Chapter 10

Artificial intelligence

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INTRODUCTION

The future of higher education is intrinsically linked with developments on new technologies and computing capacities of the new intelligent machines. In this field, advances in artificial intelligence open to new possibilities and challenges for teaching and learning in higher education, with the potential to fundamentally change governance and the internal architecture of institutions of higher education. With answers to the question of 'what is artificial intelligence' shaped by philosophical positions taken by Aristotle, there is little agreement on an ultim- atedefinitio. The future of higher education is intrinsically linked with developments on new technologies and computing capacities of the new intelligent machines. In this field, advances in artificial intelligence open to new possibilities and challenges for teaching and learning in higher education, with the potential to fundamentally change governance and the internal architecture of institutions of higher education. With answers to the question of 'what is artificial intelligence' shaped by philosophical positions taken by Aristotle, there is little agreement that an ultim- atedefinitio Education undoubtedly plays a large and significant role for people residing in developing countries. Higher education institutes are playing an important role in a nation's development. Economic and social development of individuals depends upon two important factors viz. knowledge and learning. People who are highly educated are more likely to get high skilled jobs and compensation, hence have more probability to enhance their living standards. Thus people of developing countries have more deep implications of higher education as education equips a person to live the life chosen by them to lead a creative and more productive life. Good Education and skilled students also leads to higher growth and improvement for the country as a whole particularly in developing countries. Thus in developing nation like India, role of higher education becomes more prominent and hence the learning process should be optimized.

A technological revolution has taken place in most of the parts of the world, in last few decades. Society has dramatically shifted from traditionally living conditions driven society to the present knowledge society where creativity and innovativeness drives the society. Earlier educational system was characterized where teachers and students physically interacted in the classroom and majority of work is done manually in higher education institutes. But major technological developments in the last 20 years and mostly because of the Internet have changed people's view of education and their working and a new concept that has evolved during the last few years is "artificial intelligence". It is a well-known fact that higher education is heavily dependent on human and manual work. This not only increases the operational cost for the higher education institutes but also accounts for increase in the errors and slow processing in the field. Higher education institutes due to its labour intensive framework will have to spend a big budget on hiring and retaining educators and also in the processing of data in their institutes.

Apart from financial losses in the form of salaries of highly qualified personnel, these institutes are also bearing increased amount of effort that institutions put into the admission, learning and success of all their students. Lots of information and efforts are being wasted in higher education institutes

on repetitive tasks that can be minimized. Hence being a labour sensitive field it is facing both financial and physical loss. Thus adoption of artificial intelligence will bring a cheaper and more responsive approach to higher education industry. Since 1956, we find different hypothetical understandings of artificial intelligence that are affected by "chemistry, biology, linguistics, mathematics, and the advancements of AI solutions". Notwithstanding, the assortment of definitions and understandings remains broadly contested. Most methodologies centre around constrained points of view on cognizance or basically disregard the political, mental, and philosophical parts of the idea of knowledge. With the end goal of an examination of the impact of artificial intelligence in teaching and learning in higher education, I propose a fundamental definition provided by the literature survey of some past definitions on this field. Subsequently, artificial intelligence (AI) is characterized as automated frameworks that can take part in human-like procedures, for example, "learning, adapting, synthesizing, self-correction and use of data for complex processing tasks".

WHAT IS ARTIFICIAL INTELLIGENCE?

Artificial intelligence (AI) is the impersonation of human knowledge procedures, for example, discourse and visual acknowledgment, interpretation of the dialects and virtual decision making by machines and robots. The capacity of machine to think and act like people, has given AI an extraordinary place in all fields.

Artificial intelligence is available wherever in different parts of our lives beginning from smart sensors to individual associates. Recent developments in AI have gotten numerous enormous changes in the higher education field. "Artificial intelligence helps students and teachers to make their educational experience wonderful".

Artificial intelligence (AI) is characterized as the capacity and improvement of a data innovation based PC frameworks or different machines to finish the jobs that typically require human knowledge and rational thinking. Despite the fact that AI can make the world a superior spot, AI accompanies its very own issues (Siau, 2018). Take the case of driverless vehicles. Driverless vehicles open another time of innovation progression in transportation. It carries colossal advantage to both the vehicle business and the clients from both financial and reasonable viewpoints. The use of driverless vehicles liberates the drivers from the ordinary assignment of driving and decreases mishap rates (e.g., weariness driving). By and by, driverless vehicles will supplant taxi, truck, and Uber drivers!

Artificial intelligence is presently advancing at a quickened pace, and this as of now impacts on the significant idea of administrations inside advanced education. For example, "universities already use an incipient form of artificial intelligence, IBM's supercomputer Watson. This solution provides student advice for Deakin University in Australia at any time of day throughout 365 days of the year (Deakin University 2014)". Regardless of whether it depends on calculations appropriate to satisfy dull and moderately unsurprising assignments, Watson's utilization is a case of future effect of AI on the managerial workforce profile in advanced education. This is changing the structure for the nature of administrations, the dynamic of time inside the college, and the structure of its workforce. A super-PC ready to give bespoke input at any hour is lessening the need to utilize a similar number of managerial staff already serving this capacity. In this regard, it is likewise essential to take note of that machine learning is a promising field of artificial intelligence. While some AI arrangements stay subject to programming, some have an inbuilt ability to learn examples and make expectations. "An example is Alpha Go—a software developed by Deep Mind, the AI branch of Google's—that was able to defeat the world's best player at Go, a very complex board game (Gibney 2017)". We characterize 'machine learning' as a subfield of artificial intelligence that incorporates programming ready to perceive designs, make forecasts, and apply the newfound examples to circumstances that were excluded or secured by their underlying plan.

The Role of Artificial Intelligence in the Future of Education

Gone are the days of visiting the library to photocopy a few pages from an encyclopaedia for a school project. As generations of children grow up with technology at their fingertips, we live in a world where the internet is their primary source of information, education, and entertainment. A recent survey found that children in the U.S. aged between 8 and 12 spend almost five hours a day looking at screens, while teenagers are clocking nearly seven hours a day of screen time – and that is not counting the time they spend doing schoolwork. Hours spent learning from chalkboards in physical classrooms has also reduced significantly since the start of the COVID-19 pandemic, and the ensuing social restrictions and lockdowns. As technology and society continue to evolve and develop, the way we learn will also continue to change, for children and adults alike.

The rapid advancement of technologies such as artificial intelligence (AI), machine learning (ML), and robotics impacts all industries, including education. If the education sector hopes to utilize AI's full potential for everyone, the focus should be to continue exposing the next generation to AI early on and utilizing the technology in the classroom. Teachers are already finding that many students use AI through social media and are, therefore, open to its educational applications.

There is also a great professional need for these abilities. "The U.S. Bureau of Labor Statistics sees strong growth for data science jobs skills in its prediction that the data science field will grow about 28 percent through 2026," says Bernard Schroeder, senior contributor for Forbes. With increased technology comes increased data operations and analysis sophistication, as well as more AI. These changes will ultimately increase the demand for data scientists and other AI specialists.

The rapid advancement of technologies such as AI, ML, and robotics impacts all industries, including education. Global Market Insights Inc. predicts that the AI education market could have a market value of $20 billion by 2027. The industry growth is good news, as AI can ultimately reduce the burden on teachers across the globe.

However, some educators fear that in the future, AI technology might replace the role of the teacher altogether. Fortunately, it does not look like teachers are at risk of being replaced by robots anytime soon. While AI programs can teach students literacy or math, the more complex impartation of social and emotional skills will remain in the domain of humans.

How artificial intelligence is currently used in education

Because AI is computer-based, it can be connected to different classrooms all over the world. How technology is used in classrooms has changed significantly in response to COVID-19. Rather than teaching in front of a classroom full of students, lockdowns forced many educators across the globe to teach remotely, from their homes. Using AI in education holds many benefits for both students and teachers:

Learning resources can be accessed from anywhere, at any time

Time-consuming, tedious tasks such as record keeping or grading multiple-choice tests can be completed through AI automation

Frequently asked questions can be answered through chatbots

AI tutors and chatbots can be available to answer questions at any time

Learning can be tailored and adapted to each student's goals and abilities through personalized programs

Emotional well-being: A child's emotional state affects how well they can focus, engage, and stay motivated to learn. Virtual schools can be just as effective as face-to-face learning environments when they use emotion recognition technology. Thanks to gamification, learning can also be adjusted to be fun. Furthermore, AI can determine where students struggle and help them to improve and, ultimately, excel.

Spotting and filling the gaps: AI can identify the gaps in teachers' presentations and educational material, and suggest adjustments where needed.

Children working alongside AI: Nao is a humanoid robot that talks, moves, and teaches children everything from literacy to computer programming. Nao engages children in learning science, technology, engineering, and mathematics (STEM) subjects, and provides a fun coding lab for

students. This introduction to basic coding allows students to instruct the robot to perform specific tasks, such as using hand gestures or doing choreographed dances. This way, students get the opportunity to become familiar with telling a robot (or program) what to do, thereby preparing them for a future where robots and humans work together.

The following educational applications harness the power of AI to improve learning in students of all ages:

Thinkster Math: Thinkster Math is a tutoring app that blends the math curriculum with a personalized teaching style. The app uses AI and ML to visualize how students think as they work through a math problem. This allows the tutor to quickly spot areas in the child's thinking and logic that need work. It then assists them by giving them immediate, personalized feedback.

Brainly: Students can ask homework questions on this education platform and receive automatic, verified answers from fellow students. Brainly, which ultimately helps students learn faster, uses ML algorithms to filter out spam.

Content Technologies, Inc. (CTI): This AI Company uses deep learning to create customized learning tools for students. One of these tools, JustTheFacts101, makes it easy for teachers to import syllabi into a CTI engine. The machine then uses algorithms to create personalized textbooks and coursework based on core concepts. Cram101 is another example of an AI-enhanced offering, where any textbook can be turned into a smart study guide, providing bite-sized content that's easy to learn in a short space of time. The tool even produces multiple-choice questions, saving students time and helping them learn more effectively.

Gradescope: This platform makes grading less time-consuming (teachers' grading time is reduced by 70 percent or more) and provides student data that can indicate where they need additional assistance.

Duolingo: With more than 120 million users worldwide, Duolingo has a broad audience that reaches beyond the classroom. It offers 19 languages and helps anyone using the app to learn a foreign language, building their skills over time. With quizzes and other tests, the program adapts to each user's abilities to offer new challenges.

How AI is set to change the education market

The World Economic Forum estimates that, by 2025, a large proportion of companies will have adopted technologies such as Machine Learning (ML). They strongly encourage governments and educational institutions to focus on rapidly increasing related education and skills, focusing on both Science, Technology, Engineering and Mathematics (STEM) and non-cognitive soft skills to meet the impending need. Advances in technology will cause major disruptions in the workforce, as automation could replace up to 50 percent of existing jobs in the U.S. alone, Microsoft reported.13; the Microsoft report continues, suggesting students will need to have mastered two facets of this new world by the time they graduate.

Role of Artificial Intelligence in 21st century classrooms

With Artificial Intelligence (AI) making rapid inroads into the global education space, today's youth are as much in awe of AI as they are keen on leveraging the technology to enhance their learning experience. Given that AI is based on a complex programme built to mimic the cognitive functions between two human brains, it comes handy around the problem solving premises of a learning structure. However, before we accept AI as an indispensable learning tool, we need to first understand the learning process and where and how AI could actually add value in this process.

The learning process varies widely between different students but we can broadly classify learners into three types – Quick Learners, Slow Learners and Passive Learners. For achieving the desired learning outcomes, AI as a learning tool that can be leveraged in distinct ways for these three categories of learners as elaborated below.

Quick Learners: AI, which aims at adding more to what is conventional, works like a magic wand for this category of learners who draw up maximum amount of learning within a very short span of time. Contrary to the apprehensions regarding untoward influence of technology among such kids, technology can prove to be a great learning aid for them. They do not need to compete with their mediocre peers or be assessed for going levels up the latter in an AI learning environment. As the natural drive of these learners increase towards learning facts, picking up nuggets of knowledge, retaining huge knowledge banks and very effectively reproducing them in a much enhanced shape and feature, it is very high, they are often labelled as inattentive in their classrooms or even class bunkers. Whereas, in a given learning environment, while others are still grasping the concepts, these kids are already extrapolating. Hence an AI based learning tool which processes and reproduces information and knowledge a zillion times faster than an ace teacher works very well for this category of learners. An AI system incorporated educational environment facilitates finding, searching, deriving, calculating, strategising and localising in a much more scientific way and with higher accuracy than any other learning environment. If a batch of high IQ students is working in a closed group network for sharing and exploring knowledge, the AI system starts actually by learning and adapting with the team, starts reading the group dynamics and begins assimilating and comprehending results on the basis of results and edit history. This enhances the knowledge bank for the batch of genius minds who unknowingly create an artificial intelligence learning environment for themselves.

So it is more likely that in the near future, students with higher order thinking skills will prefer learning in an AI environment for better learning outcomes.

Slow Learners: Unlike the quick learners, the slow learners are the patient lot. They take time to grasp, retain and reproduce their learning. In a classroom setup, this is the lot that struggles the most and lags behind the others. Defying the idiom 'Slow and steady wins the race', this category of students often end up being demotivated with not much hope of scaling the learning curve. However, slow learning is a process that is just slow but still is an ongoing one. Hence, effectively designed AI programmes can work wonders for these kids by helping them tutor themselves in the AI environment. For example, teaching languages, especially grammatical implications, coaching for writing ability, helping kids come out with logical reasoning from conflicting idea, clashes etc can be very effectively handled with the help of a user friendly artificially intelligent programme. Slow learners often refrain from being evaluated by traditional test series as they fear the results. If placed in an environment of self-assessing AI suite, these kids would love to take such tests time and again as every time they take a test, they get to actually realise their progress without being judged by human teachers. Learning concepts of physics and other physical sciences would be much easier with a robo-buddy who is programmed to match the learning pace of the kids. AI predictions, inferences on the basis of past history of the users, localised preferences of the researchers, interacting with info generators – all these add to building a stronger knowledge base for slow learners thereby enabling them to stand at par with their peers. Trial and error learning becomes threat free for these kids in an AI learning environment. Since slow learners generally maintain traits of exclusion like being introvert, not being upcoming and open with all, AI robots can also train them to adapt to changes around them. By subjecting such kids to specially devised AI based learning modules, parents and teachers can have better grip on their progress and can hence create a very positive and powered environment for these kids. As AI is intrinsic to all social media platforms, these kids can be taught and trained many skills by positively channelizing the power of social media. Solving problems of complex and varied nature is always difficult for slow learners and problem solving ability is the basic premise on which AI works. Hence the match. In a well customised AI learning environment, slow learners will no more think that they are not efficient enough or are slow in solving a problem compared to others. Infact, they gradually become learners from slow learners and hence the problem of delayed cognizance to facts gets solved finally.

Passive Learners: Learners of this category learn passively from a source or a teacher of their preference and they internalise the knowledge without actively seeking feedback or interaction from the teacher or source of knowledge. In classroom setups where interaction between the learner and the teacher is missing or is meagre, learning is passive. Passive learning is very effective for certain domains of knowledge where argumentative analysis of subjects/situations is not required. Programming AI modules for passive learners may be a challenge as due to lack of interaction between the teacher and the learner, it becomes difficult for the programmer to conclude whether his AI modules have been effective in facilitating learning.
Learners of higher studies, research scholars and explorers of various places and subjects can benefit immensely from an AI programme for passive learners. Passive learners largely depend on audio visual learning aids which are generally documented in form of lectures. A robot demonstrating the process of a surgery to a pack of doctors is a good example of a widely used AI tool for passive learners. Conventionally speaking, in a classroom setup of a school, a learner is a passive learner if the teacher is not an active one. Although passive is just another process of learning, it is not appreciated by a majority of school students as they look forward to both fun and fire in the learning process.

CONCLUSION

In conclusion, this research reveals the role of artificial intelligence in teaching.
Adoption and implementation of AI in higher education is late in comparison to the corporate sector, many companies that have already adopted artificial intelligence and are continuing to invest more into AI applications will surely remain ahead of their competitors. Higher education institutes that incorporate AI into all of its programs remain leaders in their field and are already reaping the benefits associated with it. Based on the discussions above, we can now say that AI is impacting higher education institutes in a significant way. AI expansion is forcing many jobs to become obsolete and thus an entire new skill sets will be required. Higher education institutes are required to train and develop their students to upgrade them to face the challenge of the AI revolution and fight successfully in the AI age.

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