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Original Paper

Application and Exploration of Artificial Intelligence in Teaching and Learning in Private Colleges and Universities

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Abstract

The rapid advancement of artificial intelligence technology across various sectors has sparked profound transformation in the field of education, particularly in the realms of pedagogy and administration within private higher education institutions. The discourse delves into the specific applications of AI educational aids in both classroom instruction and post-class learning, encompassing intelligent tutoring systems, virtual laboratories, and personalized learning recommendation systems, among others. Furthermore, it addresses the utilization of AI-driven question-answering systems, automated homework grading systems, and speech recognition technology. In terms of educational administration, it investigates the integration of intelligent student information systems, learning trajectory tracking systems, as well as course resource recommendation systems and teaching evaluation systems. The aim of the article is to furnish educators with valuable insights to enhance teaching quality and administrative efficiency, thereby promoting the intelligent development of private higher education institutions.

Keywords

artificial intelligence, private colleges and universities, teaching, application and exploration

1. Introduction

Artificial intelligence technology has become a key driving force in the development of modern society, demonstrating immense potential particularly in the teaching and management of private colleges. Faced with fierce market competition and escalating educational demands, private colleges urgently need to utilize advanced technological means to enhance their competitiveness and teaching quality. Artificial intelligence provides new possibilities for the innovation of educational models, making the teaching process more flexible, efficient, and personalized. Through precise analysis of student behavior and processing of big data, artificial intelligence can assist teachers in crafting more

individualized teaching strategies, thereby enhancing student learning outcomes and satisfaction. Intelligent educational management systems streamline the complexity of administrative affairs, improving efficiency and providing robust support for the school's development. Therefore, this article will delve into the application and exploration of artificial intelligence in teaching aids and educational management in private colleges, aiming to offer substantive references and insights for relevant university administrators and teachers.

2. Application of Artificial Intelligence Teaching Aids

2.1 Application in Classroom Teaching

2.1.1 Intelligent Teaching Aid System

The intelligent teaching assistant system has rapidly emerged as a cutting-edge tool in the teaching of private colleges in recent years, significantly enhancing the efficiency and effectiveness of classroom teaching through advanced technologies such as big data and artificial intelligence. These systems not only assist teachers in preparing lessons more efficiently but also provide customized learning solutions based on the individual needs of students. The intelligent teaching assistant system can accurately grasp students' learning situations through data analysis. By recording and analyzing students' learning behaviors in real-time, the system can identify each student's strengths and weaknesses, thereby adjusting teaching content and methods accordingly. For instance, in response to students' difficulties in understanding certain knowledge points, the system can push relevant supplementary materials or video explanations to help them overcome obstacles (Redmond, Maiorca, Roberts et al., 2024). This personalized teaching approach greatly enhances the specificity and effectiveness of teaching. In addition to personalized teaching, intelligent teaching assistant systems also contribute to enhancing classroom interactions. In a traditional classroom setting, it is challenging for teachers to simultaneously pay attention to each student's participation and interaction. Through intelligent systems, teachers can instantly monitor students' classroom performance. For example, during questioning sessions, the system can record who answered questions, the accuracy of their answers, and even changes in students' facial expressions, enabling teachers to better understand students' genuine feedback. This meticulous management not only enhances classroom interactivity but also significantly promotes positive interactions between teachers and students. Furthermore, these systems can assist educational administrators in better planning and evaluating teaching effectiveness. Administrators can understand the teaching quality of different subjects and teachers and students' learning outcomes through the comprehensive data provided by the system. This quantitative management approach helps schools continuously optimize teaching strategies and improve the overall educational level. Despite the vast prospects of intelligent teaching assistant systems in private colleges, they also face some challenges. For example, the high technical threshold and expensive costs require teachers to possess certain technical capabilities to operate and maintain the system. Additionally, privacy concerns are also a crucial topic that must be addressed. Students' learning data are sensitive information, and

ensuring the security and privacy of data has become an urgent issue that needs to be resolved (Govender, 2023).

2.1.2 Virtual Laboratory

The virtual laboratory, as an AI-based instructional aid, is gradually assuming a pivotal role in the pedagogical endeavors of private higher education institutions. Particularly within the domains of STEM disciplines, the virtual laboratory presents advantages unparalleled by conventional teaching settings, affording students the opportunity to engage in experimental maneuvers within virtual environs, thereby garnering a superlative caliber of educational experiences. The deployment of virtual laboratories substantially surmounts the constraints inherent in traditional laboratory settings. A conspicuous advantage lies in its efficacy and adaptability. Students are emancipated from the confines of physical space and temporal constraints, empowered to conduct experiments at their discretion. This is particularly salient for courses necessitating extensive laboratory hours or frequently encountering resource constraints within laboratory facilities, thereby mitigating the outlay associated with hardware procurement and alleviating the resource contention stemming from inadequacies in equipment provision. Within virtual laboratories, AI algorithms can seamlessly record and scrutinize students' experimental data in real-time, furnishing prompt feedback. Such immediacy in feedback facilitates timely rectification of errors and comprehension of experimental principles, obviating the need for subsequent amendments following the adjudication of laboratory reports. This interactive mode of learning evidently accords with contemporary students' learning proclivities, substantially enhancing pedagogical efficacy. Furthermore, virtual laboratories can simulate a myriad of experimental conditions unattainable in real-world settings. For instance, a virtual chemistry laboratory can replicate the handling of hazardous chemicals, ensuring students operate in a risk-free milieu. Similarly, a virtual biology laboratory can emulate intricate biological experimental procedures, imparting incredulous visual and interactive experiences (Sommer & Moncayo, 2023). Concerns regarding allergic reactions to feline genetics experiments are rendered moot within virtual realms. Throughout the application process, virtual laboratories also serve to cultivate students' innovation and problem-solving acumen. Leveraging AI technology, students can entertain diverse hypotheses and conduct manifold tests within experiments, perpetually iterating and refining solutions. Such inquiry-based learning not only augments students' experimental dexterity but also incentivizes the manifestation of creativity, the proposition of novel insights, and the formulation of remedial strategies. Despite the myriad advantages brought forth by virtual laboratories, their dissemination and application are not devoid of challenges. These encompass issues pertaining to technological costs and maintenance, faculty proficiency in technological assimilation, and the cultivation of student self-discipline within virtual environments, among others. Fortunately, with the continuous progression of AI technology and the burgeoning attention accorded to the realm of education, these bottlenecks associated with virtual laboratories are gradually being surmounted.

2.1.3 Personalized Learning Recommendation System

In the contemporary era of informationization, the realm of education, like many others, has been profoundly influenced by Artificial Intelligence (AI) technology. Particularly within the domain of private higher education institutions, the proliferation of AI-based educational aids is conspicuous. Among these, personalized learning recommendation systems stand out. Leveraging big data analysis and machine learning algorithms, personalized learning recommendation systems tailor learning resources and paths to individual students based on their learning habits, interests, and academic performance, thereby enhancing teaching effectiveness and learning experiences (Johanna, Ahmed, Nuno et al., 2023). By collecting behavioral data from students on learning platforms, personalized learning recommendation systems construct individual learning profiles. These data not only encompass students' learning progress and grades but also include their points of interest, common mistakes, and learning preferences throughout the learning process. Through analysis of these data, the system can accurately predict weak points in a particular domain for students and recommend corresponding learning resources for supplementation. Consequently, students can not only tailor their learning according to their own needs but also effectively improve their grades in a short period.In classroom instruction, the application of personalized learning recommendation systems significantly alleviates the teaching burden on educators. Traditional teaching methods often adopt a one-size-fits-all approach, making it challenging for teachers to cater to each student's individual differences. However, with personalized recommendation systems, teachers can understand each student's learning situation based on the system's feedback, enabling targeted guidance and clarification. This not only improves teaching efficiency but also makes students feel valued, thereby stimulating their interest and motivation to learn (Saman, Jane, & Sue, 2023) Moreover, personalized learning recommendation systems also foster students' autonomous learning abilities. With a diverse array of learning resources provided by the system, including videos, articles, and exercises, students can autonomously select learning materials based on their interests and learning needs. This learning approach breaks the constraints of traditional classrooms in terms of time and space, allowing students to obtain high-quality learning support outside of class, thereby significantly expanding the depth and breadth of learning.Despite the notable achievements in the application of personalized learning recommendation systems in private higher education institutions, there are still challenges to address. For instance, how to protect students' privacy, ensure data security, and maintain the fairness of the system requires further exploration and improvement. Meanwhile, educators need to continually enhance their technical literacy when utilizing these tools to better leverage the resources and data provided by the system for teaching purposes (D & Sharon, 2017).

2.2 Application in after-School Learning

2.2.1 Online Q&A System

The online question-answering system, as an artificial intelligence teaching aid, has demonstrated its potential and charm in post-class learning at private colleges. Not only does the online

question-answering system extend classroom teaching time, but it also offers timely assistance to students encountering problems during self-study, significantly enhancing learning efficiency. Regardless of whether it is in the midnight hours or on a weekend afternoon, students can get answers through the online question-answering system, greatly enhancing the flexibility and convenience of learning with its round-the-clock service. In practical applications, the online question-answering system can swiftly process various types of questions raised by students based on big data and natural language processing technology. From simple factual questions to complex problem-solving steps, corresponding answers can be provided. Undoubtedly, this provides students with a "lifeline" when they encounter confusion in their self-study process. With these functions, the online question-answering system not only reduces the burden on teachers but also to some extent alleviates students' anxiety. The intelligent recommendation feature of the online question-answering system can analyze students' historical questioning records, identify learning weaknesses, and generate personalized remedial plans. The formation of personalized learning paths enables students at different levels to receive learning guidance tailored to their needs, truly achieving differentiated instruction. For students who are accustomed to procrastination, the system can also help them better manage their time and enhance self-discipline through timely reminders and task assignments. Despite the excellent performance of the online question-answering system in many aspects, its development still faces some challenges. For example, the system's level of intelligence needs to be further enhanced to better understand students' questions and provide precise answers. Additionally, the human-machine interaction experience also needs continuous optimization to ensure students' satisfaction and stickiness in the process of use (OZAN, 2009).

2.2.2 Intelligent Homework Correction System

The intelligent assignment correction system has demonstrated immense potential and promising prospects in post-class learning at private colleges. This technology not only alleviates the burden on teachers and enhances correction efficiency but, more importantly, enriches students' learning experiences and outcomes. Leveraging artificial intelligence, the intelligent assignment correction system automates the grading and feedback process. Through natural language processing and machine learning algorithms, it swiftly and accurately identifies correct and erroneous components within student responses, offering targeted remarks and guidance. Such instantaneous feedback is crucial for students, aiding them in timely error rectification and knowledge consolidation. Compared to traditional manual grading, the speed and precision of intelligent systems undoubtedly hold superiority. In application, these systems excel not only in handling simple multiple-choice and fill-in-the-blank questions but also in analyzing open-ended inquiries. Through analysis and learning from extensive assignment data, the system continually enhances its comprehension and processing capabilities regarding complex issues. Moreover, personalized learning suggestions tailored to individual student situations provide differentiated guidance, a feat previously challenging to achieve. Beyond technological advancement, the implementation of intelligent assignment correction systems has

sparked discussions and reflections (Stubbs & Piddock, 2006). While these systems possess commendable grading capabilities, their understanding and assessment of emotionally and creatively demanding tasks remain limited, necessitating supplementary assistance from teachers. Furthermore, the transparency of grading results, while enhancing trust in educational quality to some extent, underscores the importance for educational administrators to prioritize safeguarding student privacy and data security.

2.2.3 Speech Recognition Technology Assisted Learning

Amidst the wave of artificial intelligence, the technology of speech recognition has manifested its unique value in the post-school learning of private colleges. Serving as a facet of natural language processing, speech recognition has the capability to transmute students' oral expressions into textual forms, thereby furnishing instantaneous feedback, facilitating a deeper comprehension and mastery of learning materials. The utility of speech recognition extends beyond the realm of language acquisition. Across various disciplines, it exerts a significant influence on post-school learning. For instance, students can articulate queries or uncertainties through voice input, which the system promptly transcribes into text and retrieves relevant learning resources or answers from its database. Such interactive learning mechanisms significantly enhance the efficiency and efficacy of education. Moreover, speech recognition can be employed to evaluate students' learning progress. By analyzing students' oral articulations, the system can discern areas of confusion regarding certain concepts and provide targeted guidance and recommendations. Such functionality contributes to the realization of personalized teaching, ensuring that each student receives assistance tailored to their individual learning needs. In addition to enhancing learning efficiency, speech recognition technology embodies inclusivity, particularly benefiting students with special learning requirements. For instance, for visually impaired students, speech recognition can substitute traditional text input methods, enabling them to participate more conveniently in learning activities. Similarly, for those experiencing difficulties in reading, speech recognition technology can convert textual content into auditory formats, thereby aiding their comprehension and retention of learning materials. The application of speech recognition technology transcends mere technical implementation; it reshapes students' learning habits and patterns. Through speech recognition, students are no longer confined to conventional written assignments, allowing for more flexibility and autonomy in post-school learning. This empowering approach to education is quietly revolutionizing the teaching ecology of private colleges, driving improvements in educational quality and innovations in teaching methodologies. It is foreseeable that with continuous technological advancement and deeper integration, speech recognition technology will play an increasingly pivotal role in the field of education.

3. Combination of Artificial Intelligence and Teaching Management

3.1 Student Management

The burgeoning field of artificial intelligence is permeating various industries, and education is no

exception. In the realm of private college educational administration, the integration of artificial intelligence has not only enhanced management efficiency but also significantly improved teaching effectiveness. This discourse will delve into the fusion of intelligent student enrollment management systems and learning trajectory tracking systems in student management, elucidating the innovations and transformations they bring forth. An intelligent student enrollment management system, grounded in artificial intelligence, efficiently manages student enrollment information through techniques such as big data analysis and machine learning. Traditional enrollment management relies on manual input and maintenance, which is time-consuming, labor-intensive, and prone to errors. The intelligent student enrollment management system automates the processing of student basic information, course schedules, and grade records, reducing labor costs while enhancing information accuracy and timeliness of updates. For instance, the system can dynamically adjust course plans and recommend suitable learning resources based on student learning progress and performance, aiding students in better planning their learning paths. Furthermore, the intelligent student enrollment management system facilitates interdepartmental data sharing, breaking down information silos. Integrated with academic, financial, and dormitory management systems, it forms a comprehensive data network. This not only enables school management to comprehensively grasp student dynamics but also provides students with more personalized and precise services. For example, the system can promptly identify and alert potential students facing learning difficulties based on their academic performance and behavioral records, offering targeted guidance and support to effectively enhance overall education quality. The learning trajectory tracking system is another crucial application of artificial intelligence, monitoring and recording students' behavioral data in real-time to generate personalized learning reports. Compared to traditional teaching evaluation methods, the learning trajectory tracking system provides more detailed and dynamic analysis results. For instance, it records various data such as classroom attendance, homework completion, exam scores, and online learning duration, analyzing student learning habits and weaknesses through big data analysis. This real-time feedback mechanism not only helps teachers understand students' learning statuses timely and adjust teaching accordingly but also allows students to clearly perceive their learning progress and shortcomings, motivating autonomous learning. For school management, the comprehensive data analysis provided by the learning trajectory tracking system assists in formulating more scientifically rational teaching strategies and management measures. For example, optimizing course settings and adjusting teaching methods based on students' learning trajectories to enhance education quality and student satisfaction. The integration of intelligent student enrollment management systems and learning trajectory tracking systems not only seamlessly connects technically but also brings profound changes to educational management models. The data sharing and synergistic effects of the two build a comprehensive, real-time, and intelligent student management system. This system not only improves management efficiency but also provides more personalized and precise educational services, ultimately achieving a win-win situation for students, teachers, and schools. In practice, private colleges should actively

explore and apply these artificial intelligence technologies, combining them with their own practical situations to continuously optimize and improve intelligent management systems. By fully leveraging the advantages of big data and artificial intelligence, they can promote the modernization of educational management processes and enhance education quality and academic standards. In the future, with continuous technological advancements, the application of artificial intelligence in the field of education will become more widespread and profound, anticipating more innovations and breakthroughs (Raffaele, Smith, & Gemikonakli, 2018).

3.2 Teaching Resource Management

The application and exploration of artificial intelligence in the teaching of private colleges, especially in the management of educational resources, have shown significant potential and effectiveness. Taking the example of intelligent course resource recommendation systems and teaching evaluation systems, the combination of the two not only enhances the efficiency of using teaching resources but also provides strong support for the improvement of educational quality. The intelligent course resource recommendation system utilizes artificial intelligence technology to intelligently recommend the most suitable course resources by analyzing students' learning behaviors, interests, and knowledge mastery. This type of recommendation system not only saves time for teachers and students in selecting resources but also provides customized learning material based on students' individual needs. For example, for students with outstanding academic performance, the system can recommend more challenging extension resources; while for students with weaker foundations, the system will recommend strengthening materials for basic knowledge. This personalized recommendation not only improves students' learning efficiency but also enhances their interest and initiative in learning. Through big data analysis, the system can also identify students' knowledge blind spots, recommend relevant learning resources, and help students fill in gaps. The teaching evaluation system is another vital domain where artificial intelligence technology is combined with teaching management. Traditional teaching evaluations often rely on final exam scores or subjective judgments by teachers, which have limitations. On the other hand, AI-driven teaching evaluation systems analyze students' daily learning data to provide a more comprehensive and objective assessment of students' learning situations. By monitoring students' classroom performance, completion of assignments, participation in online discussions, and other multidimensional data, the system generates comprehensive evaluation reports to help teachers understand students' learning dynamics in a timely manner. This method of assessment not only reflects students' attitudes and abilities in learning but also provides a basis for improving teaching methods. For instance, if a class of students generally scores low on a particular topic, the system will prompt the teacher to adjust the teaching method for that topic, thereby improving teaching effectiveness. By combining the above two systems, it can be seen that the application of artificial intelligence in the management of educational resources is gradually changing traditional educational models. On one hand, the application of the intelligent course resource recommendation system allows students to more efficiently access learning resources that meet their

needs, thereby improving learning outcomes and experiences. On the other hand, the application of the teaching evaluation system enables teachers to have a more comprehensive understanding of students' learning situations, thus being able to adjust teaching strategies accordingly to improve teaching quality. The combination of the two not only optimizes the management and distribution of teaching resources but also promotes the development of personalized education. In the future, with the continuous advancement of artificial intelligence technology, intelligent course resource recommendation systems and teaching evaluation systems will become more intelligent and precise. For example, using natural language processing technology, the recommendation system can analyze students' reading habits and interests to recommend more accurate reading materials; and through machine learning algorithms, the evaluation system can continuously learn and optimize evaluation models to improve the accuracy and fairness of assessment results. In addition, the application of virtual reality and augmented reality technologies will bring new possibilities for the presentation and experience of teaching resources, making the teaching process more vivid and intuitive. The integration of artificial intelligence with teaching management signifies a new stage in the development of educational informatization. In private colleges, the application of artificial intelligence not only improves the efficiency of teaching resource management but also provides strong support for personalized teaching. Through intelligent recommendation and evaluation systems, students can have a more personalized learning experience, and teachers can adjust teaching strategies more accurately, thereby achieving optimal allocation of educational resources and comprehensive improvement in educational quality. In the future, artificial intelligence will undoubtedly play an increasingly important role in the field of education, providing powerful support for cultivating innovative talents.

4. Conclusion

The exploration of the application of artificial intelligence in private higher education institutions is not just about the introduction of technology, but also a profound transformation of educational philosophies and models. The utilization of intelligent teaching aids and management systems not only makes the educational process more scientific and efficient, but also enhances the learning experience of students and the teaching efficiency of educators. For instance, intelligent teaching support systems assist teachers in better organizing and optimizing classroom teaching methods, while virtual laboratories break through the constraints of traditional physics labs in experimental teaching. Personalized learning recommendation systems enable every student to access learning resources that are more tailored to their individual needs. With the assistance of learning trajectory tracking systems, students' academic progress and issues can be timely identified and addressed. Intelligent student enrollment management systems and teaching evaluation systems contribute to making school management more transparent and efficient. In the future, as technology continues to advance, artificial intelligence will play an increasingly important and irreplaceable role in private higher education. Only through continuous exploration and bold innovation can technology truly serve education and propel

the vibrant development of the educational field.

References

D, A. S. P., & Sharon, K. (2017). Exploring the impact of artificial intelligence on teaching and learning in higher education. *Research and practice in technology enhanced learning*, *12*(1), 22. https://doi.org/10.1186/s41039-017-0062-8

Govender, R. (2023). The impact of artificial intelligence and the future of ChatGPT for mathematics teaching and learning in schools and higher education. *Pythagoras*, *44*(1), e1-e2. https://doi.org/10.4102/pythagoras.v44i1.787

Johanna, V., Ahmed, M. T., Nuno, O. et al. (2023). Artificial Intelligence in K-12 Education: Eliciting and reflecting on Swedish teachers' understanding of AI and its implications for teaching learning. *Education and Information Technologies*, *29*(4), 4085-4105. https://doi.org/10.1007/s10639-023-11990-4

OZAN, Ö. B. R. (2009). DIGITAL SIMULATIONS FOR IMPROVING EDUCATION: Learning Through Artificial Teaching Environments. *The Turkish Online Journal of Distance Education*, *10*(3), 247.

Raffaele, D. C., Smith, S., & Gemikonakli, O. (2018). *An Active Tangible User Interface Framework for Teaching and Learning Artificial Intelligence[C]//Middlesex University, Pembroke, Malta*; Middlesex University, Hendon, London, United Kingdom; Middlesex University, Hendon, London, United Kingdom, 12-14. https://doi.org/10.1145/3172944.3172976

Redmond, S, A., Maiorca, C., Roberts, T. et al. (2024). Navigating the Artificial Intelligence landscape: Implications for mathematics, science, and STEM teaching and learning. *School Science and Mathematics*, *124*(1), 1-5. https://doi.org/10.1111/ssm.12635

Saman, R., Jane, W., & Sue, S. (2023). Artificial Intelligence teaching and learning in K-12 from 2019 to 2022: A systematic literature review. *Computers and Education: Artificial Intelligence*, 12-14.

Sommer, B., & Moncayo, G. (2023). Machine Learning and Artificial Intelligence in Building Physics Education:Series: Building simulation and calculation tools in teaching. *Bauphysik*, *45*(6), 305-314. https://doi.org/10.1002/bapi.202300020

Stubbs, M., & Piddock, P. (2006). (2006). Artificial Intelligence in Teaching and Learning: An Introduction. *PLET: Programmed Learning Educational Technology*, *22*(2), 150-157. https://doi.org/10.1080/1355800850220207