

A Review of Research on the Evaluation of Digital Literacy among Vocational Education Teachers

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Abstract: Conducting evaluations of digital literacy among vocational school teachers is crucial for enhancing their teaching abilities and adapting to societal development. Although existing research on teachers' digital literacy is abundant, there is relatively little theoretical research on the evaluation of digital literacy among vocational school teachers. Digital literacy evaluation serves to identify, understand, and assess teachers' proficiency in digital evaluation, providing a vital reference for subsequent improvement and development. Based on this, this paper explores the concepts of vocational education teachers, their digital literacy, and the evaluation of their digital literacy one by one, drawing on current domestic and international literature research. This exploration aims to understand the state of research on the evaluation of digital literacy among vocational education teachers and provide references for subsequent related studies. It systematically reviews relevant research achievements both domestically and internationally, clarifies the current research status and development trends of digital literacy evaluation among vocational education teachers, identifies existing problems, and discusses countermeasures. This provides theoretical support and practical references for constructing a scientific and operable evaluation system.

Keywords: vocational education teachers; digital literacy; evaluation; research review

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1. Introduction

The "Guiding Opinions of the Ministry of Education on Further Promoting the Information-Based Development of Vocational Education" issued in 2017 explicitly called for "helping teachers establish correct concepts of information-based teaching, improve teaching methods, enhance teaching quality, and elevate their proficiency in applying information technology."^[1] The "Action Plan for Accelerating the Cultivation of Digital Talents to Support the Development of the Digital Economy (2024-2026)" emphasizes "enhancing the independent innovation capabilities of digital talents and stimulating their entrepreneurial and innovative vitality," as well as "striving to build a high-caliber digital talent team that is large in scale, excellent in quality, optimized in structure, and reasonably distributed." It clearly states that cultivating digital talents is a new task and requirement of the era in the context of digitalization^[2].

To strengthen education, it is essential to first strengthen the teaching force. Cultivating digital talents requires a contingent of teachers with digital literacy.

Teachers play a crucial role in talent cultivation and are closely linked to promoting China's digital development. The Ministry of Education has formulated the educational industry standard "Teacher Digital Literacy," explicitly proposing to

“solidly advance the national education digitalization strategy, improve the education informatization standard system, and enhance teachers’ awareness, capabilities, and responsibilities in utilizing digital technologies to optimize, innovate, and transform educational and teaching activities^[3].” It further specifies the structure and content of teachers’ digital literacy, reinforcing that digital literacy is one of the core competencies for teachers in the new era. Vocational education teachers (hereinafter referred to as “vocational teachers”) are the key force in cultivating high-quality skilled talents and the mainstay in promoting the evaluation of digital literacy. To this end, conducting a comprehensive review of research on the evaluation of digital literacy among vocational education teachers, sorting out the current situation, analyzing problems, and exploring future directions holds significant academic value and practical importance for advancing theoretical development and practical innovation in this field.

2. Connotation explanation of digital literacy among vocational education teachers

2.1. Vocational education teachers

Vocational education teachers are commonly defined as full-time teachers in vocational schools (including undergraduate-level vocational schools, higher vocational schools, and secondary vocational schools)^[4]. From the perspective of role orientation, Zhou Zhiying, Ran Yunfang, and Shi Weiping argue that vocational education teachers are “implementers of professional instruction,” “caretakers of students’ careers,” “leaders in professional practice,” “developers of educational and training resources,” and “proactive agents of self-development^[5].” This highlights the multifaceted roles and composite characteristics of vocational education teachers.

In recent years, with the continuous elevation of the strategic status of vocational education by the state, vocational education teachers have been endowed with richer connotations of the times. On the one hand, “dual-qualified” teachers have become a core requirement for team building. In September 2019, the Ministry of Education and three other departments jointly issued the Implementation Plan for Deepening the Reform of “Dual-Qualified” Teacher Team Building in Vocational Education in the New Era, systematically proposing 12 requirements and emphasizing the advancement of “dual-qualified” teacher team reform^[6]. Currently, there are diverse opinions in academia regarding the connotation of “dual-qualified” teachers, with no consensus reached. However, the mainstream view holds that they should possess both solid professional theoretical knowledge and strong practical abilities. Another line of research defines them from the perspective of qualification certification as individuals who simultaneously hold both teaching qualifications and enterprise technical titles, or possess both a teacher certification and relevant professional (practice) qualification certificates. On the other hand, the spirit of educators has increasingly become the value orientation for strengthening the construction of vocational education teaching staff in the new era. In 2024, the Central Committee of the Communist Party of China and the State Council explicitly stated in the Opinions on Promoting the Spirit of Educators and Strengthening the Construction of a High-Quality and Professional Teaching Staff in the New Era that the spirit of educators encompasses six dimensions: “ideal and conviction of having a grand vision for the country and serving it with utmost sincerity; moral sentiment of being a role model in both words and deeds; wisdom in educating people by enlightening their minds and nurturing their hearts, as well as tailoring teaching to individual needs; diligent and dedicated attitude in pursuing truth and innovation; benevolent heart in loving teaching and students, and being willing to make contributions; and the pursuit of promoting moral values and enlightening people with a global perspective.” These dimensions provide fundamental guidelines for the professional development of vocational education teachers in the new era^[7].

The Vocational Education Law of the People’s Republic of China provides a legal basis for the admission of vocational education teachers, emphasizing that “those who have passed training in educational and teaching capabilities may serve as full-time or part-time professional course teachers in vocational schools; those who have obtained teacher qualifications may be appointed to corresponding teaching positions based on their technical titles. The educational qualification requirements for obtaining professional course teacher qualifications in vocational schools may be lowered as appropriate^[8].” This addresses the qualification requirements for vocational school teachers. However, some studies

have pointed out that compared to the teacher qualification system in general education, the development foundation of the vocational education teacher qualification system is weaker, and there are institutional issues such as simple replication and application of the general education teacher qualification system, leading to practical dilemmas such as inadequate standards for vocational education teacher qualifications, ambiguous ability requirements, and unreasonable methods of recognition. Addressing these practical issues is the starting point and endpoint for the reform of the vocational education teacher qualification system at present^[9].

From an overall perspective, the digital literacy of vocational education teachers encompasses not only the ability to operate digital technologies but also emphasizes their responsibility and capability to leverage these technologies in vocational education teaching contexts to optimize the teaching process, innovate teaching models, and cultivate students' digital skills. Therefore, this paper defines it as the comprehensive awareness, ability, and ethical responsibility of vocational education teachers to adapt to the digital occupational environment, effectively acquire, integrate, create, and evaluate digital resources, solve complex vocational education teaching problems, innovate teaching practices, and promote the development of students' digital competencies.

2.2. Digital literacy of vocational education teachers

In the context of digitization, the education sector is undergoing unprecedented transformations. With the rapid advancement of technology, the application of digital tools and resources in education is becoming increasingly widespread. However, effectively integrating these resources to drive educational progress has become an important issue. The fundamental purpose of the digital transformation of education is not to replace teachers with educational technology or reinforce teachers' authoritative positions but to enable teachers to integrate with digital technologies through their application, thereby meeting the diverse needs of students and promoting their individual and holistic development^[10].

What is teacher digital literacy? The "Teacher Digital Literacy" document released by the Ministry of Education provides an initial explanation, clearly stating that teacher digital literacy refers to the awareness, ability, and responsibility of teachers to appropriately utilize digital technologies to acquire, process, use, manage, and evaluate digital information and resources, discover, analyze, and solve educational and teaching problems, and optimize, innovate, and transform educational and teaching activities. It also specifies that the framework for teacher digital literacy includes digital awareness, knowledge and skills in digital technologies, digital applications, digital social responsibility, and professional development^[11]. In this regard, the digital literacy of teachers in vocational colleges encompasses the recognition, understanding, acquisition, critique, communication, and creation of digital information. Its connotation is not confined to the cognitive aspect and proficient use of digital information but also includes the ability to critically evaluate and creatively utilize digital information. It represents a comprehensive skill set that teachers in vocational colleges need to master in their daily lives, learning, and professional endeavors^[12].

2.3. Evaluation of digital literacy among vocational education teachers

The evaluation of teachers' digital literacy primarily relies on data and indicators to assess their proficiency in applying digital technologies, processing information, and ensuring cybersecurity, among other aspects. Drawing from the definition and scope of vocational teachers, existing research generally posits that the evaluation of digital literacy among vocational education teachers is a process of assessing and measuring the fundamental capabilities required for vocational education teachers to carry out their educational and teaching tasks in the digital age^[13]. Compared to teachers at other educational stages, the evaluation of digital literacy among vocational education teachers possesses certain unique characteristics. It is a comprehensive assessment of the awareness, abilities, and responsibilities of full-time teachers in vocational schools in appropriately utilizing digital technologies to acquire, process, utilize, manage, and evaluate digital information and resources, identify, analyze, and resolve educational and teaching issues, and optimize, innovate, and transform educational and teaching activities.

3. The value and significance of evaluating digital literacy among vocational education teachers

3.1. The necessity of enhancing digital literacy among vocational education teachers

The “Outline for Actions to Improve the Digital Literacy and Skills of All Citizens” issued by the Cyberspace Administration of China points out that “it is essential to establish an evaluation index system for the development of digital literacy and skills among all citizens that aligns with China’s national conditions, regularly conduct monitoring surveys and evaluations of the development of digital literacy and skills among all citizens, emphasize the importance of digital literacy and skills, promote the strategic implementation of digital development, and accelerate the construction of a cyber power and a digital China^[14].” As vocational education teachers, they should possess corresponding digital literacy and skills to continuously adapt to a society undergoing digital transformation. The “Overall Plan for Deepening the Reform of Education Evaluation in the New Era” explicitly proposes to “fully leverage information technology to enhance the scientific, professional, and objective nature of education evaluation^[15].” Information technology serves as essential support for enhancing the scientific, professional, and objective nature of education evaluation, and promoting the digital transformation of education evaluation has become a clear requirement of national policies.

3.2. Practical value of conducting digital literacy evaluation

The “Outline for Actions to Improve the Digital Literacy and Skills of All Citizens” issued by the Cyberspace Administration of China states that “it is necessary to establish an evaluation index system for the development of digital literacy and skills among all citizens that aligns with China’s national conditions, and regularly conduct monitoring surveys and evaluations of the development of digital literacy and skills among all citizens^[16].” Digital literacy is the foundation for teachers to carry out digital teaching activities. By conducting digital literacy evaluations, a comprehensive understanding of the overall digital literacy and skills of the teaching staff can be achieved, enabling targeted measures to be formulated to address shortcomings and achieve the goals of “promoting construction through evaluation, promoting utilization through evaluation, and promoting excellence through evaluation^[17].” A scientific and rational evaluation of digital literacy among vocational education teachers can provide objective and quantifiable results, effectively revealing the current state of teachers’ digital literacy. This is crucial for teachers to understand their own strengths and weaknesses, make targeted improvements to their teaching practices, develop more effective teaching strategies, and promote refined development in digital literacy.

4. Research status of digital literacy evaluation for vocational education teachers

A search on CNKI reveals that current research on the evaluation of digital literacy among vocational education teachers is still inadequate. Most studies focus on the evaluation of digital literacy among all teachers, while systematic and in-depth exploration specifically targeting vocational education teachers is relatively rare.

Compared to foreign research, China has relatively fewer studies in this field, with an immature theoretical framework and an evaluation system that urgently needs improvement.

4.1. Types of research on digital literacy among vocational education teachers

Currently, research on digital literacy among vocational education teachers can be broadly categorized into problem-solving and countermeasure-oriented research, current situation investigation research, and research on the composition of digital literacy. The first type of research focuses on issues such as weak digital awareness, low levels of digital technology knowledge and skills, and insufficient digital security awareness among vocational education teachers. In response to these problems, external mechanisms should be improved, training should be strengthened, and for individual teacher improvement, channels for data acquisition should be expanded, discernment abilities should be enhanced, and digital technology knowledge reserves and application capabilities should be improved. The cultivation of digital competencies

among vocational education teachers should draw on international practices and develop a Chinese approach for enhancing digital competencies in vocational education teachers^[18]. Some scholars have proposed strategies such as deepening the application of smart education platforms, implementing micro-certifications for digital literacy, developing self-assessment tools, and establishing tracking evaluation and feedback mechanisms. These measures aim to refine the evaluation of vocational education teachers' digital literacy from technical titles to institutional improvements, thereby facilitating a comprehensive enhancement of teachers' digital literacy^[19]. The second type involves surveys of the current situation. Currently, vocational college teachers are showing increased awareness of digital application, have more opportunities for independent learning and communication, and have access to richer digital teaching resources^[20]. The third type pertains to the composition of digital literacy. Liu Qun and He Biyi suggest that the core components of digital literacy among vocational college teachers can be summarized into four aspects: digital survival literacy, digital thinking literacy, digital application literacy, and digital symbiosis literacy^[15]. Sun Binbin holds a different view, arguing that the connotation of digital literacy for vocational teachers encompasses four dimensions: digital technology cognitive ability, digital technology application ability, data resource integration ability, and a correct digital value system^[21].

Within the framework model of digital literacy for vocational college teachers, it includes basic digital literacy, digital application literacy, and digital development literacy for teachers. Yuan Weiwei points out that teachers' digital literacy consists of digital awareness, digital knowledge, digital skills, and digital ethics^[22].

4.2. Practical explorations in the evaluation of digital literacy among vocational education teachers

Currently, in the research on the evaluation system for the digital literacy of vocational education teachers, different scholars conduct studies based on aspects such as evaluation subjects, evaluation criteria, and evaluation systems.

4.2.1. The subjects of digital literacy evaluation for vocational education teachers

The indirect subjects of digital literacy evaluation for teachers are official institutions, primarily responsible for formulating relevant policy standards. However, the direct evaluation subjects are mostly researchers from universities and research institutes, etc^[23]. Some studies take the teacher group as the evaluation subject to conduct a comprehensive evaluation of teachers' digital literacy. For instance, a school has established a teacher digital literacy evaluation team composed of school leaders in charge, representatives of teachers with various professional titles (junior, intermediate, and senior), teaching and educational administration staff, and student representatives. The team collects, organizes, and compares teachers' annual teaching implementation situations to conduct a comprehensive and multi-perspective inspection and evaluation of the digital literacy of instructors. The evaluation subjects should include three dimensions: educational administrative departments, vocational colleges, and individual teachers. Educational administrative departments are responsible for improving and perfecting relevant policy systems, while vocational colleges are responsible for implementing and conveying policy requirements from higher authorities, formulating training plans based on the actual situations of school teachers, strengthening training, and improving the evaluation and management system for the digital literacy of vocational education teachers. Teachers, on the other hand, need to consciously learn and enhance their own digital literacy levels. In these three different subjects, each performs its own duties to jointly promote the improvement and development of the digital literacy of vocational education teachers^[24].

4.2.2. The criteria for digital literacy evaluation for vocational education teachers

In the current educational environment, China has yet to establish a unified and comprehensive set of standards for evaluating the digital literacy of vocational education teachers. Although the "Standards for Information Technology Application Competency of Primary and Secondary School Teachers (Trial)" provides some guidance for teachers in applying information technology, it covers relatively little content on teacher quality evaluation, which to some extent restricts the comprehensive development and enhancement of teachers' digital literacy. To more effectively assess the digital literacy of vocational education teachers, the "Technology-Enhanced Teaching Self-Assessment Tool" developed by

the European Union offers a referential model. This tool comprehensively evaluates teachers' digital teaching capabilities from four key dimensions: digital teaching, digital content usage and creation, digital communication and collaboration, and digital citizenship^[25]. This multidimensional and all-encompassing assessment method helps teachers gain a deeper understanding of their own digital literacy levels and subsequently develop personalized improvement plans.

4.2.3. The evaluation system for digital literacy of vocational education teachers

Existing research has found that the teacher quality and literacy evaluation system tends to focus excessively on traditional exam scores while neglecting the evaluation of the integration of digital skills with teaching. The digital literacy evaluation system for vocational college teachers assesses teachers' application of digital teaching concepts, strategies, and methods, thereby encompassing three levels: theoretical foundations, methods, and practices of teachers' digital literacy. These three levels form the basis for evaluating the digital literacy of vocational education teachers.

Some scholars take the evaluation practice of digital literacy among primary and secondary school teachers in Henan Province as an example, constructing five subsystems one by one, including a theoretical system for evaluating teachers' digital literacy, a technical system for the evaluation platform, an operational system for evaluation indicators, an implementation system for the evaluation, and a system for evaluation results. They establish the theoretical system for evaluating digital literacy through theoretical review and enhancement; construct the technical system for the evaluation platform by establishing the platform's system architecture and improving its content and processes; build the operational system for evaluation indicators by defining evaluation indicators and establishing an evaluation question bank; establish the implementation system for the evaluation by forming an evaluation team, developing an evaluation plan, conducting pre-evaluation technical preparations, organizing and implementing the evaluation, and creating "digital portraits"; and create the system for evaluation results by grading and applying the evaluation outcomes^[18].

4.2.4. Methods for evaluating digital literacy among vocational education teachers

Currently, the evaluation of digital literacy among vocational education teachers in China is showing a trend of diversification. Some scholars have conducted in-depth exploration and assessment of teachers' digital literacy through methods such as questionnaires and artificial intelligence capability assessment tools. Meanwhile, other scholars emphasize that vocational colleges should establish a data-driven educational quality monitoring system to ensure that teachers' digital literacy meets the demands of educational modernization. Internationally, countries such as Spain and members of the European Union are also actively exploring ways to evaluate and enhance teachers' digital literacy. Spain developed the self-assessment tool for teachers' digital literacy, "SELFIE for Teachers," in 2017, encouraging teachers to voluntarily upload their achievements and supporting materials in digital literacy to obtain certification of their digital literacy levels^[26]. Subsequently, in 2020, Spain developed the "Digital Literacy Portfolio for Teachers" based on the "Common Digital Competence Framework for Teachers," further assisting teachers in obtaining certification of their digital literacy levels. The European Union developed the "Digital Competence Diagnostic for Teachers" based on the "European Framework for the Digital Competence of Educators^[27]." This assessment approach helps teachers understand their own digital literacy status and provides them with clear directions for improvement. Additionally, Russia has also made progress in assessing teachers' digital literacy. In 2018, they developed the online assessment tool "DigCompEdu," providing teachers with a convenient platform for digital literacy assessment.

4.2.5. Indicators for evaluating the digital literacy of vocational education teachers

In domestic research, scholars have delved into the evaluation system for the digital literacy of vocational education teachers, constructing a two-tier indicator system that integrates theory and practice based on the logical relationships among evaluation content, evaluation dimensions, and evaluation subjects. At the theoretical level, this system focuses on vocational education teachers' understanding and application of digital foundational knowledge, mastery of key technologies, and strategies for resolving related issues. At the practical level, it emphasizes the practical application

capabilities of digital technologies by vocational college teachers in their teaching practices. From an international perspective, Japan has also made positive contributions to the evaluation indicators for teachers' digital literacy. In 2018, Japan released the "Third Basic Plan for Education Revitalization," which established an evaluation scale for teachers' ICT (Information and Communication Technology) instructional abilities to further refine evaluation indicators. This scale encompasses teachers' ability to utilize digital technology in teaching, their proficiency in digital office systems, and their capacity for digital security instruction, among other aspects, providing a comprehensive assessment of teachers' instructional and guidance capabilities in the digital age.

4.2.6. Tools for evaluating digital literacy of vocational education teachers

Through a literature review, it was found that current domestic literature has not conducted research on evaluation tools specifically targeting the digital literacy of vocational education teachers. Some scholars have combed through foreign literature based on the evaluation of teachers' digital literacy and extracted 40 assessment tools for teacher competencies. Depending on the method of data collection, these assessment tools for teachers' digital literacy can be categorized into self-report evaluation tools and performance-based evaluation tools. The study collected 28 self-report evaluation tools, while performance-based evaluation tasks were used to assess specific manifestations of teachers' digital literacy^[28].

5. Conclusion and prospects

Based on existing research, it is evident that evaluating the digital literacy of vocational education teachers faces numerous challenges. From the perspective of teachers themselves, the weakness in the development of digital resources and digital teaching skills has, to a certain extent, restricted the effective application of digital technology in teaching. From an external viewpoint of the evaluation system, the current dilemma lies in the difficulty of accurately representing literacy levels, which is specifically manifested in the lack of systematic evaluation indicators, relatively simple evaluation tools and methods, complex implementation processes, and high costs, ultimately leading to evaluation results that often fail to comprehensively and truthfully reflect teachers' actual literacy status.

In response to the aforementioned issues, in terms of evaluation system construction, it is essential to develop innovative evaluation models tailored to the professional characteristics of vocational education teachers, set scientific evaluation criteria, and fully incorporate digital literacy into the teacher evaluation system.

Regarding evaluation implementation, optimization of evaluation indicators should be carried out, and diversified evaluation methods should be adopted, combining quantitative and qualitative analysis as well as self-assessment and peer assessment, to enhance the comprehensiveness and accuracy of evaluation results. In terms of improving teachers' capabilities, vocational colleges should regularly organize specialized training on digital teaching skills, including the construction of digital teaching resources, the establishment of teaching environments, the design of teaching activities, and the innovation of teaching evaluations. Additionally, incentive measures should be formulated to encourage teachers to participate in practice, thereby stimulating their enthusiasm and overcoming the sense of burnout in developing digital literacy. In terms of tool development, it is advisable to draw on mature foreign experiences and develop targeted, user-friendly evaluation tools based on actual needs.

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