Implications of Artificial Intelligence (AI) on Learning and Teaching Processes in the Private Educational Institutions of India

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Abstract

The application of Artificial Intelligence (AI) in the educational system has a great implication. This is true for both the teaching and learning processes in the educational institutions. The coveted educational goals can be nicely achieved and the educational system can be better managed with the implementation of this new technological invention.

This paper examines the need of application of artificial intelligence in teaching and learning in private educational institutions of India. The paper will recommend the implementation of AI to institutions so that their students can learn and evolve.

Keywords: Artificial Intelligence, Learning and Teaching, Internet of Things

Introduction

Artificial Intelligence (AI) can efficiently point out the areas in a course structure that need improvement or modification. While teaching, it may not be possible always to understand the gaps. Again, certain aspects of study materials may keep the students confused. Learning styles and motivation differ from one student to another. It depends on a student's ability, needs, and interest. In a class of 30 students, it is tough for a teacher to meet every student's need. Classroom teachings and homework could be tailored on the basis of profiles and interests of the students [1]. They can be motivated by exposing them to different courses.

The future of higher education, not only in India but also worldwide, is inherently connected with the development of new technologies and artificial intelligence of the newly evolved intelligent machines. In the field of higher education, advances in AI have opened up new avenues and challenges for the teachers and administrators. AI has the potential to change the traditional system of governance and internal architectures of the educational institutions[2]. But, the question "What is artificial intelligence?" is still a debatable topic. Since Aristotle, it is discussed in literature with literally no consensus.

Artificial Intelligence provides some great solutions to the modern-day education system. For example, popular online higher education service provider, Coursera is using AI for various purposes. When the majority of the students in a batch give the wrong answer to a question, the system automatically alerts the teacher regarding the mistake in such a large scale. The teacher then provides a customized message to the students offering hints for the answer. This is done with the help of AI. This can mitigate the gap between a students' understanding and what their teachers want them to know. The aim here is to provide hints measuring the deficiency in understanding of the students. The waiting time is actually nil as students get immediate feedback.

Alan Turing provides a definite solution to the question of "What is artificial intelligence". In 1950, he proposed the imitation game [3]. This is a kind of test that investigates the capacities of the human listeners to differentiate between a human voice and a machine voice. If the majority of the listeners could not make a difference, then the machine voice is an intelligent system or the source of artificial intelligence[4].

First comprehensive definition of AI was proposed by Chen et al (2015)[5]. This definition goes as follows: "The study of artificial intelligence is to proceed on the basis of the conjecture that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it"[6].

Since then, the field of AI has been getting a wide attention with various understandings from different perspectives. Later definitions and descriptions of AI influenced by linguistics, biology, chemistry, mathematics, information technology, and the advancement of AI itself. However, most of these understandings and definitions have remained debatable topics with little or no mass acceptance. Most of these approaches put minimum attention on psychological, political, and philosophical aspects of AI or put little importance on cognition.

The purpose of our study is to find the impact of artificial intelligence on the higher education system, i.e. in the process of teaching and learning in higher education. Here, we accept a fundamental definition of AI as found to be the most accepted one in the available literature. So, we define artificial intelligence (AI) as a human-like process of computation that can act for learning, analyzing, self-adjusting, self-correcting, and can also select and use data for the accomplishment complicated processes or tasks.

Today, AI is progressing appropriately with the expected acceleration. Its impact on the higher

education system could be easily traced. For instance, universities already apply an incipient form of AI and the supercomputer of IBM called Watson to use AI[7]. The Deakin University of Australia uses AI of Watson in their student advice department where students can inquire any time 365 days. Even if it involves the use of algorithms for the repetitive or predictable task, Watson can use AI accurately. Watson is an example of what AI can do for the higher education in coming days. This has been changing the very concept of the services and also parameters of quality services in higher education. AI has also been changing the way we use the human resource in the education sector. A supercomputer is perfect the queries of students 24/7. This reduces the dependence on the human service. In this context, it is worth mentioning that "machine learning" is a new field of AI. The fifth generation of computers is equipped with machine learning technology capable of self-learning and making different predictions. For instance, we can discuss Alpha Go – a software developed by the AI wing of Google called Deep Mind which defeated the world's top player at Go[8]. We can say, machine learning is a sub-field of AI that includes software which can make different predictions, discover new patterns, and apply new patterns in new aspects that were not included in their factory settings.

Applications of Artificial Intelligence in Education

Tutoring

Programs related to AI are commonly known as Intelligent Tutoring System or ITS[9]. It is also called adaptive tutors. The purpose of ITS is to engage students during question-answer sessions, increase engagements through dialogues, and help students provide feedback.

Personalizing Learning

ITS makes personalized learning sessions more interactive and interesting. It understands individual requirements and weakness while tailoring learning materials. It also helps to develop individual learning pace and provides technical support to the students with special needs. For instance, AI is very useful for autistic students.

Testing

Computer adaptive assessment processes are made to adjust the successive questions based on the accuracy of the answers a student provides. It helps in identifying the mastery levels of the students.

Automating Tasks

AI performs routine tasks with utmost perfection. This includes daily attendance, test paper setup, grading, report generation, etc.

Current issues in Institutions

In an educational environment, the active involvement of the students in classrooms as well as in homework is highly expected. Efficient learning approach improves the quality of education students get in the education institutions. Students' interest could be increased through practical sessions and real-world experience. In science, experimental activities can bring a huge difference. In a cooperative learning process, the interaction between students and teachers become dynamic and continuous[10]. It makes the classroom learning more productive and satisfying for the students.

Learning ability varies from one student to another. One student can understand a topic just in one go, while many students may need several reviews and examples to understand the topic well. Sometimes, many students miss one or two previous classes for some personal issues or teacher may fail to present the relevant examples making the lesson tough to understand[11].

Teachers who can accept technology as the basis of their teaching process can enjoy the maximum benefits of technology. They can use the data obtained from the students' engagement for developing more interactive and fruitful teaching. The biggest advantage of digital data management is that huge volume of data can be accumulated, stored, process, and analyze in a short time. With the help of relevant algorithms, data can be used to understand students' problems and weaknesses. Thus, teachers could develop a classroom environment and teaching process accordingly. The ability of teachers to get assistance from new technology leads to scientific time management and more focus on classrooms and students. Teachers can gain useful insight out of the AI tools they use in the classrooms. This leads to higher standards of teaching.

These days, established organizations as well as startups integrating AI into their various activities including HR, CRM, and marketing[12]. AI can be used in various ways since it can enhance teaching ability and also perform many tasks independently.

Process of AI

An example of a teacher and AI interaction is shown below:

Step 1:

A Teacher wants to see students who have difficulty in understanding a particular subject. So the teacher commanded AI to show the list.

AI found list of students who show three categories of difficulty in understanding fractions and shows the list of students.

Step 2:

The Teacher wants to know why a particular student (call off his /her name) is unable to understand that particular chapter.

AI analyzes and shows that student missed the first lesson where that chapter is explained. His interactions suggest that he/she doesn't understand the concepts.

Step 3:

The Teacher wants to implement suitable actions to improve that student's difficulty in the chapter

AI recommended the teacher that he/she should ask his/her teaching assistant to provide the student with the information from the first lesson at the earliest opportunity, followed by the provision of homework.

Step 4:

Teacher wants to know which other students these actions can be applied to

AI suggested list of names that were also absent from the first lesson, but they are showing better capabilities in understanding the subject.

Recommendations to Institutions to implement AI

AI can automate the basic activities in education

Institutions use the grading system as a part of students' assessment. This is a tedious work for the teachers since they need to grade homework, classwork, assignments, and projects. The whole matter takes much time but this working hours of the teachers could be used in other productive purposes such as interacting with the students, prepare for the next classes, or developing own professional knowledge. Use of AI in students' grading system is getting enormous popularity all over the world[13]. Teachers could now automate the grading process for nearly all kinds of assessments such as multiple choice questions and fill-in-the-blanks. Days are not far away when a handwritten answer sheet of essay type questions could also be assessed with the help of AI. Thus, in near future, teachers will get sufficient time to prepare themselves for the classes, designing more interesting in-class activities, and improving their relationships with the students.

Students could avail additional support from AI teachers

It is not possible to replace human teachers altogether and employ AI teachers instead as there are some aspects of teaching that cannot be accomplished by machines, at least not by the machines used today. Some categories of tutoring programs, especially that are related to the fundamentals of the subjects, like mathematics, linguistics, and writing are imparted through AI in many educational institutions[14]. So far, AI is not suitable for teaching subjects or lessons that require creative thinking and higher levels of research works. However, in future, AI may be advanced enough to impart these kinds of learning and training too. The pace of advancement that AI has been showing over the past few years, advance tutoring may not be a distant dream.

Helpful feedback for educators and students through AI-driven programs

Apart from designing tutoring programs and processes, AI could also be used efficiently for the feedback to students and teachers regarding the course curriculums. Institutions that primarily depend on online processes for teaching and interacting with the students could benefit from AI for strengthening their feedback systems. Thus, students get instant support they need from their teachers. Professors also get the scope to improve their instruction methods and design special programs for the weaker students[15]. Some universities are trying to develop systems to assist the students in choosing majors based on their strength and weakness.

AI could change the roles of the teachers

The role of teachers in education is beyond all debate, but their positions and responsibilities in the education system are going to change with the introduction of AI[16]. As discussed earlier, AI has been taking over some responsibilities such as grading, interactive learning, and in some occasion's real-world teaching. With time, AI will replace teachers in many other aspects of teaching. AI could be programmed to help students get answers instantly and they could replace teachers for the basic course materials[17]. So, in future, AI will shift the role of the teachers from teaching assistants to education facilitators. Teachers will provide specialized services such as helping the students who could not understand what AI taught them or who need more explanations and examples. In many instances, AI is facilitating the changes and helping the institutions to embrace the flipped classroom concept

Trial-and-Error learning could be less intimidating with AI

Students learn through the process of trial-and-error, this is normal. However, there are students who fear to fail. These students even feel nervous about thoughts of not knowing the answers to certain questions. These students could find the specially designed computer learning process more helpful and easier way to deal with the trial-and-error process. AI provides a judgment-free environment where no one intervenes in their way of learning[18]. In fact, they can develop their own pace of learning. Actually, an AI system itself learns by a trial-and-error process.

AI may change where students learn, who teach them, and how they acquire the basic skills

Though changes we desire will take a few more decades, AI has the capacity to change everything related to the education process[19]. Using AI support, students can learn from any part of the world according to their time and pace. As AI is replacing certain types of classroom instruction methods, AI has the capacity to replace teachers in many instances[20]. Right now, AI is capable of replacing teachers in imparting basic lessons. However, in future, it will be available in many core services related to teaching.

Conclusion

Increasing use of AI in education has made it impossible to ignore related to its relevance in higher education and what categories of teaching and learning can be made through it. The rapid advancement in technology ongoing trend of applying technology in education and associated job displacement has been prompting experts to redefine the role of a teacher and pedagogies. Various applications of technological solutions like IT solutions and "learning management systems" to identify plagiarism in essays and assignments has raised the question, which is appropriate in setting the agenda for education: higher education institutions or corporate bodies? The growth of technology giants and near-monopoly of few multinational corporations are also raising the question of whether privacy and features of educational systems will remain intact or they are going to experience a dystopian future? All these matters require close attention to understand the future risks in including technological innovations inherent part of higher education.

AI tools in the classroom can gather data from multiple sources and analyze them according to the demands of the teachers. If there is an issue, AI can help in visualizing the root causes and find probable solutions. AI can help in developing consistent classroom teaching across the university irrespective the experience of the teachers. Thus, the ability of AI can save time and make the system more target oriented.

Many categories of tasks that are accepted as the core responsibility of teachers in higher education institutes will be inherent parts of teaching through AI in the future. As the programmers develop complex and need-based algorithms, the dependency on AI will increase steadily. Constant analysis and inquiry related to proposed solutions are believed to be critical in determining the kinds of support universities will get from AI tools and systems. Nevertheless, the core aim will be to maintain the core values and develop knowledge and wisdom for the betterment of the country as a whole.

This is the high time when the universities should re-engineer their pedagogical models and functions as the introduction of AI is inevitable and necessary. Universities will soon realize the oceanic possibility that AI could generate for them. The solutions AI would provide will develop new scopes of education for all. These solutions will further help to develop stronger teaching-learning models that can efficiently preserve the core values of education and society.

Now, the time has come when we should know the moral implications of the present restrictions on the developments of artificial intelligence and the likelihood of strengthening human knowledge amidst monopoly of a handful of entities. We also think that this is the time when we should redefine the roles and responsibilities of teachers in higher education institutes keeping the focus on creativity, imagination, and innovation that the teachers can provide. Machines can hardly replicate these abilities and skills of teachers.

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