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Artificial Intelligence in Higher Education

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Abstract
Artificial intelligence (AI) is becoming widely available in various sectors of society, including higher education. AI has the potential to significantly increase the scalability of educational services, both inside and outside of the traditional classroom setting. This study investigates the current and future applications of AI in higher education as well as the potential challenges that may emerge during its implementation. Academic recruitment: Artificial intelligence can provide tailored support to learners at all times during the application period. Going forward, AI might help educational institutions focus their recruitment strategies on students who are more inclined to thrive at their school and in particular fields, leading to higher numbers of students enrolling and staying. Education and teaching: AI can help teachers with evaluating assignments and offering essential materials for students who are having difficulty. This could lead to professors being able to handle larger classes while still keeping a strong connection with their students. Student support services: Artificial intelligence can offer tailored course selection and step in to assist students encountering challenges. Looking ahead, AI might forecast students' educational requirements by analyzing predictive information and past achievements and then actively provide suitable support, like extra tutoring or guidance. Efficiency within organizations: Artificial intelligence has the capability to collect data from different systems on campus and use this information to guide decisions made by administrative staff, including the selection of courses. Looking ahead, AI might help organizations comprehend the job needs of nearby companies and create educational programs that adequately equip students for these demands. To effectively embrace the entrance of AI into the higher education sector, we recommend that institutions analyze the following: 1. The most suitable timeframe (short-term or long-term) for implementing AI. 2. The specific areas within the institution where AI can provide the greatest assistance. 3. Strategies for safeguarding students' privacy while utilizing data to enhance their experience. 4. The university's desired outcome and criteria for success in implementing AI By thoughtfully integrating AI, higher education institutions can unlock a plethora of new opportunities that will benefit students, instructors, and administrators alike.

Keywords: *Artificial Intelligence, Higher Education, Academic Recruitment, Student Support, Self-Reliant.*

1. Introduction

It's widely acknowledged that higher education demands a lot of work. The earnings of teaching staff alone account for a large part (ranging from one-quarter to one-third) of the yearly budgets of most U.S. schools, as shown in the latest IPEDS data [1]. Moreover, when you think about the efforts of admissions and retention teams, along with administrative staff, one begins to understand the deep commitment these institutions have to the academic success and overall well-being of their students, whether they're taking classes online or in person. It's recognized that this commitment leads to the creation of a lot of data, which in turn needs a great deal of effort to gather and analyze. As artificial intelligence (AI) becomes more skilled and machine learning gets better at tackling complex problems, we're getting closer to a time when faculty and staff can be freed from repetitive, demanding tasks. Leaders in the field are already tackling this issue, and while we're still a long way from having a higher education system that's straight out of science fiction, there are already AI solutions available that can free

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up mental energy and save time. This allows us to concentrate on offering students a challenging, flexible, and customized learning experience. There's a growing trend across different sectors to implement AI solutions in businesses, aiming for scalability. Tasks that no longer need human input become more economical, enhance efficiency, and deliver more value to customers by making these tasks more cost-effective, improving efficiency, and increasing output without additional expenses [2]. Before exploring the impact of AI on higher education and its future role in schools, the job market, and beyond, it's crucial to define what AI is and what it can do. Since there's no universally agreed-upon definition, we suggest that AI should at least have some, if not all, of the characteristics outlined below. AI can participate in conversations with humans or other devices, understanding the message and creating a suitable reply. AI can analyze given data and act in a way that fulfills its assigned objectives. AI can absorb fresh data and modify its actions to enhance its performance. AI can carry out a significant portion of its decision-making without requiring human assistance. This brief analysis examines the use of artificial intelligence in higher education and highlights the influence of AI on academia in four crucial domains: student enrollment, learning and teaching, student retention, and overall operational effectiveness. While there are numerous other instances of AI's impact on our society and higher education [3], we aim to present the initial stages of what we believe will become standard practices and enhance the well-being of faculty, staff, and students. AI is expected to bring about positive changes in higher education, enhancing outcomes and enabling institutions to provide quality education on a larger scale. This, in turn, may lead to a more cost-effective and responsive approach within the industry. However, for higher education to fully embrace AI, several issues related to regulations, society, and organizational practices must be tackled. It is not only necessary for institutions to undergo conceptual changes but also for society to reassess the role of higher education in the workforce. Despite the practical and ethical challenges that need to be resolved, the potential of AI justifies the effort required to address these concerns. In a hypothetical scenario, envision a reality where it only takes 15 minutes to grade all the papers for an entire course. Furthermore, imagine a world where teaching assistants, student advisors, and enrollment counselors are accessible around the clock, seven days a week. In this alternate world, a student's degree plan can instantly adapt to their requirements. These adjustments would be accompanied by a transparent breakdown of how the changes will impact costs, promptly communicated to the student's advisor. Additionally, imagine a realm where instructors can craft immersive, real-life experiences for students right from the confines of the classroom [4]. They can also analyze a class's misconceptions about the subject, break it down into specific learning outcomes, and select tailored intervention strategies for each student's unique learning needs. AI will enable the availability of a world that has previously only been achievable through significant human labor. This will allow faculty and staff to allocate their time more effectively, providing students with a more customized and individualized experience that caters to their specific requirements and equips them for future achievements [5].

1.1. Academic Recruitment

With the ongoing decline in the number of students enrolling in higher education, schools and colleges are facing growing difficulties in drawing in new students. The Learning House, Inc.'s yearly study, in partnership with Aslanian Market Research, reveals that 41 percent of prospective students primarily use .edu websites for their education-related research. This underscores the critical role of a school's website as its main promotional tool, acting as a central repository for all the essential details that future students need [6]. Moreover, the website might be the initial point of interaction between the student and the school. Therefore, it's vital for the school to ensure its communication is both prompt and authentic, as students start to think about applying. The use of artificial intelligence (AI) on these platforms is essential for guiding students to the right information while keeping the school's voice consistent. Schools and colleges are using chatbots to handle the most frequent questions from students. Looking ahead, AI

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could also be used to connect with potential students through different channels and set up meetings with enrollment advisors. This strategy allows advisors to focus more on converting students rather than just addressing basic questions.

1.2. Applications in Practice

The enrollment process at any institution is a series of steps that are required from both the institution itself and the federal government. Prospective students often must navigate these steps with little help. Reaching out to an institution with a question can sometimes slow down or even derail the process if a college is too slow to respond. On the institutional side, answering these questions daily is time consuming and pulls counselors from the task of nurturing students who are further along in the enrollment process. Companies like Admit-Hub are developing chat-bots that prospective students can text for answers to thousands of common questions. This frees counselors to handle higher priority tasks.
Scheduling Appointments with Prospective Students: Chat-bots operate continuously, even during periods when human agents are unavailable to address inquiries. Given the constant influx of student queries throughout the day and the limited availability of staff, it is not uncommon for calls to be overlooked and responses to be delayed by several days [7]. Google has introduced Google Duplex, an artificial intelligence (AI) system that can initiate outbound calls using a convincingly human-like voice to carry out basic tasks like booking hair appointments or making restaurant reservations. This technology holds the potential for a similar program to serve as an initial response mechanism for prospective students who submit an online contact form or contact an enrollment center via phone. The AI could arrange for a live counselor to call the student and provide relevant details regarding the conversation [8]. Once again, this innovation can enhance the efficiency of the enrollment team and enable a small group of counselors to attend to a larger number of students within a shorter timeframe.

1.3. Arranging Meetings with Potential Learners

Chat-bots operate continuously, even during periods when human agents are unavailable to address inquiries. Given the constant influx of student queries throughout the day and the limited availability of staff, it is not uncommon for calls to be overlooked and responses to be delayed by several days. Google has introduced Google Duplex, an artificial intelligence (AI) system that can initiate outbound calls using a convincingly human-like voice to carry out basic tasks like booking hair appointments or making restaurant reservations [9]. This technology holds the potential for a similar program to be employed as an initial response mechanism for prospective students who submit an online contact form or contact an enrollment center via phone. The AI system could arrange for a live counselor to contact the student and provide relevant details regarding the conversation. Once again, this approach can enhance the efficiency of the enrollment team and enable a small group of counselors to attend to a larger number of students within a shorter timeframe. Currently, the integration of AI in student recruitment efforts in higher education is limited to chat-boat services. However, in the near future, it is conceivable that additional education technology companies will develop or that existing AI platforms used in product marketing will be utilized for student recruitment. There are existing forms of AI that can be integrated into customer databases to analyze customer behavior during the buying process, their response to marketing ads, and their purchase cycle. By leveraging this AI technology [10], it becomes possible to identify individuals who possess the desired traits and display targeted ads to them. Furthermore, the AI can dynamically adjust the ads in real time based on their performance. This approach has proven successful in increasing sales of Harley-Davidson motorcycles in the New York City market. Consequently, higher education institutions may adopt this same technology for student recruitment within the next five years, driven by the need to fill class rosters and the challenges faced by tuition-dependent colleges.

2. Improvement in Education

The field of education and teaching is always changing because of new technologies, which is good for educators. The use of AI in educational content has led to more engaging, challenging, and flexible ways of teaching. For example, educational resources

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can now spot and correct misunderstandings in students, and AI-powered grading systems can efficiently oversee online discussion forums, creating a community feeling. Therefore, AI is slowly making the learning process better [11]. Teachers who are passionate, skilled, and knowledgeable in their areas are invaluable. The idea of a class entirely run by AI is still far off, if it's even possible. However, today's teachers have a range of AI tools that can take care of routine tasks and other chores related to teaching. This means teachers have more time to build strong connections with their students and offer a tailored approach to a bigger class.

2.1. Field Implementation

Intelligent Learning Materials: Artificial Intelligence can be incorporated into educational materials as a teaching aid, helping students practice and navigate through learning exercises, or to create realistic situations for simulation. Certain AI applications are tailored to specific subjects, like Shadow Health, which acts as a simulation tool for nursing students. Other programs, such as E-Coach, focus on offering constructive feedback across various disciplines in the STEM areas. E-Coach monitors students' progress, spots possible areas of interest, and directs them away from frequent errors. It also suggests suitable practice tasks based on their performance in earlier modules.

2.2. Evaluation Instruments

The process of evaluating student work and offering feedback is a significant part of the teaching process. Numerous instruments are being developed for educators and educational institutions to streamline this process. An example of such an instrument is M-Write, developed by the University of Michigan. M-Write is designed to support teachers in managing writing tasks in introductory-level courses on a large scale. It employs an algorithm to pinpoint sections in a piece of writing where students are struggling and identify the root causes of these issues. For intricate STEM assignments, such as proof or brief responses in exams, the program Grade-scope is available. This program categorizes similar responses into groups, enabling the instructor to grade the entire group as a unified entity and provide feedback to all students who submitted similar work. Grade scope also tracks the overall performance of the class and provides a dashboard for instructors to review. Another automated grading and insight platform is Perceptive, which includes a system for double-blind peer review and algorithms developed at the University of Pittsburgh. It is equipped to grade complex, extensive essays and projects, incorporating a degree of a professor's judgment in the evaluation. These instruments provide crucial support to teachers in evaluating student work and offering feedback, thereby improving the educational experience.

2.3. Enhancing Classroom Experience with AI

Teachers leading large groups, whether in virtual or physical settings, often face the challenge of tailoring education to each student's needs. Historically, this issue has been tackled by either decreasing class sizes or breaking classes into smaller groups and assigning teaching assistants (TAs) to manage the day-to-day operations of the course. In 2016, Georgia Tech launched a trial program with an AI TA named Jill Watson, aimed at supporting a popular course. Watson served as a virtual assistant for administrative tasks and addressed complex questions related to coursework on discussion boards. At present, Watson is being tested at the university before a version suitable for wider use is released. Additionally, Pack Back has developed an AI tool that monitors discussion boards for student involvement, encourages the asking of open-ended questions, and tracks their interest.

2.4. Looking Ahead: Future Innovations in Teaching

As AI technology for educational support continues to develop, its immediate impact on classroom teaching is becoming clear. The rise of AI for managing course assessments could lead to a more balanced workload for teachers, allowing them more time to interact with students individually [12]. This could also lead to a more standardized curriculum, requiring more cooperation among departments as AI tools demand a more cohesive approach to teaching materials on a large scale. Furthermore, the combination of AI with facial recognition technology could offer teachers real-time insights into student engagement. This could help teachers identify and guide students who are less engaged. For example,

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the Minerva Schools' Active Learning Forum (ALF) is making strides by tracking the duration of students' participation in live sessions and comparing it to the average. This allows teachers to better involve students who are less active. If integrated with facial recognition software, as has been tested at the University of Saint Thomas, AI could provide teachers with a valuable tool for gathering and responding to objective feedback from their classrooms.

3. Student Support Services

In the past, student support services often responded to issues as they arose. This meant that faculty would spot students in trouble and direct them to a counselor, or students would look for help themselves. But things have changed a lot in the last ten years, thanks to improvements in data and analysis for students [13]. Now, professionals in student support can actively find students who need help and step in directly. This change has been made possible by the rise of AI, especially in smaller support departments, which helps them grow their operations and tackle tasks that used to need whole teams. By using AI, schools that are quick to respond can create tailored degree plans, build stronger communities, and give registrars and academic departments better forecasts of what courses to offer. AI can take care of everyday tasks, letting student support staff concentrate on more personal and intricate work. In the area of student support, there are many different skills and support networks for both online and in-person students. Since students have such varied needs, there's no single solution that works for everyone. However, the tools mentioned below can be customized and expanded, helping to sort out common issues and unique problems that need one-on-one attention [14].

4. Efficiency Within Organizations

The growth and intricacy of technology and IT infrastructures on university campuses have been on the rise, resulting in a considerable increase in the volume of data gathered over the last ten years. Yet, a significant obstacle emerges from the situation that this data is scattered across various systems, each managed by different departments on the campus. As a result, these systems are unable to communicate or be efficiently used. For example, when universities aim to boost student achievement, they need to retrieve student grades from one system, records of library visits from another, and details of interactions with the learning management system (LMS) from a third system. Even after obtaining the data from these systems, it might not be straightforward to export or analyze it in a way that provides valuable insights [15]. This is where artificial intelligence (AI) steps in, as it can help create a more cohesive campus environment by allowing universities to utilize data from various systems. By doing this, AI can assist in making enhancements for both students and faculty.

4.1. Applications in the Field

- **Planning for Future Course Offerings:** The process of determining which courses to offer and when can be quite intricate, and it can have a significant impact on student retention. Students often drop out while waiting for a specific course in their major to be available. On a larger scale, if this data is overlooked, it can lead to inaccurate budget planning for academic programs. As previously mentioned, Stellic is an AI application that aids in student degree planning. However, administrators can also utilize this application to gain a better understanding of which courses should be offered in the future, when they should be offered, and how many sections may be required to meet student demand [14]. This can greatly contribute to student retention, as it eliminates the need for students to wait for a crucial course to be offered in order to complete their degree. Additionally, administrators can allocate resources more effectively by budgeting for course development and staffing accordingly.
- **The Ability to Create Hyper-Learning Opportunities:** Student success tools can significantly enhance their effectiveness by integrating various aspects of campus life. By connecting diverse student and administrative systems, institutions can foster a concept known as "hyper-learning." This involves utilizing data to make informed decisions. For instance, if maintenance requests for buildings could be linked to class schedules, window repairs could

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be scheduled during times of low building usage. Similarly, if student support service usage could be correlated with course calendars, it would be possible to identify which courses may require additional tutors or writing center staff. The more interconnected the data is, the easier it becomes to draw concrete conclusions and implement necessary improvements.

Conclusion

Here's my key takeaway: don't give in to the fear of AI taking over just yet. Remember, despite all the excitement and chatter, these AI tools are essentially just machines. They're prone to errors, created by people, and their values are molded by corporations and organizations. Their data isn't unbiased; it's influenced by past trends. Approach the use of AI with care and consideration, and keep in mind it's not some kind of supernatural power. Students in higher education now have access to intelligent devices that make it possible to incorporate AI into education and teaching. The ICT policy (2016) highlights the significant role ICT can play in enhancing education and the adoption of new technologies. Yet, AI has not been utilized in teaching, learning, or evaluating students. The main obstacles to fully integrating AI in education are the lack of AI technology in teaching and learning, and the issues with internet access and the expense of internet services (Cable, 2018). These challenges significantly limit the complete adoption of AI in educational settings.

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