EDUCATION AND CRITICAL THINKING IN THE ERA OF ARTIFICIAL INTELLIGENCE: A PHILOSOPHICAL APPROACH

By

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Abstract
Education has been a key human endeavor from time immemorial; it is the chief means of transferring culture from one generation to another. Education is the product of human consciousness, language and critical thinking. Critical thinking is the ability to employ or cultivate in life activity a clear, analytical and logical thinking in everyday human actions. With the invention and deployment of Artificial Intelligence in the society, so many benefits were introduced but so many other things were lost as well. Artificial Intelligence is the procedure and engineering of making computer systems intelligent so as to do things which require human intelligence. It would seem that teaching and learning will become easier with the help of Artificial Intelligence, but the reality on ground shows that Artificial Intelligence is rather reducing the application of human critical thinking in everyday life. The paper sets out to outline some of the opportunities of education in the field of Artificial Intelligence and to also mention areas AI has 'impeded' the development of critical thinking and apparently encouraging laziness among researchers especially among young students. The research employs the method of analysis to juxtapose the advantages and challenges of Artificial Intelligence to education and critical thinking. The benefits of this paper cut across department in the education sector and human endeavors especially in logical reasoning since it promises to improve our understanding and application of Artificial Intelligence in teaching and learning and also enhances critical thinking particularly among young researchers. The research did not guarantee to have exhausted everything concerning education, critical thinking and Artificial Intelligence.

Keynotes: *Education, Critical Thinking, Artificial Intelligence, teaching and learning, advantages and disadvantages*

1. Introduction

Human beings among all created things have organized ways of training and transmitting to their young the required skills for survival in a world full of competitions. It was Charles Darwin who observed human conditions and rightly stated that we live in a world of 'survival of the fittest'. Survival of the fittest "means that the most evolved organism in a given environment is the organism that is at the top of the food chain in that

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environment. According to this definition, therefore, the organism that is most able to ensure its own survival, most able to serve its self-preservation, is the most evolved."[1] In order to survive the precarious world, it becomes necessary to learn either by observation or through direct instructions. Human society has metamorphosed from the Hobbesian utopian state of nature where life is seen to be solitary, nasty, and brutish and short to the current complicated lushly living where the world has become a global village. With this knowledge, humanity rose into prominence (at least according to their judgment), from hunter gatherer tribes humanity developed into agricultural societies. Learning how to develop land and use it to grow crops. Not so long after cities were built, hubs of knowledge, trade, and human interactions expanded; creating an environment that encourages people to always strive to be better than others. Causing sudden sprouts of human ingenuity to emerge and further push the limits of human knowledge and wisdom. Formal education is the means of transferring culture from one generation to another in an organized and conducive teaching and learning environment, while informal education can take place anywhere, within the family, community and the church or mosque. Teaching and learning is enhanced by the use of instructional materials which is aimed at helping the teacher to drive home his thoughts and also help the learners to understand better what they are taught. With the constant move from crude instructional materials like abacus to sophisticated ones like the use of computers, teaching and learning seems to be easier.

The educational system questions if students who are being prepared fail to be critical thinkers and have the necessary post-truth era skills for survival. Critical thinking acquires new meaning to different people at different epochs. As time progresses society and educational systems as a whole must as a matter of necessity adapt to the changing times including the technical society that is swiftly forming. The increasing integration of artificial intelligence (AI) across various sectors of human endeavors has yet to be fully embraced by the educational field, which struggles to find a balance between technology and traditional methods. However, the prospect of introducing artificial intelligence technologies in education sector is valuable, leading to student-centered learning opportunities. Artificial Intelligence, a transformative force in societies, can potentially alter the educational setting (and has indeed altered it), contributing a new way for student engagement in learning. However, the utilization of AI in education sector must be approached carefully to ensure it reinforces rather than diminishes critical thinking skills. An over-reliance on AI for problem-solving or generating content could lead to a passive learning approach, counterproductive to the goal of developing active, critical learners.

2. The Idea of Education

Ever since the dawn of civilization, education has always been a significant part of human civilization and socialization. Through education the prudent and elderly could pass down their knowledge to the fresh and youthful minds of the next generation to guarantee continuous human existence. "Education is a learning process carried out formally or non-formally with the aim of providing knowledge, educating and developing the potential in each individual. In addition, education is an effort that can change the attitudes and behavior of each individual or group in the form of maturity through the learning process."[2]

Education not only plays a role in developing the knowledge of a person or group, but

education also plays a role in the formation of each individual's personality, including in moral and ethical matters. Education is carried out to develop reasoning and judgment, so that students can prepare themselves or others for their immediate and future survival. When we look back to the Greeks, of course, we find the connection between the love of wisdom and a preoccupation with education to be far from accidental. Plato's lengthy discussion in the *Republic* of the kind of education that the guardian class and the philosopher-king should receive is hardly a secondary issue in Plato's conception of the just state, nor is the question of education ultimately separable for Aristotle and many other classical thinkers from one of philosophy's most basic concerns: the nature of the good life.[3]

3. The Conceptualization of Critical Thinking

Man is a thinking being. The term 'critical thinking' was first used to describe an educational goal by the most celebrated American Philosopher John Dewey, who called it 'reflective thinking.' He defined it as "active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusions to which it tends"[4] In today's fast-paced, globalized world, the importance of critical thinking skills cannot be overstated. "Critical thinking is indispensable for evaluating information, solving problems, and making informed decisions, both in academic and real-world scenarios."[5] The conceptualization of critical thinking in the academic world is remote from monolithic, reflecting the complex nature of this cognitive skill set. Several scholars have undertaken the onerous task of defining and dissecting the elements that constitute critical thinking, often yielding nuanced, multi-layered viewpoints. Abrami et al. in *Review of Educational Research*, for instance, stated that "critical thinking is not a singular ability but rather a spectrum of skills ranging from analysis and evaluation to synthesis and problem-solving."[6] As such, critical thinking is a set *skill*. It's not something you can just memorize or look up, it's a multi-dimensional skill. *By* analyzing or evaluating actions or policies, it is also *judgmental.* Critical thinking is a learned skill that requires instruction and practice. Darwin and Diyenti Rusdin opined that:

> This view aligns well with Bezanilla et al. study, which explores the development of critical thinking skills through diverse educational methods. Together, these works advocate for a broad understanding that encompasses multiple dimensions, such as analysis, context discernment, evidence evaluation, and reasoned conclusions. While the multifaceted nature of critical thinking is widely acknowledged, there is also a growing emphasis on the role of questioning and skepticism in academic contexts.[7]

Slavin et al. "research offers an insightful angle by arguing that critical thinking fundamentally involves the questioning of established norms and accepted wisdom."[8] This viewpoint is further corroborated by Alsaleh, "who explores pedagogical approaches to cultivate questioning skills in students. The act of challenging the status quo is not merely a by-product but an integral component of critical thinking. Both perspectives converge on the idea that skepticism, rigor, and proactive questioning are

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indispensable for the advancement of knowledge and understanding."[9] This demonstrates that the academic discourse on critical thinking is shifting towards a more inclusive view that not just embraces analytical and methodological rigor but also recognizes the importance of questioning as a vital component.

Critical thinking according to Fidia Ruliyatul Qutiah et al includes but not limited to the following: "observation, interpretation, evaluation, analysis, open-mindedness, self-regulation, problem solving and inference. In education, students can improve their critical thinking independently through realistic simulations."[10] To think critically means to be curious, and to use strategies of inquiry: framing questions and searching systematically for answers. The critical thinker thinks open-mindedly within alternative systems of thought, recognizing and assessing, as need be, their assumptions, implications, and practical consequences, and communicates effectively with others in figuring out solutions to complex problems. Critical thinking means to reach a position on an issue and to defend it rationally. It means to consider carefully the arguments of others, and to examine the logic of those arguments. This is where it manifests clearly that critical thinking is a philosophical skill.

Socrates related critical thinking to philosophy by his methodic dialogues. In this way, he helped people to think about themselves and achieve their knowledge, just like the midwife helps the women in labor room to deliver their babies. In his opinion, critical thinking means discovering the truth which best illustrates the practice and development of a critical thinking mindset. In process of Socrates' dialogue, people get an unstable and turbulent awareness of untested beliefs and assumptions. After Socrates, Plato and then Aristotle continued their research about thinking and knowledge. Plato believed that people are discovering the knowledge in the process of recollection while Aristotle believed that intellectual talent is one of the most important features of people. He posited that man by nature desires to know.

Immanuel Kant (1724-1804) was a German philosopher who made significant contributions to the development of critical thinking. His philosophical framework emphasizes the importance of reason, critique and intellectual humility. Intellectual humility emphasizes the importance of recognizing the limits of our knowledge and understanding. Kant acknowledged that human understanding is limited by the constraints of our cognitive faculties and the nature of our experiences. He went further to recognize that knowledge is often complex, nuanced and context-dependent which requires a humble approach to understanding it. According to Johnson et al "Educational system is closely related to informal logic that was a specific field in philosophy in early 1970. The informal logic is a branch of logic that is related to analysis, testing, and mistake investigation in language. Informal logicians consider critical thinking as a broader expression that includes informal logic findings but benefit other forms of logic".[11] Informal logic supports accurate theoretical foundations for critical thinking with little emphasis on the arguments and evidence. Although informal logic supported the idea of critical thinking based on philosophy, other philosophers also paid attention to critical thinking component.

4. The Notion of Artificial Intelligence

The first written reference to the Artificial Intelligence that is known is *The Iliad*, where Homer describes the visit of the goddess Thetis and her son Achilles to the workshop of

Hephaestus, god of smiths: At once he was helped along by female servants made of gold, who moved to him. They look like living servant girls, possessing minds, hearts with intelligence, vocal chords, and strength. Homer presented the story thus:
So saying, the mighty god rose from the anvil and limped away, though his thin legs moved nimbly. He set the bellows away from the fire, gathered his tools, and placed them in a silver chest; then he wiped his face, hands, strong neck, and hairy chest with a sponge, dressed in a tunic, took up a stout staff, and limped out the door. Golden attendants resembling young girls quickly came out to aid their lord. The immortal gods granted them intelligence, speech, strength, and knowledge of handiwork. They hurried to support him as he limped over to Thetis, sat on a splendid seat, took her hand in his, and addressed her, saying: "Long-robed Thetis, beloved guest, why have you come to our home? You do not come often. Tell me what you need, and if it is in my power to fulfill your request, then fulfill it I will.[12]

It is a known fact that the word 'artificial intelligence' was not explicitly used by Homer *Iliad* in his celebrated book. Homer implicitly presented a scenario where Hephaestus, god of smiths was tired and could not carry on with his duty, but caused his golden servants to receive intelligence, speech, strength and knowledge so as to carry out the task.
The onsets of AI thought span from deep in the past and across fields of science. Philosophers such as Rene Descartes or G. W. Leibnitz imagined mechanical men and mechanical reasoning devices respectively.
In part five of the book *Discourse on Method and Related Writings*, René Descartes discusses the conditions required for an animal or a robot to be an intelligent being. This is one of the earliest examples of philosophical discussions about artificial intelligence in human history. In 17th-century Europe, a variety of automated machines were created, and people were mesmerized by their smart movements. Descartes anticipated what would happen if someone could create complicated human shape machines which resemble our bodies and can move just like us. He contemplated that those machines could not possess human intelligence. There were two reasons for that.
The first basis is that those machines cannot use complex signs in the same way that human beings do every day. Of course, machines can utter words and responses to stimulation from the outside environment, but they cannot react correctly to every situation they face in their surroundings. Descartes writes as follows:

> [I]f someone touched it [the machine] in a particular place, it would ask what one wishes to say to it, or if it were touched somewhere else, it would cry out that it was being hurt, and so on. But it could not arrange words in different ways to reply to the meaning of everything that is said in its presence, as even the most unintelligent human beings can do.[13]

At this point, Descartes argued that in order for human-like robots to acquire intelligence, they have to gain a universal potential to accurately react to any unknown situations that may happen in the environment. However, what machines can do is no more than to respond to a single situation one-on-one through a specific organ; hence, they cannot be

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considered to have a universal capability that even unintelligent human beings can enjoy. As computers began to appear on the scene and the concept of Artificial Intelligence was born in the 1950s and 1960s, so the desire to directly compare Artificial Intelligence with human intelligence took the centre stage. But with this assessment came a basic ground rule that human intelligence was as good as intelligence got, in some cases to the extent of believing that human intelligence was the only form of intelligence. It followed, therefore, that the best AI could achieve was to be as good as human intelligence and to copy it in some way but not entirely. John Haugeland started his work *Artificial Intelligence: The Very Idea* with some fundamental questions necessary for proper understanding of Artificial Intelligence:

> What are minds? What is thinking? What sets people apart, in all the known universe? Such questions have tantalized philosophers for millennia, but (by scientific standards anyway) scant progress could be claimed ... until recently. For the current generation has seen a sudden and brilliant flowering in the philosophy /science of the mind; by now not only psychology but also a host of related disciplines are in the throes of a great intellectual revolution. And the epitome of the entire drama is *Artificial Intelligence,* the exciting new effort to make computers think.[14]

So it transpired that classical Artificial Intelligence techniques focused on getting a machine to copy human intelligence. This was borne out by an early definition from Marvin Minsky, as quoted by Kevin Warwick who said: "Artificial intelligence is the science of making machines [to] do things that would require intelligence if done by men.' Quite neatly (and probably intentionally) this definition side-step the whole concept of what intelligence is and what it is not and merely points to machines copying humans."[15]
Nishika Gupta stated that "the father of Artificial Intelligence, John McCarthy states a definition for AI which says that "Artificial Intelligence is the science and engineering of making intelligent machines, especially intelligent computer programs".[16] Artificial Intelligence (AI) is intelligence exhibited by machines. In computer science, the field of AI defines itself as the study of "intelligent agents". Generally, the term "AI" is used when a machine simulate functions that human's associate with other human minds such as learning and problem solving.[17]
The following are some more common definitions and/or descriptions of Artificial Intelligence:

- AI is intelligent because it learns;
- AI transforms data into knowledge;
- AI is about intelligent problem solving; and
- AI embodies the ability to adapt to the environment, to cope with incomplete or incorrect knowledge.

In the last few years, there has been an arrival of large amount of software that utilize elements of artificial intelligence. Subfields of Artificial Intelligence such as Machine Learning, Natural Language processing, Image Processing and Data mining have become an important topic for today's tech giants. Machine Learning is keenly being used in Google's predictive search bar, in the Gmail spam filer, in Netflix's show suggestions.

Natural Language Processing exists in Apple's Siri and Google voice.[18]

5. Implications of Artificial Intelligence In The Field of Education

Artificial Intelligence in education in a number of countries has been carried out since the last few years and continues to grow rapidly. The application of AI can involve the use of technologies such as *machine learning*, *chatbots*, *augmented reality* (AR), *virtual reality* (VR), and many more. These technologies open up new possibilities for learning inside and outside the classroom, and improve the quality of learning. In the face of the appearance of AI, education cannot remain in its definite state. The changes must be made swiftly. A precious look at this phenomenon requires a detailed understanding of the implications for teaching methods, content, and self-education. It is necessary to contemplate on the current state of education, identify possible threats, and determine opportunities related to AI development's vibrant nature. The need to introduce innovations in the teaching process, including learning programming and developing technology-related skills, may help personalize the learning process and adapt it to the student's individual needs. Education in the era of AI requires a holistic approach, combining both modern technologies and traditional teaching methods. Ewelina Majewska-Pyrkosz maintains that:

This dynamic intersection of technology and education holds promises and challenges that demand our attention and understanding. The development of artificial intelligence is inevitable, and its impact on various areas of life, including education, is becoming more and more noticeable. In today's reflections, we will focus on how these technologies can change the face of our educational system. One of the key benefits of using artificial intelligence in education is the ability to personalize the teaching process. Thanks to data analysis and machine learning algorithms, we can adapt the teaching material to the student's individual needs, allowing him to develop at the pace that suits him.[19]

The introduction of artificial intelligence opens the door to the creation of innovative teaching tools. From virtual assistants to interactive learning programmes, these modern solutions have the potential to revolutionize the way we teach and learn.

Another feature that requires our attention is the role of artificial intelligence in education is the student assessment process. How can we guard against excessive automation and loss of a human perspective on a student's development? Introducing new technologies must work together with attention to accessibility for all students. How can we avoid widening educational inequalities and ensure that the benefits of artificial intelligence are available to all especially those in rural areas? The latent benefits of artificial intelligence will be incomplete if we fail to acknowledge its impact on education.

> In education, AI systems and social robots have been used in a variety of contexts. Online courses are widely used. For example, the University of Phoenix is now (technically) one of the largest universities in the world—since hundreds of thousands of students are enrolled in their online courses. In such a highly digital learning environment, it is much easier to integrate AI that helps students not only with their administrative tasks, but also with their actual learning experiences.[20]

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> The impact of artificial intelligence on education touches all spheres of human endeavor ranging from teaching to the training of the engineers that manufacture robots, computers, etc. It covers all areas of medicine, business and even agriculture. In teaching, artificial intelligence has helped especially children with disabilities. "Another teaching context in which robots and AI systems show promising results is teaching children with special needs, more specifically children with Autism Spectrum Disorder. The robots' limited expressivity combined with its repetitive behavior (that is perceived by many as boring) is in this context actually a key advantage."[21]

Ethics in the applications of artificial intelligence in education is an issue that cannot be ignored. How do we protect students' privacy and maintain ethical standards in the use of data? The ethics *of privacy*, then, focuses on questions such as 'What is the value of privacy?' and 'What privacy norms should be respected by individuals (including ourselves), society, and the state?'[22] We have so many things like spaces, bodies, information, behavior, and so on –we call 'private'. It is undeniably difficult to hypothesize about privacy in a structural and reliable manner. Certainly, in this age of universal and virtually free access to the internet, data is the new currency. It is even more fascinating that the full potential of the data is not known yet. As technology progresses, newer applications appear enhancing the value of data. What then is data protection or information privacy?

Accordingly, Westin notably defined privacy as "the claim of individuals, groups, or institutions to determine for themselves when, how and to what extent information about them is communicated to others".[23] This is now commonly referred to as the "self-determination" of one's personal information. As questions arose on the morality and legality of abortion and the means employed, the focus of privacy further evolved in the direction of personal autonomy/self-determination and the right of individuals to make decisions concerning their own bodies and/or domestic matters. Privacy is a fundamental right, indispensable to autonomy and the protection of human dignity; serving as the foundation upon which many other human rights are built.

Cross-sector cooperation is necessary to use the potential of artificial intelligence in education effectively. How can we build bridges among academia, business, and government to jointly shape the future of schooling? Introducing artificial intelligence into education is a technological change and a cultural one. The vision for the future of education should include a balanced approach that considers technical benefits, ethical principles, and concern for the development of each student.[24]

1. The Impact of Ai on The Development of Critical Thinking

Artificial Intelligence (AI) is increasingly seen as a powerful tool to augment critical thinking skills, especially in educational settings. Artificial intelligence (AI) can have both positive and negative effects on the development of critical thinking skills among students. On one hand, AI provides tools and features that can support learning and stimulate critical thinking. On the other hand, excessive reliance on AI may limit students' ability to solve problems independently and reduce their capacity for critical evaluation of information.

Positive aspects of AI utilization: AI can assist students in analyzing large datasets, generating hypotheses, exploring alternative solutions, and evaluating the consequences of their decisions. Interactive AI tools can also stimulate reflection and discussion, encouraging students to question assumptions and seek deeper understanding.[25]

Negative aspects of AI utilization: overdependence on AI may lead to passive attitudes among students, who might expect ready-made solutions from the system rather than engaging in independent thought. Additionally, poorly designed or biased AI algorithms could introduce incorrect assumptions, negatively impacting critical thinking.[26]
To balance these effects, it is necessary to find the right equilibrium between using AI and nurturing critical thinking skills. Teachers should integrate AI into the teaching process thoughtfully, while emphasizing the importance of practicing independent problem-solving, analysis, and evaluation of information. A major challenge in using artificial intelligence (AI) in education is finding the right balance between the benefits of its application and the development of fundamental critical thinking skills among students. It is vital to avoid situations where excessive reliance on AI limits students' ability to solve problems independently, draw conclusions, and critically analyze information (SMART-SENS.ORG).[27]
Personalization of learning with AI should support, not replace, students' reasoning processes (Artificial Intelligence in Education…).

- *Balancing automation and stimulating thinking:* AI can facilitate routine tasks, but it must leave room for students to reflect, question, and reach conclusions independently (*Critical Thinking in the AI Era…*).
- *Developing metacognition:* Alongside AI use, emphasis should be placed on learning skills, self-regulation, and students' ability to monitor their own learning processes (*What is Critical Thinking?*).
- *The teacher's role as a moderator:* Teachers must skillfully integrate AI tools with discussions, questioning, and engaging students in critical thinking (*Developing Critical Thinking…*).
- *Adapting to individual needs:* Implementing AI should consider differences in learning styles and student proficiency levels to support their individual development (*AI in Education – A Guide…*).[28]

Only through conscious and balanced use of AI, combined with traditional teaching methods, can the harmonious development of critical thinking skills among students be achieved and ensured.

7. Conclusion

The central aim of this paper was to offer an in-depth understanding of education and critical thinking and the role of Artificial Intelligence (AI) in this context. The paper discovered that the introduction of AI in the area of education enhances critical thinking owing to the litany of materials available for students through the help of the internet. In the era of AI, critical thinking is essential to evaluate all information due to "banking system" of education-garbage-in, garbage-out and being academically adrift in a post-truth world where information is accepted *prima facie* from sources such as ChatGPT without any deep critical thought. Arguably, all AI output needs to be critically examined due to the limitations of Chat GPT and other AI programs.[29] Despite this, the paper also

expressed concerns about the limitations of AI. These include issues like lack of personalization, risk of echo chambers, over dependence on AI which may mar the personal development of critical thinking among students, breeding of lazy researchers and challenges in nuanced understanding. The study implies that while AI can be a powerful tool for enhancing critical thinking skills, it is not without drawbacks that need to be carefully managed. There is a compelling need for a balanced approach that utilizes AI's capabilities while being cautious of its limitations to cultivate robust critical thinking skills among students. Another major limitation discovered by this study is its reliance on self-reported data, which introduces the potential for biases and inaccuracies, possibly affecting the validity of the findings. Future research could employ more objective measures, such as observations or psychometric tests, to complement self-reported data for a more reliable and comprehensive understanding. Furthermore, investigating the pedagogical methods that can effectively blend critical thinking skills with AI applications might provide valuable insights. As such, this paper underscores the importance of a nuanced, balanced view in leveraging AI for enhancing critical thinking skills among students, while also highlighting areas where caution and further research are necessary.

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