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ARTIFICIAL INTELLIGENCE IN EDUCATION

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ABSTRACT

Artificial Intelligence (AI) is one of the disruptive technologies which is being used to customize the experiences of various learning groups, instructors, and tutors. It is considered the most in-demand technology in today's education system. It is expected that AI will enhance the education system worldwide. The educational institutions are nowadays facing various challenges like high dropout rates, unavailability of smart content, lack of customized content as per the textbooks, lack of personalized learning systems, rigid examination patterns etc. The use of AI brings hope to overcome these challenges. It helps to create personalized learning experiences, develop smart content, expand the range of education, and facilitate the management & administration of education by integrating information and disseminating data as per the needs of the target group. With AI, teachers/instructors can identify the learning styles and hard points of students and provide new avenues of teaching and support to students. The current study discusses about AI in various areas of education and its application in Indian education. AI has the potential for enabling students to achieve their goals and streamline the process of education. It can analyse the students' previous learning history, identify their weaknesses, and improve the upcoming learning opportunities for personalized learning experiences. AI can be used effectively for transcription of faculty lectures in local languages which can thus become a good educational resource to students of technical education. The AI tools and programs are inclusive which makes the classrooms accessible to all irrespective of language or any other disabilities.

Keywords: *Artificial Intelligence (AI), Artificial Intelligence in Education (AIED), Artificial Intelligence in Technicial Education, Artificial Intelligence in Indian Education*

1. INTRODUCTION

The Information and communication technologies (ICT) have become a commonplace entity in all aspects of our daily lives. Over the last few decades, ICT has nearly transformed the procedures and practices of all sorts of business and governance. It has begun to make an impact in education, although not to the extent that it has in other disciplines [9]. The main purpose of using ICT in education is to introduce new teaching and learning practices and to develop 21st century

thinking and learning skills. Its use in education ensures the proper implementation of all the technologies and makes students and teachers proficient in using these technologies. Its use in the classrooms by the teachers increases the student's motivation to learn efficiently. The National Education Policy (NEP), 2020 the first education policy of India in the 21st century has rightly acknowledged the future role of disruptive technologies in education system. In such a technology driven knowledge environment, it becomes inevitable to become familiar with various disruptive technologies like "Artificial Intelligence, Block Chain Technology, Machine Learning, Data Science etc". These disruptive technologies are going to impact equally all the areas of education like technical education, teacher education, vocational education, professional education, adult education etc. In India, technical education plays an important role in development of human resource by creating a skilled manpower, enhancing the industrial productivity and improving the quality of life of the people. It covers various programmes which includes "engineering, technology, management, architecture, town planning, pharmacy, applied arts & crafts, hotel management and catering technology".

The NEP 2020 also calls for imparting professional education in higher education. It also advises that the technical universities in India should aim to become multidisciplinary institutions to offer holistic and multidisciplinary education. The policy further mentions that India must take the lead to prepare the professionals in areas like "Artificial Intelligence (AI), 3-D machining, big data analysis, and machine learning". Thus, AI is becoming the key driver of development and innovation not only in various industries but also in various areas of education. In the next three years, the Learning Management Systems will be empowered with AI capabilities [6] and AI driven applications, would collaborate more closely to improve quality of education system. As a result, artificial intelligence software would become increasingly intelligent in the day to day world.

2. ARTIFICIAL INTELLIGENCE (AI)

In recent years, AI has brought major developments and represents an emerging technology that will transform how human beings live [14]. Since 1950, the experts on regular intervals predicted that the world would have to wait a few more years to reach to Artificial General Intelligence. A system that will show behaviour which will be indistinguishable from humans in every aspect with cognitive, emotional, and social intelligence [7]. In 1955, the first AI system was designed by Allen Newell and Herbert A. Simon which was called Logic Theorist. The system was implemented by J. Clifford Shaw [5]. The term was first used by John McCarthy in 1956. The term has been defined by various researchers. [3] define AI as "Computers that can perform cognitive tasks that are normally associated with human minds". The researchers further explain that AI isn't a single technology but rather an umbrella term that describes a wide range of technologies such as machine learning (ML), data mining and natural language processing. AI can be defined as the creation of smart machines that possess human behaviour and response [1]. It also refers to the potential of computer-controlled machines for executing tasks in an almost similar way as human beings [18]. [16] believed that the definitions in the existing literature largely focus on cognition and ignore the various other aspects like political, psychological, and philosophical aspects of the theory of intelligence. The researchers define AI as "computing systems which are capable of engaging in human-like processes such as learning, adapting, synthesizing, self-correction, and use of data for complex processing tasks".

AI has the potential for enabling students to achieve their goals and streamline the process of education. It provides students access to the right course, improving their communication with faculties and helping them to lay their focus on other aspects of life by saving their time. A key aspect of AI is personalization which helps students to have a personalized approach to learning based on their unique abilities, preferences and experiences. AI adapts itself to the students' level of knowledge, their pace of learning and preferred goals so that students receive maximum benefits from their

education. Besides this, AI can analyse the students' previous learning history, identify their weaknesses and improving the upcoming learning opportunities for a personalized learning experience. It empowers faculties as well by automating different tasks like administrative work, paper grading and assessment of learning patterns. According to [19], the faculties devote 31% of their time in planning their future lessons, grading the tests and in doing various administrative work. The use of AI and automation tools will help faculties to automate their work and allows them to use saved time in other teaching core competencies [10]. The AI use can help in providing constructive feedback to faculties by helping them improve their instruction and make the learning more fun and interesting. It will also help students in understanding their mistakes and to learn how to do better by rectifying the mistakes.

The rapid growth of computing technologies has made the application of AI in Education (AIED) easier. The use of AI technologies or application programmes in educational settings to aid teaching, learning, or decision-making is referred to as AIED [8]. AI also possesses the ability to respond to various educational needs of students. AI and ML are technologies that not only enhance the safety of institutions but also improve the efficiency of an educational system by contributing to the teaching and learning process [12]. Thus, AI is believed to play a considerable influence in supporting educational reforms. It will provide educational institutions with new intelligent teaching tools, create new teaching and learning modes, and encourage innovation in teaching assessment and management systems [13]. It helps teachers in creating smart content for students which facilitates learning and makes it comfortable. The smart content can change and adapt dynamically, depending on who is reading it. It helps in generating and updating the content of the lessons and keeping the information up-to-date. It also makes the content customized for different learning curves. It also empowers them for accessing knowledge with a single click and makes their knowledge more in-depth and broader for keeping themselves in line with the students of the 21st century. The AI-powered chatbots are available for students for their queries round the clock. It helps them for getting answers to their queries without waiting for the teacher in the physical classroom. The use of chatbots in education is to empower teachers and not to replace them. It decreases the burden of repetitive and low cognitive level tasks which are carried out by the teachers and thereby increasing their productivity [22]. The chatbots allow the colleges to answer the queries of students at a lightning-fast speed which builds the motivation and interest among the students in learning.

3. AI IN EDUCATION (AIED)

The discussion paper of NITI Aayog's "Responsible AI" (2021) has highlighted Education as one of the sectors where AI has a high potential for solving societal needs. It further highlights the potential use of AIED and claims that AI could enhance the learning experience of students through personalised learning and help in predicting the need for interventions for decreasing the dropout rate [11]. The educational institutions are using various AI technologies like chatbots, adaptive learning platforms and virtual teaching assistants for improving their efficiency and effectiveness. There exists a link between AI and education which mainly involves three areas 1) "learning with AI which involves the use of AI-powered tools in classrooms, learning about AI (which lays the main focus on AI technologies and its techniques and Preparing for AI" which enables citizens for better understanding the potential impact of AI on the human lives [21]. The use of AIED makes learning universally accessible to all students. It is considered a blessing for students who are residing in remote areas and for those students who are unable to attend physical classes due to any illness or injury. It overcomes the geographical barriers to learning, and It empowers students to learn from the best teachers in the world while sitting at home. It helps teachers to identify gaps in their teachings and their content material. Coursera a MOOCs platform has already put this into practice. Adaptive learning is considered one of the most potential use of AIED. It helps in tracking the progress of every student and provides the necessary information to teachers if students face any difficulty in the learning content. Additionally, adaptive learning also modifies the learning content

as per students' need which helps them to learn at their own time and pace. In higher education institutions (HEIs), AI-powered systems are being used to decrease human bias during the process of admission. It enhances the credibility of the admission process by giving specific criteria to select applications in admissions. AI tools helps in making global classrooms available to all students irrespective of their language that they speak [15]. The AI tools and programs are inclusive which makes the classrooms accessible to all irrespective of language or any other disabilities.

4. AI IN INDIAN EDUCATION

There are several academic institutions in India that have adopted AI. These institutions include "Centre for Excellence in AI (CAI) in IIT Kharagpur, the Centre for AI and Robotics (CAIR) associated with DRDO, the Robert Bosch Centre for Data Science and AI (RBC-DSAI) in IIT Madras, AI Group (AI@IISc) at IISC Bangalore and the Department of AI at IIT Hyderabad". The Ministry of Education (MOE), Govt of India launched "AI for All" in cooperation with the Intel and CBSE in August 2021. The main purpose of this programme was to create awareness of AI among Indian citizens. The "AI for All" is a self-learning online program that aims at creating awareness about AI. The self-learning program aims at developing all individuals like students, professionals, and senior citizens. The program wants to attract those users who want to have a 'Digital First Mindset'. In a survey conducted by Analytics Insight [2], 46% of the respondents believe that AI could predict school dropout rates in India while 24.4% do not believe it is a feasible choice. Among the participants, 29.3% were neutral. 65.9% of participants believed that AI could enhance the efficiency of individualised education and 31.7% of participants believed that 31.7% believed that the models of AI could enhance personalized education while 2.4% of participants didn't believe that AI could enhance personalized education. About 34.1 % of the participant's believed that the educational apps of AI help in covering the syllabus in their homes. However, 65.9% of participants don't use the educational apps of AI.

In yet another survey by Analytics Insight [23] for understanding the thought process of Indian people about AIED and whether they are ready to implement it. Around 241 participant's participated in the survey. About 90.2% believed that parents and students are aware of AI and 9.8% are unaware of it. Around 39% of individuals believe that AI will have a significant influence on education because it would bring new insights into educating children and adults. Only 4.9 per cent of people are fully negative, believing that AI would have no impact on the advancement of AI. When the participants were asked about the AI tools and technologies, around 46.3% of participants described the usage of AI as low. However, 2.4% of participants believed that AI use was extensive. Regarding AI use in schools, 12.2% of participants believed that there was low usage of AI in schools and 31.7% of participants were neutral.

The recent technological breakthroughs based on AI have made it clear that AI will continue to play a major role in the education system and may even become more prominent. The AI-powered solutions have encouraged schools and Universities to adopt the technology-driven front in imparting education. It has also become a new instrument for teachers which assists them in carrying out administrative tasks. To investigate the future of AI in Indian education, a study was conducted by Analytics Insight [20]. About 41.5% of participants were unsure whether AI can replace a teacher in future. 36.6% of participants believed that AI would never replace teachers in future and 22% of participants believed that AI would definitely replace a teacher in future. The participants were asked whether AI can become the future of Indian education. Around 46.3% of the participants believed that AI would be the primary technology driving the Indian education sector in the near future. Around 41.5% of participants were unsure about the AIED implementation. Around 12.2% of the participants believed that AI would never take over the Indian education system anytime soon.

5. AI IN TECHNICAL EDUCATION

Like AIED, AI will improve the quality of education in technicial education as well. The

statutory body of technical education, "All India Council for Technical Education (AICTE)" has suggested the educational institutions in the country to offer AI as elective in B.Tech. course and to start offering B.Tech. in AI and Data Science. The AICTE in a report has revealed that since 2019-20, atleast 127 diploma institutes and 663 UG colleges across India have opted for courses on "AI, Data Science & Analytics, blockchain, machine learning and robotics". The 127 institutions consist of 222 institutes for AI and machine learning, 186 institutes for AI and data science [4]. Not just offering the course on AI in technical education but AI can help in education management and delivery. It can be used to empower the teaching and teachers and also be a helpful tool in improving learning and learning assessment practices. It also has a strong potential for providing opportunities for lifelong learning [21]. Further, the NEP 2020 puts emphasis on developing teaching learning material in local languages and AI can be used effectively for transcription of faculty lectures which can thus become a good educational resource to students of technical education. Chatbots can also be used in technical education monitor the enrolment and retention of students and also to analyse students success matrices [17].

6. CONCLUSION

The future of AIED is not fully defined but it is estimated that in future almost all areas of education be it technical, professional, non-technicial will depend more on technologies and tools for creating a holistic learning environment for students and faculties. Day by day new and innovative tools of AI are being developed and it is expected that these tools will help students to plan their career paths with clarity and work in achieving their goals. AI has begun to demonstrate its benefits and potential in various educational settings, and it remains to be seen how the technology will empower and improve overall learning outcomes of students.

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