether for ethical, pedagogical, or educational reasons….may reinforce existing biases and inequities, involve the commercial exploitation of student data, embed primitive approaches to pedagogy" (Holmes, 2023, p. 11). Although the AIED tools are debatable, anecdotal evidence by educators reveals that AI is being used by all students. Having interviewed many students from varied higher education institutions, Bowen and Watson (2024) discovered that "all students (100%) were

using AI in many different ways…..that they did not consider a lot of it to be cheating" (p. 4).

Academic conversations on AI mainly concentrate on policies and plagiarism resulting in significant gaps in deeper understanding of students sensemaking of AI in academic contexts. The significance of this study derived from AI's relentless interruptions leading to forming a digital mind as the new model of thinking as explained by Ott (2023): "Employing a media ecology of communication…digital computers and microprocessors are defined by three structural properties…..hence, underlying logics: digitization (binary code), algorithmic execution (input/output), and efficiency (machine logic)" (para. 1). A new learning environment emerges which "cultivates a digital mind, a model of thinking, communicating, and sense-making characterized by intransigence, impertinence, and impulsivity" (Ott, para 1).

For educators while the conversations revolve around preventing cheating and developing better policies, understanding how students make sense, interpret and negotiate their relationship with AI provides essential guidance in integrating AI ethically and responsibly. In fact, implementing AI ethically in teaching and learning could lead to better practices which entails promoting AI literacy and competency, ethical decision-making, and improved self-regulated learning (SRL).

## LITERATURE REVIEW

Higher education institutions are responsible for advancing student learning by means of cognitive and social engagement with the outcome of improving students' superior performance competencies (Ward et al., 2023) for better preparing them for the workforce and global citizenry. During the pre-AI era, when describing a *learning environment*, the focus was on "the dynamics and interactions between four dimensions – the *learner* (who?), *teachers and other learning professionals* (with whom?), *content* (learning what?) and *facilities and technologies* (where with what?)" (Dumont & Istance, 2010, p. 29). Today, however, with AI, the four dimensions have been interrupted, altering the digital mind further, and giving rise to the emergence of a new learning environment in which both the instructor and the student expectations continue to change rapidly, affecting how knowledge is delivered and learning shortcuts are created. There is no going back or stopping AI's further development as indicated by Carr (2025): "Once people adapt to greater efficiency in any practice or progress, reductions in efficiency, whatever the rationale, feel intolerable" (p. 227).

While the learning dimensions shifted demanding more effective pedagogies and curricula, there still exist varying reactions and responses among educators, from early adopters who experiment with AI-enhanced teaching strategies to opponents or late users who wait for evidence of efficacy based on Rogers's *diffusion of innovations* (Rogers, 1995; 2003). As early as 1936, in his work *The Study of Man*, referring to cultural elements from an anthropological point, Linton explained that "diffusion required not only a donor but also a receiver, and the role of the receiver is certainly the more important" (p. 334) and described the concept in "three distinct processes: presentation of the new culture element or elements to the society, acceptance by the society, and the integration of the accepted element or elements into the preexisting culture" (p. 334). Akin to Linton, educators'

willingness to adopt and adapt to AI depends on factors such as perceived usefulness, ethical understanding, institutional support, and self-efficacy (Rogers, 2003; Davis, 1989; Teo, 2011; Zawacki-Richter et al., 2019).

The large Language Learning Models (LLMs) have been reshaping the way early adopters design, deliver, and assess learning. These tools offer unprecedented opportunities for personalized learning, creativity, and productivity, yet also raise profound questions about authorship, ethics, critical thinking, equity, environmental impact, and the nature of human expertise. Adopting and adapting to AI requires not only technological competence but also a fundamental rethinking of pedagogy, social and emotional learning, assessment, transformative learning, and professional identity. The challenge for educators is to integrate AI's superpower in ways that "enhance, not replace, our own natural gifts" (Khan, 2024, p. 8) which entails accepting technology as a *digital partner*: "Educational technology should be a dialog partner, not a dialog master….It should never play a central role in teaching and learning….It should complement it as a supplementary tool or, at the most, as a player in the game" (Feller, 2014, p. 237).

When it comes to challenges, Selwyn (2023) warns that resistance often stems from legitimate concerns about academic integrity, workload, and the erosion of critical thinking. Similarly, Khan (2024) iterates these concerns: "But what cognitive abilities do we risk in the age of general-purpose AI, when a system like GPT-4 can be 'helpful' in solving so many problems" (p. 47). Conversely, scholars like Cotton et al. (2023) highlight how educators who adopt AI early often demonstrate higher pedagogical flexibility and a commitment to student-centered innovation. Emerging research also points to the importance of professional learning communities and institutional culture in fostering meaningful adaptations (Barbour & Hodges, 2021). Successful implementation occurs when educators view AI not as a threat but as a *collaborative partner* which can extend human capabilities in analysis, creativity, and problem-solving (Bowen & Watson, 2024; Khan, 2024). Thus, the process of adapting to AI is not simply a technological matter but a psychological, social, cultural and an ethical question.

Since the development of digital technologies, the term, *cognitive offloading*, "the use of physical action to alter the information processing requirements of a task so as to reduce cognitive demand" (Risko & Gilbert, 2016, p. 3) has become a routine practice making life easier for users. Similarly, with the introduction of AI, students continue to depend on AI in many different ways one of which is doing their academic work (Bowen & Watson, 2024). Additionally, "as cognitively gifted mammals who crave mental simulation and as socially obsessed" (Carr, 2025, p. 217), we consult with AI to socialize and ask for personalized advice which has given rise to mental health problems, and at times with harmful effects (Hao, 2025).

With AI promoting cognitive offloading, there is a huge concern regarding using this technology ethically and safely for instructors and administrators alike. The consensus is that meaningful AI use is not about efficiency alone, but about developing a *partnership* with technology which demands judgment, responsibility, and intellectual humility (Bowen & Watson; Khan, 2024). This new technology entails drastic modifications in teaching and learning when compared to the pre-AI *learning with technology* era (Mayer, 2010). With the introduction of AI, a new learning environment needs to be reformulated as AI continues to

trigger not only fear and doubt among educators but also a continual battle to catch up with the pace of disruptions.

Currently, one school of thought continues to adopt and adapt to AI, integrating it into teaching by means of guiding students how to tackle challenges with the introduction of concepts such as *cognitive offloading*, *hallucinations*, *algorithmic biases*, *misunderstandings*, *misinformation,* and *factual inconsistencies*. This method could help students develop or improve their high order thinking skills learning to "generate, process…sort complex information…think systematically and critically…take decisions weighing different forms of evidence…ask meaningful questions…to be adaptable and flexible to new information…be creative…be able to identify and solve real-world problems" (Dumont & Istance, 2010, p. 23). High order thinking skills can also be interpreted as inquiry, prompting, patience, judgement, critical thinking, and ethical awareness in the formulation of the new learning environment. On the other hand, the other school of thought which resists using AI, thinking continuous use would create a myriad of problems in thinking and learning, affecting the brain. In an article in *The Economist* (2025), related to AI use, researchers Risko and Gilbert (2016) are mentioned regarding *cognitive offloading* which can "shrug off difficult or tedious mental tasks to external aids" and explain that "once the brain has developed a taste for offloading, it can be a hard habit to kick" (p. 65). Similarly, Khan (2024) has suspicions and mentions the deeper ramifications when it comes to using AI in tasks such as writing or summary of the reading materials: "It isn't just the reader who ends up intellectually poorer. For the first time, authors no longer need a particular audience in mind….people will cease to write or read, delegating both tasks to generative AI" (p. 51).

Arguments for and against AI continue to lead to questions such as: Will it enhance or destroy students' our critical thinking skills described in this context as "observe, monitor, analyze, assess, and reconstruct thinking of many sorts in many dimensions of human life" (Elders & Paul, 2013, p. 2). Similarly, Anders and Speltz (2025) looked into AI regarding "both opportunities for enhanced learning and risks of skill erosion and dependency" (para. 1) and found that "human-AI collaboration strategies that augment rather than replace students' disciplinary expertise and creative vision….scaffolded experiential learning integrating AI literacies and metacognitive processes can promote effective AI collaboration and empower students to actively direct their own learning" (para. 1).

In addition to continuous reflection by educators, the integration of AI also requires re-calculating the *transformative approach to teaching* by means of re-considering AI and the interdependent core elements of *transformative learning* (Mezirow & Taylor and Associates, 2009) including *individual experience, promoting critical reflection, dialogue, holistic orientation to teaching, awareness of context, authentic relationships with students* (Taylor, 2009). As summarized by Noroozi et al. (2024), AI is both a *pedagogical disruptor*, creating doubt among educators as it becomes easier for students to use the output as if they were their own; and as *an amplifier*, creating ample opportunities and benefits which improves student competencies. Moreover, Holmes (2023) argues that AI technologies can deepen learning through adaptive feedback and generative content, provided that ethical guardrails are established. Similarly, Luckin (2025) emphasizes the need for *AI literacy* among educators to navigate issues of bias, transparency, and accountability. As early as 2017, Aoun listed three "new literacies" including *data literacy*,

*technological literacy*, and *human literacy* in his book *Robot Proof: Higher Education in the Age of Artificial Education* which were considered essential skills for students. Relatedly, a growing number of researchers (Touretzky et al., 2019; Vo & Pancratz, 2023; Bowen & Watson, 2024; Williams et al., 2024) pointed out that *AI literacy* was one of the various technology-related skill sets together with *digital literacy*, *computational literacy*, *data literacy*, among others. Researchers argue that effective student use requires not only technical know-how of AI, defined as *AI competency*, but also critical skills for interpreting outputs, detecting bias, and evaluating reliability. Instruments and programs for measuring and teaching critical AI literacy are emerging, signaling the field's shift from "do students use AI?" to "how well do they use it?" (Gu & Ericson, 2025).

Large-scale platform surveys and independent studies report very high adoption of AI, often above 60–80% among students and highlight that AI use is now a *mainstream student practice* rather than a marginal experiment (Kelly, 2024), and is used for tasks that range from idea-generation, summarizing to drafting written work. Additionally, a dominant technical concern, well-documented in empirical and practitioner literature, is the frequency with which generative models produce inaccurate or fabricated content, called *hallucinations*, including *invented citations* and *misinformation* (Bowen & Watson, 2024; Khan, 2024; Hao, 2025). Studies show that guiding students in using AI (Watson, 2024) requires verification, cross-checking, and source-skepticism which in turn, demands increased cognitive load and time-on-task, but they also appear to cultivate metacognitive habits (*fact-checking*, *source triangulation*). Moreover, scholars and policy reports have wrestled with how AI use intersects with academic integrity and ethical authorship. Research finds a spectrum of student behaviors, from responsible, transparently augmented work to misuse that undermines learning, and a concurrent institutional push to update assessment design rather than relying solely on punitive responses. Importantly, recent reviews by Lee et al. (2024) call for embedding ethics education and clear transparency practices into curriculum design to help students develop responsible norms of AI use. Akin to responsible norms, research recommends moving beyond the *binary ban vs. allow* debates: "By developing clear policies, providing targeted training, strengthening support systems and conducting continuous research, universities can ensure AI integration is both effective and ethically sound" (Farinosi & Melchior, 2024, p. 12). Effective responses include designing assessments which require reflective artifacts (logs, notes on how AI was used), scaffolded AI-literate practices, and professional development for instructors. Policy-oriented reports, such as the 2023 *US Department of Education, Office of Educational Technology Report*, emphasize institutional capacity-building (guidelines, staff training, assessment redesign) to support equitable and pedagogically sound AI integration (Cardona et al., 2023).

Emerging studies suggest that AI can accelerate idea generation and scaffold complex tasks, but meaningful learning outcomes depend on students' critical engagement. According to one research (Xu et al., 2025) "metacognitive support on college students' self-regulated learning enhances students' self-regulated learning (SRL) abilities particularly in terms of task strategy and self-evaluation, as well as optimizing their learning experience" (p. 1842). Self-regulated learning is "an active constructive process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, and behavior, guided and constrained by their goals and contextual features of their environment" (Pintrich, 2000, p. 2). One study concluded that "GenAI supports

learners to accomplish learning tasks while potentially reducing self-regulated learning effectiveness, and that metacognitive support is key to supporting effective regulation in learners' GenAI environments" (Xu et al., p. 1842). Conversely, unstructured or covert use can undermine learning by bypassing formative struggle. These findings align closely with this study's observations that students learn to view AI as a partner only after investing effort in verification and ethical reflection (Bowen & Watson, 2024; Wang et al., 2025).

Moreover, as a new learning environment emerges, it becomes critical to understand how values and beliefs of students can shift as well. The *belief-driven process of sensemaking* in this context is used as "building confidence as the particulars begin to cohere and as the explanation allows increasingly accurate deductions" (Weick, 1995, p. 133). Making sense of using AI ethically and responsibly depends on two related elements including a belief and an action: "The activities of relating are the sensemaking process. The outcome of such a process is a unit of meaning….And the connected elements are beliefs and actions tied together by socially acceptable implications" (Weick, p. 135). Teaching an educational research course using AI also followed Mezirow's (1991) *transformative dimensions of adult learning* since it required "intentional action, personal risk, a genuine concern for the learners' betterment, and the ability to draw on a variety of methods and techniques that help create a classroom environment that supports personal growth, and for others, social change" (Taylor, 2009, p. 14).

## METHOD

This study explored the lived experiences of five graduate students who volunteered to make sense of their interactions with ChatGPT-4o (hereinafter GPT4) in developing a diagnostic literature review assignment as part of a research course in the Spring semester of 2025. Diagnostic indicated that the assignment would not be graded for achievement. The remaining nine students opted out based on "doubt," "lack of knowledge," "environmental concerns," "not interested." and the "inequity" of AI. The instructor's *pedagogical encounter* (Patton, 2015) regarding how students experienced using GPT4 in an academic setting led to selecting the *phenomenological inquiry*, for this design "[explores] how human beings make sense of experience into consciousness, both individually and as shared meaning" (Patton, p. 115).

The central question of the study was: What are the experiences of students using GPT4 in developing their academic work? Triangulated data collected during the teaching of the research course included: 1) the instructor *analytic memos* (Saldaña, 2016, p. 44) produced during the teaching of literature review period; 2) student reflections based on their experiences using GPT4 in developing their literature review assignments; and 3) instructor and student post assignment conversations on making sense of AI.

The first dataset, which consisted of analytic memos, were analyzed using thematic analyses (Guest et al., 2012). In addition, *value coding* (Saldaña, 2016, p. 131) was used to analyze the second dataset which included student reflections on their experiences developing their assignments. Finally, *provisional coding* (Saldaña, p. 168) was used for the post-assignment conversations which took place between the students and the instructor.

These analyses revealed that teaching how to use AI was an obligation as it revealed a valuable exercise. Student interactions with GPT4 indicated a deep and evolving

understanding of how knowledge was created, verified, and ethically applied. The students also realized that with AI, they felt cognitively challenged, which they enjoyed and were motivated as they experienced that the assignment was attainable. In addition, they felt that creating an assignment with the instructor–student partnership provided them with a stress-free learning environment. Moreover, they felt that by using AI under the supervision of the instructor in a responsible manner, they were able to control the movements of AI rather than being controlled by AI.

While the instructor had experience using ChatGPT in teaching, to avoid nearsightedness, the second author, as an expert, provided accuracy and trustworthiness as part of *member checking* (Creswell, 2012).

**Pre-data Collection Phase**

Prior to introducing the data collection and analyses, it is pivotal to describe the context in which the assignments were created. The following section provides the reason for selecting this particular assignment which was used diagnostically rather than achievement purposes; outlining the work and the details of the instructions of the assignment.

*The Scope of the Assignment*

Since the introduction of Open AI's Chat-GPT, the instructor had instructed students to provide in-text citations and references in assignments when using AI in the research course. The reason for selecting a literature review assignment for this research was because the process required extensive writing as it was based on "publications containing such primary information, whereby the latter is digested, sifted, classified, simplified, and synthesized" (Manten 1973, p. 75). During the teaching process, the students were introduced to the difference between "summary" and "synthesis." In this context synthesis was the focus of a literature review assignment and served as an important skill since it necessitated building a comprehensive text using previous research findings and perspectives, giving due where it was necessary. The intention for selecting the free version GPT4 for this particular assignment was based on Anna R Mills's testing of the early use of the software GPT4 and her observations regarding what to expect which were detailed in the *Chronicle of Higher Education* (March 2023). Based on Mills's observations, GPT4 was suitable for its precise and connected prose and suitability for writing assignments. It had more varied sentence structure word choices.

The instructor had observed in previous research courses that some students had been taking shortcuts using AI with no references which entailed plagiarism. As part of the research course, had been taught about the ethical side of authorship and academic honesty. In short, they knew how to comply with the 7th edition of the APA style guide (2020). It became essential for the instructor to teach and guide the students in using these LLMs ethically as the new learning environment was not about identifying cheating or having students admit to their failure but about changing students' harmful habits into positive attempts, that is using AI ethically and constructively in their course which was based on *The Principles of Psychology* by William James (1918):

*For this we must make automatic and habitual, as early as possible, as many useful actions as we can, and guard against the growing into ways that are likely to be disadvantageous to us, as we should guard against the plague. The more of the details of our daily life we can hand over to the effortless custody of automatism, the more our higher powers of mind will be set free for their own proper work. (p. 122)*

The literature review section of the research course involved extensive writing with analytical and synthesis skills and was based on the Open Educational Research (OER) textbook which the instructor and four other colleagues had developed (Olt et al., 2025) which was being used in this course. The course was also designed based on the original core elements of the theoretical framework of the *transformative learning theory* which necessitated for the students to have "personal experience, critical reflection, and dialogue" (Taylor, 2009, p. 4). Moreover, it was important for students to become aware of the interconnectedness of these core elements as a fundamental step in learning how to make sense of AI. According to Taylor "these elements do not have interdependent relationships; they do not stand alone. For example, without individual experience, there is little or nothing to engage in critical reflection" (p. 4).

The students were taught how to develop their assignments entitled "a review of literature" using *the process approach to writing* (Leki, 1998) which involved academic writing, and particularly, *sequenced writing* with several drafts until achieving the final product. The academic writing process had two stages as follows.

### Step 1: Pre-assignment Meeting:

The aim of this Zoom meeting was to add awareness to the opportunities and limitations of AI as students were shown how AI could act as a thinking partner, a tool, rather than a shortcut to completing assignments (Bowen & Watson, 2024). The one-hour meeting took place prior to students working on their assignments and was based on sharing knowledge from three sources including: 1) a current source, *prAIority* by Toscani (2025); 2) one of the earlier sources: *Teaching with AI: A practical guide to a new era of human learning* by Bowen and Watson (2024), and 3) *The Unintended Consequences of Artificial Intelligence and Education* by Holmes (2023).

First, it was essential to "create a balanced approach to AI" (Toscani, 2025, p. 1) by introducing knowledge from *prAIority*: "Aristotle's Nicomachean Ethics, it draws on the virtues of episteme (knowledge), phronesis (practical wisdom), and techne (craft)" (p. 1). According to Toscani:

*AI emphasizes the importance of high-quality data (episteme) as the foundation for AI, addressing challenges such as data silos and ensuring data integrity. Second, AI systems (techne) should be designed to augment human decision-making, not simply automate tasks, while prioritizing ethical considerations like privacy and bias. Finally, human judgment (phronesis) remains crucial, guiding AI applications with practical wisdom to ensure they align with ethical standards and societal values. (p. 1)*

Second, the talking points of creating positive habits in using GPT4 ethically and constructively as well as effective prompting was introduced referring to one of the earliest

sources, *Teaching with AI: A practical guide to a new era of human learning* (Bowen & Watson, 2024). It was essential for students to re-think what AI entailed: "The implications of being able to process of virtually anything (data, images, computer code, DNA or brain waves) as language and at scale, however, is mind-blowing and needs careful consideration" (Bowen & Watson, p. 3).

Third, explanation regarding concerns and transparency came from a report entitled *The Unintended Consequences of Artificial Intelligence and Education* by Holmes (2023):

> *While these developments might appear exciting, AI also raises multiple concerns, such as privacy and security risks, harmful biases, job displacement, and other potentially negative impacts of AI on society. For these reasons, there is increasingly a need for transparency and accountability in AI systems, as well as greater attention to issues of disempowerment and social inequity. (p. 1)*

Although this assignment was used diagnostically rather than for achievement, the instructor observed that many students felt reluctant to experiment with AI. As full-time teachers in the K-12 system, they had only been using AI in their work such as curriculum development, some projects and as strategic tools to save time. With the instructor's encouragement five students volunteered to use AI with this assignment. They were also instructed to cross-check, refine, and re-construct their prompts; and pay attention to recognize the limitations of AI such as *hallucinated citations* (Watson, 2024), misinformation, algorithmic biases, misunderstandings. The goal of this stage was to prepare the students to develop their *academic critical literacy* (Appatova & Horning, 2023) as defined by Horning (2012):

> *The psycholinguistic processes of getting meaning from or putting meaning into print and/or sound, images, and movement, on a page or screen, used for the purposes of analysis, synthesis, evaluation and application; these processes develop through formal schooling and beyond it, at home and at work, in childhood and across the lifespan and are essential to human functioning in a democratic society. (p. 14)*

With this section, the students were able to check the *hallucinated citations* (Hao, 2025) and were surprised that some of the citations were made up. They also understood that this experience was not only a technological exercise but also a cognitive and ethical transformation. They became aware of the opportunities and limitations of GPT4; and seemed to have shifted their thinking, perceptions of learning, productivity, and academic honesty. This dataset indicated that it was fundamental to teach students the intricacies of AI to guide the students, to bring awareness regarding how they could use this technology to improve their education, rather than creating damaging losses. This would also prepare them for the changing workforce.

*Step 2: Assignment Instructions:*

Students were asked to complete a literature review assignment (to be used diagnostically; not be graded) using Open AI's ChatGPT-4, the free version. Once again, the instructions alerted the students regarding hallucinated citations in outputs as well as trained data with no permission. The assignment instructions required that the students submit four

screenshots demonstrating their academic writing using GPT4 including: 1) The first screenshot of their original rough draft. They were instructed to refrain from using any AI tools during this stage. 2) The second screenshot was their GPT4 prompts. They would provide their research topic, problem and a few references and as the LLMs with their literature review. The students were asked to refrain from uploading their original work, alerting them to the legal authorship which meant that these LLM's trained materials included copyrighted data without permission. 3) The third screenshot was the GPT4's fabricated output. 4) The final screenshot was the students' manual edits of GPT-4 output as a final draft. The edits had to be shown in red.

## Data Collection and Analyses

### Dataset 1: Instructor Analytic Memos

As part of the first dataset, the instructor observed and reflected on teaching the literature review section of the educational research course, and jotted down notes on index cards which made up the *analytic memos* (Saldaňa, 2016). Each *analytic memo* was "comparable to journal entries, blogs" and the "objective is instructor reflexivity on the data corpus" (p. 44). Due to the phenomenological design of the study, applied thematic analysis was utilized for the first data set because these data were smaller; covered "subjective human experience" which led to "subjective interpretation and extrapolation" (Guest et al., 2012, p. 17).

Because this was a new learning environment and students were expanding their digital mindset, it was essential to show students how to use AI. Analysis of the instructor analytical memos indicated that positive habit formation was fundamental in guiding students away from "cheating" as this was a major challenge in education. The memos indicated that while it was difficult to change the harmful habits of taking shortcuts, encouragement in using AI responsible proved to be effective as revealed in private conversations with students. The instructor notes ranged from "must provide guidance and share knowledge" to "form ethical attitudes." The instructor had a hunch regarding "providing guidance" and "sharing knowledge on AI" and phone calls and emails with students showed that it worked. The instructor also noted that the assignments included GPT4 as part of their in-text citations and references, which was a critical step in revealing that the students felt in control when using AI.

### Dataset 2: Student Reflections on Experiences Using ChatGPT4

With the emergence of the new learning environment, it was critical to ask students to provide their thoughts and perspectives on using AI based on their beliefs and values: "Technologies encode practices and values into the societies that adopt them. This happens in many ways, often unpredictably and unintentionally, as the second- and third-order effects of technologies" (The Consilience Project, 2022, para. 1). The students were asked to write their reflections upon completing their literature review assignments responding to one question which required a short response: What is your overall belief using GPT4 in your assignment? This question derived from making sense of using AI ethically and responsibly which depended on two related elements including a belief and an action (Weick, 1995). Hence, the importance of analyzing student reflections using *value coding* (Saldaňa, 2016):

"reflected a participant's values, attitudes, and beliefs, representing his or her perspectives or worldview" (p. 131). One important note with value coding is that "Though each construct has a different meaning, Values Coding, as a term, subsumes all three" (Saldaňa, p. 132).

The analysis demonstrated that the students became aware of their values, beliefs and attitudes regarding AI. While these reflections were limited as they were written texts, the consensus was that 1) integrating AI into an assignment was a "fun process rather than a chore;" 2) they felt that "the pressure was off" and they "could think better" when the instructor guided them and showed them how to use AI responsibly; 3) they were "surprised" to detect "fake information" and realized how some citations were "hallucinated;" 4) two students indicated that learning how to use the technology could "help them" rather than lead them to "harmful behaviors;" 5) one student confessed that "it was confusing…..took away from my thought process."

Following up with this the student who found it "confusing," the student clarified that this technology interrupted his thought process and made the assignment more challenging. This explanation was an example of how AI could affect some students' *stream of consciousness,* coined by William James in 1890, and was explained as thoughts which are not a series of separate events but an uninterrupted flow of experiences, perceptions, and feelings. In addition, one student also questioned the "environmental damage" caused by AI. This was also important as students understood the limitations of AI, including biases and environmental damages.

### Dataset 3: Post-assignment Informal Conversation

Once the assignments were submitted, the instructor held a conversational meeting with the five students. The data were analyzed using *provisional coding* which is "predetermined start list of codes prior to fieldwork" (Saldaňa, 2016, p. 168). The predetermined codes which the instructor listed derived from "literature reviews related to the study, the study's conceptual framework and research questions, previous research findings….the instructor's previous knowledge and experiences (experiential data), and researcher-formulated hypotheses or hunches" (p. 168) and included some of the following codes: *digital literacy, computational literacy, data literacy, AI literacy, AI competency, critical thinking, creative mindset, mental elasticity, human side of AI, cognitive offloading, ethical and responsible use of AI, hallucinations, hallucination citations, invented citation, misinformation, meaning-making, critical AI use, collaborative partner, study buddy, partner, technological process of AI, cognitive, affective, and ethical transformation; promises and limitations of AI, perceptions of learning, productivity, academic integrity, critical literacy.*

The post-assignment informal conversation did not only repeat the previous research findings but also verified the datasets analytic memos and students reflections. In addition, the findings aligned with the aforementioned "predetermined list of codes from previous fieldwork" (Saldaňa, 2016, p. 168) as listed below. Moreover, this section included a wide range of affective processes, including emotions and motivational beliefs as the students made sense of the new tool and their new learning environment.

Regarding the findings, each student is categorized as S1, S2, S3, S4, S5 when referring to individual perspectives. In case of a consensus among students, the students are referred to as "all students" as indicated below.

- All students found the assignment valuable. They not only felt that they were more "relaxed" but also were able to "think better."

- All students viewed the process as a "collaborative force" between the instructor and themselves and "appreciated the approach" from which they "learned a lot."

- S1, S3 and S4 confessed that they could generate texts using AI in a "fast manner" and thus, viewed the tools as "convenient" and "helpful." This experience made them quickly discover that when used correctly and ethically, it "was time consuming" but "well-worth" it.

- S2, S3, S4 admitted to using AI due to the quantity of their academic work. They described the situation which was categorized as cognitive offloading by the researcher.

- All students agreed that this assignment was a "challenging" process, they were "unable to get what they wanted" or it was "frustrating;" but then, they became "curious" and "relaxed." They felt the more they understood the mechanism, the more they were able to "feel confident" which they considered a "valuable experience."

- S2, S3, S4 admitted to the importance and intricacies of effective prompting. Once they started experiencing and grasping what "effective prompting" entailed, they were able to receive "better" results. They stated that it took a "few tries."

- All students became aware of the ethical side of AI, what *algorithmically biased* concepts entailed; and how these tools "ignored equity" and "could not be trusted" at face value.

- All students understood the meaning of *hallucinations* which gave them awareness in critically analyzing the incoming information. The experience they described was similar to that of media and information literacy (MIL) presented by UNESCO (n.d.): "ability to engage critically with information, navigate the online environment safely, and help build trust in our information ecosystem and in digital technologies" (n.d., para. 1).

- S3, S2 and S5 admitted that their perceptions of AI tools "shifted." First they confessed that AI was a tool to do most of the work for them since they had no time for extensive writing assignments. Following this experience, they admitted that AI could be utilized as a "support mechanism" rather than a tool to "do the work for us" which meant that AI was now considered a "valuable source" rather than a damaging habit of "copy, paste, submit the assignment," and was not what learning meant.

- All students gained a balanced perception of AI's capabilities which was "fun," "productive," which gave them "confidence" and "opened up another avenue."

- S1 and S4 indicated that rather than inadvertently "creating a shortcut," using AI responsibly would improve their skills such as "problem-solving," "ethical judgment," "critical analysis;" and "decision making."

- S1, S2, S5 indicated "betterment" making them think, rather than opening up avenues for using AI unethically.

- S2, S3, S4 explained that in "this partnership" they would not allow AI to be "in charge." They had the "control" to "maneuver the technology" the way they wanted it.

- S3 brought up the "environmental damage" caused by AI and questioned the "unethical side" of AI.

- S5 questioned the process by explaining how AI "affected his thought-process." He felt "disturbed" and "confused" by the ChatGPT output. When asked, other students did not have a similar experience.

# RESULTS

In sum, the three datasets revealed that student experiences were similar to previous study findings in that interactions with GPT4 indicated a better understanding of how knowledge was created, verified, and ethically applied. While initial responses to GPT4 ranged from "uncertainty" and "reluctant," "curiosity" to "integrity," "awareness" as the students indicated that they ultimately "felt growth" in both "ethical awareness" and "critical analysis;" and praised the "collaboration triangle" including the instructor, the students and AI.

Due to the small sample size, this study was limited and could only be generalized to similar environments and subjects. Although limited, the aforementioned specific results confirm many previous studies in that embracing AI's potential and teaching how to use AI could be a game changer for contemporary education. In addition, on one hand, it would be critical to "advance these limitations" (Creswell, 2012, p. 199) such as expanding or replicating this type of research with larger samples which could expand the aforementioned findings, possibly, leading to significant conclusions and implications. On the other hand, it is critical to note the date of this research (2025) and the training developments of AI which continue to change the education world rapidly. Hence, the replication of this research could present totally different findings.

# RECOMMENDATIONS FOR FURTHER RESEARCH

This research was not about whether students used AI, but what meanings they attached to those interactions. The literature on AI still needs more longitudinal studies to examine *the belief-driven sense making process* (Weick, 1995) of AI regarding how ongoing conceptions of knowledge, authorship, and trust evolve over time for students. Additionally, a need for intervention studies that test specific pedagogical scaffolds for developing critical AI habits is also critical.

# CONCLUSIONS

The integration of AI resulting in formulating a new learning environment represents a profound transformations of education. For both educators and students, it is not simply a matter of mastering the new technology with multitude tools but of reimagining the very process of teaching and learning including curriculum, instruction, course design and assessment. When students are taught to use AI responsibly, they develop metacognitive

awareness, ethical judgment, and stronger research literacy. Rather than accepting AI output uncritically, they learn to evaluate, validate, and reflect on its role in their thinking. Importantly, responsible AI integration preserves productive struggle by encouraging engagement with complexity rather than bypassing it.

It is important to note that this study contributed to the growing body of scholarship that views AI not as a threat to authentic learning, but as a catalyst for deeper inquiry into what it means to be an intentional, critical, ethical, and responsible learner in the age of intelligent technologies. Student-sensemaking of AI provides essential guidance for educators and institutions striving to integrate AI ethically and responsibly in defining the new learning environment which necessitates changing teaching practices to introduce and promote AI literacy, ethical decision-making, and self-regulated learning.

With this study, the authors also aimed to provide practical guidance by suggesting several actionable strategies which can support students and their meaningful relationships with AI in this new learning environment. Students' own reflections and awareness serve as important points of illumination. The authors believe that discussions about tools and strategies for integrating AI into courses require collaboration among all stakeholders so that ongoing changes offer students thoughtful, effective guidance. With these purposes in mind, the following strategies are presented for educators.

Instructors can give students explicit, low-stakes opportunities to use AI with clear instructions and reflection points. Structured tasks can help students recognize hallucinations, learn and practice effective prompting, compare AI output with human-created resources, and reflect on their learning processes. For example, an AI log in which students document prompts, outputs, hallucinations, and revisions can be useful. Students in this study benefited from reflecting on their experiences with AI. Short reflective tools, such as prompts asking how AI affected their thinking, what hallucinations they detected, where AI supported or interfered with their learning, and how they verified academic integrity, can further support this awareness. Providing a brief reflection sheet before and after using AI is a simple way to integrate this practice.

The authors think that AI use may influence students' confidence as they gain practice with prompting. Mini lessons on prompt structure, examples of tiered prompts ranging from simple to complex, and checklists for improving prompts can strengthen students' skills. Because students can be surprised by fabricated outputs, every AI-related assignment can require hallucination checks, citation verification, comparison with peer-reviewed sources, and documentation of how accuracy is confirmed. A verification form where students attach screenshots of AI responses and describe their verification steps can support this process. A simple, memorable set of ethical questions can help students evaluate their AI use before submitting work. These might include prompts such as: Is this use permitted by the assignment? What part of this work is authentically mine? Did I verify the accuracy of AI-generated information? Students also can learn through trial and error. Instructors can require early drafts, ask students to compare different outputs, and discuss why certain prompts produced more effective results. Because some students may raise concerns about equity and environmental impact, instructors can incorporate brief discussions or short readings on algorithmic bias, environmental costs of AI systems, data privacy, and the hidden labor behind large models. Finally, students feel more confident when expectations are clear. Course policies should specify what types of AI use are allowed,

what must be cited, what constitutes misconduct, and when AI can be used as a support rather than a primary source.

To conclude, AI is moving so abruptly that it is paramount for the world of education to find avenues which must move beyond policies. No matter how fast the technology changes, educators must regulate AI use by creating intentional frameworks to promote responsible engagement, transparency, and equity. Professional development for educators should emphasize reflective practices, design thinking, with an emphasis on AI literacy and competency. Additionally, this new learning environment should encourage experimentation, ethical reasoning, and authentic collaboration with AI. Ultimately, the goal is not to resist or surrender to AI at face value, but to adopt and adapt to wisdom, to cultivate an educational ecosystem where human curiosity and compassion remain at the center of technological progress.

In this shared journey of adaptation, educators and students alike are reminded that the true measure of intelligence, whether human or artificial, lies in its capacity to learn, reflect, and create meaning for the common good. Since there is no option of reversing or stopping the further development of this technology, it is a moral obligation to teach students how to move forward responsibly despite some of AI's fake characteristics.

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