
Research on the Path of Digital Literacy Improvement for Teachers in Higher Vocational Colleges under the Background of Educational Digitalization

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Abstract: With the rapid advancement and widespread adoption of digital technologies, digitalization has been positioned as a strategic tool for educational modernization. The Ministry of Education has established specific standards and requirements for teachers' digital literacy. This study conducts a specialized questionnaire survey on teachers' digital literacy across dimensions including digital expertise, digital teaching practices, and digital security awareness, using selected higher vocational colleges in Hainan as case studies. Through in-depth analysis of the connotation, practical value, and current status of teachers' digital literacy in vocational education contexts, the research proposes targeted improvement strategies. These findings aim to provide actionable guidance for enhancing teachers' digital competencies in relevant institutions, thereby promoting professional development and teaching innovation among vocational educators within the digital education landscape.

Keywords: higher vocational colleges; educational digitization; digital literacy; pathways

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1. Introduction

In November 2022, China's Ministry of Education officially released the "Industry Standard for Teachers' Digital Literacy," providing clear guidance for enhancing educators' digital competencies in the new era. As a critical driver of connotative development in vocational colleges and a key factor in cultivating students' digital thinking and core skills, the progress of teachers' digital literacy not only impacts the quality of educational digital transformation and the cultivation of high-caliber technical professionals, but also serves as a vital indicator for measuring China's educational modernization level and supporting the national strategy to build a strong education system. In-depth research on pathways to improve information literacy among vocational college teachers can provide evidence-based foundations for developing training programs and policies, deliver effective professional development support, and enhance educators' instructional capabilities in digital education environments.

2. The Connotation of Teachers' Digital Literacy

Israeli scholar Youram Eshet-Alkalai introduced the concept of “digital literacy” in 1994, defining it as a “survival skill.” In 1997, American scholar Paul Gilster elaborated on this notion in his seminal work “Digital Literacy”, describing it as an individual’s ability to effectively access and utilize diverse information resources through internet-based media. Guzman et al. further interpret “digital” as activities related to new information and communication technologies, while “literacy” refers to the integrated set of knowledge, skills, and attitudes essential for personal and professional development across various contexts. Digital literacy encompasses technical proficiency, innovation capabilities, communication skills, and decision-making abilities within digital environments. Teacher digital literacy specifically denotes comprehensive competencies demonstrated by educators in digital education settings. Grounded in adherence to digital ethics, it includes expertise in leveraging digital technologies to optimize teaching environments, efficiently develop and utilize digital resources, conduct digital research, and manage cybersecurity. These capabilities collectively enhance classroom instruction effectiveness while emphasizing teachers’ adaptability and proactive engagement in the digital age^[1].

3. Practical Value of Enhancing Teachers' Digital Literacy in Higher Vocational Colleges

Against the backdrop of building a strong education nation, digital transformation in education has become a critical pathway to achieving China’s educational modernization. As a core element of this digital transformation, teachers’ digital literacy profoundly impacts its practical outcomes and holds significant practical implications for enhancing the quality of cultivating high-caliber technical and skilled talents in vocational education.

3.1. Enhancing Competitiveness and Career Development of Vocational College Teachers

The “Action Plan for Enhancing Vocational Education Quality (2020-2023)” explicitly requires deep integration of information technology with teaching practices. This initiative has not only transformed traditional teaching environments, resources, methodologies, and evaluation systems, but also given rise to innovative paradigms like virtual simulation training and online education through “digital technology + vocational education,” significantly expanding the temporal and spatial boundaries of instructional activities. Improving digital literacy among vocational college teachers enables them to effectively utilize digital tools in instructional design and implementation, delivering more engaging and personalized learning experiences that stimulate student motivation and enhance teaching outcomes. Possessing digital literacy serves as both a fundamental prerequisite for conducting theoretical instruction and practical guidance in vocational education, and essential skills for conducting digital scientific research. It is evident that elevating teachers’ digital literacy represents not only an imperative for vocational educators to enhance teaching capabilities, but also a driving force for their professional growth and career development^[2].

3.2. Enhancing Digital Literacy Among Vocational College Students

Enhancing teachers’ digital literacy holds significant importance not only for educators themselves but also exerts positive impacts on students’ digital literacy development. When teachers demonstrate solid digital competencies and utilize digital technologies to provide diverse learning resources and activities, students are motivated to develop interest in digital technologies, actively acquiring, evaluating, and utilizing digital information. Moreover, teachers can guide students in effectively using digital tools and platforms, cultivating problem-solving skills and promoting comprehensive quality improvement. Digital technology has become an essential tool in modern society, and possessing strong digital literacy enables students to better adapt to future societal demands. Through digital education, students gain broader learning opportunities while enhancing their information literacy, innovation capabilities, and collaborative skills, thereby achieving holistic development in overall competencies^[3].

3.3. Enhancing the Adaptability of Vocational and Technical Education

In the development of modern vocational education systems, higher vocational colleges play a pivotal role. To enhance the adaptability of vocational education, it is crucial to align with emerging trends in industries, technologies, professions, and job roles, effectively leverage digital technologies as a driving force, and ultimately promote students' holistic development and long-term growth. The digital transformation of higher vocational education hinges on the digital literacy of faculty members, whose proficiency significantly impacts the creation of digital learning environments, implementation of blended teaching methodologies, application of virtual simulations, and optimization of lifelong learning services. This not only determines the effectiveness of cultivating students' digital adaptability, critical thinking skills, and comprehensive technological application capabilities, but also facilitates the deep integration and innovative development of diverse educational approaches—including specialized training, ideological and political education, physical and mental health development, innovation and entrepreneurship programs, and humanistic literacy education^[4].

4. Current Status of Digital Literacy Among Vocational College Teachers

Based on the definition of digital literacy, 18 questions were designed across four dimensions: teachers' digital expertise, digital teaching practices, digital ethics, and digital security awareness. An online survey was conducted using the Wenjuanxing platform among frontline faculty members at four higher vocational institutions, including Hainan Vocational University of Science and Technology and Haikou University of Economics. The survey data indicates that while the current digital literacy level among vocational college teachers generally falls within the upper-middle range, there remains room for improvement.

4.1. The application capability of digital information technology among vocational college teachers needs improvement

The surveyed vocational college teachers predominantly hold master's degrees. Survey results indicate strong overall digital application capabilities, with over 90% demonstrating proficiency in using digital education software and social media tools to share information via email, WeChat, QQ, and DingTalk. Approximately 85.6% possess skills in searching for, editing, and designing online learning resources, while effectively utilizing digital social tools to maintain communication with parents and colleagues. However, around 11% of teachers remain uncertain about their ability to effectively utilize digital technologies for resource collection and express limited confidence in using digital social tools^[5].

Survey data reveals that some teachers lack comprehensive digital technology skills and struggle to adapt to emerging technologies and methods across various platforms. For instance, 12.1% of teachers reported consciously using digital tools to address teaching challenges in daily practice. However, when platform glitches like system freezes occur during lessons, they often find themselves at a loss, forcing online teaching activities to halt. A further 21.21% expressed uncertainty about their ability to effectively utilize digital tools, devices, and software to handle routine workplace issues. Notably, 8.33% of teachers explicitly admitted lacking problem-solving capabilities. These findings indicate that many educators still need to enhance their proficiency in managing digital resources within digital environments.

4.2. Weak integration capability of teachers in digital technology and subject teaching

Digital technology application literacy primarily manifests in three aspects: teaching resources, instructional activity design, and assessment evaluation. Survey data reveals that only 73% of vocational college teachers demonstrate proficient use of digital office software. While 78% can skillfully operate basic digital teaching equipment, effectively utilize digital tools to optimize teaching processes, make precise selections of high-quality digital resources, meticulously design instructional content, and innovate teaching strategies. This indicates that digital technology advantages remain underutilized in optimizing teaching practices. Meanwhile, periodic evaluation of student learning outcomes helps educators monitor progress, refine teaching methods, and enhance instructional quality. However, 25% of teachers

express uncertainty about using digital assessment tools to track student learning progress. Additionally, 20.45% doubt the effectiveness of digital tools in resolving teaching challenges, while 4.55% struggle to implement innovative digital teaching activities.

4.3. Lack of Cybersecurity Awareness Among Teachers in Digital Environments

In the context of educational digitalization, cybersecurity awareness among vocational college teachers has become critically important. Survey results indicate that 87.88% of educators consciously implement measures to safeguard digital content security, effectively protect personal privacy during information sharing, and maintain good practices such as regularly updating essential software and encrypting personal data files. Given the current landscape of mixed-quality online information, teachers must develop scientific analytical skills to verify content before instruction, ensuring the accuracy and reliability of information delivered to students. However, 15.91% of educators remain uncertain about their ability to accurately discern information authenticity in complex digital environments and protect themselves from potential cyber threats^[6].

5. Pathways for Enhancing Digital Literacy Among Vocational College Teachers

With vocational colleges as the primary research subjects, in-depth exploration of pathways to enhance teachers' digital literacy holds profound guiding significance for promoting digital transformation, deepening connotative development, and comprehensively improving educational quality. In response to the current status of digital literacy among vocational college teachers, the following aspects should be addressed to elevate their digital literacy capabilities.

5.1. Cultivating Teachers' Digital Teaching Competencies

The integration of digital technology into education fundamentally represents an innovation in teaching philosophies. It requires educators to continuously enhance their digital teaching competencies, master the skill of comprehensively utilizing digital resources, and actively assume responsibility for driving digital transformation in vocational education. In practical teaching scenarios, instructors should proficiently employ various digital teaching tools, boldly experiment with innovative software like cloud-based live streaming platforms, and organize hybrid online-offline teaching seminars and exchange activities. Taking automotive engineering education as an example, teachers can utilize vehicle simulation models and multimedia presentations to visually demonstrate theoretical concepts during lectures, thereby improving instructional effectiveness. Given the complex structural characteristics of automobiles, simulation models can be employed to illustrate internal components through step-by-step explanations – progressing from surface-level observations to detailed component analysis and holistic understanding. This approach enables students to visualize part positioning, functional relationships, and structural integrity within three-dimensional models, significantly enhancing learning outcomes.

5.2. Enhancing Teachers' Digital Research Competence

Teaching and research constitute the two primary pathways for faculty development in higher education institutions. Digital research, as a hallmark of digital literacy among university educators, emphasizes the scientific knowledge, research capabilities, and research thinking demonstrated by faculty members. These elements synergize to ultimately realize multifaceted values including enhancing teaching quality, nurturing students, and serving society.

- (1) Enhancing teachers' digital processing capabilities. Faced with a vast array of research challenges, educators can utilize digital technologies to precisely identify topics aligned with their research fields and directions. By employing digital research methods and models to conduct in-depth analyses and propose effective solutions, teachers can gain comprehensive insights into the current state of professional research, thereby laying a solid foundation for their professional development.

- (2) Proficient operation of research systems and tools both within and outside academic institutions. A solid foundation in research knowledge and expertise serves as the cornerstone for faculty members to engage in digital research. It is essential to address emerging challenges and demands of the digital era to drive sustainable progress in university researchers' digital research endeavors. Simultaneously, faculty-led digital research should be shared with society at large, leveraging cutting-edge technologies to overcome technical barriers and highlight their contributions through the translation and application of research outcomes.
- (3) Cultivating students' scientific research awareness and digital capabilities for societal service. Educators should actively explore effective methods to foster research consciousness and instill a sense of responsibility in leveraging digital technologies for social benefit. During instruction, teachers can inspire students by sharing their own research passion and achievements, igniting curiosity and exploration in scientific inquiry. By developing students' logical reasoning skills, educators can systematically build their research literacy and scientific mindset.

5.3. Improve the Training System for Teachers' Digital Teaching Literacy

The National Vocational Education Reform Implementation Plan proposes to motivate teachers to proactively adapt to technological transformations such as digitalization through comprehensive measures covering faculty development, curriculum materials, and teaching methodologies, thereby shifting their information technology applications toward enhancing digital literacy. Vocational institutions should develop tailored training programs aligned with the diversified and specialized needs of educators. Survey results indicate that teachers with five years of experience generally demonstrate strong proficiency in utilizing digital technologies for instruction, with 81% reporting technical competence. In contrast, only 52.6% of educators with over 20 years of experience possess proficiency in instructional software. To address this gap, vocational schools should implement differentiated training programs. For teachers with foundational information literacy, focus should be placed on database search techniques including advanced retrieval strategies, subject-specific searches, and resource integration methodologies. Data reveals that merely 65% of teachers aged 51+ can skillfully employ instructional software to complete teaching tasks. Therefore, targeted training should prioritize resource application skills such as PowerPoint design, micro-lecture creation, and micro-video production techniques for this demographic.

5.4. Enhancing the Development and Application of Digital Resources in Schools

Higher vocational colleges should leverage national high-level professional cluster development and faculty team building initiatives, actively integrate into collaborative communities, enhance the construction of professional teaching resource repositories, and refine institutional mechanisms for developing high-level professional clusters and teaching teams to elevate the quality and standards of digital teaching resource development.

The effective implementation of digital resources in classroom teaching requires collaborative efforts from multiple stakeholders including education authorities, research institutions, enterprises, and schools. Vocational colleges should adhere to the updated "Digital Campus Standards for Vocational Institutions," integrating digitalization and intelligent technologies across teaching, research, and management processes. This approach establishes digital campuses as crucial platforms for enhancing teachers' digital literacy. Libraries should develop electronic textbook databases to provide targeted digital materials for educators. For accessing challenging academic resources, disciplinary service communities should be established to meet teachers' needs for digital resource utilization both on and off campus. A comprehensive resource support system equips teachers with information resources, improves their search skills, and strengthens their digital literacy capabilities.

5.5. Enhancing Teachers' Awareness of Cybersecurity

Cybersecurity remains a critical issue in digital transformation. Enhancing teachers' cybersecurity awareness is essential to safeguard personal information security for both educators and students. Vocational colleges should establish comprehensive cybersecurity management systems to help teachers better understand and comply with relevant

regulations, ensuring robust protection of sensitive data. Additionally, implementing structured cybersecurity training programs equips instructors with foundational knowledge, enabling them to identify common threats, manage password security, and prevent phishing attacks. Institutions must prioritize evaluating teachers' cybersecurity literacy by teaching proper usage of digital educational tools like learning management systems and online teaching platforms. Educators should also receive training in threat detection and response strategies to strengthen their overall cybersecurity awareness.

Disclosure statement

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