# **Exploration on the Application of Artificial Intelligence Technology in Vocational Education Teaching**

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Abstract: As an important driving force in today's era, artificial intelligence technology has wide applications and influences in various fields. Especially in the field of vocational education, the application of artificial intelligence technology is leading the transformation of modern teaching methods. This article summarizes the application prospects artificial of intelligence technology in four aspects: personalized teaching, adaptive learning, intelligent tutoring and teacher assistance in vocational education, focusing on the three core levels of students, teachers and teaching. It summarizes the difficulties of artificial intelligence technology in innovative teaching of vocational education and proposes strategies for its change. Through the discussion and summary of this article, it not only provides useful references and lessons for digital teaching in vocational education, but also proposes strategies for its change, laving a solid foundation for cultivating professional talents in the new era. Therefore, this study has important theoretical and practical value, which is conducive to promoting the development and improvement of vocational education.

Keywords: Artificial Intelligence; Vocational Education; Adaptive Learning; Intelligent Tutoring; Personalized Teaching; Teacher Assistance

#### 1. Introduction

Artificial Intelligence (AI)[1] is an interdisciplinary science that studies how to make computers mimic human behavior, involving multiple fields such as computer science, control theory, information theory, mathematics, and psychology. The concept was proposed by American computer scientist

McCarthy in 1956[2]. In addition to various applications in daily life, artificial intelligence technology also has many effective applications in the field of education. For example, intelligent assessment systems, intelligent interaction systems, intelligent tutoring systems (ITS)[3], educational robots, intelligent classrooms, VR/AR, etc., all demonstrate the positive impact of artificial intelligence technology on promoting modernization of education[4].

The emergence of artificial intelligence has broken traditional educational concepts, promoted the reform of vocational education structure, solved the contradiction between knowledge dissemination and personalized learning, and led vocational education towards a direction of intelligence and smartness. Currently, a new round of technological revolution and industrial transformation is rapidly underway globally, and China is facing new opportunities of The Education Informatization 2.0 and Industry 4.0[5]. Driven by major national strategies such as "Belt and Road" and "Made in China 2025"[6], as well as the promotion of new economic models represented by new technologies and industries, higher-level challenges have been posed to the education field, especially vocational education. Therefore, there is an urgent need for a more intelligent and wise talent education approach to cultivate skillful and intelligent talents with innovative and entrepreneurial cross-border integration abilities and capabilities, promote the development of a smart society, and assist in economic transformation and upgrading.

The core driving force of artificial intelligence as a new round of technological revolution and industrial change has promoted the birth of a large number of new products, new technologies, new business models, and new modes, and has also opened up more space for the modernization of education. The latest Generation Artificial Intelligence "New Development Plan" issued by the State Council of China emphasizes that: "China attaches great importance to the profound impact of artificial intelligence on education, actively promotes the deep integration of artificial intelligence and education, and promotes educational reform and innovation." Vocational education is an important way to cultivate high-quality technical and skilled talents, facing challenges and opportunities in social demand, industrial change, teaching models, and so on. Artificial intelligence technology can help vocational education achieve innovation and optimization in various aspects such as curriculum system, curriculum content, teaching methods, and teaching evaluation[7], improve teaching quality and efficiency, meet the personalized learning needs of different students, promote the comprehensive quality and professional ability of students, and also provide effective assistance and support for teachers, releasing their creativity and vitality. Therefore. application exploring the of artificial intelligence technology in vocational education is of great theoretical significance and practical value for promoting the development of vocational education and cultivating technical and skilled talents that meet the requirements of the times. This paper aims to investigate the impact of artificial intelligence technology on teaching models in vocational education. It summarizes the application strategies of AI technology in personalized teaching, adaptive learning, intelligent tutoring, and teacher assistance, with the hope of providing valuable insights for the reform and development of vocational education.

#### 2. Application of Artificial Intelligence Technology in Vocational Education Teaching

Artificial intelligence technology is an important field in the reform of digital education, playing a variety of roles in innovative vocational education teaching and the cultivation of skilled and intelligent talents.

# 2.1 Personalized Teaching by Artificial Intelligence Technology

Personalized teaching is an application of artificial intelligence technology, which

analyzes the learning situation of students based on their needs, abilities, and interests through machine learning and natural language processing. Using artificial intelligence technology for personalized teaching can provide intelligent services based on data and algorithms according to the learning styles and ability needs of students, better meeting the needs of different students to enhance learning effectiveness.

The implementation of personalized teaching relies on the data processing and analysis capabilities of artificial intelligence technology. In vocational education, students' professional development requires mastery of specific skills and knowledge, thus necessitating teaching tailored to different types of students in different career directions. Through artificial intelligence technology, algorithms such as clustering and association rules can identify different types of students from a large amount of student data, and then develop personalized education plans. Additionally, artificial intelligence technology can obtain data through means such as student behavior analysis and learning trajectory analysis, modeling students using various algorithms to analyze their learning behavior, methods, and speed, and to promptly discover learning problems. After modeling students, personalized learning resources and plans, such as textbooks, courses, and literature, can he recommended based on student characteristics and needs, and diverse learning methods and guidance can be provided. Tracking student performance digitally during the learning process can achieve performance tracking. Collected performance data, learning outcomes, test scores, activities. and homework situations can be cleaned and organized and then analyzed with artificial intelligence technology, such as machine learning and natural language processing, to obtain information on students' learning behavior, characteristics, and trends. Continuous tracking of students' performance and grade data, evaluating the quality of performance. students' and providing personalized feedback and guidance to teachers and students to further optimize learning direction and adjust resources.

# 2.2 Adaptive Learning by Artificial Intelligence Technology

Artificial intelligence technology can automatically adjust course content and difficulty based on students' learning progress and mastery, making learning more efficient and effective. Adaptive learning is another application of artificial intelligence technology. It is personalized and tailored to each student's needs, abilities, and interests through machine learning and natural language processing. Different from the traditional teacher-centered teaching model, adaptive learning places students at the center of teaching, providing personalized guidance and support through technology, enabling students to actively participate in the learning process and improve learning outcomes.

Adaptive learning emphasizes the automation of course learning. Through artificial intelligence analysis, course content and difficulty are automatically adapted based on students' learning situations by increasing relevant teaching materials, course links, or recommending assignments and exercises to enhance students' interest and participation. An intelligent assessment system can analyze abilities and students' masterv levels. automatically calculate recommended learning content and difficulty, generate students' learning progress reports, and provide timely feedback and evaluation, helping students better plan their study schedules.

Adaptive learning emphasizes the personalized nature of course learning. Personalized problem-solving is a method of providing personalized answers to students using natural language processing technology. This method utilizes machine learning technology based on question-and-answer, where students ask questions and artificial intelligence can provide them with the most accurate answers and detailed explanations, helping students better understand problems and solutions. A natural language processing technology based on language models called ChatGPT is applied to personalized problem-solving in vocational education. ChatGPT technology can provide language-based feedback and guidance based on students' input, enhancing students' language comprehension, expression, and text generation abilities, and achieving intelligent problem-solving and learning support. By analyzing students' input, ChatGPT can understand students' language, organize their knowledge system, and generate appropriate and fluent language-based answers or guidance, providing personalized and high-quality learning guidance. ChatGPT can present corresponding language models based on different fields of language and academic systems to assist students in mastering knowledge in those fields. As a typical example of the application of personalized problem-solving in vocational education. ChatGPT can help students better understand and absorb knowledge, provide personalized guidance and answers, and contribute to the comprehensive improvement of professional qualities and skills, with a wide range of application prospects.

#### 2.3 Intelligent Tutoring by Artificial Intelligence Technology

Intelligent tutoring is an important means of using artificial intelligence technology to improve the effectiveness of vocational education, where dynamic problem mining and learning monitoring feedback technologies are widely applied.

In vocational education, many problems are in a constantly changing state, so dynamic problem mining (DPM)[8], a data mining technology used to detect and identify realtime dynamic problems from data streams, has been proposed and applied. Unlike traditional data mining techniques, DPM deals with constantly updated and dynamic data streams, requiring real-time algorithms and technologies for processing and analysis. The use of DPM technology can help students to promptly discover changes in problems and adapt and solve them more quickly. Through the extraction and analysis of natural language processing technology, dynamic problem mining can help students to obtain the latest information in a timely manner and adjust their learning plans accordingly. This technology students to better master new helps technologies and methods and apply them in practice.

Learning analytics feedback (LAF)[9] technology, a popular and widespread intelligent tutoring technology, is used to help teachers and students understand and improve learning outcomes through data analysis. LAF technology uses artificial intelligence technologies such as deep learning and machine learning to extract key information from students' behavioral data and provide

feedback on their learning and practice. This feedback can identify a student's shortcomings in mastering specific concepts and practical skills and provide suggestions for improvement. LAF technology can also provide real-time feedback when reading behavioral data, helping students to quickly correct errors, deepen understanding, and optimize learning.

### 2.4 Assist Teachers by Artificial Intelligence Technology

In vocational education and teaching, artificial intelligence technology can not only provide intelligent learning assistance for students, but also intelligent assistance for teachers. In vocational education and teaching, how to use artificial intelligence technology to optimize the teaching process and improve teaching quality has become an important research direction for enhancing teachers' teaching ability.

Artificial intelligence technology can analyze students' learning progress and understanding, and teachers can continuously optimize course design based on this information. Machine learning algorithms can analyze students' learning situations, including progress, mastery, and deficiencies. Based on students' learning situations and interests, teachers can update teaching materials and adjust teaching methods to achieve better teaching effects.

In vocational education and teaching, teachers need to carry out various forms of teaching assistance work, such courseware as production, classroom management, and student assessment. These tasks require a lot of time and effort from teachers, and sometimes even affect their teaching effectiveness and quality. Artificial intelligence technology can assist teachers in improving efficiency in these tasks. Teachers can input teaching content into intelligent text recognition software such as ChatGPT to quickly generate courseware content through natural language processing and machine learning technologies[10], achieving rapid course production and updates. Teachers can use artificial intelligence technologies such as body posture estimation and image recognition to identify students' movements and expressions in the classroom, and provide teachers with reports on student participation in the classroom and corresponding suggestions. Traditional student

assessments usually involve questionnaire surveys or group discussions, which are timeconsuming and prone to errors. Using artificial intelligence technology for student assessment can quickly obtain and process student feedback information, leading to more scientific and accurate assessment results, and ultimately providing teachers with more critical decision-making references.

By leveraging the advantages of artificial intelligence technology, teachers can more accurately analyze current job markets and career trends, and develop the highest career planning and development paths for students. Through methods such as big data analysis and machine learning, we can delve into the job market and career trends. By collecting and analyzing a large amount of data from various online channels, including job demand, salary level, company size, and employee satisfaction, we can analyze the current job market. At the same time, machine learning algorithms can predict the development trends of industries and careers, and therefore provide students with more accurate career planning advice. Using technologies such as big data analysis and machine learning algorithms, teachers can optimize the entire process of career training and education upgrades, and improve students' career matching. By exploring career skills and collaborating closely with enterprises and industries, we can align students' knowledge and skills with market demand, and enhance students' competitiveness in the job market.

In higher vocational education and teaching, teachers can use artificial intelligence technology to optimize course design and achieve more efficient teaching assistance work, thereby improving teaching efficiency and quality. At the same time, artificial provides technology intelligence more forward-looking and leading teaching methods and career planning for higher vocational education and teaching.

#### 3. The Changing Strategies of Vocational Education in the Era of Artificial Intelligence

With the development of artificial intelligence technology, traditional repetitive and mundane work will gradually be replaced by automation, freeing more people from monotonous and simple jobs to engage in creative and innovative work. Therefore, vocational schools need to pay more attention to the cultivation of students' cultural literacy, ideological and moral levels, and humanities disciplines. At the same time, teaching should focus on stimulating students' active learning abilities and innovative spirit, promoting the formation of cross-border thinking, and enabling students to master the professional knowledge and corresponding intelligent skills required in the era of artificial intelligence. In order to meet the challenges and opportunities of the era of artificial intelligence, vocational schools need to readjust the teaching content, teaching methods, and evaluation system to better adapt to the new era's requirements. Therefore, the following four aspects are crucial:

Vocational schools need to pay more attention to the cultivation of students' humanistic and comprehensive qualities. The development of artificial intelligence technology poses higher requirements for the discipline structure and talent training mode of vocational education. In the future, we will need more talents with innovative thinking, entrepreneurial awareness, and cross-cultural communication skills. This requires vocational education to focus more on the cultivation of humanistic qualities and the interdisciplinary cultivation of students' comprehensive qualities to meet the professional needs of the era of artificial intelligence. In the process of researching and evaluating the talent training in vocational education, it is necessary to consider the balance between the cultivation of professional skills and the development of non-technical qualities.

Teachers should focus on cultivating students' active learning abilities and innovative spirit. In the era of artificial intelligence, students must have the ability to continuously learn new knowledge, adjust their working methods, and adapt to new changes. Therefore, teachers should guide students to master the ability to learn new knowledge and new technology independently, understand the impact of information technology on society, the environment, and culture, and focus on the cultivation of students' innovation and application abilities. In the teaching process, teachers should stimulate students' innovative spirit and hands-on ability, encourage students to actively explore diverse practical activities, and enable students to learn and master knowledge and skills through practice.

Vocational education in the era of artificial intelligence needs to emphasize both knowledge structure and skill structure. Vocational schools need to establish a comprehensive curriculum system to meet the needs of the new era. At the same time, appropriate artificial intelligence technology should be introduced to enable students to quickly master new knowledge of the digital age in the curriculum. In addition, when assessing students' skill levels, a virtual-based skill assessment testing system can be used to assess students' skills in a real simulated work environment. At the same time, a "continuous learning mechanism" should be established, including industry training, vocational training, and educational experiences, so that students can continuously learn relevant knowledge, master new skills, and adapt to new professional demands.

colleges Vocational should establish а diversified cooperation platform. Nowadays, artificial intelligence technology has begun to influence all aspects of daily life. Establishing a diversified cooperation platform can promote cooperative effective interaction and communication between the industry, government, and schools, and fully leverage the advantages of artificial intelligence technology in vocational education to improve the quality and efficiency of vocational education. Vocational colleges should establish cooperative relationships with enterprises to jointly carry out vocational education and research projects related artificial to intelligence technology, achieving a win-win situation for school-enterprise cooperation. This not only helps to cultivate high-quality talents that meet market demand but also provides better talent supply and technical support for enterprises. Vocational colleges should also focus on cultivating students' practical and operational abilities, increase the practical elements related artificial to intelligence technology in the teaching process, improve students' practical skills, broaden their practical experience, and increase their employment opportunities. Vocational colleges should establish a high-level teaching staff. provide professional teaching content and guidance services, and train teachers with and professional knowledge practical experience in artificial intelligence technology.

## 4. Conclusion

The application of artificial intelligence technology in vocational education has become the future development trend. It not only changes traditional education methods but also various intelligent provides vocational education development methods, such as personalized teaching, adaptive learning, intelligent counseling, and teacher assistance. In the era of artificial intelligence, vocational colleges need to pay more attention to the improvement of students' humanistic quality and technical literacy, and the improvement of teachers' intelligent teaching technology and smart teaching methods. In short, the application of artificial intelligence technology in vocational education has broad prospects and potential, and vocational colleges should actively promote its development to better meet the needs of talent cultivation and promote economic and social development.

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