

Research on the Digital Competence Framework for Vocational Education Teachers in China

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Abstract: Since the 14th Five-Year Plan period, China has been accelerating the transformation from a major country in education to a strong country in education. The digital transformation of education is an important way to promote the development of education in China, and the digital competence of teachers is a key factor affecting the digital transformation of education. Teachers of vocational education, as the key to cultivating technical and skilled talents, empower students by enhancing their digital competence to promote the development of their abilities. By analyzing European Framework for the Digital Competence of Educators (DigCompEdu)^[1], and comparing the framework of “Teacher Digital Literacy” in China^[2], combined with the development characteristics of vocational education, this study explores the digital competence framework of vocational education teachers and provides optimization strategies for improving teachers’ digital competence in the context of digital transformation in education.

Keywords: Digital Transformation in Education, Vocational Education, Digital Competence of Teachers, Optimization Path

1. Introduction

The Framework for 21st Century Learning, officially released by the United States in 2006, proposes that Digital Competence is one of the core competencies of 21st-century talents^[3]. The EU has updated the expression of “Digital Literacy” from the original “Digital Literacy” to “Digital Competence”, but the latter focuses more on expressing comprehensive abilities and competencies compared to the former^[4]. To achieve the transformation of China into an education powerhouse, high-level innovative talents are the key. As the core competence of high-level innovative talents, digital competence requires teachers to lead and demonstrate, promote the digital transformation of education, and enhance the digital transformation of society. Teachers, as promoters and participants in the digital transformation stage of education, carry out digital transformation by enhancing their digital competence, thereby cultivating students’ high-level abilities and enhancing their digital competence. Therefore, in the context of digital transformation, as the center of educational activities, teachers’ digital competence is particularly crucial. How to improve their digital competence is a topic that every teacher should study.

2. Enlightenment on the Research of Digital Competence Framework for Vocational Education Teachers

2.1 Research on Digital Competence in Vocational Education

Digital competence is a collection of advanced, complex, and systematic comprehensive abilities and traits related to digital technology. In vocational education, students usually need to face practical career challenges and problems. The advanced nature of digital competence enables students to more effectively utilize digital technology to solve these complex problems and promote innovation and creativity in the workplace. Vocational education emphasizes the application of acquired knowledge and skills to practical work. Due to the sensitivity of digital competence to social and cultural contexts^[5], it enables students to have more adaptability and flexibility to adapt to the digital requirements of different professions and work environments. This is very important for the goals of vocational education, as they aim to cultivate students with transferable skills. With the advancement of technology and changes in professional needs, the components of digital competence will also be adjusted. Vocational education needs to ensure that students’ digital competencies are in line with the current and future demands of the job market, so it is necessary to continuously adjust teaching methods and content.

Overall, digital competence has significant applicability in vocational education, as it emphasizes practical application, problem-solving, adaptability, and adaptation to the continuous evolution of the job market. By cultivating digital competence, vocational education can better meet the needs of students in a digital work environment and enhance their competitiveness in the workplace.

2.2 Research on the Internal and External Operating Mechanisms of Digital Competence

The digital competence of teachers is not static but constantly develops with their internal motivation and external environment. The development of the digital competence of teachers is closely related to the interaction between their internal motivation and external environment. The intrinsic motivation of teachers may include a passion for teaching, a desire to pursue professional development, and so on. The external environment includes the development level of digital education, the needs of teaching tasks, and social responsibility. This interaction promotes teachers’ digital competence to be not only influenced by individual internal factors but also driven by external environmental stimuli and needs. The development level of the digital environment and the requirements of teaching tasks will pose challenges and demands to teachers’ digital competence, thereby stimulating their motivation to improve their digital level.

Teachers are not developing digital competence in isolation, but constantly adjusting and improving their digital teaching level through interaction with external environments and tasks. In specific environments and task requirements, teachers’ digital competence will be stimulated and mobilized, enabling them to better adapt and respond to the current digital education environment.

Overall, the operational mechanism of digital competence for vocational education teachers is a dynamic and interactive process, influenced by both internal motivation and external environment, as shown in Figure 1. Teachers need to constantly adjust their digital

teaching abilities to adapt to the constantly evolving digital education environment and the social responsibility of cultivating skilled talents with both moral and technical skills.

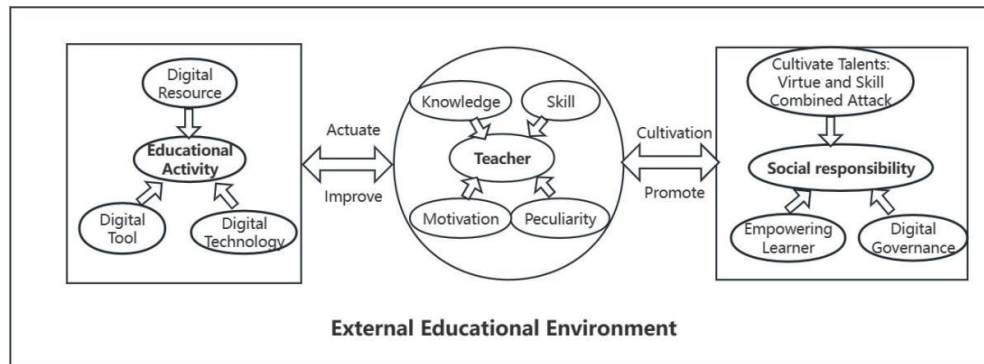


Figure 1. Operational Mechanism of Digital Competence of Vocational College Teachers

3. Research on the Framework Model for Digital Competence of Vocational Education Teachers

3.1 Fundamentals of Research Theory

3.1.1 The Spiral Curriculum

The Spiral Curriculum is an educational theory proposed by British educator James Bruner. The core idea is that educational content should be presented to students in a layer-by-layer deepening manner. By continuously deepening their understanding of core concepts, students gradually form a more abstract and comprehensive cognitive structure. During the process of deepening layer by layer, students can delve deeper into their interests and learning styles. This personalized learning approach helps stimulate students' learning interest and motivation. Spiral courses advocate incorporating the relationships and connections between disciplines into educational design, which helps students connect knowledge from different disciplines and better understand the practical application and significance of knowledge, forming a more comprehensive understanding.

3.1.2 Bloom's Taxonomy

This classification system was proposed by American educational psychologist Benjamin Bloom in the late 1950s to classify and organize educational goals. This classification mainly focuses on the cognitive field, namely the development of intelligence and cognitive processes. This classification system mainly includes six cognitive objectives, which are Remembering, Understanding, Applying, Analyzing, Synthesizing, and Evaluating, according to their cognitive complexity from low to high. These six cognitive goals are organized into a pyramid shape, with memory at the bottom and evaluation at the top. This pyramid shape reflects the gradual complexity of learning activities and the gradual development of students' thinking. This cognitive goal classification method is widely used in education, and educators can use this framework to design course objectives, evaluate student learning outcomes, and develop corresponding teaching strategies.

3.2 Model Building

By analyzing DigCompEdu and comparing the framework of "Teacher Digital Literacy" in China, it is found that the content of domestic and foreign frameworks covers three categories: digital application, promoting student development, and teacher development. Due to the early attention and long implementation time of foreign countries on teacher information technology capabilities, foreign mainstream frameworks regard teacher digital basic skills and teaching abilities as basic teacher literacy. It focuses on empowering learners by teachers, promoting student development, and emphasizing the hierarchical and progressive development of abilities.

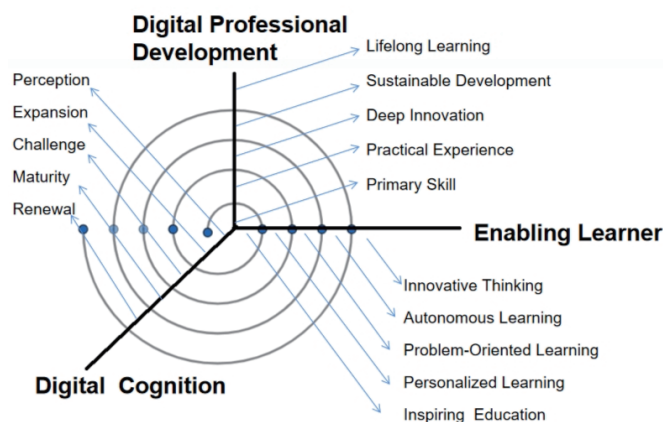


Figure 2. 3D Spiral Model Architecture of Digital Competence for Vocational Education Teachers

Starting from the level of training objectives in vocational education, it is more important to emphasize the aspect of teachers empowering learners and promoting student development. Therefore, when constructing a digital competence framework for vocational education teachers, we can refer to the six levels of classification standards in the EU DigCompEdu framework. By integrating Bloom's Taxonomy, we can promote the development of digital competence for teachers through level division. Digital competence is a comprehensive high-level ability that is a deep level of cognition and practice. The digital competence of vocational education teachers can be constructed as a three-dimensional model: digital cognition, digital professional ability, and empowering learners. Each dimension is hierarchical and constantly developing. The digital cognition dimension is divided into five levels: perception, expansion, challenge, maturity, and renewal. The digital professional ability is divided into five levels: primary skills, practical experience, deep innovation, sustainable development, and lifelong learning. Empowering learners can be divided into five levels: inspiring education, personalized learning, problem-oriented learning, autonomous learning, and innovative thinking, ultimately forming a three-dimensional spiral model architecture for vocational education teachers' digital competence (Figure 2).

3.3 The Cultivation Path of Digital Competence for Vocational Education Teachers

3.3.1 Evaluation method based on the combination of results and processes

The traditional evaluation of teachers' digital literacy is usually based on results, such as creating measurement scales for questionnaire surveys or on-site inspections. This evaluation method is simple and rapid, but cannot comprehensively evaluate digital competence. Therefore, it should be combined with process evaluation methods. This is a data-driven evaluation method that requires collecting data from teachers' teaching activities, such as offline and offline teaching behavior data Innovative achievements in online training and digital teaching, student learning outcomes and feedback evaluation, and comprehensive data on student internships and training. Therefore, it is necessary to build a comprehensive evaluation model for teachers' digital competency, develop an evaluation system and platform, open up channels for teacher evaluation, and obtain more accurate evaluations through comprehensive data analysis methods. So teachers can make targeted adjustments based on the evaluation results.

3.3.2 Carry out Precision Advanced Training

Firstly, carry out specialized training on digital competence for teachers. Through a comprehensive evaluation of teachers' digital competence, deficiencies are identified and targeted training is conducted. Teachers select training courses based on their shortcomings, rather than passively receiving all teacher training. Secondly, Conduct personalized training courses. Based on the big data evaluation system, it is necessary to accurately identify the personalized development direction of teachers, carry out personalized training, and cultivate innovative thinking in vocational education. Divide teachers into different levels based on their current level and provide targeted training to help them gradually improve.

3.3.3 The cultivation goal of combining technology and academic

Future teachers should be digital teachers who are capable of meeting the requirements of cultivating new talents in the digital era. The so-called academic ability refers to the ability to engage in knowledge inheritance and teaching research. The so-called technology refers to making good use of digital equipment and resources. The development of digital competence is dynamically changing in the process of interacting with the external educational environment. From the most basic information technology skill literacy to addressing unknown digital skill challenges in the future, teachers can adapt to and be competent in any stage of challenge through their improvement of digital competence. Regardless of the future development of technology, teachers can cope with and empower learners, making them equally capable of facing the future. Therefore, this should be the ability that every educator should possess.

Conclusion

Vocational education is a "technological education", and the talent cultivation positioning and goal of vocational education are high-quality technical and skilled talents. Therefore, vocational education should take the background of digital transformation of education as an opportunity to deeply explore how to strengthen the type attributes of vocational education, reverse the traditional thinking solidified in society, change the weak position of vocational education, shape a new ecology of education, and promote the construction of modern education system. Vocational education teachers should quickly adapt to the digital transformation of education in the digital era, actively shoulder the responsibility of digital transformation, improve their digital competence, and empower learners, promoting the comprehensive development of students.

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