

THE EFFECTS OF ARTIFICIAL INTELLIGENCE ON HIGHER EDUCATION

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Abstract

A change in university education is necessary in light of the information society. Artificial intelligence (AI) offers substantial advances in individualised learning and integrates various forms of human interaction with information and communications technology. Academic institutions must cultivate digital competencies to educate individuals who can comprehend, innovate, and manage the technology landscape while executing the universalization of digital languages. Higher Education Institutes (HEI) have made tremendous advancements in AI, which present both new opportunities and difficulties for educational practices.

Teachers are unaware of how to use AI for pedagogical goals and its significant influence on teaching and learning, despite the technology's promise to assist many other areas. AI is already being used by HEIs in a variety of ways for teaching, research, development, and assessment, and the use of ICT in the classroom is becoming more and more important.

Keywords: *Higher Education Institutions (HEI), Artificial Intelligence (AI), Machine Learning (ML), Personalization.*

Introduction

Artificial Intelligence (AI) is the capacity and development of computers and other information technology-based technologies to do activities that often require human intelligence. With the development of deep learning and machine learning, a new paradigm in HEI management has developed. Artificial intelligence (AI) may be classified into weak and robust systems. Weak systems are used in certain activities, whereas robust systems carry out tasks meant for human use. Using AI in higher education will transform instruction while guaranteeing student engagement and learning. It will also enable campuses and institutions to innovate and perform. The pandemic-induced shift to online learning has made artificial intelligence (AI) more and more significant in Higher Education Institutions (HEI). Artificial Intelligence (AI) is a key enabler in the shift to virtual classrooms as remote learning becomes more efficient and available. With an anticipated implementation phase in the next years, artificial intelligence and adaptive learning technologies rank among the most significant development tools. Nearly half of learning management systems should incorporate AI capabilities over the next two years, with AI estimated to reach 44% in HEI between 2018 and 2022. All industries, including HEI, are developing at a rapid pace thanks in large part to ML and AI.

The term artificial intelligence (AI) is a broad term that lacks a consensus meaning. It is described as the engineering and science of creating intelligent devices, especially computer programs. Artificial intelligence (AI) systems are software and hardware systems created by humans that operate in the digital or physical realm by using data to perceive their

surroundings, interpret structured and unstructured data, reason using existing knowledge, or process information derived from this data to determine the best course of action. What is artificial intelligence?

AI has two capabilities: AGI stands for artificial general intelligence, whereas ANI stands for artificial narrow intelligence. WeakAI, or ANI, has been accomplished thus far, but it is incapable of independent thought. AGI, often referred to as strong AI or human-level AI is now a theoretical concept that, if realised, would be equivalent to human intellect. Artificial Super Intelligence (ASI), which Nick Bostrom defines as any intellect that significantly surpasses the cognitive performance of humans in almost all subjects of interest, is a third type of AI. AI can be categorized according to its phases or functions, including theory of mind, self-awareness, limited memory, and reactive machines.

Predictive and Generative AI

Artificial intelligence (AI) comes in two flavours: generative AI creates original material, while predictive AI analyses data and projects future events. Application areas in higher education include personalised learning platforms, student success promotion, student advisement, and student enrolment management. Predictive AI leverages statistical algorithms to analyse historical data and forecast results for fresh data. With the use of General Advanced Networks (GANs), which train two neural networks at once, generative AI creates material that looks and feels human.

Input data is compressed into a lower-dimensional space using Variation Auto Encoders (VAEs), which also produce new data points. Higher education is seeing a rise in the usage of generative AI for support services, automated assessment feedback, and instructional material creation.

AI Techniques and Subfields

Since this is the form of AI that is currently in use, when AI is discussed in this primer, it is always concerning the ANI version. Machine learning is ANI's most widely utilised approach, to the extent that the terms artificial intelligence (AI) and machine learning are sometimes used interchangeably. That's why Because of this, it's essential to briefly discuss other AI methods before concentrating on machine learning.

Machine Learning

One area of artificial intelligence (AI) that has advanced significantly in recent years is machine learning (ML). Unlike classical programming, which involves programming computers with predetermined rules, machine learning (ML) enables computers to learn and identify patterns from samples. It builds a predictive data model by applying algorithms to find patterns in the data. Similar to how people get better with more practice, machine learning outcomes get more accurate with more data and expertise. ML computers are capable of autonomous thought and learning, knowledge creation, and data linkage. On the other hand, machine learning (ML) systems are trained to recognise patterns in data and rules, whereas programmers provide both in classical programming. Essentially, machine

learning (ML) systems enable computers to think and learn on their own by training them instead of directly programming them.

Higher Education

In general, professional and vocational education pursued by students after finishing their secondary school is referred to as higher education. Training senior specialist talent and vocational staff is the primary social activity. Generally speaking, schools and other organisations assist in the completion of advanced learning, research, social activities, and other educational material. One of the key components of the educational system is higher education. Higher education has ushered in rapid development as a result of rapid societal change and the growing need for high-level talent. People have a greater need for possibilities for higher education, ranging from elite to popular education. The rivalry in the education sector is growing along with the number of audiences. Foreign higher education, which offers additional learning options and speeds up higher education collaboration, is a competitor for domestic higher education in the fields of general education, vocational education, and private and public education.

Higher education as a whole must become more and more integrated due to the advancement of modern science, technology, and manufacturing. This is mirrored in higher education through the integration of courses. Its goals are to make basic education and professional education, development research and application research intertwine and permeate one another, and equip students with the knowledge and abilities to address challenging problems and adjust to the demands of social development. These days, every nation aggressively pursues higher education development and tightly monitors academic performance. Its significance is in raising the bar for social production and encouraging the simultaneous growth of the economy and culture. The curriculum of higher education is always changing, which keeps a lot of future potential for the community.

Teaching Skills

Effective teaching requires a variety of abilities, including design, homework correction, after-school supervision, assessment, and research. These abilities can be successfully, methodically, and scientifically integrated using artificial intelligence technology. Teacher create a sophisticated and robust teaching behaviour system based on the body of current theoretical knowledge. While advanced skills may be attained through consolidation exercises, primary teaching skills can be attained by raising the calibre of teachers. To achieve both instructional originality and high teaching impacts, teaching abilities are required.

AI significantly influences the development of higher education:

- The progress of scientific research and teaching in colleges and universities is impeded by China's long cycles, high costs of education investment, and scarce resources. Artificial intelligence technology and social production have come together to boost

management effectiveness and educate people's educational experiences. To keep up with the trends, educational philosophy should prepare students to become more efficient managers. Teaching, research, financial management, and everyday and student status management are all areas where this method is evident. Internet technology and artificial intelligence may facilitate smarter transactional administration, save expenses, and increase productivity. To raise the standard of higher education, provide graduates with a competitive edge in the job market, and encourage globalisation of higher education for life, artificial intelligence development ought to be given top priority.

- Artificial intelligence literacy has been included in college and university curricula, igniting students' interest in global governance and sustainable development. A composite talent training program known as "artificial intelligence + X" has been implemented, utilising modularised online courses. The focus of teaching methods has shifted from conventional collective learning to individual learning. The electronic reading room has improved service function and retrieval efficiency by transforming the autonomous book collection organisation into a computer-based and network-based service. Large-scale expansions have been made to the library function space; however, readers may benefit from monitoring and time restrictions to make better use of their time and avoid being lost in the network world.

Features of Artificial Intelligence Use in Contemporary Higher Education:

- Due to high-performance parallel operation, large amounts of information data and algorithm models will be used in intelligent informatisation in the future to accomplish a variety of jobs. More intelligent tools to help teaching and learning in the field of education will be made available via the implementation of artificial intelligence technology.
- Learners will experience learning like never before thanks to intelligent instruction and teaching. Furthermore, online autonomous learning will showcase the new standard of ubiquitous learning and lifelong learning everywhere by seamlessly integrating with real- world scenarios and unrestricted human-computer interaction.
- AI in education can offer individualised learning materials, pathways, and services to match the requirements of specific students. Teachers can create preview reports, offer remote coaching, and keep track of their students' learning progress from a distance. Real-time communication between educators and students is made possible by the intelligent teaching platform, which also permits "one-to-many" problem-solving and real-time assessment of each student's progress. Personalised learning advice is made possible by the platform, which evaluates individual knowledge challenges by analysing classroom learning data after class.
- Effective cooperation between the public and private sectors is necessary for the integration of multidimensional collaborative artificial intelligence technologies into education. This includes updating teaching modes, refining algorithms, and compiling instructional materials. The application scenarios for school-enterprise cooperation,

technological research and development money, and AI technology education demonstrate the full potential of teamwork. Since learning necessitates instructors' collaboration and coordination in an intelligent learning environment, human-computer collaborative development fosters educational intelligence in the near run.

Applications of Artificial Intelligence in Higher Education

AI has improved teaching strategies, course materials, and other aspects of education in the modern world, just as it has in other domains. Learning is no longer just done in classrooms. Artificial Intelligence has enhanced education even within schools. AI has several applications in the field of education. It may support academic staff, forecast student performance, grade student work, enhance instructional material, and more. The next subsections of this paper provide a detailed examination of these applications.

The FAQ Chatbot to Help Teams with Scaling Registration

The registration procedure presents difficulties for federal governments and institutions and can be time-consuming for everybody involved. A business called Admit Hub has created a chatbot that can automate online interactions and field hundreds of inquiries from prospective undergraduate students. As a result, advisors can concentrate on more crucial work, and chatbots may learn from each professor's expertise by using AI and ML. Advisors may spend more time educating by automating chores with the Chatbot. Students' entire experience is enhanced and the registration procedure is streamlined with the aid of this solution.

Modular Educational Resources

Artificial intelligence (AI) may be directly incorporated into courseware as a teaching tool, offering more lifelike simulations and applications that can mentor and assist undergraduates in their practice [26]. For nursing undergraduates who would typically hone their abilities on live actors, Shadow Health is an AI-focused training software that mimics patient scenarios (a frequent practice in medicine). Formative feedback from the University of Michigan E-Coach program is more STEM- focused. E-Coach monitors student development, recognizes mistakes, and pinpoints interest areas in huge classrooms. Additionally, based on how well they performed in the preceding modules, he could recommend real-world tasks related to their course.

Instruments for Assessment

The University of Michigan created M-Write, a technology to assist instructors with writing assignments for extensive introductory courses. It makes use of an algorithm to find writing flaws and underlying problems that lead to subpar writing. Undergraduates can utilise the grading scale to classify solutions that are similar when they submit answers to complicated assignments. After that, academic staff can evaluate the entire group and provide each undergraduate student with comments. Teachers may monitor and analyse student performance using a dashboard. Another automated scoring and analysis software,

Perceptive, ranks long-term trials and projects within a fair range of a faculty's judgment using double-blind peer review mechanisms.

Rates of Retention and Dropout

AI's ability to analyse massive data sets can assist Higher Education Institutions (HEIs) in identifying students who are in danger of dropping out. This can assist in monitoring pupils' development and delivering aid when needed. Studies have been done to forecast projected dropout rates and create early warning systems for students who are in danger. To increase prediction accuracy, the study concentrated on non-cognitive traits including time management and self-esteem. It also looked at the effects of cognitive and non-cognitive traits on academic success. The way that this strategy addresses the rate of student dropouts makes it distinct.

Academic Excellence and Undergraduate Models

Determining the path-level expectations of college freshmen' learning outcomes and modelling their learning behaviour accordingly have been the subjects of a great deal of research. This is especially significant in large distance education institutions where it is challenging to draw undergraduates to a classroom, as reports that machine learning algorithms allowed analysis of undergraduate behaviour data from the UK Open University's virtual learning environment in the prediction of undergraduate participation. Faculty members will be able to automatically identify and intervene with inactive undergraduates thanks to the authors' plans to expand an intelligent prediction system. Using face and hand control, evaluated the project learning progress in workshops with undergraduates. Professors might be taught project-based learning activities, according to the researchers' analysis of multimodal data.

Automated Grading

Higher education institutions (HEIs) are implementing AI-based grading and assessment systems to cut down on the time and expense of hiring several human assessors. Medical graduating essays may be assessed by open-source Java programs, which eliminates the need for several human assessors. It is now simpler to mark lengthy assignments quickly thanks to AI paper graders, thus using a paper checker is advised for correct grading. AI software may be trained using the data at its disposal, and the information found in the graded papers helps to start the learning process. The paper grader uses artificial intelligence (AI) along with machine learning to award grades automatically. Artificial intelligence (AI) grading solutions are trustworthy and capable of assigning grades according to precise guidelines without interference from other sources.

Feedback

The assessment of undergraduate involvement in Open University, including final grades and the frequency of undergraduate clicks in the virtual learning environment, was conducted by with the use of machine learning algorithms. This information can assist in

informing academics that action is necessary. As part of its examinations for academic integrity, used machine learning algorithms to ascertain whether or not undergraduate papers were likely to overlap. Because the average accuracy is 93%, it presents options to alleviate privacy issues by eliminating the need for observers or access to undergraduate accounts.

Assessment of Instruction

Faculty performance has been evaluated by data mining methods; however, surveys frequently don't provide enough information. Clickers proved to be more successful than online assignments with instant feedback in an algorithmic assessment of differential equation classroom instruction. Though they don't always correspond with project success, test results from the past are a useful indicator of future tests. Past test results had no bearing on how well undergraduates anticipate performing on project assignments, according to research that also examined the usefulness of clickers and online homework with instant feedback.

Conclusion

In the next twenty years, artificial intelligence (AI) applications are predicted to dominate academic technology, with important ramifications for administrators, instructors, and undergraduates. Through intelligent undergraduate guide systems, AI applications in Higher Education Institutions (HEIs) may promote adaptive and personalised learning, offering flexible, interactive, and customised learning possibilities. But it's important to consider AI's function in HEIs from an educational, moral, cultural, social, and economic standpoint. It is important to priorities what is pedagogically good over what is technically feasible since digital data does not always offer a clean, technological answer to educational problems.

Even the most sophisticated artificial intelligence (AI) systems are subject to human oversight. Critics contend that teaching and learning, along with the human element of digital technology use in higher education institutions, should be re-examined. To fully utilize the enormous potential that AI applications provide for intelligent learning and teaching systems, researchers and designers must collaborate to incorporate AI applications across the undergraduate life cycle. Researchers are urged to produce specific theories that support empirical investigations on the creation and use of AI in HEI projects, as there aren't many clear educational viewpoints in the papers that were analysed.

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