Impact of the Application of Artificial Intelligence Technology on the Teaching Models in Vocational Undergraduate Education and Adaptive Reform Strategies

Xiao Han

Hainan Vocational University of Science and Technology, Haikou, Hainan Province 571126

Abstract: *With the deep infiltration of artificial intelligence technology in education sector, as a key carrier for developing high-level technical talents, vocational undergraduate education is facing unprecedented challenges and opportunities in its conventional teaching models. This paper takes the core elements of teaching models in vocational undergraduate education as the point of penetration, systematically analyzes the deep impact of artificial intelligence technology on the reconstruction of learning objectives, the updating of instructional content, the innovation in teaching methods, and the optimization of teaching assessment, and points out that there are some problems, such as insufficient integration of technology and teaching, mismatch of teaching competency, and weak personalized teaching in current vocational undergraduate education in the process of using artificial intelligence technology. Based on this, this paper proposes adaptive reform strategies from four dimensions: establishing a teaching system integrating "AI + practice", building compound teaching faculty, refining a personalized teaching framework, and perfecting an AI-enabled teaching assessment system, and aims to provide a feasible pathway for vocational undergraduate education to enhance their quality of talent development by leveraging artificial intelligence technology.*

Keywords: *Artificial Intelligence (AI) Technology; Vocational Undergraduate Education; Teaching Models; Adaptive Reform; Technical Talents*

DOI:10.12417/3029-2328.25.10.005

1.Introduction

Against the backdrop of the rapid development of the digital economy, the demand is becoming increasingly urgent for high-level technical talents in society, and vocational undergraduate education is becoming more and more important. Vocational undergraduate education takes "developing technical talents with solid theoretical foundation and strong practical ability" as its core objective. Its teaching models need to closely follow the development trends of industries and be constantly optimized and innovated. AI technology provides technical support for the upgrading of teaching models in vocational undergraduate education by virtue of its advantages such as data processing, intelligent analysis, and personalized information push [1]. However, there are still some problems, such as "emphasizing technology import over its deep integration" and "emphasizing form innovation over real effect", in current vocational undergraduate education in the process of using AI technology, resulting in that AI technology do not play it role in promoting the improvement of teaching quality.

2.The Deep Impact of the Application of AI Technology on the Teaching Models in Vocational Undergraduate Education

2.1 *Shifting from "Monolithic Skills Development" to "Integrated Competency Cultivation"*

The learning objectives of conventional vocational undergraduate education focus on the development of skills for specific roles. Students frequently demonstrate "job suitability" yet exhibit deficiencies in "career progression resilience" and "cross-domain adaptability". The application of AI technology has brought about significant changes in job demand. On the one hand, some repetitive and mechanical roles are gradually being replaced by AI, such as basic operation roles in manufacturing and routine consultancy roles in the service sector. On the other hand, emerging roles, such as AI trainer, industrial Internet operation and maintenance engineers, and intelligent equipment debugging engineers, are constantly emerging. These roles require students not only to master professional skills but

also to possess data thinking, AI application ability, and inter-disciplinary collaboration skills. Against this backdrop, the learning objectives of vocational undergraduate education need to be reconstructed with "technical skills as the foundation, AI literacy as the core, and innovation ability as the orientation" to cultivate compound talents who can adapt to industrial transformation and apply AI technology to solve practical problems [2].

2.2 *Updating from "Static Textbook-Driven Instructional Content" to "Dynamic Industry Demand-Oriented One"*

The instructional content is centered on textbooks in conventional vocational undergraduate education, have a long update cycle and are difficult to keep up with the rapid iteration of industry technology, resulting in a "time lag" between the instructional content and the actual job demand. The application of AI technology makes it possible to adaptively update instructional content. On the one hand, by analyzing the job demand data through big data technology, vocational undergraduate education can accurately identify the core skills and knowledge required for roles now and within the next 1-3 years, and adjust instructional content in a timely manner [3]. On the other hand, vocational undergraduate education can leverage AI technology to build "virtual simulation teaching resource libraries", transform complex scenarios, high-risk operation, and advanced equipment in industries into virtual instructional content to making up for the shortcomings of conventional teaching, for example, "insufficient practical training resources" and "high -risk practical operation".

2.3 *Innovating from "Spoon-Feeding Pedagogy" to "AI-Enabled Interactive Teaching"*

Conventional teaching mainly relies on "teacher-led lecture + student practice" in vocational undergraduate education. The monolithic teaching methods lead to passive learning and low student engagement. In practice teaching, teachers also find it difficult to pay attention to each student, resulting in uneven teaching effect. AI technology is driving conventional teaching methods to shift towards "interactive, personalized and intelligent teaching methods". For instance, under the "AI+ flipped classroom" model, teachers use the AI platforms to push preview resources in advance, and focus on discussions and practice in class. The "AI virtual mentors" can answer questions 24 hours a day relying on natural language processing technology. "AI+ Project-based learning" builds real scenarios. AI monitors project progress in real time and analyzes students' performance, and facilitates teaching adjustment and ability development.

2.4 *Optimizing from "Monolithic Outcome-Oriented Teaching Assessment" to "Multi-Dimensional Process-Oriented One"*

The conventional teaching assessment mainly relies on "final exams + practical training reports" in vocational undergraduate education, has monolithic methods, focuses only on students' learning outcomes and neglects the improvement and progress of their ability during the learning process. Moreover, the assessment results are lagging behind, making it difficult to promptly feedback teaching issues. The application of AI technology has made teaching assessment "diversified, process-oriented and real-time". On the one hand, vocational undergraduate education can collect students' learning process data, such as the number of classroom interaction, the quality of homework completion, practical training operation steps, and online test scores by using AI technology, construct a "student learning profile" to comprehensively assess students from multiple dimensions including knowledge mastery, skills application, and innovation ability [4]. For instance, in the practical training courses of mechatronics, AI systems can record students' equipment operation steps, debugging time, troubleshooting methods and other data through sensors, and automatically generate practical training assessment reports in combination with preset assessment criteria. On the other hand, AI technology can conduct real-time assessment on teaching process, analyze data, such as teachers' instructional content, teaching methods, and classroom interaction, identify their weak links in teaching, and provide suggestions for improvement to teachers.

3.Problems in the Teaching Models of Vocational Undergraduate Education in the Process of Using AI Technology

3.1 *The Integration Is Not Deep Enough Between Technology and Teaching, and the Problem of "Emphasizing form over Real Effect" Is Prominent*

When some vocational colleges and universities import AI technology, they lack deep analysis of teaching demand and blindly pursue "technical gimmicks", resulting in the integration of technology and teaching remaining superficial. In some colleges and universities, the AI teaching platforms are disconnected from the existing teaching systems. In the platforms, the teaching resources are the repetition of the textbook content, and students are unwilling to use them. The platforms have become mere decorations and have failed to truly leverage the role of AI technology in enhancing teaching quality. Furthermore, due to lack of precision alignment with industry demand, AI teaching resources lack of specificity, making it difficult to meet the teaching demand of different majors and roles, which greatly reduces the application effect of AI technology.

3.2 *The AI Literacy of Teaching Faculty Is Insufficient, Making It Difficult for Them to Adapt to the Technology-Enabled Teaching Model*

Teachers are the core executors of teaching model reform, and their AI literacy directly affects the application effect of AI technology in teaching. There are currently two major problems with the teaching faculty invocational colleges and universities. The first problem is "weak technical application ability". Most teachers have solid professional knowledge and teaching experience yet lack the ability to use AI technology. For example, some of them do not know how to use AI virtual simulation software, some of them are not familiar with the operation of AI teaching platforms, and some of them are unable to use big data to analyze students' learning conditions. As a result, it is difficult for them to carry out AI-enabled teaching activities. The second problem is the "insufficient design ability to integrating AI with teaching". Even if some teachers have mastered the basic operation of AI technology, they still find it difficult to effectively combine AI technology with professional instructional content and methods, and are unable to design AI teaching schemes that meet student needs.

3.3 *It Is Inadequate to Implement Personalized Teaching, Making It Difficult to Meet the Diverse Needs of Students*

There are significant differences among vocational undergraduate students in terms of their learning foundation, learning ability and career planning. The conventional "one-size-fits-all" teaching models is difficult to meet the personalized needs of students. Although AI technology provides technical support for personalized teaching, there are still deficiencies in the implementation of personalized teaching. On the one hand, the "personalized information push" function is not precise enough on AI teaching platforms. Most platforms only push learning content based on students' test scores, and ignore students' learning interests, learning habits and career goals, resulting in that the content they push are inconsistent with the actual needs of students. On the other hand, due to lack of monitoring and guidance on students' personalized learning processes, although AI platforms can collect students' learning data, they fail to conduct deep analysis of the data, and are unable to provide targeted learning suggestions for students or offer valid basis for teachers to adjust teaching strategies. As a result, personalized teaching becomes a mere formality.

3.4 *The Teaching Assessment Systems Are Not Perfect, and the AI-Enabled Assessment Function Has Not Been Fully Exerted*

Although the current teaching assessment systems have imported AI technology in vocational colleges and universities, there are still many imperfections. Firstly, the assessment indicators are monolithic. Most colleges and universities still take "knowledge mastery" as the core assessment indicator, ignore key dimensions, such as students' practical ability, innovation ability, and AI application ability, which is inconsistent with the talent development objectives of vocational undergraduate education. Secondly, the utilization rate of assessment data is low. Even though AI systems have collected a large amount of students' learning data, colleges and universities lack

professionals in data analysis and are unable to conduct deep data mining, making it difficult to extract valuable information for teaching improvement. Thirdly, the feedback mechanism is not sound for the assessment results. The assessment results are only used for students' academic performance assessment and are not promptly fed back to teachers and students. Teachers cannot adjust their teaching methods based on the assessment results, and students cannot understand their own weaknesses in learning, affecting the improvement of teaching quality.

4.Adaptive Reform Strategies for the Teaching Models in Vocational Undergraduate Education under the Background of AI Technology

4.1 *Establishing a Teaching System Integrating "AI+ Practice" to Enhance the Pertinence and Efficacy of Teaching*

Guided by industry demand, vocational colleges and universities can establish a teaching system that deeply integrates AI technology with professional teaching and organically connects theory teaching with practice teaching. Firstly, they can establish a dynamic matching mechanism of "industry demand-instructional content", and collaborate with enterprises to analyze job demand data using big data technology, and regularly update the instructional content to ensure that instructional content is in sync with industry technology. Secondly, they can build a teaching platform featuring "AI+ virtual training", develop virtual training projects based on the characteristics of majors, and achieve virtual-real combined practice teaching. Thirdly, they can design an "AI+ project-based" course module, and take real projects as the carrier to guide students to apply AI technology to solve practical problems in the projects. For instance, they can design "AI Precision Marketing Projects" for students majoring in marketing. Students analyze consumer data through AI tools, and make precision marketing programs to enhance their practical ability for projects.

4.2 *Building "Professional +AI" Compound Teaching Faculty to Enhance Teachers' Ability to Apply and Integrate Technology*

Vocational colleges and universities can establish a mechanism for building teaching faculty of "cultivation + import + cooperation" to enhance teachers' AI literacy. Firstly, they can carry out systematic training for teaching faculty to offer hierarchical and staged AI technology training to teachers. For teachers with "weak technical application ability", they can conduct basic training, such as operating AI teaching platforms and using virtual simulation software. For teachers with insufficient ability in integrated design, they can offer advanced training, such as case-based teaching and instructional design workshops, on the integration of AI and professional teaching to ensure that the training content is targeted and practical. Secondly, they can import "dual-qualified +AI" talents, and employ engineers and technical experts with rich experience in AI technology application from enterprises to serve as part-time teachers to inject practice experience in industries into teaching. At the same time, they can introduce AI educational experts from colleges and universities to guide teachers in carrying out AI-enabled teaching reform. Thirdly, they can establish a "school-enterprise mentor collaboration" mechanism, and organize teachers to participate in the development and practice of AI-related projects in cooperative enterprises, such as participating in the debugging of AI systems and data annotation in enterprises, to enhance teachers' practical ability for AI technology.

4.3 *Refining an AI-Enabled Personalized Teaching Framework to Meet the Differentiated Needs of Students*

Centered on students, vocational colleges and universities can use AI technology to build a personalized teaching framework featuring "precision information push, real-time guidance, and dynamic adjustment". Firstly, they can optimize the "personalized information push" function on AI teaching platforms, integrate students' learning foundation, learning interests, career goals and other data to construct a multi-dimensional student learning profile to achieve learning content push of "thousand students, thousand personalized strategies". Secondly, they can establish a dual-mentor system of "AI virtual mentors + teachers". AI virtual mentors can provide 24-hour services such as answering students' questions and make learning plans for them, while teachers offer deep guidance on

students' personalized issues. For instance, when students complete AI project training, teachers provide comments and guidance on the rationality of the projects and the innovation in technology application. Thirdly, they can dynamically adjust the teaching progress and methods. AI systems analyze students' learning data in real time. If they find that a student's learning progress is slow in a certain knowledge point, they promptly remind his or her teachers to adjust the teaching progress or provide additional learning resources for the student.

4.4 *Perfecting a "Multi-Dimensional and Three-Dimensional" Teaching Assessment System to Perform the AI-Enabled Assessment Function Adequately*

Guided by talent development objectives, vocational colleges and universities can construct a multi-dimensional and three-dimensional teaching assessment system that combines process-based assessment with outcome-based assessment, quantitative assessment with qualitative assessment, and teacher assessment with AI assessment. Firstly, they can perfect the assessment indicator system, incorporate "AI application ability", "practical and innovation ability", "inter-disciplinary collaboration ability", etc. into the assessment indicators, and make specific assessment criterion in combination with the characteristics of majors. Secondly, they can enhance the utilization rate of assessment data, form professional data analysis teams to conduct deep mining of the learning data collected by the AI systems, extract information, such as students' weaknesses in learning and weak links in teaching, and provide data support for teaching improvement. Thirdly, they can perfect the feedback mechanism for assessment results, establish three-party feedback channels of "teachers-students-managers", and promptly provide feedback on the assessment results to relevant personnel.

5.Conclusion

The application of AI technology has brought unprecedented opportunities for the reform on teaching models in vocational undergraduate education. It not only promotes the reconstruction of learning objectives, instructional content, teaching methods and teaching assessment, but also provides technical support for developing compound technical talents. However, in the process of applying AI technology, vocational colleges and universities still need to address the issues, such as insufficient integration of technology and teaching, inadequate AI literacy of teachers, weak personalized teaching, and incomplete teaching assessment. By implementing strategies, such as establishing a teaching system integrating "AI+ practice", building compound teaching faculty, refining a personalized teaching framework, and perfecting a diversified teaching assessment system, vocational colleges and universities can effectively promote the adaptive reform on their teaching models, enhance their quality of talent development, and provide more high-quality technical talents for the digital economy era.

References:

[1] *Lin Zhong.(2025)Thought and Practice on Generative Artificial Intelligence Technology Empowering Classroom Teaching in Vocational Colleges and Universities[J].Teacher,14,134-136.*

[2] *Jiangmin Yu,Lin Qiu,Sudong Lu and Mei Li.(2025)Construction of the "Four Integrations" Teaching Model Integrating Artificial Intelligence Technology into Agricultural Planting Courses in Vocational Colleges and Universities[J].Survey of Education,14(10),1-6.*

[3] *Xinggang Li and Qiongqiong Sun.(2025)Application of Artificial Intelligence Technology in the Innovation of Teaching Models in Vocational Education in Henan Province[J].Information and Computer,37(02),200-202.*

[4] *Zichen Li,Jiangyue Liu and Dan Wang.(2024)Teaching Practice of Artificial Intelligence Technology in Vocational Education[J].Electronic Technology,53(11),74-77.*