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Research on the Improvement of Information-Based Teaching Ability of Vocational College Teachers Based on the TPACK Framework Under the Background of Digital-Intelligent Empowerment

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Abstract: With the rapid development of digital technology, the digitalization of education is continuously promoted in depth. As an important base for cultivating high-quality technical and skilled talents, vocational education needs to keep up with the trend of the times to adjust teaching. Teachers' information-based teaching ability has become a key indicator to measure the teaching quality of vocational education and promote the high-quality development of vocational education. As a new teaching mode that deeply integrates technology and teaching, the TPACK framework can further improve the information-based teaching ability of vocational college teachers. Starting from the connotation of the TPACK framework, this paper deeply analyzes the importance of improving the information-based teaching ability of vocational college teachers based on the TPACK framework under the background of digital-intelligent empowerment, and systematically discusses the effective paths to improve it. It is expected to provide new ideas for the professional development of vocational college teachers.

Keywords: Digital-intelligent empowerment; TPACK framework; Vocational college teachers; Information-based teaching ability

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1. Introduction

With the rapid development of digital-intelligent technologies such as big data, artificial intelligence and cloud computing, their popularization in the field of education is constantly improving. Educational digitalization has become an important driving force for the modernization of education. As an important part of vocational education, it integrates its talent training objectives and industrial needs in the digital era. Therefore, it

is more necessary to adjust its teaching mode according to the trend of the times, so as to continuously promote the innovation and upgrading of teaching modes. As the main implementers of teaching activities, teachers' information-based teaching ability directly affects the educational effect of the integration of digital technology and vocational teaching. The TPACK framework can start from teachers' technological knowledge, pedagogical knowledge and content knowledge, build a knowledge system integrating the three, and provide a clearer theoretical framework and practical guidance for the cultivation of teachers' information-based teaching ability.

2. Connotation of the TPACK framework

The formation of the TPACK framework helps to improve the traditional teacher knowledge cultivation system. It is developed from the PCK theory proposed by American scholar Shulman, which emphasizes the integration of content knowledge and pedagogical knowledge [1]. On this basis, combined with the basic knowledge introduced by Mishra and Koehler, a more complete TPACK framework has been gradually developed. This framework includes seven core parts. Specifically, the core elements include teachers' ability to use digital-intelligent technologies and information tools, core abilities such as teaching principles and strategies, and teachers' deep understanding of their own professional knowledge. These are the basis of information-based teaching and the main support for improving teachers' overall teaching ability [2]. In addition, there are three derived dimensions: the integration of content and pedagogy, the ability to optimize the presentation of subject content with digital technology, and the innovation of teaching modes with digital technology. TPACK is the core of the deep integration of the three, and pays more attention to teachers' ability to flexibly use digital technology to optimize the teaching process.

The core value of this framework lies in integration, rather than the traditional form of independently cultivating teachers' teaching ability. In the cultivation process, more attention is paid to technology serving teaching objectives, so as to provide more accurate guidance for the improvement of vocational college teachers' information-based teaching ability [3]. In addition, the TPACK framework emphasizes that the use of digital-intelligent technologies in the teaching process is not the main purpose, but rather adhering to the transmission of teaching content and the realization of teaching objectives. The overall teaching framework pays more attention to situation and dynamics, requiring teachers to continuously optimize their knowledge system and teaching ability according to changes in teaching situations, technological updates and the development of subject content [4].

3. Importance of improving the information-based teaching ability of vocational college teachers based on the TPACK framework, in the background of digital-intelligent empowerment

3.1. Core support for promoting the digital-intelligent transformation of vocational education

Under the guidance of the digital-intelligent development background, the digital-intelligent transformation of vocational education has become a very important development direction, and teachers' information-based teaching ability is the core support to ensure the smooth realization of this transformation. The digital-intelligent transformation of vocational education requires not only perfect information-based teaching

facilities and rich digital-intelligent teaching resources, but also teachers with high information-based teaching ability, who can take the initiative to deeply integrate digital technology into the teaching process, so as to ensure that the teaching mode, content and methods adopted by teachers are comprehensively innovative [5].

As a core theory that deeply integrates technology, pedagogy and subject content, the TPACK framework can guide teachers to establish a correct information-based teaching concept, and help teachers clarify the core composition of information-based teaching ability in practice, so as to help teachers break the restrictions of traditional teaching thinking, enable them to take the initiative to learn and use digital-intelligent technologies, thereby continuously optimizing their own teaching process and improving teaching quality [6].

3.2. Key measures to improve the quality of vocational talent training

The main goal of vocational education is to cultivate high-quality technical and skilled talents who can adapt to the industrial development needs of the digital-intelligent era. However, insufficient information-based teaching ability of teachers will directly affect the quality of talent training. Especially in the digital era, the development of all walks of life is accelerating, and the requirements of the industrial field for technical and skilled talents are constantly changing. Students are required not only to master solid professional knowledge and skills, but also to have strong digital literacy, innovation ability and independent learning ability [7].

Improving the information-based teaching ability of vocational college teachers with the TPACK framework as the core can help them better integrate digital-intelligent technology with professional teaching, enable them to continuously optimize teaching content and methods according to actual teaching conditions, and subtly cultivate students' digital literacy and innovation ability. At the same time, the application of this new teaching concept can realize the precise and personalized development of the teaching process. Teachers can formulate personalized teaching plans for students according to their personal learning characteristics and needs, and combine with the hierarchical teaching mode to ensure that each student can obtain suitable learning methods and content, so as to comprehensively improve the quality of vocational talent training, enable students to better adapt to the industrial development needs of the digital era, and lay a solid foundation for their future personal career development.

3.3. Promoting the alignment between TPACK practice and industrial demand

In the process of digital-intelligent development, the connection between university education and industrial development is becoming closer and closer. Therefore, the improvement of teachers' information-based teaching ability also needs to be based on the actual needs of the industry, ensuring that teaching content is closely linked to students' future career development, and effectively avoiding the disconnection between teaching and industry.

The practical application of the TPACK framework can deeply integrate teachers' ability development with cutting-edge industrial scenarios such as intelligent manufacturing, artificial intelligence and big data, enabling teachers to take the initiative to integrate real industrial cases, technical standards and work processes into teaching design, so that students can understand the future post-ability requirements of their major in a more real industrial environment. At the same time, this teaching practice can effectively improve the pertinence and foresight of teaching courses, enable teaching content and forms to keep up with the trend of industrial technology updates, and synchronously promote the optimization and adjustment of the curriculum system while improving teachers' information-based teaching ability, to ensure the overall quality of vocational teaching.

4. Effective paths to improve the information-based teaching ability of vocational college teachers based on the TPACK framework under the background of digital-intelligent empowerment

4.1. Strengthen concept guidance and establish the TPACK integrated teaching concept

The teaching concept is an important prerequisite for ensuring the implementation of relevant teaching objectives. To improve the information-based teaching ability of vocational college teachers, it is necessary to help them establish the concept of TPACK integrated teaching. This can breaks the restrictions of traditional teaching thinking and enable teachers to further clarify the core goal of the integration of digital technology and teaching.

On the one hand, vocational colleges need to strengthen the publicity and training of information-based teaching concepts, and popularize the core connotation and teaching application value of the TPACK framework to teachers through regular special lectures, teaching seminars and experience sharing meetings. In this way, they can deeply understand the importance of the integration of digital technology and teaching, and subtly establish a student-centered information-based teaching concept for them, making preparations for their subsequent teaching practice [8].

On the other hand, vocational colleges also need to guide teachers to take the initiative to change their teaching role positioning, from traditional knowledge transmitters to guides, organizers and collaborators of students' learning, so that they can pay more attention to stimulating students' learning interest with digital-intelligent technologies in the implementation of teaching, thereby guiding students to take the initiative to participate in the teaching process and continuously cultivate their independent learning ability and innovation ability.

At the same time, vocational colleges need to create a good information-based teaching atmosphere for teachers, and guide them to carry out information-based teaching reform practice by encouraging teachers to take the initiative to explore information-based teaching modes. Teachers who perform well in information-based teaching should be properly commended and rewarded, so as to continuously stimulate teachers' enthusiasm and initiative to improve their own information-based teaching ability. In addition, teachers need to be guided to establish the concept of lifelong learning, so that they can realize that they also need to continuously learn and update their own teaching system under the trend of digital development, so that they can consciously and continuously improve their own technology application ability and teaching integration ability, so as to continuously adapt to the new needs of vocational teaching reform under the background of digital empowerment.

4.2. Improve the training system and focus on the cultivation of TPACK core competencies

For vocational college teachers, a sound training system is an important guarantee for improving their information-based teaching ability. When introducing the TPACK framework, vocational colleges need to build a targeted and practical teacher training system, focusing on the cultivation of teachers' TPACK core competencies, with the main direction of improving teachers' technological knowledge, pedagogical knowledge and content knowledge application ability.

The training content needs to be carried out around the core components of the TPACK framework. In the curriculum arrangement, it is necessary to combine the characteristics of vocational teaching and the development trend of digital-intelligent technology to set targeted training modules. In terms of technological knowledge training, vocational colleges need to focus on training teachers' ability to use digital-intelligent technologies in teaching, comprehensively improve their proficiency in various tools such as online teaching platforms, virtual simulation technology, big data analysis tools and artificial intelligence teaching tools, and also strengthen their ability to develop and produce digital-intelligent teaching resources, ensuring that

teachers' abilities can fully support the digital-intelligent teaching system.

In terms of pedagogical knowledge training, vocational colleges need to focus on training teachers' innovation and application of information-based teaching modes and strategies, including the specific design and practice of various teaching methods such as blended teaching, project-based teaching and inquiry-based teaching, so as to continuously optimize their overall teaching quality and further improve students' learning enthusiasm[9]. In addition to classroom teaching, it is also necessary to improve teachers' implementation skills in classroom management and teaching evaluation to ensure the integrity and effectiveness of the entire teaching process.

4.3. Build a practice platform and promote the implementation of TPACK integrated teaching

Practice is the key link to improve teachers' information-based teaching ability. Therefore, when introducing the TPACK framework, vocational colleges also need to build a special practice platform for teachers, so as to provide them with more opportunities for information-based teaching practice, thereby promoting the real implementation of TPACK integrated teaching, enabling teachers to continuously accumulate experience and improve their own teaching ability in practice[10].

Specifically, vocational colleges need to strengthen the construction of information-based teaching infrastructure, continuously improve hardware and software facilities such as online teaching platforms, virtual simulation training rooms and digital-intelligent teaching resource libraries, so as to provide good conditions for teachers to carry out information-based teaching in the follow-up. For example, vocational colleges can build virtual simulation training rooms, enabling teachers to use virtual simulation technology to carry out practical teaching based on their own professional teaching knowledge, effectively solving the problem of insufficient practical teaching venues and equipment in the traditional teaching system.

At the same time, it is necessary to improve the online teaching platform. The relevant platform needs to support teachers to carry out blended teaching, online Q&A, homework correction and other teaching activities, ensuring that teachers can hand over repetitive and time-consuming work to the intelligent system, so that they can devote more energy to the core teaching links. Cooperating with a special digital-intelligent teaching resource library, it can integrate various high-quality digital-intelligent teaching resources for teachers, so as to provide them with richer teaching materials and ensure that the knowledge content taught by students is consistent with the development of the times.

Finally, vocational colleges can build a special information-based teaching practice and exchange platform for teachers, guide them to regularly carry out activities such as information-based teaching competitions, teaching reform projects and teaching case selection, so as to continuously stimulate their enthusiasm and initiative to carry out information-based teaching practice. Teaching competitions can also provide a platform for teachers to show their information-based teaching achievements, enabling them to absorb successful teaching experience from each other, truly solve various practical problems in the teaching process, thereby effectively improving teachers' information-based teaching ability and laying a solid foundation for the comprehensive improvement of teaching quality in vocational colleges.

5. Conclusion

Under the background of digital-intelligent development, vocational education needs to integrate digital-intelligent teaching in line with the trend of the times. The improvement of teachers' information-based

teaching ability is also the key to promoting the high-quality development of vocational education and cultivating high-quality technical and skilled talents. As a new teaching support theory, the TPACK framework can provide a practical framework for improving teachers' information-based teaching ability, help them adjust the current training system, and comprehensively optimize the overall teaching implementation effect.

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References

[1] Luo L, 2024, Research on TPACK Structure and Development Strategies of High School Ideological and Political Teachers, thesis, Southwest University.

[2] Yang F, 2024, Research on Cultivation and Improvement Strategies of Information-Based Teaching Ability of Vocational College Teachers. Teachers, (35): 90–92.

[3] Chen Y, Zhao M, 2024, Research on Improvement Strategies of Information-Based Education Ability of Teachers in Higher Vocational Medical Colleges. The Theory and Practice of Innovation and Entrepreneurship, 7(23): 159–161 + 173.

[4] Hu P, 2024, Competency Model and Improvement Path of Higher Vocational Professional Teachers Under the Background of Speciality-Innovation Integration. Modern Vocational Education, (35): 37–40.

[5] Xu Y, 2024, Research on Improvement of College Teachers' Teaching Ability Under the Background of Industry-Education Integration. Talent, (34): 121–124.

[6] Cai L, 2024, Exploration of Digital Empowerment in Ideological and Political Teaching for Adult Education Under the TPACK Framework. Continuing Education Research, (05): 72–76.

[7] Hong Y, 2024, Research on Influencing Factors and Improvement Strategies of Teachers' Information-Based Teaching Ability. Journal of Hubei Open Vocational College, 37(21): 147–148 + 151.

[8] Zhao J, Chen L, Gao A, 2024, Research on Improvement of College Teachers' Information-Based Teaching Ability Under the Background of Industry-Education Integration. The Guide of Science & Education, (31): 75–77.

[9] Qian X, 2023, Improvement of Teachers' Digital Teaching Ability: Logic and Path—Analysis Based on TPACK Framework Theory. Teaching Monthly (Middle School Edition: Teaching Management), (12): 65–70.

[10] Li L, Liu L, Cheng S, 2024, Research on Improvement Path of Information-Based Teaching Level of Vocational College Teachers. Way of Success, (30): 125–128.