Webology (ISSN: 1735-188X)
Volume 19, Number 3, 2022

Applied Artificial Intelligence Applications In Higher Education Institutions: A Systematic Review

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Abstract:

In Higher Education Institutes (HEI), digital information processing techniques, including Artificial Intelligence (AI), have been developed significantly. Artificial Intelligence in Higher Education Institutes opens up new possibilities, possibilities, and challenges for educational practices. In recent years, Artificial Intelligence (AI) has seen a lot of progress. This new technology has the potential to benefit a wide range of companies and sectors. While it has been around for about 30 years, educators are still unsure how to use it for pedagogical purposes on a larger scale, and how it can have a meaningful impact on teaching and learning in Higher Education Institutes (HEI). Higher Education Institutes (HEI) are already using Artificial Intelligence in many forms to research, develop, evaluate, and teach. Integration of information and communication technology (ICT) in the classroom is becoming increasingly significant. The study's main goal is to investigate and assess how faculty members view Artificial Intelligence as a teaching and learning tool. The goal of the study is to investigate how faculty members assess the possible impact of AI in Higher Education Institutes.

Keywords: Artificial intelligence (AI), Higher Education Institutes (HEI), Machine learning (ML), Personalization

Introduction

The growing importance of Artificial intelligence (AI) can also be seen in the HEI sector. Many traditional HEI were impacted by the pandemic-induced shift to online classes [1, 2]. Education systems have become more accessible and efficient as a result of remote learning [3]. [2] pointed out that technologies must provide solid support for the transition to virtual classrooms. There have been numerous reports on the role of AI in distance classrooms and virtual education systems, as well as how easily it simplifies various administrative tasks [4, 5]. Artificial intelligence (AI) is becoming an increasingly popular tool in HEI and has received a great deal of attention in the last few years [4, 5]. Adaptive learning technology and AI are among the most important developments tools [4], with an expected implementation period of upcoming years. [2] noted that experts predicted that AI will reach 44% in HEI during the period 2018-2022. Despite the fact that the

report predicted that AI will become more widely used in teaching and learning, as described in [3], the future of HEI is inextricably linked to AI technology. [4] estimated that in the next two years, nearly half of learning management tools will have AI capabilities. Machine learning (ML) and AI are key drivers for the development of all industries, and they are no exception in the field of HEI [10]. A machine's ability to learn and solve problems AI is defined by [6]. As defined by the authors, AI doesn't belong to any particular technology. Among the technologies and techniques involved in data mining, neural networks, machine learning, and natural language processing are a wide range of terms. [7] defined AI as the ability and development of computer systems or other machines based on information technology to perform tasks that normally require human intelligence. Machine that is capable of learning and solving problems, using cognitive abilities similar to human thinking, can be termed an AI. A major function of AI is to develop intelligent machines that can perform business functions without human involvement [8]. A new paradigm in HEI management has emerged with advances in deep learning and machine learning, despite AI being a knowledge-based science with many approaches. IT can be divided into 2 totally different parts: weak and robust. Weak AI demonstrates a system designed to impact a particular job. Weak AI systems encompass video games and private assistants. Powerful AI systems measure systems that perform tasks that are designed for humans. They are generally complex and classic systems. They are programmed to handle the things they need to solve problems without the intervention of a single person. These styles of system are often found in applications such as self-driving vehicles or in hospital operations [9]. The application of AI will revolutionize what is taught at higher education institutions and ensure that students are engaged and learning. As a result, schools and campuses will be able to innovate and improve their performance.

Machine learning (ML) and AI are often discussed together [10]. In AI, ML is a technique for classification and profiling based on supervised and unsupervised data, such as predicting who will be accepted into a particular program or determining topics for writing projects. According to [10], ML software recognizes patterns and predicts outcomes, or applies newly discovered patterns to situations not considered in the design process or not considered at all. Feedback and assessment can be provided by AI in real time. AI can provide feedback just in time. In HEI, undergraduates' performance can be continuously analyzed with AI instead of being tested at the end of a lesson.

Although significant work has examined AI in HEI categorizations [7], methodologies [8], research difficulties [9], and obstacles [9], there is still much more to be done [5]. There are few studies that analyze how AI is connected to existing educational theories, what its impact is on learning, and just how far AI technology impacts learning and instruction, as stated in [10]. [5] described three distinct approaches to AI educational tools: 1) learner-oriented, 2) faculty members-oriented, and 3) system-oriented which are also known as learner-driven AI tools, allow undergraduates to customize learning in response to their interests. Faculty member management systems are designed to relieve faculty members of administrative, valuation, feedback, and plagiarism detection tasks by solving them automatically. In HEI, AI will also provide tools to

deepen learning development so that faculty members can provide active support and guidance if needed. AI systems adapted to the needs of institutions provide institutional managers and administrators with information about student dropout rates, for instance.

The HEI sector is undergoing a paradigm shift through the use of AI, which can be used to uncover information about understanding how to personalize the learning experience of undergraduates, how to get more information to aid in decision-making, how to model complex interactions between undergraduate learning. subject area knowledge and tools that enable undergraduates to interact with the subject area [3]. Indeed, AI is significant to solving education-related problems that are rooted both in the inadequacy of the traditional way of teaching the current generation and in the complexity of the educational system itself. Through e-learning, AI will be able to solve complex educational problems and implement smarter educational technology solutions. Increasingly automated AI systems and ML will allow faculty members and support staff to do more tedious tasks.

Over the past era, AI's role in learning has been at the lead of HEI, government agencies, financial agencies, and industry. It is expected to grow by over 47% in the education sector in the United States from 2018 to 2022, based on AI market data [4]. Given the diversity of research efforts on the application of AI in HEI, it has become more possible to solve the serious problems facing education in our society [12]. HEI must use technology in order to enhance human thinking and teaching, rather than limiting it to a set of procedures for delivering content, monitoring, and evaluating. The study discusses how AI can be used to improve the learning process on HEI. Additionally, the study presents a literature review of recent research, which shows AI research has the potential to change not just the way undergraduates learn in HEI, but the entire structure of HEI.

Curriculum and recruitment are the two main areas of AI that will impact HEI. The HEI curriculum will be strongly impacted by AI. Fast, accurate and consistent are the defining characteristics of AI. AI cannot compete in these dimensions. AI is always the latest behind human capabilities to develop soft resources like originality, novelty, critical thinking, problem-solving, socialization, governance, sympathy, teamwork. and report. Science, mathematics and engineering cannot be ignored. Providing opportunities for undergraduates to improve their general skills in both science and mathematics should always be part of HEI. There are already several HEI that offer courses in AI and machine learning not only for computer science undergraduates, but also for business undergraduates, as business leaders and executives need to understand AI business applications.

Different people learn in different ways. The same method does not work for everyone. Many undergraduates find books and lectures to be very useful, while others find practical experience to be much more beneficial. It's similar to the fact that not everyone enjoys teamwork or interactive activities. With AI built into HEI, undergraduates can create personalized learning styles that

match their needs and abilities. Personalized learning aims to adapt the program to the thinking and lifestyle of the student. AI systems provide information about skill and ability levels of undergraduates since they analyze undergraduate performance. Professors can use this data to develop personalized learning styles. By doing so, learners will be more willing to study and learn. As each undergraduate will benefit from a personalized study program, AI-based profiles can improve the quality of education. In addition, professors will be able to pay attention to each undergraduate through individual feedback. Personalized learning supported by AI has the potential to increase undergraduate retention and involve more people in education [5].

To date, the most effective classroom technologies in HEI, such as PowerPoint and clickers, are the technologies that are closest to traditional practices. In order to prepare undergraduates for their future careers, AI will make class technology more problematic; this will require changes in the teaching content and teaching materials. Faculty members in HEI may face new challenges and opportunities as a result of AI. There are little opportunities to take HEI in new directions with AI incorporated into existing curricula or teaching roles [6]. AI could have a large impact at the studying paths of college undergraduates, for instance:

- Personalization: Personalization is one of the most essential trends in education. Through the use of AI, undergraduates now have a customized technique to the program based on their own experiences and capabilities. AI can adapt to the level of knowledge, speed of learning and desired goals of each undergraduate so that they can take full advantage of their education. In addition, AI-based solutions are able to analyze undergraduates' learning histories, find out weaknesses, and suggest appropriate course quality for improvement, providing sufficient opportunity for personalized study.
- Tutoring: Outside of the classroom, AI tools can assist undergraduates in improving their abilities and overcoming weaknesses. They provide one-on-one instruction without the need for the faculty members to answer questions at any time during the day.
- Quick Responses: Through automating assistance and dialogue intelligence, AI can help undergraduates find answers to the most common questions in a few seconds. This not only saves faculty members a lot of time, but it also saves undergraduates time looking for solutions and waiting for their questions to be answered.
- 24/7 Universal Learning Access: AI- powered tools enable all undergraduates to learn anytime, anywhere. Each undergraduate learns at his own pace, and 24/7 access allows undergraduates to learn the method that suits them without waiting for the faculty members. In addition, undergraduates from all over the world can receive quality education without having to pay for travel and accommodation.
- Undergraduates Success: Attracting undergraduates, enhancing their academic performance, and forging strong relationships with undergraduates.

- Teaching and Learning: Personalized learning systems and collaborative learning spaces allow academics to give their best work while enabling undergraduates to reach their full potential.
- Faculty Member Research - By providing a powerful and flexible computing environment, faculty members from around the world can collaborate without being restricted by the underlying infrastructure.
- Secure and Connected Campus: Connecting campus resources to digital infrastructure to ensure smooth, up-to-date operation is fundamental to keeping campus safe and connected.

Faculty members and undergraduates both benefit from AI-based education as it helps them perform their duties and facilitates communications at all levels.

- Faculty members- undergraduate interaction: Education software and AI tools can help professors establish a better relationship with their undergraduates. AI applications can serve as effective communication channels through which undergraduates can keep in touch and consult with their instructors, clarifying all issues as they arise during the learning process. In this way, educational productivity can increase and undergraduates can achieve higher levels of satisfaction with their academic performance.
- Robots with AI: A number of AI systems offer chatbots that can be used as faculty members' assistants or to perform certain tasks. Intelligent assistants are attractive to any educational institution offering distance learning courses. Since their undergraduates cannot be in class, they need more guidance that can be easily provided by AI powered assistants. Undergraduate FAQs provide assistance with simple questions and help undergraduates with completing and submitting homework. Some AI robots are also capable of guiding first-year undergraduates on the institution's rules. An intelligent assistant usually works with speech recognition and immediately directs the learner to relevant information.
- An accurate assessment: Scoring is one of the most time consuming aspects of teaching, as each faculty member is responsible for assessing a good number of undergraduates on a daily basis. The AI application simplifies the process of learning assessment and thus allows more time to be spent on other equally important aspects of education. Indeed, AI facilitates the work of faculty members by preventing them from making miscalculations. Additionally, AI systems usually come with analytical tools that can be used to monitor undergraduate progress. Thus, a faculty member will be able to clearly see who is the weakest by all means, thus increasing the academic success rates. Therefore, it becomes easier to create an incentive to motivate these undergraduates to strive for better results and to put extra effort into their learning. Using AI-based ratings also eliminates the possibility of unfair scoring which can lead to dropouts if left unchecked.
- Course preparation and planning: Artificial intelligence can facilitate the planning and distribution of lessons in HEI. In addition to sending course materials automatically, AI

bots can also mix different learning activities together, such as tests, webinars, and presentations, among others. More importantly, the use of AI typically involves the use of cloud-based storage for class materials and files. Consequently, these materials and procedures can be accessed by any learner or professor from anywhere and anytime through this knowledge base. By enhancing the consistency of all educational processes, this makes it much easier for faculty members to conduct classes, check homework, and distribute new assignments.

- An automated administration system: The efficiency of the learning process is also affected by the performance of administrative staff. They make educational services more efficient and help undergraduates study more efficiently. During application season, intelligent resource arrangements may be required. We use artificial intelligence to automate repetitive tasks such as sending emails to registrants, reminding them of due dates, and updating the registration process. Using AI applications, undergraduates can track their academic performance and verify the results of their selection. As a result, it is possible to guide and control undergraduates remotely through AI in HEI.
- Higher education quality: Finally, the importance of artificial intelligence in HEI is also explained by its ability to involve all undergraduates, regardless of their location, financial capacity and aptitude. When there is a need for a universal platform that can access each learner and represent a collective intelligence shared and developed by an academic community, an AI application is necessary. Each learner will benefit from the vast reservoir of knowledge available on this platform. With artificial intelligence in HEI, there will be more affordable learning options that will attract more people who are actively seeking to improve.

The use of AI in all sectors of the economy is expanding rapidly, and HEI is no exception. AI allows for a significant expansion of HEI services both inside and outside the classroom. AI applications in HEI are discussed in this study, along with some of the challenges involved in implementing them.

Artificial Intelligence Applications in Higher Education Institutions

In today's world, as in other fields, AI has revolutionized education by improving teaching methods, course content and other materials. Education is no longer limited to classes. Even in classrooms, AI has improved the learning process. AI can be applied in several ways in education. It can help faculty members, predict undergraduate performance, grade and grade undergraduates, improve lesson content, etc. This study examined these applications in detail in the following subsections.

1. The FAQ Chatbot for Scaling Registration Teams:

The registration process for any institution requires that the institution and the federal government take certain steps. The process of communicating with an institution to ask a question can

sometimes be slowed down or even derailed if the college takes too long to respond. The process of answering these questions on a daily basis is very time consuming on the part of the institution and time consuming to educate undergraduates who are further along in the registration process. A company like AdmitHub has developed a Chatbot (a computer program that automates internet communication by sending text or text-to-speech) so that potential undergraduates can ask thousands of questions. It allows advisers to focus on more important tasks [20]. Chatbot are Apps that use AI and ML can learn from each professor's experience to automate a variety of tasks, allowing them to devote more time to more important aspects of teaching [21].

2. Obtaining an Undergraduate Appointment:

Chatbots operate around the clock, even if people aren't available to respond to a request. Often, calls go missing and questions are not answered for days with undergraduates arriving at all hours of the day. Duplex is an artificial intelligence developed by Google that uses a realistic human voice to make outgoing calls to perform low-level tasks, such as booking a hair appointment or ordering food. A similar program could be used as a first step in responding to potential undergraduate applicants who fill out an online application or call an enrollment center. AI could arrange for a live advisor to call the undergraduate and take notes on what was said during the conversation. As a result, the enrollment team will be able to be more effective and responsive to undergraduates in less time.

3. Adaptive Courseware:

It is possible to integrate AI into courseware directly as an educational tool, which can guide and support undergraduates in their practice, while providing more realistic simulations and applications [26]. Shadow Health is an AI-focused training program that simulates patient cases for nursing undergraduates who would normally practice their skills on living actors (a common practice in medicine). With the University of Michigan E-Coach program, formative feedback is more focused on STEM topics. E-Coach tracks undergraduate progress, identifies errors and identifies areas of interest in large classes. Depending on their performance in the previous modules, he may also suggest practical activities relevant to their course.

4. Assessment Tools:

Evaluating undergraduate work and providing feedback are time consuming aspects of teaching. M-Write, developed by the University of Michigan, is one of many development tools for professors and institutions in this field. One of the main goals of M-Write is to help professors tackle writing homework in large-scale introductory courses. M-Write uses an algorithm to find weak spots in parts of writing, as well as underlying issues contributing to poorer writing [27]. Undergraduates who offer similar answers to complex assignments, such as test copies or short exam answers, can use the grade scale to sift through and group similar answers together. The faculty member can then assess the whole group and give feedback to all the undergraduates. A dashboard is provided for faculty members to review and track class performance [28]. As another

automated scoring and analysis platform, Perceptiv has double-blind peer review structures that rank long-term trials and projects using algorithms developed at the University of Pittsburgh term and complex within a reasonable range of a faculty's assessment.

5. Course scheduling and admissions decisions

[11] argued that accurate predictions of all undergraduate performance are critical for enrollment decisions and better educational services. Machine learning is one of the methods used in lesson planning as pointed out by [12] in their study. Using the course and faculty member characteristics, workload, study mode, and exam length as indicators of undergraduate course choice [30], [31] developed a model to predict course choice by undergraduates. Therefore, research has shown that decisions are highly predictable. An AI solution could free up some of their administrative time, so they can focus on cases that are more complex.

6. Retention and drop-out rates

HEI leadership can identify students who are struggling and likely to drop out by using AI to analyze and find trends in enormous data sets [18]. They might, for example, look at how many times a student went to an online course and then abruptly stopped. The schools may then track and measure the students' gains and results thanks to timely intervention by advisors [19]. Dropout and retention research targeted at identifying undergraduates at risk and developing early warning systems in order to assist them [24] or expected undergraduate dropout rates [24]. [25] looked at the impact of undergraduates' cognitive and non-cognitive characteristics on their academic performance prognosis. To improve prediction accuracy, they focused on non-cognitive variables such as time management and self-esteem, unlike many other studies.

7. Undergraduate models and academic achievement

Much research has focused on profiling college undergraduates and modeling learning behavior based on their path-level expectations of their learning outcomes. According to [26], machine learning algorithms allowed analysis of undergraduate behavior data from the UK Open University's virtual learning environment in prediction of undergraduate participation, which is highly noteworthy in huge distance education institutions where attracting undergraduates to a classroom is difficult. The authors hope to expand an intelligent predictive system that will allow faculty members to automatically identify and intervene with inactive undergraduates. In workshops with undergraduates, [20] used face and hand control to assess project learning progress. Using the information obtained from multimodal data, the researchers concluded that project-based learning activities could be taught to faculty members.

8. Automated Grading

AI-based grading and assessment systems have already been implemented at many HEI [29]. [21] noted that using an open source Java program to evaluate medical graduate essays can reduce the cost and time associated with employing multiple human evaluators for large companies. The scale

was posted in 2015 [22]. Grading a large number of assignments in a short amount of time has become much easier with the help of an AI paper grader. As a result, using a paper checker to complete accurate grading of student papers is recommended [31]. The data available to AI software can be used to train it. The graded papers provide information that starts the learning process. The software learns to mimic the grading process that humans use when grading papers. ML, combined with AI, allows the paper grader to assign grades to papers automatically [31]. AI grading tools are reliable and can assign a grade using an AI algorithm that learns exactly what needs to be included in the student's essay based on your specifications. External factors have no effect on AI scoring tools, which only determine a score based on actual quality of work.

9. Feedback

Using machine learning algorithms, [13] assessed undergraduate participation in Open University, including final grades, and how often undergraduates clicked in the virtual learning environment. This information can help tell professors they need to intervene. Using machine learning algorithms, [39] determined whether there were likely to be overlaps between undergraduate papers as part of their academic integrity tests. By reducing the need for observers or access to undergraduate accounts, it opens up opportunities to reduce privacy concerns as the average accuracy is 93%.

10. Evaluation of Teaching

The performance of faculty members has been systematically assessed using data mining algorithms [20, 21, 22], but [21] found that so many questions in questionnaires were not relevant. Based on an algorithmic evaluation of teaching methods in a differential equation classroom, clickers were found to be more effective [23] than online homework with immediate feedback. Additionally, the study found that while previous test scores may be a good predictor of exams in the future, they say little about whether undergraduates were successful in the projects. Using the algorithm, [43] compared the effectiveness of online homework with immediate feedback to clickers. Additionally, they found that while past exam scores are generally good predictors of future exam scores, they bear little relation to undergraduates' projected performance on project tasks.

11. Personalization and Adaptive Systems

Personalization of learning is the most common application of AI in education. Faculty members have a big influence on how well students learn. Professors' ability to maintain a consistent focus on each student's development becomes more difficult as class sizes grow. Students also learn in a variety of ways and at different rates. As a result, a one-size-fits-all learning approach might not be the best choice for all students [29]. Many studies focused on the institutional and administrative levels of adaptive systems. The educational guidance of undergraduates is the subject of two studies [24]. [25] focused on AI to support academic career services. AI systems can optimize student models adaptively by accumulating emergent, personalized information; learners can

participate in the process by communicating with the AI system so that learning can be improved. [8, 5, 26].

12. Teaching Course Content

Learning content is frequently edited and updated over time, just as textbooks have different editions. As a result, we can use AI system to help content designers as assistants during this multi-step process [47]. Activating learning and enabling connections between teachers and students ultimately helps professors provide a personalized education and optimize learning [48]. Information and communication technologies (ICT), linguistic learning, environmental science, and simulation design are just a few disciplines which use adaptive systems [12]. Descriptive approach, however, focuses on an adaptive system based on the effectiveness of human and machine learning, without naming any particular discipline.

13. Recommending/Providing Personalized Content

The use of AI in recommendation systems is a positive step forward [34]. Recommendation systems use Machine Learning algorithms to learn from the user's data and provide personalized recommendations. These systems customize content for each user based on their unique identity and characteristics. A good faculty member can use data-driven feedback to improve their teaching and make real-time adjustments based on what works and what doesn't. AI can be used by HEI to extract data value from systems and activity logs like Blackboard, student information systems, and Google apps. This enables them to anticipate areas for improvement, quantify productivity, and tailor learning recommendations to help students succeed [29]. The AI-system makes appropriate recommendations based on the individual's strengths and weaknesses. Because recommendations are personalized to the student's problem areas, the personalization engine and recommendation system overlap. Practice questions similar to the questions incorrectly answered by the student, remedial videos, and suggestions to refer to specific sections of the textbook to improve the learner's understanding are all examples of recommendations [13].

14. Using academic data to adviser and director learners

Researchers in this group utilize adaptive systems to extract academic information and perform diagnostic tasks to help their tutors offer more proactive personalized guidance to undergraduates [28]. Aside from this mission, it also includes performance assessment and personalized support and feedback, such as an AI-based assessment, support and diagnostic system for engineering undergraduates [51]. College advisors can connect with struggling students and help them stay on track to graduation and future success by analyzing interactions in AI-based learning management systems [30].

Conclusions and implications for further academic research

In this study, the purpose of authorship and guideline templates was to examine how AI is being used in HEI research. In addition, this study offers an outline of a significant set of AI applications

for undergraduates, faculty members, and administrators in HEI. Although there are few studies and there are a lot of descriptive and experimental studies, from a technological point of view there are still vast opportunities for professors to explore creative and meaningful research using AI applications in HEI ion and create meaningful learning activities, such as introduction of simulation-based methods into the classroom. [28]. There is also a predominance of experimental and quantitative approaches in the development of educational technology, according to a recent systematic review of the literature on personalization in educational technology [28]. The results of this study are also similar to those reported by [29] in their systematic review of learning analytics implementation and impact studies.

In the next twenty years, AI applications will likely dominate academic technology. AI has inordinate implications that cannot be completely anticipated today. Undergraduates, professors, and administrators can benefit from high-quality AI tools and services at some point in the undergraduate's life cycle. This article describes pedagogical applications that support adaptive and personalized undergraduate learning via intelligent undergraduate guide systems. AI applications in HEI may aid in overcoming the challenge of providing HEI access to large numbers of undergraduates, mainly in the realm of HEI. In addition to providing flexible, interactive, and individualized learning opportunities, such as eliminating instructors' burdens of grading hundreds of projects, it could also help them focus on the real task: empathic human teaching.

HEI is not always about technology; the role of AI in HEI needs to be seen from educational, moral, cultural, social, and economic perspectives as well. Digital data, like digital in general, does not provide a neat technical solution to educational dilemmas [30]. We need to focus on what is pedagogically sound rather than what is technically possible. In China, facial recognition in the classroom is already being used to track undergraduate participation and expressions, which are displayed on a dashboard for faculty members. Educating oversight is an example of how a faculty member should be able to respond empathically and pedagogically to a learning group, but such systems are debatable as to whether they are valuable.

In this regard, it's critical to consider how we're exploring the potential of algorithmic decision-making systems embedded in AI applications in higher education by adopting a care ethic [31]. Furthermore, we must always keep in mind that AI systems require human control first and foremost. Even the most intelligent AI systems can make mistakes. The data used to train AI systems is only as intelligent as the data that was used to train them [56]. Some critics of educational technology argue that we need to reconsider learning and pedagogy, as well as the human aspects of using digital technology in HEI [57]. The new UNESCO report on the challenges and opportunities of AI applications in HEI for sustainable development covered a wide range of topics, all of which have an educational, social, or ethical component, such as ensuring inclusion and equity in AI applications in HEI, preparing faculty members for AI-powered education, developing quality and inclusive data systems, or ethics and transparency. [34].

There has been a significant loss of critical thinking about the academic and moral implications, as well as the risks of implementing AI applications in HEIs, as a result of this insight. In terms of ethical implications, it was also noted that issues of confidentiality were rarely addressed in empirical studies of a recent systematic evaluation on evaluation knowledge acquisition [53]. Researchers and designers must work together to integrate AI applications throughout the undergraduate life cycle in order to take advantage of the vast possibilities offered by AI applications for intelligent learning and teaching systems. According to our systematic review, there are few authors associated with educational services related to these technological advances.

Technology in HEI generally can suffer from a lack of theory. The top three educational technology journals published over 40% of articles that were completely hypothetical, according to a recent study by [35]. [33] discovered this loss of explicit pedagogical views in the studies analyzed in an ordered review. A number of the studies in this systematic review focus on analyzing data and finding patterns in statistics to help undergraduates and professors to understand applications, or to help administrators make more informed decisions based on advanced mathematical theories and gadget learning techniques. This type of research is now possible thanks to advances in computing power and the widespread availability of vast amounts of digital data on undergraduates. However, there may be little or no evidence of educational and psychological theories progressing as a result of the AI-driven educational era. Researchers are encouraged to make explicit the theories that underpin empirical studies on the development and implementation of AI in HEI projects, in order to broaden the scope of the studies and better understand the motivations and mechanisms that drive this dynamic improvement.

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