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Research on the Application of Higher Education Technology under the Background of Artificial Intelligence Technology Empowerment

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Abstract: This study explores AI technology applications in higher education, focusing on intelligent teaching, personalized learning and educational management. Research identified key challenges: technical adaptability issues, data ethics risks and teacher role transformation. Strategic recommendations include building education-specific AI systems, improving data governance and enhancing teachers' digital capabilities. Effective AI integration in higher education requires educational logic to lead technical implementation.

Keywords: Artificial intelligence; Higher education; Intelligent teaching system; Personalized learning

With the continuous development and popularization of science and technology, artificial intelligence technology has gradually become an important driving force for promoting social and economic development and has become an important development strategy in my country. As a key place for cultivating innovative talents, higher education faces important opportunities and challenges in using artificial intelligence technology to improve education quality and efficiency[1]. my country's higher education system is at a critical stage of digital transformation, and artificial intelligence technology provides new possibilities for education reform.

1. Current status of artificial intelligence technology in higher education

1.1 Development and application of intelligent teaching systems

Intelligent teaching systems have made significant progress in the field of higher education. College teachers can use intelligent teaching platforms to achieve personalized push and accurate delivery of teaching content. The "smart classroom" system developed by many domestic universities integrates technologies such as face recognition, voice recognition and natural language processing, and teachers can obtain real-time feedback data on classroom interactions [2]. The new intelligent teaching platform uses intelligent algorithms to analyze students' homework completion and test results, and the system can provide teachers with detailed class learning reports. The program code intelligent evaluation system developed by universities can not only judge the correctness of the code, but also analyze the efficiency and programming style of the code, and provide students with personalized improvement suggestions.

1.2 Innovative models of personalized learning support

Artificial intelligence technology provides strong support for personalized learning of college students. The engineering mechanics adaptive learning system developed by domestic engineering colleges breaks down the course content into fine-grained knowledge points, and the system adjusts the learning path of each student through continuous evaluation [3]. The intelligent tutoring system used in computer science courses can identify common error patterns in students' programming process, and the system will push relevant learning resources and exercises in a targeted manner. The "Smart Learning Buddy" platform innovatively developed by universities combines cognitive science theory and machine learning technology. The system can build students' cognitive models and provide targeted learning suggestions.

1.3 Intelligent transformation of education management and decision-making

Artificial intelligence technology is promoting the intelligent transformation of education management in universities. The new generation of intelligent scheduling system uses genetic algorithms to optimize course arrangements. The system can generate

the optimal schedule plan under the premise of meeting various constraints. The teaching quality evaluation model constructed by universities integrates teaching satisfaction surveys, course assessment results and learning behavior data, providing accurate diagnosis for teaching quality improvement. The graduate student recruitment auxiliary system can automatically extract key information from candidates' resumes and predict candidates' academic potential based on historical admission data. The "smart campus" system of universities optimizes library seat allocation, cafeteria dining peak prediction and campus safety management through technologies such as face recognition, location services and behavior analysis.

2. Key issues and challenges in the application of artificial intelligence technology

2.1 Problems of technology adaptability and integration with educational scenarios

The integration of artificial intelligence technology and university education scenarios faces adaptability challenges. Existing intelligent education technologies often originate from general artificial intelligence models and lack a deep understanding of educational principles and teaching rules . Artificial intelligence algorithms perform well in processing structured knowledge, but are not adaptable enough to disciplines such as humanities and social sciences that require deep understanding and creative thinking. The educational adaptation of artificial intelligence technology requires in-depth cooperation between educational experts and technical experts. Unilaterally dominated systems often have problems such as lack of educational value or difficulty in technical implementation.

2.2 Challenges of data ethics and privacy protection

Data ethics and privacy protection have become the core challenges of artificial intelligence education applications. University intelligent education systems collect a large amount of students' learning behavior and personal characteristics data, and data security and privacy protection mechanisms are still imperfect. Algorithmic fairness issues are becoming increasingly prominent in intelligent education applications. For example, academic early warning systems trained based on historical data may be biased against specific groups. Educational research has found that the warning rate of some academic prediction algorithms for rural students is 15-20% higher than that for urban students, while the actual academic risk difference is much lower than this. The problems of data monopoly and uneven distribution of educational resources also need to be taken seriously. Head universities have widened the gap with ordinary universities in the application of intelligent education by relying on their data advantages.

2.3 Challenges of teacher role transformation and capacity improvement

The role transformation and capacity improvement of teachers in the era of artificial intelligence face multiple challenges. The professional positioning of university teachers in the intelligent technology environment needs to be re-examined, from knowledge transmitters to learning designers and guides. Teachers' digital literacy and artificial intelligence literacy need to be improved, and insufficient technical capabilities have become the main obstacle to the promotion of intelligent education. The teacher professional development system needs to be reconstructed, and digital teaching ability and educational data literacy should be included in the teacher training and evaluation system. Educational research shows that teacher training based on design thinking can effectively promote the improvement of teachers' ability to apply intelligent educational technology.

3. Strategies and paths for artificial intelligence to empower university education

3.1 Building an artificial intelligence technology system for educational scenarios

Building an artificial intelligence technology system for educational scenarios is the key to achieving deep integration. Colleges and universities should promote the transformation and customization of basic artificial intelligence technology into education-specific technology, and develop intelligent algorithms and models that conform to the laws of education. The educational knowledge graph construction technology developed by domestic universities has achieved an accurate description of the subject knowledge structure, and this technology has been applied to the course design of multiple disciplines. The development of intelligent education products should adhere to the principle of "education logic first, technical logic follow-up" to ensure that technology serves educational goals. The "teacher-led, technology-assisted" development model adopted by universities, where the teaching team determines the teaching needs and the technical team is responsible for implementation, generally has a product satisfaction rate of more than 90%. Universities should actively build an educational artificial intelligence technology standard system to promote the standardized application and interoperability of technology. The intelligent technology-supported teaching experiment platform established by the education authorities has proposed technical specifications including data interface, privacy protection and algorithm transparency, providing a reference framework for the industry.

3.2 Establish and improve the education data governance and ethical guarantee mechanism

Education data governance and ethical guarantee mechanisms are the foundation of artificial intelligence education applications.

Universities should establish a complete education data collection, storage, use and sharing specification to ensure data security and student privacy. The "Education Data Management Measures for the Ministry of Education and Directly Affiliated Institutions" formulated by some domestic universities clearly defines mechanisms such as data classification, desensitization and access control, which effectively ensures the security of student data. Intelligent education applications should follow the principles of algorithm fairness and transparency to avoid bias and discrimination in technology applications. The "algorithm fairness audit tool" developed by colleges and universities can evaluate the differences in the impact of educational prediction models on different groups and has been applied in enrollment and academic early warning systems. Colleges and universities should establish an educational artificial intelligence ethics committee to conduct ethical review and supervision of intelligent education applications. The "Artificial Intelligence Education Ethics Committee" established by many domestic universities is responsible for assessing the ethical risks of on-campus intelligent education projects and providing ethical guidance. The establishment of open sharing of educational data and data public welfare mechanisms will help alleviate the data divide problem. The "China University Education Data Alliance" has collected anonymous educational data from many universities to provide data resource support for small and medium-sized universities.

3.3 Promote the improvement of teachers' digital capabilities and professional development transformation

The improvement of teachers' digital capabilities and professional development transformation are the core support for the application of artificial intelligence in education. Colleges and universities should build a hierarchical and classified teacher digital capability training system to meet the development needs of teachers in different disciplines. The "Teacher Digital Capability Advanced Training Program" designed by normal universities sets three levels of basic application, in-depth development and innovation leadership according to the technical level of teachers, and the training satisfaction rate generally exceeds 90%. The teacher evaluation incentive mechanism in the intelligent education environment needs to be reconstructed to encourage teachers to innovate and apply technology to improve teaching. The revised teacher evaluation standards of colleges and universities take "technology supports teaching innovation" as an important indicator, and regularly select "smart teaching models" to give material and spiritual rewards. The establishment of a teacher intelligent education application community can promote experience sharing and collaborative innovation. The "artificial intelligence + education" interdisciplinary teacher team formed by colleges and universities has promoted the intelligent reconstruction of multiple courses through regular seminars, joint teaching and research, and resource sharing. Colleges and universities can set up educational technology assistant positions to provide technical support and services for teachers. The "Educational Technology Assistant Program" implemented by domestic universities equips colleges and departments with full-time technical assistants, which significantly improves the willingness and efficiency of teachers to apply intelligent technology.

4. Conclusion

The deep integration of artificial intelligence technology and college education is an important direction of education reform. By analyzing the current application status of intelligent education technology in colleges and universities, this study identifies key challenges such as technology adaptability, data ethics, and teacher role transformation, and proposes strategic paths such as building an education-specific artificial intelligence technology system, improving data governance mechanisms, and promoting teacher professional development. Artificial intelligence empowers college education is not only a technology application, but also an innovation in educational concepts and models. The application of artificial intelligence technology needs to follow the laws of education, be people-oriented, and promote the all-round development of students. Future research can further explore the differentiated impact of artificial intelligence technology on teaching in different subjects, conduct in-depth research on the laws of student development in an intelligent education environment, and provide a more solid theoretical foundation and practical guidance for the deep integration of intelligent technology and education.

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