ISSN 2522-6398 Vol. 8, Issue 4: 99-104, DOI: 10.25236/FER.2025.080415

# Research on the upgrading of software technology specialty in vocational colleges in the era of artificial intelligence

**Qin Dejie**

*Zaozhuang Vocational College of Science and Technology, Tengzhou, Shandong, China, 277599*

***Abstract:*** *In order to meet the requirements of the era of artificial intelligence, the integration of software technology specialty and artificial intelligence technology in vocational colleges has become an inevitable trend. Based on the analysis of the application of artificial intelligence in the field of education at home and abroad, this paper points out the problems existing in the current education model. This paper puts forward the practical path of constructing the "software+artificial intelligence" intelligent education system, that is, building the intelligent education platform in higher vocational colleges, improving teachers' information literacy and realizing personalized learning.*

***Keywords:*** *generative artificial intelligence; Major in software technology; Vocational education; Individualized teaching*

## 1. The research status of each country

With the maturity of Generative Artificial Intelligence (Generative AI) technology, research institutions all over the world have begun to study the influence of artificial intelligence on the teaching mode of vocational colleges. Taking software technology as an example, introducing artificial intelligence-driven programming AIDS such as GitHub Copilot into programming courses can significantly improve students' programming ability and efficiency. Some researchers have found that the use of AI-assisted tools not only improves students' learning efficiency, but also has great advantages in improving classroom evaluation, assisting teaching design and regulating interactive communication.

The United States has been studying the application of AI in the field of education for a long time. In 2016, Preparing for the Future of Artificial Intelligence and the National Strategic Plan for Research and Development of Artificial Intelligence put forward that education is one of the core areas of AI application, emphasizing reshaping the teaching evaluation model through technologies such as intelligent assessment and learning behavior analysis [1].

The Knewton platform in the United States has refined the content granularity of mathematics textbooks from chapter level to example level by constructing a prediction model of knowledge mastery and analyzing the behavior data of 30 million students.

The learning analysis technology based on artificial intelligence developed by American universities generates personalized learning suggestions by tracking students' attendance, homework completion and online learning behavior, which greatly improves the efficiency of teaching management. The "school is laboratory" mode implemented by Carnegie Mellon University gives grass-roots teachers the ability to independently design management processes with artificial intelligence technology, and allows teachers to customize evaluation rules to achieve a dynamic balance between teaching management and personalized learning.

The European Union's "EdAI" project is developing a multilingual cultural adaptation system. For example, when explaining the Renaissance history, it focuses on analyzing the artistic achievements of southern European students and strengthening the comparison of the influence of religious reform on northern European students.

The team of Beijing Normal University put forward a "three-layer and four-dimensional" content architecture based on educational knowledge map: the bottom layer is the core concept network of disciplines (such as mathematical function diagram), the middle layer is the interdisciplinary theme module (such as "carbon neutrality" integrating physics, chemistry and social sciences), and the top

ISSN 2522-6398 Vol. 8, Issue 4: 99-104, DOI: 10.25236/FER.2025.080415

layer is the personalized learning path generator.

XAI tool developed by EU Horizon Project is used to analyze the correlation between students' mental health data and academic performance. For example, Finland's pilot project combines emotional calculation with knowledge map technology to provide early warning service for school administrators. The Netherlands requires that the AI system can only process structured data (such as attendance and grade statistics), while qualitative evaluation (such as teacher evaluation and curriculum design) must be led by human experts to prevent the algorithm from excessively interfering with the education model. The credit certification system developed in Germany based on blockchain technology can realize cross-school credit mutual recognition and lifelong learning record management, and enhance the transparency and traceability of education management.

Singapore uses artificial intelligence to optimize the allocation of educational resources, and dynamically adjusts the division of school districts and the allocation of teachers through big data such as regional population structure, student achievement distribution and teacher ability, which greatly reduces the redundancy of educational resources. The intelligent learning evaluation system developed by Nanyang Technological University in Singapore generates personalized reports by analyzing students' learning data, which helps teachers adjust teaching plans in time according to students' learning status.

In 2017, the China Municipal Government issued the New Generation Artificial Intelligence Development Plan, which clearly put forward that the development of artificial intelligence should be promoted to a national strategy [2]. In 2018, People's Republic of China (PRC) Ministry of Education's Action Plan for Artificial Intelligence Innovation in Colleges and Universities put forward a pilot plan of "Artificial Intelligence Boosting the Construction of Teachers", aiming at improving the innovation of teacher education. All kinds of colleges and universities in China actively embrace artificial intelligence technology. The AI teachers developed by the teaching team of Beijing Normal University can undertake the work of automatic grading of homework, diagnosis of learning disabilities and generating comprehensive quality reports. A teaching team of a vocational college in China proposed a smart campus system based on artificial intelligence technology, and constructed an intelligent system covering 12 management scenarios, including homework grading, classroom behavior analysis and teacher performance evaluation. By analyzing the interaction frequency between teachers and students and the quality of questions in teaching videos, the evaluation report of teachers' teaching ability is generated to guide teachers to teach better.

## 2. The analysis of research status in Shandong Province

As a big education province, Shandong Province actively responded to the national strategy of "artificial intelligence+education", deeply integrated AI technology into teaching reform, and made breakthroughs in curriculum design, teaching mode and evaluation system.

Shandong Tourism Vocational College takes the digitalization of cultural tourism industry as the breakthrough point, remoulds professional courses, teaching materials and training modes by using educational information technology, and constructs a new digital education mode with distinctive cultural tourism characteristics.

Jining Vocational and Technical College is piloting the "AI Engineer Resident Program". Enterprises send technical backbones and professional teachers to jointly develop AI-based training programs. At present, 30 technical patents have been transformed, forming a closed loop of "teaching, R&D and production". Cooperate with Weichai Power to establish an "industrial ai training base", convert the million-level working condition data of engine fault diagnosis into a teaching resource library, and develop a "virtual simulation system for fault prediction and health management (PHM)". The student training period will be shortened from 6 months to 3 months.

Shandong Business Vocational and Technical College has joined hands with Inspur Group, Haier Smart Home and other companies to create a "new generation information technology+business services" professional group and integrate AI technology into traditional e-commerce professional courses. For example, in the course of Intelligent Logistics Management, an AI warehouse scheduling system is constructed based on real enterprise data. Students use the simulation optimization algorithm to improve the warehouse turnover, and the matching degree between the course and the enterprise employment needs reaches 92%.

The mechatronics major of Qingdao Vocational and Technical College is studying and developing

ISSN 2522-6398 Vol. 8, Issue 4: 99-104, DOI: 10.25236/FER.2025.080415

"AI dynamic teaching materials", which uses natural language processing technology to capture the latest industry technical standards in real time and automatically update them to the training cases in the teaching materials to realize the synchronization of teaching content and industry technology.

## 3. The research significance of this project

With the rise of Generative AI such as ChatGPT, TongYiQianWen and DeepSeek, its powerful natural language generation ability provides new ideas and technical basis for the reform of education and teaching mode in vocational colleges.

In the traditional teaching of software technology specialty, the teaching content is still mainly based on basic technologies such as Java and database, which is out of touch with the actual post demand in society. With the emergence of new job requirements such as AI algorithm optimization engineer and intelligent system operation and maintenance engineer, software technology specialty urgently needs to integrate new technologies and upgrade and transform to cope with the structural changes in industrial talent demand.

The software technology major in vocational colleges is deeply integrated into the big model of teaching, promoting the innovation of vocational education mode paradigms, changing the traditional one-way knowledge imparting method in the classroom, achieving truly personalized teaching, and cultivating composite talents with dual abilities of "software+AI".

Focusing on the digital transformation needs of regional characteristic industries such as manufacturing and agriculture, we will cultivate technical talents who can develop vertical AI applications and serve the intelligent upgrading of local industries. For example, it provides customized AI solution development services for small and medium-sized enterprises, forming a closed-loop ecosystem of "teaching R&D industry".

## 4. Research objectives of this project

By analyzing the technical characteristics of Generative AI and the actual needs of software technology teaching, this topic has set the following feasible research objectives:

(1) Construct an integrated curriculum system of "software+artificial intelligence" through curriculum system reconstruction, teaching method innovation and evaluation mechanism reform. By embedding AI core modules such as machine learning, natural language processing and computer vision into traditional software technology courses, the professional curriculum system is reconstructed to realize the unity of cutting-edge technology and job adaptability. The research group has developed a new type of "loose leaf textbook" for software technology majors, which supports dynamic updates of teaching content and industry technical standards, ensuring that textbook cases are synchronized with real enterprise projects.

(2) Deepen the integration of production and education, and explore the teaching mode of "teaching, scientific research and production". The research group establishes an artificial intelligence studio for school enterprise cooperation, innovates the "dual teacher+AI" collaborative education model, collaborates with enterprises to develop a real project case library, and achieves seamless integration of production and education scenarios through virtual simulation and digital twin technology. The research group has established a "technology patent conversion channel" to encourage teachers and students to participate in enterprise technology research and development, forming an integrated teaching mode of "teaching, research, and production", such as deploying AI algorithm models developed by students directly to enterprise production lines.

(3) The research group will innovate teaching models, construct multimodal intelligent teaching scenarios, implement the "project driven+capability graph" teaching method, and break down enterprise projects into quantifiable capability units. By using blockchain to record skill growth trajectories and dynamically recommending learning paths based on learning behavior data such as code submission frequency and debugging time, personalized learning for students can be achieved.

The ultimate goal is to design a specific, replicable and popularized transformation and upgrading scheme for software technology specialty based on the current technology development trend and the actual situation in Shandong Province, so as to promote the overall level of vocational education.

ISSN 2522-6398 Vol. 8, Issue 4: 99-104, DOI: 10.25236/FER.2025.080415

## 5. Research contents of this project

In the teaching of software technology, teachers can get better teaching ideas and lesson preparation materials, integrate resources and obtain cases faster through the semantic understanding ability of Generative AI technology. Through the construction ability of knowledge map, teachers can integrate massive programming courses, technical documents, case analysis and other resources to form the latest and complete knowledge system, which significantly improves the teaching effect.

Students majoring in software technology can better understand programming knowledge through the intelligent question-and-answer function of Generative AI technology, just like having a senior program engineer around to coach them when they encounter problems that they can't. Through the knowledge map built by teachers, with the help of learning platform and Generative AI technology, students can obtain necessary information quickly and personalized, and improve learning efficiency.

Knowledge map is the basis of intelligent transformation of teaching resources, and this knowledge presentation will complement AI, which will eventually accelerate the intelligent transformation of education, improve educational efficiency, promote personalized learning, and make it possible to teach students in accordance with their aptitude on a large scale. [3]

The intelligent technology is used to track the teaching process, and multi-agent supported learning analysis is implemented from the aspects of learning engagement, cognitive construction and innovative practice ability, so as to diagnose the teaching effect. By designing an open comprehensive learning system, a platform composed of learning tasks across occupations and multiple learning places is built. [4]

The application of Generative AI technology can also solve the problems of educational equity and unbalanced resource allocation to a certain extent, and provide equal learning opportunities for students from different backgrounds and regions.

In order to make a feasible teaching reform plan, the research group investigated the curriculum design and teaching content of software technology specialty in several famous vocational colleges in Shandong Province. The main content of the survey is to see whether the curriculum design is reasonably planned and whether it covers the core skills and knowledge needed by the industry; Whether the curriculum design keeps pace with the times and meets the needs of industry development; Whether the course content pays attention to the combination of theory and practice.

Various vocational colleges have carried out various researches on the application of new technologies such as AI, VR and big data in the education system, such as AI question answering assistant, AI virtual simulation training center and AI intelligent workshop. At this stage, the exploration of AI in higher vocational colleges still stays in the application of certain functions or scenarios, and the construction of intelligent training system from the perspective of intelligent education system is still in the exploratory stage. [5]

Many teachers are worried about the development of artificial intelligence technology and confused about the future education model. However, we need to realize that artificial intelligence has penetrated into all aspects of our life and work like water, and confusion can't change reality. Teachers should settle down and embrace such technology with a learning attitude.

On the basis of a comprehensive survey, we can find out the problems and shortcomings in the teaching of software technology specialty in higher vocational colleges at the present stage. In order to solve these problems, the teaching reform should aim at improving students' professional quality and innovation ability, explore modular and project-driven teaching modes, and optimize the talent training scheme in combination with vocational qualification examination.

## 6. Application Path and Innovation Strategy of the Project

The application of Generative AI technology combined with the Internet of Things and intelligent big data analysis to build a smart education system is of great significance to the educational reform and innovation in higher vocational colleges [5].

Based on Generative AI technology, a smart learning platform supporting smart training, smart examination, curriculum resource management, smart supervision and smart data analysis will be built to meet the needs of future educational technology. The school Arrange teachers to participate in special training related to artificial intelligence technology, and improve teachers' wisdom training

ISSN 2522-6398 Vol. 8, Issue 4: 99-104, DOI: 10.25236/FER.2025.080415

platform and wisdom teaching level. Through regular seminars, exchange activities and other forms, teachers are encouraged to share wisdom teaching experience and promote the informationization level and professionalism of the whole teacher team.

Each student's learning progress and learning methods are different. In order to realize students' personalized learning and development, teachers need to know each student's learning situation in time and make appropriate teaching plans. This puts great demands on teachers' ability and energy. Under normal circumstances, teachers can only teach according to the learning progress of most students.

The use of smart learning platform can recommend suitable learning resources for students according to their interest preferences and mastery of knowledge points [6]. For example, if students have been unable to understand a certain knowledge point, then the intelligent learning platform will analyze the reasons for the problems of students according to their previous knowledge points. If it is because the pre-knowledge is not mastered, the learning resources of the pre-knowledge will be pushed; If the knowledge is difficult to understand, the platform can also provide a variety of teaching tools and resources to meet the different learning needs of learners.

Generative AI does not directly provide answers to questions, but guides students to find answers by generating enlightening questions and dialogues, helping students to complete most of the problem-solving work by themselves, thus guiding students to think about the nature and laws of knowledge points. This teaching method can stimulate students' thinking ability and creativity, enhance students' thinking depth and breadth, and help students form the ability of independent thinking. [6]

The traditional teaching method allows learners to master knowledge through lectures, discussions, reading and experiments, and it is difficult to meet the needs of modern education by assigning homework, writing papers, testing and other tools. The possibility of introducing new teaching methods, such as project-based learning (PBL), flipping classrooms and online collaboration, is studied. The new teaching methods not only make learning more interesting.

With the intelligent interactive function of Generative AI, it is easier to flip the classroom teaching mode in teaching. Before class, students can use the AI teaching assistant function in the learning platform to answer questions if they have any questions when learning the basic knowledge. In the classroom, teachers give targeted explanations and discussions according to the students' preview statistics of the learning platform and the suggestions provided by AI. After class, when students consolidate their knowledge, they can ask AI teaching assistants to put forward personalized test questions for testing. This AI-assisted flip classroom teaching mode greatly improves students' autonomous learning ability and classroom interaction.

Generative AI can objectively comment on students' programming assignments, evaluate the correctness of typical algorithm programs as a whole, provide fine-grained feedback and evaluation on code standardization, complexity and other dimensions, guide students to explore problems in assignments and provide ideas for improvement. Different test papers for each student can be automatically generated according to different test paper requirements.

Generative AI can help teachers automatically correct the programming problem assignments submitted by students, integrate grammatical, logical, stable and normative performances, and finally generate comprehensive comments and ratings.

Generative AI's powerful information integration ability accelerates the process of information acquisition and knowledge transfer, and the traditional evaluation is difficult to meet the actual needs. In future evaluation, we should pay more attention to the cultivation and development of students' innovative consciousness and ability, and build a comprehensive evaluation system that emphasizes interpersonal cooperation and human-computer collaboration.

The research group call the local large language model deployed by ollama tool in the campus LAN, and build a new electronic homework management system that supports the intelligent marking of electronic homework, aiming at improving the efficiency of electronic homework marking and personalized feedback of evaluation. The new electronic homework management system read the job file and convert it into text format, then filter sensitive characters or irrelevant content, and finally add the text to the prompt prompt and send it to the three large models for review. If there is a big difference between the scores of large models, the assignment will be marked as abnormal and checked manually by the instructor. If the scores among the large models are not large, the result of marking the large model with the middle score is selected as the final result.

ISSN 2522-6398 Vol. 8, Issue 4: 99-104, DOI: 10.25236/FER.2025.080415

## 7. Summary

The application of Generative AI in software technology teaching has broad prospects, but there are also many problems to be solved, including but not limited to ethics, prejudice, academic integrity and so on. In particular, we should strengthen the academic moral education for students, balance efficiency and academic integrity, and prevent students from relying too much on tools to help them deeply understand the true meaning and value of academic research, so as to establish a correct academic concept.

## References

*[1] Chen Fengxian. Research progress on the measurement method of artificial intelligence development level [J]. Economic trends, 2022 (02): 142-158.*
*[2] Sun Hongyan, Wang Shaohua. Research on Artificial Intelligence and Its Application in Digital Transformation of Power Grid [J]. China Management Informatization, 2021(12):108-109.*
*[3] Zhang Zhi.ChatGPT/'s generative artificial intelligence reshapes the underlying logic and possible path of education [J]. Journal of East China Normal University (Education Science Edition), 2023(07):131-142.*
*[4] Xu Guoqing,Cai Jinfang,Jiang Beijia, et al.ChatGPT/ Generative Artificial Intelligence and Future Vocational Education [J]. Journal of East China Normal University (Education Science Edition), 2023(07):65-77*
*[5] Zhuang Qun. Analysis on the construction and practice path of intelligent education system in higher vocational colleges based on AI [J]. Internet of Things Technology, 2024. (12): 15-17.*
*[6] Chen Jingyuan, Hu Liya, Wu Fei. ChatGPT/ Research on Generative Artificial Intelligence Promoting the Change of Teaching Mode with Knowledge as the Core [J]. Journal of East China Normal University (Education Science Edition), 2023,41(7):177-186.*
*[7] Huang Xumei. Research on the influence of artificial intelligence technology on the skill structure of China's labor force [D]. Changchun: Northeast Normal University, 2020.*
*[8] Peng Feixia. Transformation and upgrading of vocational education personnel training mode in the era of "internet plus" [J]. Education and Occupation, 2018 (05): 42-48.*
*[9] Jiang Hongping, Hu Yongfeng, Wang Qingbao, et al. Training mode reform of accounting professionals in higher vocational colleges under the background of artificial intelligence [J]. Employment and security, 2021 (15): 156-157.*
*[10] Dong Qi. Research on strategies to improve the teaching innovation ability of higher vocational teachers in the era of artificial intelligence [D]. Guangxi: Guangxi Normal University, 2024.*
*[11] Yang Zhen. Research on the role change and ability improvement of higher vocational teachers in the era of artificial intelligence [J]. Digital Communication World, 2024(11):220-222.*
*[12] Lili Ban. Research on the professional development strategy of higher vocational teachers in the era of artificial intelligence [J]. Journal of Hebei Radio and TV University, 2021,26(5):76-78.*