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Artificial Intelligence: Between Scientific Innovation and Human Responsibility**

## **Artificial Intelligence in Learning: Between Cognitive Innovation and the Responsibility of Preserving Human Curiosity**

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### **Abstract**

Artificial intelligence (AI) has reshaped the world in different ways. This impact extends to fields of learning and education. Such technologies are considered revolutionary tools in these fields. AI has altered different areas of education, including pedagogical training methods. Its advances are unlimited in time-saving, lessen effort, self-reliance in learning, and autonomous answers. Despite the advantages mentioned above, the use of AI in education and learning is not without flaws, particularly in critical thinking and problem-solving. It provides learners with ready-made information. As a result, it blocks the main human features of using their mindsets in thinking and problem-solving. One of the intrinsic features of human beings is curiosity, which drives them to find and learn more about anything they encounter. These tools have their own challenges in making the surface learning is the dominant than the deep learning. There are many ethical issues are related to using AI in learning and education, such students' privacy, bias and confidentiality. The governments must play crucial roles in establishing a set of rules and restrictions that control the use of these technologies in such fundamental fields. We must not forget teachers' responsibility and the roles that might have in restricting such tools. Because if teachers continue use AI programs and encourage students to do the same, the role of teachers will be passive in the future.

**Keywords:** Artificial Intelligence, Education, Critical Thinking, Teacher Responsibility, Ethics, Curiosity

### **1. Introduction**

The innovation and development of artificial intelligence have extended to different aspects of life. The use of AI technologies in the educational field has made a remarkable contribution to improving and reshaping traditional teaching and learning methods. The impact of these tools has been evident in fostering pedagogical methodologies that enhance both the effectiveness and equity of learning (Chen *et al.*, 2020, p.75264) <sup>[5]</sup>. The implications of AI technologies in education have increased day by day. The use of such tools enhances students' cognitive abilities, broadens their awareness and gives them the chance to be self-dependent learners. Despite its many advantages, AI faces significant challenges and flaws regarding the ethics of learning and education. The most affected aspect of using artificial tools is curiosity, which is considered the key driver of deep "learning through exploration and information acquisition" (Sun, Qian and Miao, 2022, p. 1) <sup>[20]</sup>. So, this study focuses on the advantages and disadvantages of applying such technologies in educational domains and on the responsibilities imposed upon developers, governments and teachers to preserve humankind's innate curiosity.

This study tries to encourage students and teachers to use their innate abilities to explore and find authentic sources of acquiring knowledge. As educators, we have to consider these tools as supporters rather than replacements. The questions are: to what extent do AI tools affect learning outcomes and human curiosity? What are the developers', teachers' and learners' responsibilities concerning the ethics of employment of such tools?

## 2. Literature Review

John McCarthy (2007) <sup>[12]</sup> classifies the principal difficulty as the requirement for programs that "deal with the common sense informatic situation [which is often incomplete, changing, and complex]" (p.1174). McCarthy offers major points, including elaboration tolerance, formalized contexts, and self-analysis, which enable AI to imitate human intelligence. Therefore, this article is important for readers because it explores creative methods to achieve human-level AI that address the complexity of information, and "they should be designed so as to excite neither fear nor sympathy"(McCarthy, 2007, p. 1181) <sup>[12]</sup>.

In their present article, Academic Integrity in the Time of Artificial Intelligence: Exploring Student Attitudes, Benke and Szöke (2024) <sup>[2]</sup> show the diverse perspectives among students, who see the prospect of AI as a means to improve efficacy and uphold innovation. At the same time, they worry about ethical matters such as deception, academic dishonesty, and diminished creativity. Benke and Szöke focus on the unfathomable influence of artificial intelligence AI on academic values within "a constantly changing world characterized by volatility, uncertainty, complexity, and ambiguity (VUCA)"(p.91). On the one hand, they highlight the need for adaptability and evolution in the educational and personal arenas, including ethics and academic integrity. Additionally, Benke and Szöke underscore the pivotal role of cooperation between educators and policymakers in creating a learning milieu that benefits from AI's prospects while upholding ethical issues among students.

Hasan (2025) <sup>[9]</sup>, in his article titled How AI quietly undermines the joy and effort of learning: a call for rebalancing education in the digital age, focuses on the pivotal role of artificial intelligence in educational institutions. He focuses on the potential advantages of AI as well as its flaws and effects. Hasan (2025) <sup>[9]</sup> argues that excessive reliance on AI "diminishes the satisfaction that comes from overcoming challenges through personal effort" (p.4693). In other words, this technology should be a supplement, rather than an alternative to, human effort, calling for a "cultural shift in how both educators and students perceive AI" (p. 4693). Eventually, the article calls for readjusting AI's use and its role to uphold the intellectual evolution and maintain the core of the teaching operation.

Saini and Goel (2019) <sup>[18]</sup> examine technological evolutions in their comprehensive review, underscoring the multifaceted role of these technologies in upholding educational quality. They highlight the integration of innovative classroom technologies to enhance interaction between students and teachers, including information communication technology, machine learning, sensor networks, mobile computing, and hardware. Therefore, Saini and Goel's (2019) <sup>[18]</sup> review asserts that the synergistic integration of hardware and software advances can transform old classrooms into responsive and intelligent learning milieus. Also, it can identify "new research opportunities and challenges that need

to be addressed for the synergistic integration of interdisciplinary works" (p. 1).

Gezgin's study (2024) <sup>[8]</sup> is a crucial contribution to the literature, presenting a practical examination of the relationship between chatbots and students' learning in educational processes. Gezgin in his article distinguishes between deep and surface learning, focusing on the deep impact of chatbots on students' interactions and learning methods. So, Gezgin (2024) <sup>[8]</sup> sees that "chatbots facilitate access to information and support learning processes by providing students with personalized learning experiences" (p.638). Further, Gezgin asserts that the frequent use of these programs can enhance deep learning. Therefore, this study provides researchers and students with valuable insights for those aiming to evolve education that depends on AI technology to uphold critical thinking.

## 3. Theoretical Framework

This work is based on Berlyne's (1960) <sup>[3]</sup> Theory of Curiosity. Berlyne states that curiosity consists of three main components, including "novelty, complexity, and uncertainty". According to him, if someone finds a challenge or an unsolved problem, he is intrinsically driven to explore it further. The conditions mentioned above are essential; if any component is missed, curiosity will be lowered. The crucial idea in his incorporated approach is the concept of 'collative variables'. These external elements essentially attract our attention and motivate our curiosity. As Berlyne (1965) <sup>[3]</sup> explains, "The probability and direction of specific exploratory responses can apparently be influenced by many properties of external stimulation, as well as by many intraorganism variables" (cited in Oudeyer, Gottlieb & Lopes, 2016, p. 29) <sup>[13]</sup>.

Employing AI tools in the educational context can impact curiosity triggers. For instance, these tools most often provide students with instant autonomous answers to any question or inquiry. Such risk leads students to lose a sense of uncertainty about the knowledge they acquire and to avoid complex matters. As a result, this leads to learners' curiosity. Another example, "the schoolteacher, when she asks the class to attend to what she is saying, is not content to rely on central filtering processes but expects her pupils to be seated in front of her with faces and eyes turned in her direction" (Berlyne, 1960, p.78) <sup>[3]</sup>.

Using AI tools in the educational field has both advantages and challenges. In psychology, curiosity is often grasped through the perspective of intrinsic motivation, as described by Ryan and Deci (2000) <sup>[17]</sup> "doing something because it is inherently interesting or enjoyable" (p. 55). In contrast, extrinsic motivation, as Ryan and Deci (2000) <sup>[17]</sup> proposed, is "doing something because it leads to a separable outcome" (p.55). So, the intrinsic motivation is a primary phenomenon for teachers because it is a "natural wellspring of learning and achievement that can be systematically catalyzed or undermined by parent and teacher practices" (Ryan and Deci, 2000, p.55) <sup>[17]</sup>.

One of the fundamental responsibilities is to ensure that AI tools support human learning rather than completely replace it or dismiss essential cognitive skills such as critical thinking, problem-solving, and deep understanding. Teachers, in particular, must lead their students and raise their awareness of the negative consequences of AI tools on their way of thinking and learning materials. Learners must be taught that such tools are meant to be assistants, rather than

dismissing our cognitive abilities.

Students must be responsible for their own knowledge and do their best to go beyond surface learning by using different authentic resources. They should remain cautious about relying solely on information provided by AI tools, as such reliance often leads to a superficial understanding. Instead, learners should aim to cultivate deep learning, focusing on critical engagement, analysis, and meaningful comprehension of complex concepts.

Therefore, Berlyne's (1960) <sup>[3]</sup> focus on arousal and curiosity provides a basic understanding of why the internalization of motivation leads to greater student interaction and why alienation emerges when motivation remains external and detached from intrinsic curiosity.

#### 4. The Role of AI in Education

Artificial Intelligence (AI) is technology that enables intelligent machines, software, and hardware to perform tasks that typically demand human intelligence, such as analyzing information, making decisions, and understanding language. So, it is "the ability to develop and imitate the decision-making process adopted by people" (Fahimirad and Kotamjani, 2018, p.109) <sup>[7]</sup>. Artificial intelligence has become a significant part of increasing the quality of learning and teaching processes. Therefore, it offers new prospects and challenges to education. In other words, it has the possibility "to make effective changes in the core design of institutions in higher education" (p.107).

In addition, these advanced technologies and innovations can reconstruct the structures of educational institutions, changing decision-making processes and the framework through which education is presented. Moreover, the synergistic integration of AI has the potential to create more tailored, productive, and effective learning milieus personalized to the necessities of each student. In so doing, Popenici and Kerr (2017) <sup>[15]</sup> assert that the future of higher education is deeply "linked with developments on new and computing capacities of the new intelligent machines" (p.1). Therefore, setting students at the core means that educational institutions and approaches are prepared to directly address students' needs and challenges, making learning effective and more tailored. In addition, AI technologies can present an accessible learning style. For example, it can adapt to students with disabilities, such as visual or hearing impairments, worldwide. So, these AI tools have the potential to "inspire the people to take advantage of AI in higher education, motivate learners and teachers to be more engaged in the learning and teaching process" (Popenici and Kerr, 2017, p.108) <sup>[15]</sup>.

Supporting AI technologies can change educational environments. Students sometimes confront economic challenges; thus, using AI is a good choice to solve some of their issues. Integrating machines with human intelligence is possible, and this matter is considered a challenge for teachers in finding new technological innovations, functions, and teaching methods in various educational frameworks. Schleicher (2012) <sup>[19]</sup> emphasizes that teachers should be "agents of innovation not least because innovation is critically important for generating new sources of growth through improved efficiency and productivity" (p.36). In other words, to increase our skills as AI technology quickly grows and gets its benefits, teachers should change how they teach, and they need to be "high-level knowledge workers who constantly advance their own professional knowledge as

well as that of their profession" (Schleicher, 2012, P.36) <sup>[19]</sup>. So students develop the skills they necessity for today's competitive world.

In academic institutions, AI plays a pivotal role in upgrading the quality of education systems by determining the topics of courses where students challenge the most. Teachers "might not always be cognizant of gaps in their educational materials which can lead to students' confusion" (Fahimirad and Kotamjani, 2018, p.110) <sup>[7]</sup>. Furthermore, AI can help teachers provide feedback and improve lessons, permitting students to understand the lessons better. In addition, AI technology permits tailored learning processes. It can personalize course content to match individual students' learning preferences and concerns.

As a result, teachers with the potential to use AI technologies for their educational materials can obtain the benefits of automatic information generated from students' interaction. So, integrating digital information systems, specifically those supported with AI technologies, has changed the way educational milieus roles.

Besides these specific methods, these systems can evaluate the grade of students' interaction during learning activities. Therefore, using AI technologies can help teachers administer the classrooms adequately, reduce the number of tasks, implement effective strategies to evaluate student performance, and save time on lesson planning.

#### 5. Human Curiosity and the Impact of AI

Curiosity can be defined as "the impulse towards better cognition." (as cited in Kidd & Hyden, 2015, p.2) <sup>[11]</sup>. It means that people naturally desire to learn more and acquire knowledge. Curiosity is fundamental to human nature; it motivates people to grasp and discover the world around us. However, its significance and how it clearly appears in our lives have received little attention in other debates or studies, as they are juxtaposed with other psychological characteristics. So, curiosity is "a basic element of our cognition, yet its biological function, mechanisms, and neural underpinning remain poorly understood" (Kidd & Hyden, 2015, p.1) <sup>[11]</sup>.

Furthermore, Burke (1860) <sup>[4]</sup> proposes curiosity, which he defines as "the most superficial of all the affections, it changes its object perceptually, it has an appetite which is very sharp, but very easily satisfied; and it has appearance of giddiness, restlessness and anxiety" (p.41). In other words, all these seemingly simple activities make curiosity a powerful initial driver that engages different areas of the mind and encourages us to think critically. Consequently, curiosity can be seen as a shallow desire, since our interest in things fades away quickly if we understand the idea. Hence, curiosity can stimulate learning and exploration, but relies on being enhanced by more extensive motivation for permanent understanding.

Considering the issues of researching curiosity during the 20th century, Daniel Berlyne differentiates between 'perceptual versus epistemic curiosity' and 'specific versus diversive curiosity'. On one hand, he argues, there is 'perceptual curiosity', which refers to "states of high arousal that can be relieved by specific exploration and in which, therefore, specific exploratory responses are likely to occur" (Berlyne, 1960, p.195) <sup>[3]</sup>. Epistemic curiosity is a "drive aimed not only at obtaining access to information-bearing stimulation, capable of dispelling uncertainties of the moment, but also at acquiring knowledge" (Kidd & Hyden,

2015, p.3) <sup>[11]</sup>. He described it as curiosity that applies mainly to humans, motivating them to learn more profoundly and search for new information. So, the curiosity of humans is distinct from that of other kinds.

In addition, epistemic curiosity is an essential in learning and education because it "has a particular relevance to learning in an academic setting" (Pluck & Johnson, 2011, p.25) <sup>[14]</sup>. However, the focus on curiosity in education is not new, but it has been explored for a long time. Many scholars agree that curiosity is the driving force for learning, particularly when intrinsically motivated rather than dependent on intelligence (Pluck & Johnson, 2011, p.24) <sup>[14]</sup>. Even if teachers do not completely change their teaching style, the easy methods in effective learning, including "providing regular feedback and assessments of students' current state of knowledge may aid teachers in enhancing learning via increased curiosity" (Pluck & Johnson, 2011, p.29) <sup>[14]</sup>.

From these observations, it can be inferred that curiosity is an essential instrument used to support academic learning and gain, and use knowledge. According to the psychologists, there are two approaches to learning and information processing: deep and surface learning. Deep learning focuses on "students actively processing, understanding, and thinking critically about information" (Gezgin, 2024, p.639) <sup>[8]</sup>. This method drives students to observe gaps in their information to "make connections between the information they have learned, to explore the principles and theories underlying the topics, and to apply the knowledge learned to new and different situations" (Gezgin, 2024, p.639) <sup>[8]</sup>. On the contrary, surface learning is a technological tool that relies only on "memorization of facts without understanding their underlying principles" (Gezgin, 2024, p.640) <sup>[8]</sup>. In other words, students focus on memorizing and studying to pass the exams and will never take advantage of such learning, as it is merely stored in short-term memory.

Ultimately, it is imperative to discover which type of learning is dominant in the era of artificial intelligence. It is pointed out that AI has opened a new era in the field of learning and education; however, it still has limitations that prevent it from replacing teachers' unique abilities. Although pedagogical tendencies that support the use of AI in teaching processes exist, these technologies may hinder the students' and teachers' curiosity for deep learning. AI technologies often struggle to examine "irony, sarcasm, and humor is marked by various attempts that are reduced to superficial solutions based on algorithms" (Popenici & Kerr, 2017, p.2) <sup>[15]</sup>. These forms of expression rely strongly on nuanced human emotions, creativity, and critical thinking. Deep learning is gradually fading as most students now rely on the easiest ways to acquire knowledge and end up sharing the same limited pool of information.

## 6. Ethical Issues Concerning Using AI in Education

AI tools have impacted education and learning systems. They offer remarkable advances and notable challenges. It is noted that the implementation of AI in education has considerable shortcomings and may fail to fulfil its intended purposes, such as "information privacy, algorithmic bias, and the possible reduction of human interaction" (Rasul *et al.*, 2023, p. 3) <sup>[16]</sup>. Additionally, the repeated use of AI is considered a concern, which enhances surface learning, which students "use chatbots may indicate that they use chatbots to pass the course" (Gezgin, 2024, p.648) <sup>[8]</sup>.

Consequently, data privacy is considered the most critical ethical issue in the integration of AI into institutional education. AI tools use students' data, like behavioral patterns and academic records, to enhance their algorithms that fit the students' needs. Another issue is that the algorithmic bias is embedded in these tools. They often lack balanced data on gender or race, social class, and learning abilities. In other words, "ChatGPT-generated text may contain factual biases due to biased training data, which could perpetuate misconceptions held by learners" (Rasul *et al.*, 2023, p.8) <sup>[16]</sup>. Therefore, students must be aware of their generated thinking, considering the facts and information they gain through using such tools. Learners know that the outputs of such technologies are not always authentic and that they need to discover this for themselves in different ways, such as by comparing diverse sources to "identify potential biases or inaccuracies to construct an accurate understanding of the topic" (Rasul *et al.*, 2023, p. 8) <sup>[16]</sup>. Moreover, Khan (2024) <sup>[10]</sup> asserts that "transparency, accountability, and fairness" must be fundamental principles in environments where AI tools are used. The aim of using these tools is to promote some areas rather than creating disparities (p.5). Nonetheless, to solely understand the AI's prospects, it is essential to address ethical matters. The core values to consider when integrating AI tools into education are confidentiality, fairness and transparency. Prospering this method will foster both the quality and efficacy of learning and "help to avoid many social and moral problems associated with technological innovations" (Dzhorobaeva, Mamadalieva & Kaliev, 2025, p. 80) <sup>[6]</sup>.

Ultimately, one of the main ethical issues relevant to research design is plagiarism and dishonesty. Many students never consider the original author's rights and submit ready-made assignments as their own work. Almost all researchers, learners and AI critics agree that these tools don't respect students' privacy and use their data in unauthorized ways. Therefore, addressing AI-assisted dishonesty is vital for preserving academic integrity and enhancing equal opportunity learning. Teachers and students must be aware of AI technology's potential and be able to distinguish between ethical use and dishonest conduct. So, Aust and Caukin (2024) <sup>[1]</sup> assert that "by sharing knowledge, experiences, and strategies, we can collectively support academic integrity and promote genuine learning experiences for all students, ensuring that AI enhances rather than undermines educational outcomes" (p. 76-77).

## 7. Conclusion

Every innovation is considered to be a coin with two faces. The innovation of AI and its applications in teaching and learning domains has many benefits as well as many challenges. It is known that AI technologies have revolutionized the domain of education. Many traditional ways of learning and training have disappeared due to the employment of AI tools. Teachers have to compete with these technologies and enhance their potential, which is relevant to methods. Therefore, learners never mistrust their teachers and use such techniques to support their knowledge attainment. The excessive use of these technologies has its own impact on the most prominent aspect of human beings, curiosity. It is considered one of the intrinsic properties that makes humans unique from other species. People begin to rely less on their cognitive abilities to think critically.



Deep learning seems to be fading, whereas surface learning is becoming dominant. It has been found that there are many ethical issues related to using these tools in educational environments. These issues include information privacy, algorithmic bias, and the possible reduction of human interaction. Developers must be held accountable for implementing restrictions that respect students' data privacy. The government must have a hand in establishing such rules that preserve students' privacy and confidentiality. Finally, educators must take into consideration that AI tools are only assisting their needs, not replacing their roles of interaction. They need to use their mindsets and think critically, view different authentic sources about any phenomenon that they might confront.

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