Exploring how Education can Leverage Artificial Intelligence for Social Good

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Abstract: Artificial intelligence (AI) is rapidly transforming society and industries, presenting both opportunities and ethical challenges. AI enables machines to perform tasks traditionally done by humans, such as natural language processing, pattern recognition, decision-making, and problem-solving (Brookings, 2023). In education, AI enhances teaching methodologies, student assessment, and administrative tasks through tools like intelligent tutoring systems, adaptive learning platforms, and educational chatbots. These tools offer customised learning experiences, immediate feedback, and data-driven insights. This research aims to investigate how AI can be leveraged within education to promote social good by identifying how familiar educators and students are with AI tools, identify how educators and students perceive the role of AI in education and what are the current applications of AI technologies in educational settings and how widely are they used. Finally, discuss the opportunities and ethical considerations of integrating AI in education. AI technologies can address critical social challenges such as inequality, accessibility, and personalised learning. According to Luckin et al. (2016), "AI can provide tailored educational experiences that adapt to individual learning needs, thus promoting equity in education." This exploratory research begins with an overview of AI's role and tools in education, followed by a discussion of the challenges, opportunities, and ethical considerations associated with AI integration. Understandings are drawn from educator's response to a questionnaire and a focus group with first year and final-year third level students. This qualitative data, analysed using NVivo software, reveals key themes and significant findings on effectively utilising AI in education.

Keywords: Artificial intelligence, Education, Adaptive learning, Intelligent tutoring systems, Educational analytics

1. Introduction

Artificial intelligence (AI) has been a relatively new but developing technology in recent years, affecting various elements of our lives and sectors. Traditionally, AI was confined to industrial and technological platforms. However, it has deeply influenced social and, for the most part, the educational sector. A report by McKinsey Global Institute shows that AI has the potential to alter the fundamental nature of virtually all aspects of human existence, such as health, learning, and transport (McKinsey, 2018). In an educational context, AI has prospects to enhance the process of education and individual approaches to learners, increase the participation of people with disabilities, and facilitate the work of teachers. Throughout this exploratory research, we aim to provide a comprehensive overview of the educational potential of AI by exploring the AI technologies that educators can incorporate into their learning-teaching practices—determining the positive effects of AI in the instructional environment, Understanding the views and current application of AI resources by third-level learners, and exploring the perspectives and current adoption of AI tools by tertiary-level educators.

2. What is Artificial Intelligence?

Artificial intelligence takes information, analyzes it, and then makes decisions based on similar information it finds. AI involves using different techniques, such as machine learning, neural networks, and natural language processing, which enhance AI's ability to carry out complex tasks (Russell & Norvig, 2016). As discussed by Science Direct 2023, AI is a wide specialism that covers the knowledge and design of intelligent beings or competent entities that can learn, think, and operate independently. To summaries, AI refers to a collection of activities that aims to teach machines how to think, solve problems, reason, and see, activities that are associated with human brain functions in one way or another.

3. The Role of Artificial Intelligence in Education

Artificial intelligence, or AI, is becoming more widespread in education; new technologies positively change conventional approaches to teaching and learning. AI technologies can improve general education by personalizing the learning process, diminishing the work of the administrative staff, and supporting the decision-making process by accumulating a vast amount of data. Holmes et al. (2019) argue that "AI can provide personalized learning environments that can change their learning and teaching strategies based on a learner's learning needs, thus enhancing equity in learning'. Since AI is one developing as an essential tool in learning and knowledge acquisition, it has several uses, one being personalized learning. The possibility of using AI systems to identify learner's characteristics, preferences, and difficulties lets us develop individual learning paths for

every student. They learn at different paces and in other ways; hence, this approach will enhance student engagement and achievement. Besides, AI has a potentially positive impact in that it can reduce workloads and administrative tasks, including grading, timetables, and resources. On the other hand, computerized grading systems can give the results as soon as the paper is scanned. Luckin et al. (2016) stated that using AI in learning and teaching can minimize the clerical work burden most often found in teaching-learning, allowing the teacher more instructional time interacting with students individually. In addition, AI can also support the decision-making process in educational institutions based on statistics that is can showcase. AI can develop customized learning environments, and its potential applications extend to curriculum design, student support services, and institutional policies. According to West and Allen (2020), integrating AI into education can enhance decision-making within education systems and assist teachers (Brookings).

Utilizing this data can therefore enhance educational delivery to learners while minimizing resource inefficiencies. Nevertheless, the use of Artificial Intelligence in the education sector also has ethical issues such as data privacy and protection along with possible bias in the algorithm. It is essential to deal with these challenges to make AI technologies sustainable for responsible integration and utilisation.

4. AI Tools Supporting Teaching and Learning

AI-based solutions are now revolutionizing learning, and the effectiveness of teaching and students' performances have potential to improve. Intelligent Tutoring Systems (ITS) based on artificial intelligence learn individual learners' characteristics and courses of action and provide necessary information and prompting (VanLehn, 2011). Automated Essay Scoring (AES), students are provided with instant feedback on their writing capabilities to employ constructive criticism to enhance their work (Shermis & Burstein, 2013). They deliver copyrighted learning content and track learning progress with efficient usage of Learning Management Systems (LMS) supported by artificial intelligence (Johnson et al., 2014). In addition, adaptive learning technologies, virtual classrooms, speech recognition tools, and chatbots improve learners' engagement and increase the accessibility to enhance the learners' environment (Roll & Wylie, 2016; Chen et al., 2018; Winkler & Söllner, 2018).

AI TOOLS	DESCRIPTION	REFERENCES
Intelligent Tutoring Systems (ITS)	Intelligent Tutoring Systems (ITS) are computer-aided instruction systems that assist students by identifying and responding to their requirements. These systems apply AI algorithms to determine students' performance and provide materials to the learners.	VanLehn, K. (2011). The relative effectiveness of human tutoring, intelligent tutoring systems, and other tutoring systems. Educational Psychologist, 46(4), 197-221.
Automated Essay Scoring (AES)	AES systems are based on NLP analysis and then give scores to written essays, for instance. Such tools provide feedback on topics such as passable, string coherence, and overall quality, thereby enhancing students' writing competencies.	Sharmi's, M. D., & Burstein, J. (Eds.). (2013). Handbook of automated essay evaluation: Current applications and new directions. Routledge.
Learning Management Systems (LMS) with AI Integration	By incorporating artificial intelligence, LMS delivers tailored learning materials and follows up on the student's progress while suggesting areas for improvement.	Johnson, L., Becker, S. A., Estrada, V., & Freeman, A. (2014). NMC Horizon Report: 2014 Higher Education Edition. The New Media Consortium.
Adaptive Learning Technologies	These tools modify and format the level and kind of content provided so that students are always pushed as far as they can go, given the data being received by the learning management system.	Brusilovsky, P., & Millán, E. (2007). User models for adaptive hypermedia and adaptive educational systems. The adaptive web, 3-53.
Virtual Classrooms and AI Tutors	Virtual classrooms employ AI to develop a fruitful, engaging experience for visitors. They also encompass the competence of human tutors by answering questions and providing explanations.	Roll, I., & Wylie, R. (2016). Evolution and revolution in artificial intelligence in education. International Journal of Artificial Intelligence in Education, 26(2), 582-599.

AI TOOLS	DESCRIPTION	REFERENCES
Speech Recognition and Language Learning Tools	Programs that use artificial intelligence, such as speech recognition, assist language learners by providing feedback when they feel stuck and do not know how to pronounce certain words properly or fluently.	Chen, X., Xie, H., Hao, Y., & Hu, J. (2018). Exploring AI-based learning analytics in language education: A review and classification of practices. British Journal of Educational Technology, 49(4), 557-572.
Chatbots and Virtual Assistants	To cite examples, chatbots and virtual assistants that help students answer questions such as what time it is, what the next class is, and what assignment is due also help in tutoring students during their free time.	Winkler, R., & Söllner, M. (2018). Unleashing the potential of chatbots in education: A state-of-the-art analysis. Proceedings of the 38th International Conference on Information Systems.

A vast array of tools available in different fields of AI benefits teaching and learning practices. AI tools are not an opposing to educators but more of a supportive element to be used to improve the education and learning process. According to Teaching Common 2023, It is only when the application of AI has been standardized to have practical and moral principles of education on a course that we can effectively utilize the above-discussed advantages together with handling the shortcomings like privacy infringement and potential biases of the algorithms. (Teaching Commons, 2023).

5. Education and AI: The Positives

Below are some of the advantages of Artificial intelligence in education, which improve teaching and learning: personalized learning, academic support, data-driven decisions, and accessibility.

Personalized Learning: AI enables personalized learning by aligning closely with the individual needs of students. Intelligent Tutoring Systems (ITS) entails assessing an individual's knowledge to guide them through gaining knowledge. According to VanLehn's (2011) record, ITS can accurately match the advantages of human tutorials with individual students and enhance learners' performance. **Efficient Administrative Support:** AI performs tasks like grading, timetabling, and materials creation and development so that educators can teach and attend to students. For example, AES systems, such as those that endorse formative and summative assessments, enlighten students' learning processes and enable teachers to handle large classrooms numbers without sacrificing quality by offering feedback on written assignments (Shermis & Burstein, 2013). **Data-Driven Decision Making:** In the educational field, AI tools can significantly analyze the extensive education dataset to produce functional patterns to form a curriculum or teaching methods. This ensures that educational practices are constantly improved and there is no room for compromise. The use of LMS indexed by AI assists educators in monitoring student performance and probably changing delivery methods (Johnson et al., 2014).

Accessibility and Inclusivity: AI integration enhances access in a classroom for students with disabilities allowing some students use speech-to-text, text-to-speech, or any other AI technology. To achieve this, the following are essential learning tools that ensure unbiassed participation in learning and educational activities for all students. Other studies, such as Chen et al. (2018), explain how AI-integrated learning analytics can help language learners by offering real-time feedback on pronunciation and fluency.

6. Education and AI: The Negatives

This paper also focuses on the disadvantages of AI incorporation within education: Privacy and Security, AI bias, dehumanizing education, and cost.

Data Privacy and Security Concerns: The reliance on AI in education has required tracking and understanding a vast amount of information about students. This leads to questions about the adequacy of data privacy and security issues. Regan and Jesse (2019) further observed that AI has become a standard tool of instruction and learning in academic institutions. Yet, the risks to the privacy rights of students are high (Regan & Jesse, 2019). **AI Algorithmic Bias:** This issue means AI systems can learn and then spread and even amplify the bias in the training data. This can and may result in prejudice against students from diverse statuses, hence the need to avoid stereotyping. Bias in algorithms can produce prejudiced educational tools that may affect the student's performance and learning prospects. This is according to Noble (2018), who explains that prejudicial algorithms merely mirror and amplify societal lack of uniformity. Therefore, inequality in educational technologies should

be strongly opposed. **Dehumanization of Education:** Creative use of AI tools tends to result in a dehumanized education; this reduces interaction between teachers and students. Robots cannot substitute the flexibility or individual attention that teachers give to students. The previous work of Selwyn (2019) lectures that using technologies to augment education reduces the human aspects that are influential in the learning process (Selwyn, 2019). **Costs**: Adopting AI technologies in educational institutions requires massive investments. Although the present systems are very efficient and comprehensive, many schools, especially those in less developed countries or regions, may have severe problems financing the needed infrastructure and staff training. This can also increase the educational achievement gap between the haves and have-nots. Luckin 2016 and his colleagues pointed out, implementing AI can be expensive and may be reserved for well-endowed schools only (Luckin et al., 2016).

7. Ethical Considerations in Artificial Intelligence and Education

The following are the ethical issues arising from the use of Artificial Intelligence in education:

Bias and Fairness: One of the risks in the education process based on AI systems is the inclusion in the result of the existing bias in the data used. For instance, if the dataset represents society, AI will help execute the same discrimination against certain students. AI must be designed not to be a biased system that discriminates against society. For example, the United Nations Educational, Scientific and Cultural Organization (UNESCO) notes that this is only possible through data pluralism and active tracking of AI to ensure their fairness. **Privacy and Data Security:** AI integration in learning tends to gather and process students' information, which may infringe on students' right to privacy. The Center for Teaching Innovations advises executing specific protocols for managing data while acknowledging the privacy and rights of students' data. Teachers and policymakers should also prioritize how data is gathered, processed, and used and ensure learners agree or are briefed accordingly (European Education) (Center for Teaching Innovation).

8. Methodology

This exploratory research employs a mixed-method approach by utilizing both questionnaires and focus groups. Participants from the tertiary education sector were recruited to gather insights and perspectives on AI education. To minimize biases and obtain a broader perspective, questionnaires were distributed to participants located in universities across Ireland, Germany, and Dubai. Two focus group sessions were conducted using video conferencing technology. Each session lasted approximately 70-80 minutes and included first-year (10 participants) and final-year (8 participants) students from various disciplines to compare their knowledge of AI utilisation for learning purposes. The objective of these focus groups was to gather in-depth information and foster discussions about students' attitudes, beliefs, and perceptions regarding the use of AI. A mix of questions and statements was presented to stimulate discussion and gain additional insights and perspectives.

9. Findings

This study sought to find out how educators and students interact and utilise AI, its influence on the familiarisation, perceptions, and usage of AI tools towards embracing social good within education, and the opportunities and ethical discussions of incorporating artificial intelligence in the learning environment. The literature review emphasizes the optimistic perspective of AI applications in learning by defining its potential to enhance student's learning process, administrative roles, and decision-making roles. ITS, AES, and AI LMS are enabling technologies to deliver personalized education experiences, reduce paperwork, and enhance the best practices in education.

These ideas are supported by the research results, which confirm the awareness of the term AI and positive attitudes among educators and students—the majority of the respondents (2%) indicated that they were somewhat familiar with AI, and even more (4%) stated that they incorporated various AI-based educational applications into their work. ITS has been widely adopted in KM, along with chatbots and speech recognition tools, to improve delivering adaptive KM and better administrative services.

However, certain challenges remain unresolved, and people remain cautious about AI. While the overall perception is positive, there is a clear awareness of its benefits. The two parties also represent worries about privacy, algorithms, dehumanization, and other socio-political issues arising from the use of AI. The potential of AI to aggravate the problem of inequality in education and reduce the general capacity for critical thinking and problem-solving is also presented.

To ease all these concerns, there is a need to embrace the practical integration of AI in addition to the existing techniques in the education sector. AI should be used in teaching to support educators and students by introducing or continuing the training for educators to use these technologies effectively. One way to minimize risks and guarantee that the application of AI technologies is fair and ethical is to set guidelines for the use of the technologies and usage restrictions that are put in place

10. Review of Findings

Questionnaire:

A questionnaire consisting of 20 questions (17 multiple-choice and 3 opinion-based) was emailed to faculty members in selected colleges. To minimize regional bias and gain an international perspective, colleges in Ireland, Germany, and Dubai were chosen to participate. The questionnaires were emailed directly to faculty members. The primary objective of the questionnaire was to collect a wide range of opinions and stats on the use, understanding, and perspectives of AI in education, aiming to capture both quantitative data and qualitative insights. A total of 120 questionnaires were distributed via email to faculty members across six universities: two in Ireland (30 each), two in Germany (30 each), and two in Dubai (30 each). The overall response rate was 49%, with 59 out of 120 questionnaires being completed and returned.

11. Results Summary

Among the 59 participants, 86 percent believe that the existing standards are good enough to sustain the company's growth in the long run. 4% (51) of the respondents were teachers or lecturers, while 13. 6% or 8 of the respondents stated that they had an administrative position in education. Experience: The majority of the respondents, 66 percent, have been teaching for more than 10 years. 25% of the respondents ticked the box asking how familiar they are with AI: 18. 6% said they were not familiar, 2% said they were somewhat familiar, Respondents' perception of the use of AI for educational tools was also sought, 4% have employed such a tool, whereas 11. 9% still need to. ITS appears to be the the most used or trialed AI educational system, followed by Chatbots and Virtual Assistants, as well as Speech recognition and Language learning instruments. Furthermore, there is an observation that among people who are aware of AI, one percent stated that they employed AI in education at least once a week.

The respondents' most compelling rationales for integrating AI in educational settings are provided below: personalization of lessons (8%) and efficient management of institutional tasks (2%). Nevertheless, there is a noteworthy concern about educational inequality; most of the respondents have doubts about AI technologies' effectiveness in solving such problems.

Based on the survey of its users, 33% of them are of the view that AI can revolutionize the delivery of education by helping teachers, in this case mainly in administration. Only 6% suggested that the given focus on individual tutoring as well as learning will improve and transform the teaching profession. From the responses of the participants who answered the open-ended question, to identify the most preferred or commonly used AI application: Duolingo Socrative, and Blackboard were some of the most commonly mentioned applications of AI. Some of the respondents stated that they had adopted these applications in the sense that they had used them on a trial basis.

5% said that they have yet to see a decrease in administrative responsibilities. Regarding the assessment aspect of AI, only 2% of the respondents stated that they have utilized AI in this aspect. The participants were given an opportunity to express any other view they would wish to add. Still, one of the most significant common threads was a general unawareness of AI implementations. A good number also indicated they would like to get more information and training on the use of AI in education and related tools. The second recurring topic was the issue of the student's autonomy when using AI as a tool and surrounding technologies. Some of the respondents' concerns were that students may overly rely on AI and hence may be affected in their learning dimension.

12. Focus Groups

The four main themes that emerged from the focus group responses are Awareness about AI Applications, the Kinds of AI most often employed and most effective AI systems, Thoughts on the advantages of AI, and observed disadvantages and ethical issues.

Awareness and Understanding of AI: From the findings of the focus group discussions, it is evident that more students have a good understanding of the element of Artificial Intelligence. All the students surveyed possess a working knowledge of Artificial Intelligence and have described it as the use of technology to enable machines

to learn and make decisions similar to humans. A consistent identification of AI's core functions suggests that the students have a sound understanding of the subject matter. More importantly, it shows just how ingrained AI is in the student's academic and personal lives.

Types of AI Used and Most Useful AI Systems: It is evident from the discussions that there are numerous AI technologies that students practice in their everyday experiences and studies. Students frequently interact with voice assistants, chatbots, social media algorithms, video games, and recommendation systems. The students perceived AI tools as significant in transforming their learning efficiency, with mentions made to Grammarly Language Translation Tools, Academic Journals/Database, and Research Tools as most beneficial. All these tools assist them in their writing, translating, research, and information activities or tasks. In conclusion, the student recognizes artificial intelligence technologies that enhance their academics and daily endeavors, implying that they hugely depend on artificial intelligence for effectiveness.

Perceived Benefits of AI: The answers from the students also confirm the overall enforced perception of AI and the importance of its role in increasing the effectiveness of academic work, development of research skills, and organizational competencies. Students also consider AI to be helpful and, therefore, expect better results and this to be reflected in their grades and everyday life. Grammar checks, enhancing the quality of the writing and translation, finding academic papers, organizing information, managing study schedules, and using other AI tools were appreciated by the students. Moreover, AI was significant for auto-search with citation and summary of research articles, ease in writing and citation, and generating relevant content/information. The use and appreciation of AI tools among participating students establishes an important role in their educational activities.

Concerns and Ethical Considerations: Students' attitude towards AI tools: The discussion with the focus group results indicates that students are more or less inclined to have a positive attitude regarding the use of the tools powered by Artificial Intelligence in their academic and personal activities. However, they also highlight the significant concepts in the context of ethical use and concern and issues that should be solved to help AI and not harm or hinder students.

The key conclusions from the student’s responses are as follows:

General Lack of Fear: Survey participants need to report a high degree of concern with reference to the use of AI tools. They understand what AI offers and approve of its application in the improvement of efficiency when it comes to productivity in their academic lives. This comfort level with AI, therefore, points to a relatively high level of acceptance and incorporation of these technologies into their way of life and education experiences, hence eliminating the fear factor as a potential prohibitive criterion for the students adopting AI.

Importance of Ethical Usage: Ethical issues raised by the students are apparent throughout the discussion. They accept that with the rise of the use of Artificial Intelligence tools in the modern world, there is the risk of misuse of these tools, and hence, there is the need to practice the use of AI tools ethically. Nearly all the students agree with the proposition that educative ethical standards and the right-use policies are crucial in enhancing confidence in Artificial intelligence systems.

Concerns about Overreliance: Another issue that the students raised is dependency on the developed AI tools. However, one main problem has to do with dependency on AI, as a student might end up relying on these tools and thus likely to decline in the relevant skills.

Positive Outlook with Caution: In general, students' attitudes toward AI appeared to be somewhat optimistic. They acknowledged its capability to bring major positive changes to their academic and personal experiences. However, they also exercise caution and promote its responsible and balanced use.

13. Conclusion

The survey provides strong ideas about the current adoption of AI in education concerning the respondents, who are teachers and lecturers in third level education. Overall, participants are generally aware of AI but recognize the importance of having specific training and education on AI and its uses. It was observed that most learning methods were AI-enabled, especially in the areas of learning customization and optimization of administration, with a significant percentage of the respondents using them weekly.

Still, problems with AI in education have emerged, for instance, in relation to equality and students’ dependence. Sadly, there is no confidence in handling more profound problems in education as a majority share confidence in AI to revolutionize administrative work. All in all, the work brings out the potential as well as the difficulties

of adopting AI solutions in learning environments, thus calling for continuous improvement in the utilisation of this and related strategies.

Preliminary data collected from the student focus group show a good level of awareness and perceived usefulness of AI in the learning environment. Majority of the students reported the AI tools being convenient in their student assignments, with a majority of them citing the use of Grammarly, Google Translate, and other artificial intelligence-based research tools to be very helpful in aspects such as grammar control, organization of information and translation. There exist apprehensions about specific issues central to the over-reliance on AI, but most respondents consider these technologies to be helpful tools that enhance performance and learning. This indicates the increasing understanding and implementation of AI in education, students included, knowing that it is useful in easing their academic endeavors.

Consequently, there is substantial support for the notion that students are gradually more aware of the existence of AI and engage in employing particular tools to enhance their learning process. One of the most striking features of all the positives listed is the complete absence of fear and the readiness to accept all the benefits of AI. Still, educational institutions remain in the trial and development stage of many possibilities. There are still some worries over the issues of human contact and social interaction and students' overdependence on such technologies. Wooldridge's research suggests that although AI has advanced considerably, particularly in fields like machine learning and natural language processing, it still falls short of reaching the broad, general intelligence that humans possess. Instead, AI demonstrates strong capabilities in specialized, narrow areas where it can be extensively trained using large datasets (Wooldridge 2020).

However, with the help of AI functions, educational practices can be improved due to the organization of individual approaches in the learning processes, as well as the exclusion of numerous bureaucratic tasks and carrying out of carefully researched decisions based on AI algorithms. But, to promote general well-being in education, there is a need to weigh down the ethical issues that are most likely to come with AI solutions.

14. Researchers Recommendations

In order to counter this issue, one has to pay much attention to the proactive use of AI technologies as well as to reserve the primary forms and activities that foster one's abilities and knowledge. Students should be encouraged to adopt AI as an aid and not a substitute for essential study processes. Particular attention should be paid to how AI tools would complement or mistakenly replace valuable skills that learners are expected to acquire as part of their academics. This balanced view is needed so that the benefits to be derived from AI can be fully realized without disastrously running into the pitfalls of extreme dependency

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