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ARTIFICIAL INTELLIGENCE IN THE CLASSROOM: INNOVATION OR DISRUPTION IN EDUCATION

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Abstract

These days, artificial intelligence (AI) is regarded as one of the most revolutionary technologies and consequently, its application is evident in various industries, education inclusive. The investigative design in this research utilizes review of literature. The analysis demonstrates that there are aspects that make it more reasonable to integrate artificial intelligence into the learning process, such as increased content diversity and student engagement, deep learning capabilities, and better organizational assistance. Fast and effective adaptive learning systems based on AI can provide appropriate materials and the required level of difficulty to each learner individually, while evaluation systems can automatically assess the knowledge and learning speed of students and relieve cut down the efforts needed by teachers. However, the study also suggests a number of barriers and possible risks, such as privacy issues or lack of privacy regarding students' data, unfair treatment in AI algorithms, the gap of technology in society, and lack of human beings in the education process. The main point of this particular article is that AI as an ordinary classroom tool is both a source of creativity and a source of problems. The potential of technology to change the educational landscape is immense, but steps on how to achieve it should be gradual and ethical.

Keywords: Artificial Intelligence, Classroom, Innovation, Education Disruption.

Introduction

Over the last few decades, there have been many significant changes in many areas of human life including education due to the swift growth of information and Communication Technology. As of now, there is, however, one technology innovation that bask in a lot of hype, that is Artificial Intelligence (AI).

In simple terms, the branch of computer science that aims to create computer systems that are capable of doing tasks that would require human intelligence is called Artificial Intelligence (AI). AI advances and combines a number of tasks such as learning

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from experience, generalization, recognition, natural language processing, reasoning and problem solving (Murdan & Halkhoree, 2024). These technologies are intended to recreate processes characteristic of human cognitive abilities: learning and reasoning, and the eventual goal is to create systems that act independently, learn and enhance their efficiency in performing new tasks over time without having to be programmed to do each task every time (Zhang, 2024).

There has been a stir in the educational practices where AI technology has started penetrating the classroom which raises the dilemma of whether it is a disruptive technology in education or an innovation with a promise. Prain et al (2018) With the use of this AI in Education, there are many areas that are set to improve and include but are not limited to individualized learning, intelligent tutoring systems, assessment and feedback, augmented reality and virtual reality. These systems are considered to augment the effectiveness and efficiency of the teacher – learner engagement processes and also help teachers with classroom control and appreciating the diverse learning needs of the students.

AI has become a vital component in the revolutionization of education in the 21st century. Darayseh (2023) argues that AI helps in better targeting individual treatment of learners since the system assesses each learner's capability and drawbacks, reformulates teaching materials, and gives timely comments. In administrative areas, it helps teachers conduct automated evaluation and assessment of students' performance data. They thus concentrate on parts of teaching that need human intervention only. For example- the use of intelligent distance learning systems assisted by virtual assistants who can respond to students' queries at anytime of the day can be very useful (Zlateva et al., 2023).

Moreover, the inclusion of AI in education ensures that the students are ready for future working environments, which are likely to be dominated by automation. By embedding AI concepts and applications in the curriculum, students may acquire programming to develop applications based on the use of, data analysis and complex problem solving. AI also aids in innovative learning through the use of advanced techniques such as collaboration and high-end immersive learning environments (Salloum, 2024). That being said, there are such advantages of an AI that one cannot simply ignore, nonetheless, these technologies have to be implemented responsibly and with attention to social and legislative issues, making sure that these tools assist, rather than displace, the essential function of the teacher in the educational process. Nevertheless, as it is, the application of artificial intelligence in classrooms is accompanied by concerns of technology addiction, privacy concerns, widening the gap, and changing the traditional responsibilities of the teachers (Gulson & Sellar, 2024).

The controversy of whether introducing AI in the classroom is an adventure in innovation or simply a wrecking ball on education has been centered on some quarters. Informed approaches to development place some strategies as very favourable, while others consider it as a novel invention that bears fruits in ways that have not been available in the past (Montuori et al., 2020). However, in contrast, some people regard threats

targeting the conventional system of education, the system of learning, the elements of collaboration between students and teachers concerning AI as potential risks – new dawn to educational development (Zentner, 2022).

In this regard they have studied how AI is applied into the classroom learning process by the users who are students.

Research Method

The study in this research uses the literature research method. This method is a systematic approach to collecting, analysing and synthesising information from various literature sources relevant to a particular research topic. (Sahar, 2008); (Arikunto;, 2000); (Fadli, 2021).

Results and Discussion

Concept of Artificial Intelligence (AI)

There is a wide range of definitions of AI. Since it is the study of tasks which a person would typically undertake instead of a machine, it is a branch of computer science which deals with creating machines which demonstrate human intelligence (DiMatteo, 2022). Even further, is the availability of specialized AI systems, such as one for robotic encyclopedias. The internet of things (IoT), which involves the exchange of data around connected appliances, has become common place today. All people's daily activities now involve some aspect of technology or the other.

Artificial intelligence (AI) belongs to several main categories depending on the capabilities and the level of complexity. First, there is Narrow AI or Weak AI which is programmed to handle tasks within a limited domain such as speech recognition natural language understanding etc. Second, there is General AI or Strong AI which at the moment remains a kind of fantasy seeking to attain human-level intelligent behavior in every aspect (Oh-Young & Karlin, 2024). Third, Super AI, which is yet another one that is also in the head of many is what would be called anything that could be possibly called AI that is more intelligent than a person. Besides them, depending on a certain language being used, one might distinguish on the basis on the methodology: Rule-Based Ai systems, Machine Learning, Deep Learning and Evolutionary Algorithms. Last but not least, on the basis of the level of interaction with the operator, the level of attitudes of the AI, one can differentiate between Reactive Machines, Limited Memory AI, Theory of Mind AI, and Self-Aware AI, out of which the latter two possess a theoretical twist (Su & Yang, 2022).

The advancement of AI in education has led to profound modifications in the forms and techniques of teaching and learning. These technologies define the role of students because they alter the content and rhythm of learning accordingly, which enhances the education process, making it more efficient and personalized. Providing answers to your student's concerns and questions, there are also AI chatbots and virtual assistants who

operate round the clock for help (Lo et al., 2021). Language learning attracts new tools like voice recognition technologies and natural language processing that allow for more effective and engaging language activities. So, AI contributes in relieving teachers of such burdensome work as depression, grading, and student-performance analysis offering more valuable data on academic performance. AI remains a driver of innovation enabling remote and blended learning through intelligent interactive ecommerce platform (Majeed, 2024). New deeply engaging experiences in learning can be developed in the use of virtual realities and augment setup which is augmented with avishai aid. Nonetheless, there are also ethical and privacy issues that require consideration, as is the case with most emerging technologies, AI will pose the promise of improving the current educational landscape to enable more pupils to access quality education to more effective and personalized learning experiences.

Education in the Digital Age

The transformation of learning methods has undergone drastic changes in recent decades, fuelled by technological advances and a better understanding of how humans learn. From the traditional teacher-centred model, learning is now shifting to a more student-centred, interactive and collaborative approach (Syakhrani & Aslan, 2024). Methods such as blended learning combine face-to-face with online learning, while the flipped classroom flips the traditional structure by introducing material outside of class and using class time for discussion and practical application. Project-based learning and inquiry-based learning encourage students to investigate and solve real-world problems. Gamification and game-based learning make learning more interesting and engaging. Technologies such as virtual and augmented reality open up new dimensions in visualisation and immersive learning experiences (Judijanto et al., 2024); (Irwan et al., 2024); (Iksal et al., 2024). Personalised adaptive learning using AI allows students to learn at their own pace and style. Continuous formative assessment replaces the traditional summative assessment model, providing faster and more relevant feedback. All these changes aim to create a more dynamic, relevant, and effective learning environment, preparing students to face the challenges of a changing world (Peng et al., 2021).

Technology in education has revolutionised the learning landscape, creating new opportunities and methods that were previously unimaginable. Learning management platforms (LMS) such as Moodle and Canvas enable efficient management of online courses, while video conferencing and live streaming facilitate distance learning. Mobile devices and educational apps make learning more flexible and accessible. Virtual reality (VR) and augmented reality (AR) technologies bring new dimensions in visualisation and practical experience, especially in fields such as medicine and engineering (Lee et al., 2021). Artificial intelligence (AI) and machine learning enable personalised learning and adaptive tutor systems. E-books and digital resources democratise access to knowledge, while blockchain technology is beginning to be used for verification of academic credentials. Adaptive learning technologies customise materials based on individual student

performance and needs. Learning analytics use big data to provide insights into learning patterns and teaching effectiveness. Educational robots and AI chatbots assist in teaching and student support (Liu et al., 2020). All these innovations not only improve access and quality of education, but also prepare students for an increasingly digitalised world, encouraging the development of 21st century skills such as digital literacy, critical thinking and adaptability.

Innovation in Education

Educational innovation can be defined as the process of developing and applying new ideas, methods, technologies or approaches that significantly improve the effectiveness and efficiency of the education system. It includes changes in the way teaching, learning, assessing and managing the educational environment with the aim of improving learning outcomes, expanding access to education and preparing learners to face future challenges (Sridharan & Sequeira, 2024). Educational innovation is not only limited to the introduction of new technologies, but also includes updates in curriculum, pedagogical strategies, organisational structures and educational policies. These can be major changes such as the introduction of large-scale online learning systems, or smaller modifications such as the implementation of new assessment techniques in the classroom (Samid, 2021). The essence of educational innovation is to create creative solutions to existing educational problems, improve learning experiences and ensure that education remains relevant and effective in the face of the changing needs of society and the labour market. These innovations are often the result of collaboration between educators, researchers, policy makers and other stakeholders in the Education ecosystem (Mer & Virdi, 2022).

Educational innovation has resulted in a variety of new approaches and methods that enrich the learning process. Some prominent examples include: project-based learning, where students work on real-world projects to understand concepts; the flipped classroom, which allows students to study material at home and use class time for discussion and practice; gamification, which integrates game elements into the curriculum to increase engagement; AI-based personalised learning, which tailors learning materials to students' individual needs; STEAM (Science, Technology, Engineering, Arts, Mathematics) education that integrates different disciplines; online collaborative learning, which allows students from different locations to work together on virtual projects; the use of virtual and augmented reality for immersive experiences; makerspaces in schools, which encourage creativity and practical skills; competency-based learning, which focuses on mastery of skills rather than time spent in class; and the use of blockchain for verification of educational credentials. These innovations are not only changing the way learning and teaching is done, but also preparing students for a rapidly changing world (Yang, 2022); (Hendriarto et al., 2021).

Disruption in Education

Disruption, in the context of business and technology, refers to the process by which innovations or new business models significantly change the way a market or industry operates, often by displacing established players or shifting existing paradigms (Chan et al., 2022). This phenomenon is typically characterised by the emergence of new products, services or approaches that may initially be considered inferior or limited, but gradually gain traction in underserved or new market segments. Over time, these disruptive innovations improve their quality and features, eventually attracting mainstream consumers and displacing incumbents from their dominant positions (Rasiwala & Kohli, 2021). Disruptions often utilise new technologies, more efficient business models or more consumer-oriented approaches, resulting in fundamental changes in the way industries operate and consumers interact with products or services. As a result, disruption can result in significant shifts in market power, creating new opportunities while challenging established companies and practices to adapt or risk becoming obsolete (Cifuentes, 2024).

Disruption in the education system has resulted in fundamental changes in the way teaching-learning and educational institutions are managed. Digital technologies, such as online learning platforms and educational apps, have enabled wider access to knowledge, democratised education, and enabled more flexible and personalised learning. Virtual classrooms and distance learning have challenged the traditional classroom-based education model, allowing students to learn from anywhere and at any time (Khadragy, 2024). Artificial intelligence and big data analytics have enabled a more customised and data-driven approach to learning. The rise of massive open online courses (MOOCs) and micro-credentials has challenged the monopoly of traditional universities in higher education. The impact of this disruption is also seen in the changing focus of education from content mastery to the development of skills such as critical thinking, creativity, and adaptability, which are more relevant in the digital age. As a result, traditional educational institutions face pressure to evolve, adopt new technologies, and redesign their curricula to remain relevant in this era of disruption. While this brings challenges, it also opens up opportunities to improve the quality, accessibility and relevance of education in the digital age (Dakakni & Safa, 2023).

AI Implementation in the Classroom

The implementation of Artificial Intelligence (AI) in classrooms has brought about a revolution in the way education is delivered and managed. AI enables unprecedented personalisation of learning, where each student can receive materials and assignments tailored to their ability level, learning style, and individual needs (Fan & Sun, 2023). AI-powered adaptive learning systems can analyse student performance in real-time, identify areas that need improvement, and adjust learning content dynamically. This enables a more targeted and efficient approach to education, ensuring that every student can develop according to their unique potential.

On the other hand, AI also helps teachers in managing administrative and assessment tasks. Automated grading systems can evaluate essays and structured answers, providing quick and consistent feedback to students, while freeing up teachers' time to focus on more complex and interactive aspects of teaching. AI can also assist in monitoring student engagement, identifying patterns of behaviour that may indicate learning difficulties or other issues that require special attention (Holmes & Douglass, 2021).

In addition, AI opens up opportunities for more immersive and interactive learning experiences. AI-powered virtual and augmented reality can create simulations and rich learning environments, allowing students to interact with abstract concepts in a more concrete and immersive way. AI-powered chatbots and virtual assistants can provide 24/7 learning support, answer students' questions, and guide them through learning materials (Foster et al., 2024). While the implementation of AI in classrooms brings many benefits, it is important to consider the ethical implications and ensure that these technologies are used as tools to support, not replace, the important role of human interaction in education (Correia et al., 2024).

Positive Impact of AI in Education

Education has experienced a fair number of positive impacts due to the advancements in artificial intelligence (AI). One of the main benefits is more effective personalisation of learning. The education industry has benefitted from the aforementioned technology by being able to monitor the progress of a given student or group in real time, determine what their strengths and weaknesses are, and adapt the content accordingly to what each learner requires (Gharaibeh, & Kassim, 2024). This assists in being more focused to the learners in such a way that every individual gets to learn in a way and at a speed in such a way as to enhance learning and motivate the student. Moreover, AI can also help in spotting trends within the learning data which might be difficult for people to see, thereby aiding teachers in creating more useful approaches to teaching (Sumo, & Bah, 2021).

The potential of educators has also been transformed positively with the aid of AI. Educators are now available to more individuals including those who have physical challenges or reside in remote areas through the use of Artificial Intelligence-supported distance learning platforms. In particular, features like translation programs and books on tape make more learning materials available to students with different language and reading skills (Dillenbourg, 2021). In addition, the emergence of virtual assistants and chatbots that offer learning and information when students need it is thanks to AI technology. Not only does this add to the overall quality and effectiveness of the educational process, it also lightens the burden on teachers as they would be expected to deal with such issues as answering repetitive questions from the students (Zhang, 2024).

Moreover, an augmented effectiveness has been noted in the area of educational management and assessment due to the introduction of AI. Thanks to the existence of AI,

less time is spent in grading assignments and examinations as artificial tools can perform the grading instantaneously. High pressure is removed from the teachers and they can now be able to concentrate on teaching other complex areas. AI-powered systems may also be useful in areas such as the management of educational resources, looking for the most efficient schedules, as well as helping an institution look at data for more informed decisions. Given that it is now possible to research things on a greater scale, AI, brings in new avenues in the domains of the education seeking to find out how students learn and as a result make the better education system possible (Shi et al., 2021). All of these aspects are aimed at increasing, in particular, the impact on the quality and efficiency of education, helping students withstand the impacts of the new generation which is considerably more digitized than the previous ones.

Challenges and Risks of Using AI in the Classroom

While AI offers many benefits in education, its use in the classroom also presents a number of challenges and risks that need to be considered. One of the main challenges is the issue of data privacy and security. With AI collecting and analysing extensive student data, there is a risk of privacy breaches if this data is not managed properly or falls into the wrong hands (Yuwono et al., 2024). Schools and educational institutions need to ensure that they have strong security protocols in place and comply with applicable data protection regulations. In addition, there are concerns about how this data might be used in the future, especially if it is linked to individual student profiles that could affect their later educational or career opportunities (Gao, 2021).

Another significant challenge is the potential over-reliance on AI technology. While AI can be very helpful in many aspects of learning, there is a risk that its overuse could detract from the human interaction that is essential in the educational process. Social skills, empathy, and the ability to collaborate in person are important aspects of education that may be neglected if too much reliance is placed on AI. Furthermore, reliance on AI for assessment and feedback may reduce students' ability to think critically and assess their own work, skills that are critical in real life (Mercurio & Yu, 2021).

Accessibility issues and the digital divide are also serious concerns. While AI can improve educational access for many, it also has the potential to widen the gap between those with access to advanced technology and those without (Almirall & Tschang, 2021). Schools and students in less developed areas or from less affluent economic backgrounds may be left behind because they cannot access or fully utilise AI technologies. This may create new inequalities in education, which goes against the goal of providing quality education for all (Hervé, 2021).

Finally, there is the challenge of ensuring that the use of AI in education remains ethical and unbiased. AI, like any other technology, is not free from biases that may exist in the data or algorithms used to train it. These biases can affect learning recommendations, assessments, or even decisions about a student's educational path. For

example, AI may not understand certain cultural or social contexts, which may result in inappropriate or even detrimental recommendations for some groups of students (Southworth et al., 2023). Therefore, it is important to continuously evaluate and improve AI systems used in education, ensure transparency in AI decision-making, and involve various stakeholders in the development and implementation of AI technologies in classrooms.

Conclusion

The role of Artificial intelligence (AI) in education has emerged as a major area of concern within scope of the discussions about the progress of education in future. Adopting such innovations is positive for transforming learning desktop computer use to other activities such as improving learning, customising teaching and learning and effectiveness of the learning. That is why it has great potential for education because it can process large volumes of data, give feedback on the spot and provide materials that meet each student's requirements. A crowning aspect of contemporary society is reliance on technology which affects physically and psychologically polices but in this case to challenge the educational functionalities and practices of classrooms and practice.

Though he benefits of AI are numerous, integrating such technology into one's operations comes with challenges and risks which must be taken into account to avoid failures. Issues such as data privacy, excessive dependence on technology, issues of equity and discrimination in AI among others are some of the issues which ought to be mitigated. At the same time, we should remember about some other things — the aim of learning, the AI technologies implementation in education should not disregard other essential components of students' abilities such as communication, social interaction, and analytical skills.

All in all, the introduction of AI into any education system is both a novel phenomenon and a disturbance. An understanding of its magnitude in terms of improving learning and teaching is unquestionable, however its deployment should proceed with caution. Finding synergies between the employment of AI technologies and preservation of the fundamental educational principles is paramount. How AI will be adopted in class without compromising the desire of students, teachers, parents, the community and the children themselves will decide the outcome of this brave innovation or this disruption. Luckily, given the correct initiative and intent A.I will not be but will enrich vital parts of the already so many years of old teachinglearning process.

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