

Systematic Review of Artificial Intelligence Application in Higher Education

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Abstract

The role of Higher Education in any society is inevitable when it comes to harmonious personality development of the youth and nation-building. The promising higher education system is research-oriented and is open to newer dimensions of teaching-learning pedagogy. One of the recent advancements in this sector is the emergence of the application of artificial intelligence which has eventually led to the emergence of New possibilities and challenges as well. The Massification of Higher Education and the diversified nature of curriculum has no doubt increased the workload of the teacher and the nature of the job has also undergone drastic changes. With changing times the teaching-learning methods including testing, measuring and evaluative processes involved in it, have experienced lots of changes recently with the interventions of the latest technology in the process. It is surprising to see how the application of artificial intelligence has aptly equipped not only teachers and teachers but also the whole system involved in the higher education system with its latest techniques. Despite all this, the use and application of artificial intelligence in higher education scenarios is still unclear to some extent especially in a country like India with different kinds of limitations when it comes to the use of technology. This paper tries to analyze the advantages and disadvantages of artificial intelligence and its role in the higher education system and finally the role of teacher in this respect.

Keywords

AI, Pedagogy, Curriculum, Technical Interventions, Higher Education.

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Introduction

As an effective medium, that fosters personal development, and promotes economic stability and social change, the role of Higher Education in any society is inevitable. As a tool for exchange of knowledge, research and innovation it equips students with skills needed to meet ever-changing societal demands. We can call it a passport to economic security and a stable future not only for the students but for the nation as a whole. Over the past decades worldwide higher education has undergone many changes when it comes to enrolment, student mobility, diversity of provision, research dynamics and technology. According to reports by UNESCO around 235 million students are enrolled in universities around the world. This number that has more than doubled in the last 20 years and is set to expand. In terms of Higher Education especially in a country like India we are in a flux, on one hand our students are being acclaimed worldwide and on the other hand we are drastically shifting away from our indigenous educational system. In any case use and application of artificial intelligence in this regard has been immense. It won't be any exaggeration if we say that AI has customized the whole teaching-learning process. It has been able to efficiently cater to the different needs and demands of the teachers and students. Specifically due to the diverse nature of present curricula. Along with the teaching-learning process AI interventions have been immense and effective in other avenues of Higher Education i.e. administration, office keeping, library science, sports and health etc. In higher education institutions that are set up in the rural areas role of AI is a bit restricted right now due to their own kind of limitations but the future seems to be very bright in this regard. The massification of students and the diverse nature of curriculum designing at Higher education institutes have posed newer challenges and here the role of artificial intelligence can play a vital role. AI is capable enough to address most of the problems associated with the better imparting of Higher Education at Higher Education centers. However, unless along with teachers and students associated stakeholders will not understand the role of artificial intelligence in its truest form, the application of artificial intelligence cannot be administered aptly.

Objective of the Study

The purpose of the study was to review systematically on Artificial Intelligence applications in Higher Education.

Methodology

Various available literature, articles in books, research papers and online literatures, articles regarding Artificial Intelligence applications in higher education were systematically reviewed by the researcher for the study.

Findings of the Review

After a systematic review of literature and articles following advantages and disadvantages of Artificial Intelligence applications in higher education were observed and the role of teachers dealing with Artificial Intelligence applications was also realised.

Advantages of Artificial Intelligence



To promote effective teaching-learning, blend of Artificial Intelligence and higher education has vast scope for personalized and customized methods of teaching-learning, keeping in mind the massification of students and the diversified nature of present study material. Each student in a class perceives the imparted knowledge in her own unique way but our conventional teaching and evaluative ways despite being loaded with reforms lacked concept of customized teaching and learning and here comes AI to our rescue. For example **Duolingo** is a language learning app that offers personalized lessons based on learners proficiency and learning pace. Another app called **Cognil**: An AI-driven assessment tool especially in essay grading which offers instant detailed feedback on essay writing, while suggesting areas of improvement. Inherent characteristics of AI to adapt and self-correct not only aid in task automation but also help in enhancing human intelligence in a higher education institute. Tasks like classification, curriculum designing, queries of the students,

and parents, data analyzing, homework formulating and its assessment, making presentations, evaluation, record keeping etc. are skilfully tackled by AI and hence reducing human labor and time to a great deal and helping in achieving daily goals. The role of AI in creating smart content is of high acclaim. Smart content refers to lessons created keeping in mind the specific personalized needs of the learners. In doing so AI has proved to be very engaging, relevant and useful, it can potentially organise and analyse vast amounts of data and it knows the behaviour of the user or learner and can formulate and recommend possible strategies that need to be adopted. It is so much user-friendly by default that AI creates content that resonates emotionally with the user. Though AI tools are totally backed up by technology and are data-driven but for a content to be smart enough it has to strike balance with human creativity, which helps in making it memorable and shareable. But the heart of any smart content is its customized / personalized flair. To make it personalized AI tools first segment the targeted audience, try to understand their choices and create personalized content that fosters deeper connections, elicits strong emotions i.e. awe, empathy, and laughter and adds a touch of surprise and relativity to it. Transforming data and content that needs to be delivered to the students into graphical or interactive forms using 3D or 5D techniques definitely boosts better learning and teaching giving both, the teacher and the taught better chances to explore and effectively communicate. This in turn enhances the learning outcomes, engagement and feedback of both teacher and thought. Our traditional education system somehow lacked this element. The real beauty of AI in the education sector lies in the fact that it is accessible in an extremely easy way. We can almost access these AI-driven study materials from almost any kind of source, without them taking up much space in our systems. We can see the examples of Khan Academy, Gurushala etc. learning apps that try circulating high-impact study material to the students hailing from the farthest areas of the country along with easy accessibility, even updation and timely notification of the content has also become very aptful. In addressing the problems faced by the students with visual and hearing impairment, AI plays a noble and crucial role. It has really enabled people with visual hearing problems to come across new learning experiences. Finally AI has been able to create such a digital education ecosystem wherein the masses have vast scope to learn according to their aptitude. Adaptable accessibility of AI along with its features like multilingual support makes it even more convenient for students of different linguistic zones. A recent survey projects that more than 60% of education businesses rely on AI/ML-based education app development supported by modern tools and features. Like in many other sectors especially the service sector AI also poses the danger that it

might replace the human touch. In terms of the education sector AI is not a threat to anyone, AI and education go hand in hand complementing and supplementing each other. Teaching is a work of creativity that cannot be accomplished without human touch and direct involvement and thus AI works as an aid and supports the experts by improvising and innovating the teaching-learning process for individuals. AI has also marked its excellence in closing the skill gap among our youth by delivering widely available and affordable opportunities for students to upskill. Not only for students it has proved to be beneficial for the business workforce too by giving them huge opportunities to upgrade their skills. Measurement and evaluation of the teaching and learning outcomes, form a very important part of the total educational system. Effective teaching includes effective evaluative techniques and proper feedback on the whole process. And when this evaluation part is customized for every single student nothing can be better than this. Like other service sectors education sector also faces the problem of data and information protection, alterable data accessibility, outdated certification etc. Here again AI offers secure and decentralized Learning Systems. Amidst all these challenges, AI-based decentralized solutions can bring a positive technical revolution to the education sector. The role of AI in Examinations at educational institutes is extremely promising with bright future prospects. An AI-based software and application solution proves to be beneficial in more ways than one can imagine. During exams and interviews AI keeps an eye on every single move of the participants through web cameras, browsers and microphones etc. and thus not only analysing his factual knowledge but also tracking down his body language and emotional stability during the process.

Disadvantages of Artificial Intelligence

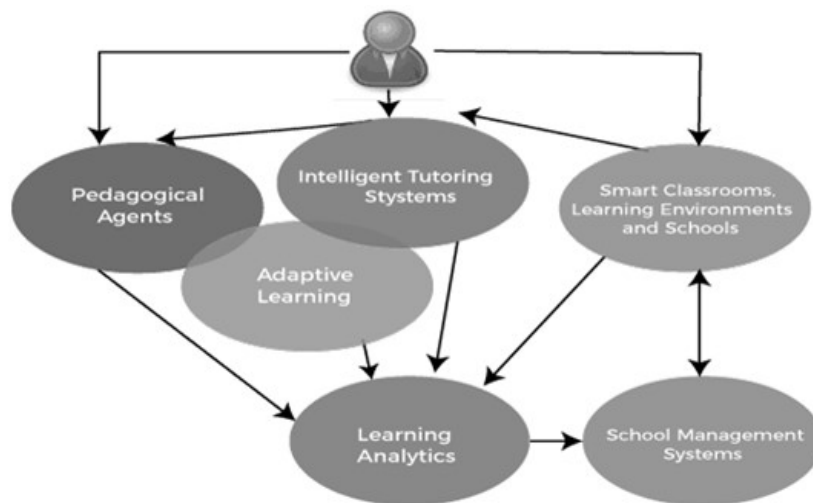


Artificial intelligence has facilitated improved education outcomes, however, despite its impressive advantages it also poses serious negative influences on the whole education system in general. As discussed before teaching is an art and calls for input of creativity for its effectiveness. One of the significant concerns about AI applications is they serve already-cooked meals to students and teachers forcing them not to think and analyse much and hence there is less thinking out of the box and less engagement in creative problem-solving. It is killing creativity among students. The originality of ideas and concepts is lacking hugely. AI is a purely data-driven system and this data is set to this system by human maneuver, so if the data is biased or faulty it may lead to biased and faulty analysis by AI system. Significant ethical concerns are also associated with it constantly and somewhere it seems to lack transparency and accountability. For example certain AI platforms might be fed with data that reflect some kind of societal prejudices and stereotypes, in turn AI might make recommendations about courses or career paths, targeting a particular demographic group. This fosters elements of inequality in the teaching profession, which is totally against the ethos of education. Another great threat associated with the application is its vulnerability to hacking, cyber security risk and infringement on privacy of the user. Seeing the connectivity and compatibility of AI and the education system it is alarming to see that susceptibility to cyber crimes AI in education needs to be protected and secured otherwise personal and sensitive information, and the academic progress of the users are always at stake. So maintaining high levels of privacy, and data security is the call of the day.

Education is not only about factual learning and mugging up, it is also not only about getting good grades and being able to get a good job in the end. Interactive and proper education is also about teaching cultural and societal values and fostering emotional, social being and critical thinking among students. Though AI applications in education have automated many aspects of the education system worldwide but the importance and place of human teachers is irreplaceable in this whole scenario. somehow AI lacks the skill of comprehension and empathy and fails to recognise and respond appropriately to emotional cues. Emotional and social aspects are important elements of our personality and these are badly ignored in by AI tools in education. During the last few years it is strange to see the number of students opting for dummy classes over regular school classes, if it's not taken care of in time this would lead to the crashing down of the whole system. Another negative impact of AI in the education sector is the disruption of the labor market. lots of automation of the task i.e. online tuitions, tailoring personalized study plans, online grading etc. might reduce job opportunities. It

can even potentially harm the quality of education imparted. Gradually we are depending hugely on AI tools for our educational needs, this over-dependence on one hand hinders us from indulging in critical problem-solving, and it is also compromising our originality of ideas and efforts. Developing critical thinking among students is a vital job that motivates and prepares students to analyze things around them objectively with a reason. AI is a costly affair. From the Indian perspective where we face a large digital divide due to the high cost involved in its installation and use is always at stake large number of institutions and students lag behind due to their financial limitations. Buying AI software , their upgradation, installation ,hardware, maintenance ,repair and training educators to use these applications , every step involves cost and somewhere this high cost of it perpetuates the digital divide. The use of AI tools in education poses difficulties for students with visual and auditory limitations though it is helpful to some extent, students from remote areas due to connectivity issues also find it difficult to use these and most of the time these remain beyond their reach.

Role of Teacher



Teacher plays a vital role in the fine-tuning these artificial intelligence, algorithms, ensuring the technology aligns with the student's developmental requirements. Moreover, teachers can leverage artificial intelligence-generated insight to provide targeted interventions for struggling students and advanced challenges for those who excel. With artificial intelligence and robots offering personalized instructions, teachers' roles may shift towards overseers who design and select machine-led instructions, monitor student progress and provide pastoral

support. Traditional methods of teaching learning are on the verge of huge transformation right now and here role of teacher in this shift is just immense, not only for the sake of the teaching process but also for her own professional growth as an educator role of artificial intelligence can not be avoided. AI has not only optimized teaching skills but also has helped in the evaluative process. With the aid of AI today teaching has not only become more innovative but also has diversified teachers' knowledge domain and teachers now are comparatively less burdened in their daily work.

Conclusion

Artificial intelligence has opened doors to a vast scope for innovation and newness in terms of teaching pedagogy and has helped largely in establishing a bond between teacher and taught. Since its inception in higher education artificial intelligence has reformed it in so many ways. Pedagogical interventions, innovative teaching-learning skills, research methodology, data collection and its extensive analysis and evaluation and classification, artificial intelligence has intervened conveniently and effectively. The bright side of its implication in higher education is no doubt impressive but once this coin is flipped over, we tend to see contradictory things. Undoubtedly artificial intelligence has established a bridge between almost all the sectors of the society but on the contrary somehow extensive use of the medium has made us believe that we are self-sufficient for leading a better life and it has motivated us to lead the life of a loner. On one hand it has created scope for innovation for better teaching and learning but also has discouraged critical thinking and quest for knowledge. Keeping in mind the concept of sustainable development and holistic education, artificial intelligence along with higher education if compiled properly can pave out new avenues for a new era with effective teaching-learning processes. In the transformative era of AI-driven teaching-learning, teachers are undergoing a profound evolution in their roles. They are guiding students with the help of educational experience and insights provided by AI. As most of the teaching load of teachers is being shouldered by AI, so teachers now have become more aware and responsible about social-emotional learning (SEL) where in teachers can focus on such skills as empathy, resilience etc. among students.

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