Education Reform and Development, 2026, Volume 8, Issue 10
https://bbwpublisher.com/journal/erd
Online ISSN: 2652-5372
Print ISSN: 2652-5364

Practical Problems and Optimization Paths of Integrating AIGC Tools into IT Practical Training Teaching in Higher Vocational Colleges

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Abstract: With the advent of the artificial-intelligence era, generative artificial intelligence (AIGC) technologies have been popularized and applied in social life and work fields, bringing opportunities for the reform of practical-teaching systems in higher vocational colleges. Meanwhile, IT technologies are developing and updating at an accelerating pace, and enterprises in the IT industry have raised requirements for talents' hands-on practical abilities. Against such a background, how to leverage the strengths of AIGC tools in content generation, human-computer dialogue and personalized feedback to optimize the practical-training teaching system for IT-related majors in higher vocational colleges has become an important issue for teachers to improve practical-training teaching quality. Based on the background of the artificial-intelligence era, this paper elaborates on the application advantages of AIGC tools in higher-vocational practical-training teaching, analyzes problems encountered when integrating AIGC tools into IT practical-training teaching in higher vocational colleges, and explores optimization paths from five aspects: in-depth integrated application of AIGC tools, reconstruction of practical-training teaching systems, empowerment of teaching-staff development, optimization of teaching-evaluation systems, and improvement of implementation guarantee mechanisms. It provides references for reconstructing practical-training teaching paradigms for IT-related majors in higher vocational colleges and cultivating high-quality technical-and-skilled IT talents.

Keywords: AIGC tools; IT-related majors; Practical training teaching; Problems; Paths

Online publication: November 25, 2026

1. Introduction

Opinions of the State Council on Further Implementing the "AI+" Initiative clearly point out: "Integrate artificial intelligence into all elements and the whole process of education and teaching, innovate new human-computer collaborative education-and-teaching modes such as intelligent learning companions and intelligent teachers, and promote the shift of talent cultivation from knowledge-imparting orientation to competence-enhancement orientation." Against this backdrop, artificial-intelligence technologies are

developing rapidly, and numerous generative-AI tools have emerged at home and abroad, such as ChatGPT, Kimi, DeepSeek, Wenxin Yiyan and Tongyi Qianwen. The advent of these AIGC tools brings opportunities for the digital reform of higher-vocational education [1]. In higher-vocational education, practical-training courses for IT-related majors feature strong comprehensiveness and great operational difficulty. Some higher-vocational students have weak basic knowledge and insufficient knowledge comprehension. When confronted with complex practical-training projects, they tend to develop fear-of-difficulty sentiment and may even lose enthusiasm for hands-on operation due to occasional mistakes, resulting in unsatisfactory practical-training learning outcomes [2]. AIGC tools can generally generate text, pictures, audio, videos, code, and other content. They not only have the functions of conversing with humans and remembering dialogue contexts, but can also analyze students' learning data via algorithms, diagnose students' learning objectives and competence levels, provide personalized learning resources for them, help students build bridges between theory and practice, and enhance their knowledge-comprehension and practical-application capabilities [3]. Therefore, integrating AIGC tools into the IT practical-training teaching system of higher vocational colleges is of great significance for enriching practical-training teaching resources of IT-related majors, lowering students' practical-operation difficulties and improving IT practical-training teaching effects.

2. Practical problems of integrating AIGC tools into IT practical-training teaching in higher vocational colleges

Literature research and field investigations show that AIGC has been applied to a certain extent in higher-vocational practical-training teaching, yet its application in practical-training teaching for IT-related majors still faces several problems.

2.1. Superficial technology application and prominent formalistic integration

Some higher-vocational teachers apply AI technologies at a shallow level and fail to deeply integrate AIGC tools into the whole process of IT practical-training teaching [4-5]. In practical-training courses for IT-related majors, some teachers only adopt AIGC for teaching-design links. They utilize the automatic-generation and revision functions of AIGC tools to optimize practical-training teaching contents and methods, or design relevant exercises with such tools, but do not truly embed AIGC tools into classroom-teaching procedures. Consequently, the auxiliary role of AIGC tools in students' practical training cannot be exerted.

2.2. Insufficient adaptation of teaching systems and disconnection between practical-training contents and industries

The practical-training teaching systems for IT-related majors in some higher vocational colleges are relatively fixed, lacking practical-training projects and resources that keep pace with cutting-edge developments of IT-industry enterprises [6]. In terms of practical-training-teaching contents for IT-related majors, some teachers still mainly adopt practical-training projects from textbooks, fail to pay close attention to new industrial trends, and find it difficult to convert cutting-edge projects into practical-training resources. In designing IT practical-training projects, some teachers still focus on training students' basic computer-operation and software-operation capabilities, but fail to empower relevant practical-training-teaching contents with AIGC functions. They cannot cultivate students' competence in applying AI tools, so students' practical capabilities cannot meet industrial demands.

2.3. Insufficient digital literacy of teaching staff and lagging teaching-empowerment competence

Some IT-major teachers in higher vocational colleges have inadequate digital literacy, attach little importance to AIGC tools, and cannot proficiently master methods for applying such tools in teaching [7]. In IT-related majors of higher vocational colleges, many teachers possess professional theoretical knowledge and practical-operation skills, but fail to keep up with the development trend of educational digital transformation, and have gaps in their understanding, cognition and application of AIGC tools [8-9]. In particular, middle-aged and elderly teachers hold relatively conservative teaching concepts, tend to adopt traditional teaching modes, lack enthusiasm for learning about AIGC tools, which restricts the development of their own digital literacy and teaching capabilities, and prevents them from integrating AIGC into practical-training-teaching links.

2.4. Imperfect practical-training evaluation system and ambiguous talent-cultivation orientation

The practical-training-teaching evaluation for IT-related majors in some higher vocational colleges still mainly relies on final practical-training reports, and AI evaluation tools for assessing students' learning processes have not been introduced [10-11]. For IT practical-training evaluation, some teachers still adopt summative-evaluation approaches, which mainly assess students' project deliverables and practical-training reports, while paying insufficient attention to students' performance during practical-training processes. Meanwhile, evaluation criteria set by some teachers are imperfect. Scores are merely given according to students' completion of practical-training projects, without assessment criteria for teamwork, innovation capacity and AI-tool application, which hinders the development of students' comprehensive qualities and AI-application capabilities.

2.5. Prominent technical-ethics and security risks and absence of guarantee mechanisms

Some higher-vocational colleges have not established guarantee mechanisms for AI-assisted teaching in IT-major practical-training teaching. IT practical-training projects involve massive volumes of data, code, and personal information, facing risks of information leakage and academic-integrity violations [12]. In practical-training teaching for IT-related majors, some students are overly dependent on AIGC tools. They directly adopt solutions for project problems generated by such tools without independent thinking, and even copy practical-training reports produced by AIGC tools. Teachers cannot effectively restrict such behaviors, which squeezes students' space for independent thinking and impedes the development of their hands-on practical capabilities.

3. Optimization paths of integrating AIGC tools into IT practical-training teaching in higher vocational colleges

3.1. Deeply integrate intelligent tools and build human-machine collaboration mechanisms

The in-depth integration of AIGC tools into practical-training teaching for IT-related majors in higher vocational colleges requires the construction of human-machine-collaboration mechanisms. Teachers shall thoroughly analyze the adaptability between AIGC tools and practical-training-teaching demands for IT-related majors, and build an AIGC-empowered practical-training-teaching system [13]. In terms of application scenarios, teachers can flexibly design application schemes for AIGC tools according to key and difficult points of practical-training projects such as software engineering, information security,

Internet-of-Things communication and comprehensive wiring. In practical-training links including project design, code writing and fault troubleshooting, teachers can apply AIGC tools to convert real-world enterprise projects into practical-training resources. Students can also use such tools to analyze causes of code errors, so as to troubleshoot program-operation faults more efficiently and improve learning outcomes. In terms of application workflows, teachers can build intelligent-teaching systems oriented toward IT practical-training projects based on the functional advantages of various AIGC tools. AIGC tools shall be applied in links including practical-training lesson-preparation, scenario construction, hands-on-operation guidance, Q&A and achievement evaluation, forming an intelligent-teaching workflow featuring human-machine collaboration.

3.2. Meet IT-industry demands and reconstruct practical-training teaching systems

Integrating AIGC tools into practical-training teaching for IT-related majors in higher vocational colleges requires deepening school-enterprise cooperation. Teachers shall collect real-time news, trends and achievements of IT-industry enterprises, and optimize practical-training-teaching contents in light of new demands and new technologies of the IT industry [14]. For practical-training-project development, teachers can leverage AIGC tools, combine cutting-edge information and resources of the IT industry, embed cutting-edge technologies, specifications and projects into practical-training-teaching contents, and develop practical-training projects that fit front-line post requirements. Specifically, teachers can use AIGC tools to design practical-training projects simulating real-world enterprise engineering, create virtual-simulation operation scenarios, and expose students to real tasks and real-world scenarios. For innovation of practical-training-teaching modes, teachers shall embed commonly-used AIGC tools, their types and application methods into practical-training courses. Establish AIGC-empowered modes including project-oriented teaching, immersive practical training and personalized layered teaching, push personalized practical-training resources for students with different foundations and competence levels, and promote improvement of practical capabilities and innovative thinking among all students.

3.3. Attach importance to empowerment of teaching-staff development and build specialized AI-teaching teams

Integrating AIGC tools into practical-training teaching for IT-related majors in higher vocational colleges calls for enhanced construction of teaching teams. Higher vocational colleges shall organize special training activities on digital literacy and artificial-intelligence literacy to improve teachers' understanding and application capabilities of AIGC tools. On the one hand, schools shall establish regular training systems, invite experts from education and science-and-technology sectors to hold training sessions on themes including AIGC-tool application, intelligent teaching design, teaching-risk prevention-and-control and AI-ethics prevention, so as to strengthen teachers' awareness and capabilities of AI application. On the other hand, teachers shall proactively update teaching concepts, apply AIGC to teaching design, teaching implementation and evaluation links, and gradually transform themselves from knowledge imparters into practical-training guides, scenario designers and risk controllers. They shall continuously optimize practical-training workflows with AIGC tools and improve their capabilities for intelligent-teaching design and practice. In addition, schools shall encourage teachers from different majors and disciplines to set up practical-training-teaching-r eform teams, conduct special research focusing on difficulties of integrating AIGC into IT practical-training teaching, jointly build and share high-quality resources, excellent teaching cases and reform achievements, and form a virtuous dual-promotion cycle of "AIGC boosting teaching-and-research, and teaching-and-research

lifting practical-training quality".

3.4. Optimize teaching-evaluation systems and build a whole-process multi-dimensional evaluation mechanism

Integrating AIGC tools into practical-training teaching for IT-related majors in higher vocational colleges requires reconstructing teaching-evaluation systems. Teachers shall leverage the data-collection, processing-and-analysis functions of AIGC tools to establish evaluation systems covering the whole practical-training process [15]. In terms of evaluation indicators, besides evaluation of traditional practical-training deliverables, teachers can add evaluation indicators including standardized application of AI tools, independent hands-on-operation capabilities, problem-solving capabilities, project-innovation capabilities, digital literacy and professional norms, so as to objectively assess students' operational proficiency and comprehensive qualities. In terms of evaluation workflows, teachers can use AIGC tools to collect data such as students' practical-training-operation tracks, Q&A records, project-iteration processes, error frequencies and rectification status, build student-competence profiles, accurately monitor their competence-improvement progress, and timely identify students' knowledge and competence weaknesses. In terms of utilization of evaluation results, teachers can generate practical-training evaluation outcomes and feedback data for students via AIGC tools, adjust practical-training contents, teaching approaches and guidance strategies in a targeted manner, and realize a closed-loop talent-cultivation mode of "AI-assisted evaluation — feedback data — practical-training-scheme optimization — AI-assisted evaluation".

3.5. Improve implementation guarantee mechanisms and guard against risks in AI-empowered practical-training teaching

Integrating AIGC tools into practical-training teaching for IT-related majors in higher vocational colleges requires supporting implementation guarantee mechanisms. Higher vocational colleges shall build guarantee mechanisms for AIGC-empowered IT practical-training teaching from the perspectives of hardware facilities, application specifications and ethics. For hardware facilities, schools shall increase investment in practical-training rooms in accordance with hardware-equipment requirements of AIGC tools, timely update computer devices and systems, and ensure normal operation of AIGC tools on campus computers. For application specifications, schools shall formulate relevant documents and adopt "AI-detection tools" to standardize AIGC application in practical-training classrooms, clarify usage boundaries of AI tools for teachers and students, prohibit acts of copying AI-generated outputs, and standardize teaching orders under human-machine collaboration. For application ethics, schools shall carry out artificial-intelligence-literac y education activities, require teachers and students to sign commitment letters on AIGC-ethical norms and academic-integrity specifications before practical-training teaching, make students realize the tool-oriented nature of AIGC, help them form the practical-training concept of "independent hands-on operation as the mainstay and AI empowerment as the supplement", and fully cultivate their innovative thinking and independent problem-solving capabilities.

4. Conclusion

To sum up, integrating AIGC tools into the IT practical-training-teaching system of higher vocational colleges can create practical-training scenarios simulating real-world workflows, help students understand

and consolidate theoretical knowledge, and strengthen their hands-on practical capabilities and abilities to solve practical problems. Therefore, higher-vocational colleges and IT-major teachers shall establish the concept of AIGC tools serving practical-training teaching. By thoroughly exploring application scenarios, reconstructing practical-training-teaching systems, strengthening teaching-team construction, optimizing practical-training-evaluation mechanisms and improving teaching-guarantee mechanisms, they shall raise the application level of AIGC tools in IT practical-training teaching. Students can exercise their capabilities to apply theoretical knowledge in open-ended tasks, real-world scenarios and human-machine-collaboration contexts, effectively improving their practical abilities and innovative thinking, and delivering more high-quality technical-and-skilled talents for the high-quality development of the IT industry.

Disclosure statement

The author declares no conflict of interest.

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