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ORIGINAL

Transforming Education in the World of Artificial Intelligence

Transformar la educación en el mundo de la inteligencia artificial

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ABSTRACT

Introduction: Artificial Intelligence (AI) and Machine Learning (ML) are key drivers of innovation and growth among all industries, and the education sector is no exemption. AI is considered as a powerful tool to facilitate new examples for technological development, instructional design and educational research that are otherwise not possible to develop in the traditional education techniques. With the development in information processing and computing techniques, artificial intelligence has been widely applied in educational practices (Artificial Intelligence in Education; AIEd), such as teaching robots, human-computer interactions intelligent tutoring systems, learning analytics dashboards and adaptive learning systems. It has the ability to maximize both teaching and learning, helping the education sector to evolve for better thus benefitting students and teachers both.
Objective: this research paper specializes in showcasing the benefits of AI for Students and Educators both by producing an actual survey report conducted on respective category of people.
Method: a survey has been conducted on 46 people belonging from different sections of society to find out if generative AI could help the education sector in India.
Results: AI is one of the highly advanced tool that can be used to ease learning making more accessible for students and teachers at different levels.
Conclusion: AI-powered learning analytics will add to many pluses, considering the potential challenges associated is also important. This will also put a broad light on key insights and adaptive recommendations from world renowned forums and government bodies related to AI in education.

Keywords: Artificial Intelligence; Students; Teachers; Digital Education; UNESCO.

RESUMEN

Introducción: la Inteligencia Artificial (IA) y el Aprendizaje Automático (AM) son motores clave de la innovación y el crecimiento entre todas las industrias, y el sector de la educación no es una excepción. La IA se considera una poderosa herramienta para facilitar nuevos ejemplos de desarrollo tecnológico, diseño instruccional e investigación educativa que de otro modo no sería posible desarrollar con las técnicas educativas tradicionales. Con el desarrollo de las técnicas informáticas y de procesamiento de la información, la inteligencia artificial se ha aplicado ampliamente en las prácticas educativas (Inteligencia Artificial en la Educación; AIEd), como los robots docentes, los sistemas de tutoría inteligente de interacción humano-ordenador, los cuadros de mando de análisis del aprendizaje y los sistemas de aprendizaje adaptativo. Tiene la capacidad de maximizar tanto la enseñanza como el aprendizaje, ayudando al sector educativo a

evolucionar para mejor, beneficiando así tanto a estudiantes como a profesores.
Objetivo: este trabajo de investigación se especializa en mostrar los beneficios de la IA para estudiantes y educadores mediante la elaboración de un informe de encuesta real realizado a las respectivas categorías de personas.
Método: se ha realizado una encuesta a 46 personas pertenecientes a diferentes sectores de la sociedad para averiguar si la IA generativa podría ayudar al sector educativo en India.
Resultados: la IA es una de las herramientas más avanzadas que pueden utilizarse para facilitar el aprendizaje y hacerlo más accesible a estudiantes y profesores de distintos niveles.
Conclusiones: la analítica del aprendizaje impulsada por la IA aportará muchas ventajas, pero también es importante tener en cuenta los posibles retos asociados. Esto también arrojará una amplia luz sobre las ideas clave y las recomendaciones adaptativas de foros de renombre mundial y organismos gubernamentales relacionados con la IA en la educación.

Palabras clave: Inteligencia Artificial; Estudiantes; Profesores; Educación Digital; UNESCO.

INTRODUCTION

Artificial intelligence (AI), has been around for a few decades now but has only recently started to get recognized. As the digital transformation has been expediting its pace in every single industry, so have the applications of AI in the education sector.[1,2] Earlier in the 1970s, when the artificial intelligence and education sector were first established, the earliest intelligent tutoring systems were invented to support students in exploring the geographical features of South America. This set the beginning of AI's, to proceed into the world of education. Some of the most common ways AI technology is incorporated in teaching and learning could be: Repetitive & Administrative Task Automation, Personalized Learning, Global Access to High-quality Education and Support outside Classrooms. According to eLearning Industry, upwards of 47 % of learning management tools will be enabled with AI capabilities in the next three years. AI in Education can possibly be characterized into AI as director for learner as recipient, AI as supporter for learner as collaborator and AI for learner as leader. Varied AIEd (Artificial Intelligence in Education techniques i.e. natural language processing, artificial neural networks, deep learning, machine learning and genetic algorithm have been implemented to create intelligent learning environments for prediction model building, behaviour detection, learning recommendation, etc.[3,4]

UNESCO has been committed to support Member States to gain the maximum potential of technologies related to AI for achieving the Education 2030 Agenda, while also ensuring that its application in educational contexts is backed up by the core principles of inclusion and equity. UNESCO has also developed a publication within the framework of the Beijing Consensus aimed at being related to the readiness of education policy-makers in artificial intelligence.[5,6] The publication, Artificial Intelligence and Education: Guidance for Policy-makers, should be of much use to practitioners and professionals in the education sector and policy-making. It shares the understanding of the opportunities and challenges that AI will offer for education, as well as its significance for the core competencies needed in the AI era.[7]

Application of AI In Education

A. AI Benefits for Students

- Personalised Learning: The usage of AI by students, has introduced a personalized approach for learning programs based on their individual preferences. AI can adapt to each student's level of knowledge, speed of learning and customized goals so they're getting the most out of their education. Additionally, solutions powered by AI can analyse students' learning histories, bring out their weaknesses and offer unique courses accordingly.[8]
- Tutoring with Virtual Assistant: AI tools can help students sharpen their skills outside of the classroom without incurring fear of replacing educators. These intelligent systems offer prompt aid guiding students through homework tasks, offering valuable feedback and addressing queries.
- Instant Feedback and Support: Bombardment of repetitive questions by students on tutors on a daily basis can be reduced as AI can help students find responses at a response rate of 2,7 seconds to their frequently asked questions through support automation and conversational intelligence.[9]
- Universal 24*7 access to learning: AI-powered tools makes each student learn at their own pace, and full time access makes it easier for students to explore whatever they want without waiting for an educator. Moreover, this provides access to high-quality education without any additional traveling expenses.

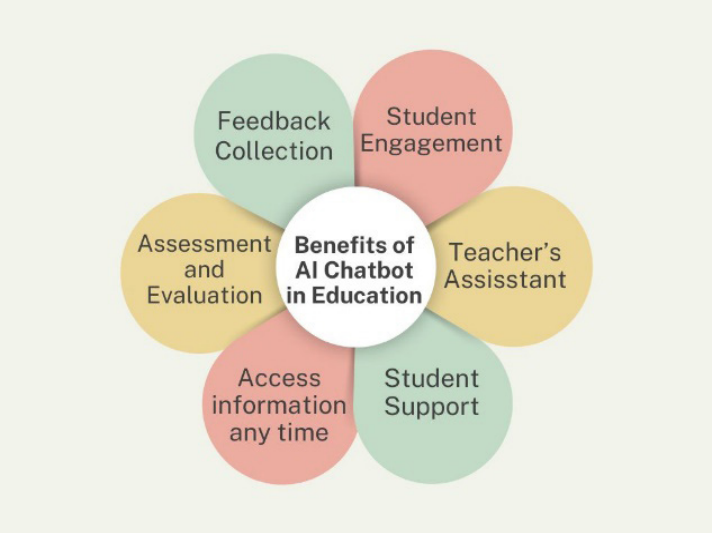

Figure.1. Benefits of AI chatbot in Education sector

B. AI Benefits for Educators

Most teachers and faculty believe that with developing technology comes a bit of hesitancy, especially with something as powerful as AI. They aren't afraid to admit that they struggle spending more time educating students individually, diving into research while continuing their own learning. AI can help educators with time management by automating tasks, enhancing creativity by analysing student performance.[10] Few ways in which AI can improve a teacher's job are as follows:

- Personalised learning: By analysing the students' learning abilities and history, educators can provide tailored learning experiences. This analysis allows teachers to create the personalised learning program adapting to each student's strengths and weaknesses.
- Creating and supplementing content: AI will leave more time for educators to research on curriculum, plan lessons efficiently or improving student engagement. With access to a school's information base, AI-powered chatbots can answer a huge variety of generic and repetitive questions.
- Administrative efficiency: Automation of the most tedious of tasks can be done with great efficiency, including grading papers, attending similar questions or assessing learning patterns or any other kind of administrative work. A Telegraph survey reports a teacher spends 31 % of their time planning lessons, grading tests and doing miscellaneous work. Using right AI tools can help educators to streamline these tasks and save their time for engaging with their students.

Some AI-powered tools are AudioPen, Canva Magic Write, Curipod, Eduaide.Ai, OpenAI, Quizizz, Slidesgo which may help teachers personalise support and optimize instruction for maximum impact.

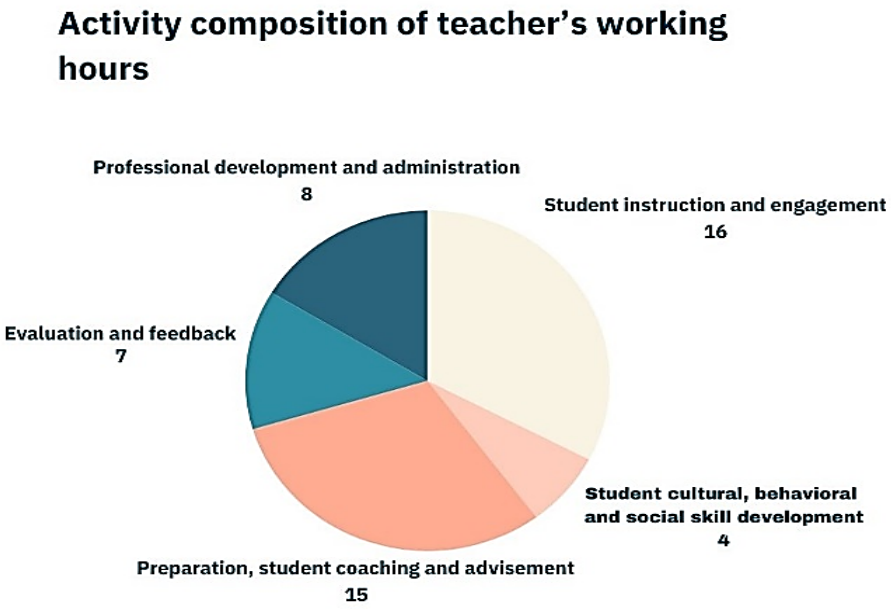

Figure 2. Teachers work about 50 hours a week, spending less than half (only 49 %) of the time in direct interaction (Average for respondents in Canada, Singapore, UK and US)

METHOD

To make sure AI benefits all sectors of education, we should be mindful of the principles such as Co-creation, Easy entry points, Digital literacy, Innovation and adaptation. Various technologies that are involved in shaping AI for education, includes:

- Machine Learning (ML): ML algorithms are used in analysing student data, helping to create personalized learning paths and related recommendations.
- Natural Language Processing (NLP): NLP techniques are used to understand basic human language. In education sector, NLP is used for text-based tasks like language translation, automated essay scoring and virtual assistants or chatbots for answering student queries.
- Computer vision: This technology is employed to determine visual content, such as images and videos. It can be used for tasks like handwriting recognition for grading, facial recognition for attendance tracking and object recognition for interactive learning apps.
- Speech recognition: Speech recognition technology will enable the transcription of spoken language into text. This is highly recommended as accessibility tools for students with disabilities, language learning apps and virtual language tutors.
- Recommendation systems: Recommendation systems powered with AI suggests personalized educational content such as textbooks, courses and additional resources based on a student's learning history and preferences.

Research Finding

A survey has been conducted on 46 people belonging from different sections of society to find out if generative AI could help the education sector in India. This survey was done via Google form https://forms.gle/ddwkqxeDaCzQmNG58 that presented the responders with 'Questionnaire about AI' that could delve into their perspective on artificial intelligence in education. The feedback has been presented below:

Table 1. Data showing if generative AI can help the education sector in India

Sl. No.	Shorten version of Question	Categories	Frequency (%)
1.	Age	Under 25	6,5
		26-35	50
		36-45	34,8
		Above 45	8,7
2.	Field of study	Humanities and Social Science	30,4
		Engineering and Technology	43,5
		Business and Management	10,9
		Medical and Health Science	4,3
3.	Level of Education	Graduate	17,4
		Post Graduate	45,7
		Doctorate	28,3
		Post Doctorate or above	8,7
4.	Familiarity with the concept of artificial intelligence	Yes	100
		No	0
5.	Use of AI technology	Never	3
		Rarely	17,4
		Sometimes	54,3
		Frequently	21,7
6.	Usage of tools in the educational process that include artificial intelligence	Yes	58,7
		No	30,4
		Not Sure	10,9
7.	If AI can improve the learning experience for students	Yes	82,6
		No	10,9
		Not Sure	6,5
8.	If school/educational institution uses artificial intelligence systems for administrative tasks	Yes	32,6
		No	37
		Not Sure	30,4
9.	Areas in which AI can benefit students	Personalized Learning	63
		Automated Grading	34,8
		Tutoring Support	54,3

		Career Guidance	34,8
		Educational Content Generation	80,4
10.	Comfort with AI technology assisting teachers in grading assignments and exams	Yes	58,7
		No	32,6
		Not Sure	8,7
11.	Comfort with AI technology collecting and analyzing your personal data for educational purposes	Yes	37
		No	56,5
		Not Sure	6,5
12.	If AI technology can replace human teachers in the future	Yes	15,2
		No	63
		Not Sure	21,7
13.	If AI technology can bridge the educational gap between disadvantaged and privileged students	Yes	60,9
		No	26,1
		Not Sure	13
14.	Wish to see more AI integration in your educational institution	Yes	73,9
		No	13
		Not Sure	13
15.	AI applications likely to see in your educational institution	Smart Classrooms	67,4
		AI-Powered Personalized Recommendations	37
		Virtual Reality/Augmented Reality Learning	58,7
		Smart Assessments	52,2
		Intelligent Educational Software	71,7
16.	Concerning ethical considerations related to AI in education	Privacy and Data Security	82,6
		Bias and Discrimination	30,4
		Lack of Human Interaction	73,9
		Reliability and Accuracy	43,5
		Job Displacement	45,7
17.	If interested in learning more about AI technology	Yes	93,5
		No	4,3
		Not Sure	2,2
18.	Consider pursuing a career in AI or related fields	Yes	63
		No	21,7
		Not Sure	15,2

Also here are some latest proceedings related to AI in real-time:

- UNESCO's mandate has called to address the conversation including AI's role in addressing differences regarding access to knowledge and research.[11] The promise of "AI for all" stands for taking advantage of the technological revolution for all and making sure that AI does not form any kind of technological gaps within countries notably in terms of innovation.
- Sal Khan, founder of Khan Academy, envisioned that AI could help teachers to stay updated of the latest advancements in their respective field. For instance, a biology teacher will get an AI update on the latest breakthroughs in cancer research, or let Artificial Intelligence to update their curriculum.
- According to World Economic Forum, Teachers work about 50 hours a week, spending less than half of the time in direct interaction with students. Technology can help teachers reallocate 20-30 % of their time toward activities that support student learning.
- Dede, the associate director of research for the National AI Institute for Adult Learning and Online Education, states "The trick about AI is that to get it, we need to change what we're educating people for because if you educate people for what AI does well, you're just preparing them to lose to AI. But if you educate them for what AI can't do, then you've got IA [Intelligence Augmentation],"
- U.S. Department of Education's Office of Educational Technology (OET) released a new report, "Artificial Intelligence (AI) and the Future of Teaching and Learning: Insights and Recommendations". The report being a part of the Biden-Harris Administration's, shows continuous efforts approaching to AI-related opportunities and risks. The report suggests on working for aligning AI Models to a Shared Vision for Education, designing AI Using Modern Learning Principles, informing and involving educators, developing Education-specific Guidelines and Guardrails etc.

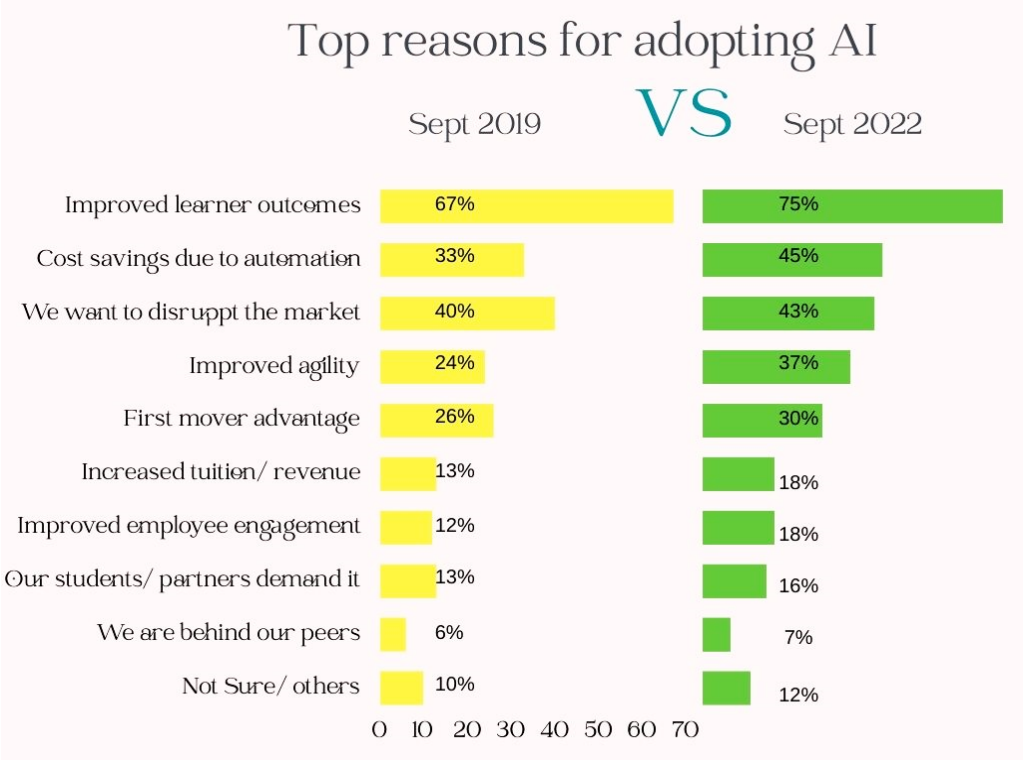

Figure 3. Improved learner outcomes remain the top reason for adopting AI

Future Scope

It is for sure that the way AI is used, in future it will be fine-tuned and made more accurate as the technology becomes more developed. For example, the way students gain with AI apps will become more detailed and sophisticated. Grand View Research reports that, AI in education market was valued at USD 1,82 billion in 2021 worldwide, and expected to grow at a compounded annual growth rate (CAGR) of 36,0 % from 2022 to 2030.[11] Aside from AI apps, virtual reality games are likely to become more prevailing in classrooms. Virtual reality AI provides students with first-hand experience, which makes learning more interactive. In educational institutions, AI will be used to create smart classrooms, things like temperature, alarms, and lights are controlled remotely by AI-powered apps.

CONCLUSION

AI is one of the highly advanced tool that can be used to ease learning making more accessible for students and teachers at different levels. With this new technology, students have gained the power to take their learning experience into their own hands with personalization. However, many educational institutions have shown concern in effectively integrating AI into their teaching practices such as ethical concerns and high cost of AI tools. In another way of using AI, various apps are now analysing students' learning styles, learning pace, strengths and weaknesses and provide real-time feedback. Although AI-powered learning analytics will add to many pluses, considering the potential challenges associated is also important. Hence, faculties must regularly assess the effectiveness of learning analytics tools powered with AI and gather feedback from educators, parents and students to identify areas of improvement.

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AVAILABILITY OF DATA AND MATERIALS

The datasets used in this research are publicly available and properly cited in our dataset section for transparency and ease of replication.

COMPETING INTERESTS SECTION

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

CONFLICT OF INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

AUTHOR CONTRIBUTIONS

All authors contributed to design and development of the system as well as the manuscript. All authors have read and approved the final manuscript.

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