Organizational Factors Affecting Teachers' Competency in the Digital Era of Vocational Colleges in Shaanxi Province

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Abstract

The purposes of this study were 1) To study the levels of organizational factors in the digital era of vocational colleges in Shaanxi province;2) To study the level of teacher's competency in digital era of vocational colleges in Shaanxi province; 3) To examine the relationship between organizational factors and teacher's competency in digital era of vocational colleges in Shaanxi province; 4) To analyze the organizational factors affecting teacher's competency in digital era of vocational colleges in Shaanxi province; and 5) To propose the guideline for developing the teacher's competency in the digital era of vocational colleges in Shaanxi Province. The study utilized a mixed-method approach, data were collected from 500 respondents, including administrators and college lecturers from 40 vocational colleges and interviewing 9 experts, combining questionnaires, interviews and Multiple Regression Analysis to evaluate the impact. This study explores the impact of organizational factors on teachers' competency in vocational colleges in Shaanxi Province, China.

The result of the research found that: 1) The levels of Organizational Factors in the digital era of vocational colleges in Shaanxi province are at a moderate level.2) The levels of Teacher Competency in the digital era of vocational colleges in Shaanxi Province is at a moderate level. 3) The relationship between Organizational Factors and Teacher Competency in the digital era of vocational colleges in Shaanxi province. The analysis showed that the two were significantly correlated. 4) Multiple regression analysis of Organizational Factors affecting Teacher Competency in the digital era of vocational colleges in Shaanxi province. It shows that teachers' competency in the digital era is affected by multiple factors. Application of Technology, Workplace Adaptability, Leadership, Social Relations, Organizational Culture, Training for Self-development, and Institutional Structure are critical in enhancing teachers' competency. 5) The guideline for developing Teacher Competency in the digital era of vocational colleges in Shaanxi province. The proposed guidelines focus on seven key areas: Leadership, Organizational Culture, Institutional Structure, Social Relations, Application of Technology, Training for Self-development, and Workplace Adaptability. The

recommendations aim to create a sustainable and technology-driven educational environment that enables teachers to thrive in the digital era.

Keywords: Organizational Factors, Teachers' Competency, Vocational Colleges, The Digital Era, Shaanxi Province

Introduction

In the age of digitalization, the rapid development of digital technology has greatly impacted and changed human society, gradually changing from an industrial economy to an information economy and then to an intelligent economy (Garifullina & Gilmanov, 2024). The growth and development of digital technology have broken through the traditional concepts and models of vocational education and caused institutional, organizational, and teachers' confusion and anxiety (Holilah & Hajjaj, 2024; Ismail, 2024). Education, especially vocational education, is a pioneer in digital transformation, and digitalization is a new trend in modern education and teaching system reform (Lian & Juliansyah Putra, 2022; Méndez et al., 2022).

China has made positive efforts in the field of educational digitalization, incorporating digital technology in classroom teaching and school management, and constantly innovating and improving the content and mode of education to improve the overall quality of education (Hu & Shen, 2022; Zheng et al., 2021). As an important force in leading the development of vocational education, vocational teachers are in the first line of digitalization. The digital competency of teachers will have a significant impact on the practice of digital education and the training of future talent (Castañeda et al., 2021; Aksay Albuz, 2023). Therefore, it is of great significance to study the organizational factors affecting teachers' digital competency to provide a high-quality digital education.

In the new context of digitalization, the demands for teachers to master digital literacy are increasing, but teachers' digital integration in actual teaching behaviors is often influenced by institutional factors, such as institutional leadership, institutional support, digital facilities, and organizational culture (Adeniyi et al., 2024; Lazarević & Ružičić, 2023; Li, 2024). Institutional factors have a direct impact on teachers' digital competency. A sound institutional environment will enhance the digital competency of teachers, improve their teaching and guidance effectiveness, and provide an enabling environment for educational innovation (Ismail, 2024). At present, many scholars have conducted research on teachers' digital competency. Although the factors affecting teachers' digital competency have been extensively studied, it is worth noting that in the vocational education system, few researchers have considered digital competency of teachers as a research object and systematically analyzed the impact of institutional arrangement, institutional policy and incentive mechanism, and institutional support on teachers' digitalization adaptability (Méndez et al., 2022).

To develop a more comprehensive understanding of the digital competency of teachers, particularly those working in vocational education, it is critical to close the research

gap through further investigation into the organizational factors that influence digital adaptation among teachers. In this study, the research will start from the organizational factors of colleges and schools to study and summarize the factors that influence the digital competency of teachers in vocational colleges in Shaanxi Province. In view of this, this research will have two research questions (RQs): (1) What institutional factors influence teachers' digital competency in vocational colleges in Shaanxi Province? (2) How do institutional factors influence the digital competency of teachers in vocational colleges in Shaanxi Province? In terms of theoretical value, this study will fill the research gap and further explore the organizational factors that affect teachers' digital competency and have positive reference significance for the digitalization research of vocational education. In terms of practical significance, through this research, it is expected to provide reference for the in-depth development of digital education in vocational colleges and for the construction of digital competency among teachers in vocational colleges in Shaanxi Province. Moreover, for decision-makers, it will provide valuable empirical support for formulating and improving education policies and the construction of teachers' digital competency (Creswell & Clark, 2017). Therefore, this study may contribute to the digital transformation of vocational education to a certain extent by exploring and sorting out the organizational factors that affect the digital competency of teachers, and then clarifying the path for colleges and universities to improve teachers' digital competency.

Research objectives

1. To study the levels of organizational factors in the digital era of vocational colleges in Shaanxi province.

2. To study the level of teacher's competency in digital era of vocational colleges in Shaanxi province.

3. To examine the relationship between organizational factors and teacher's competency in digital era of vocational colleges in Shaanxi province.

4. To analyze the organizational factors affecting teacher's competency in digital era of vocational colleges in Shaanxi province.

5. To propose the guideline for developing the teacher's competency in the digital era of vocational colleges in Shaanxi Province.

Research Methodology

Population and Sample

The population used in this research was administrators and college lecturers of 40 vocational colleges in Shaanxi Province. The sample consisted of 500 administrators and college lecturers in vocational colleges in Shaanxi Province, which is considered a good number (Comrey, A. L., & Lee, H. B., 1992). The key informants in the first in-depth interview to study the variables related to female leadership components were 5 expects, and the key

informants in the second in-depth interview to consider the proposed teacher's competency model were 9.

Research Instruments

The questionnaire on the personal status of the respondents, the questionnaire on the level of teacher's competency in digital era of vocational colleges in Shaanxi Province, and the semi-structured questionnaire for the in-depth interview.

Statistics used for data analysis

The statistics used in data analysis were frequency, percentage, mean, standard deviation, Multiple Regression Analysis (MRA), and content analysis.

Conceptual framework for research

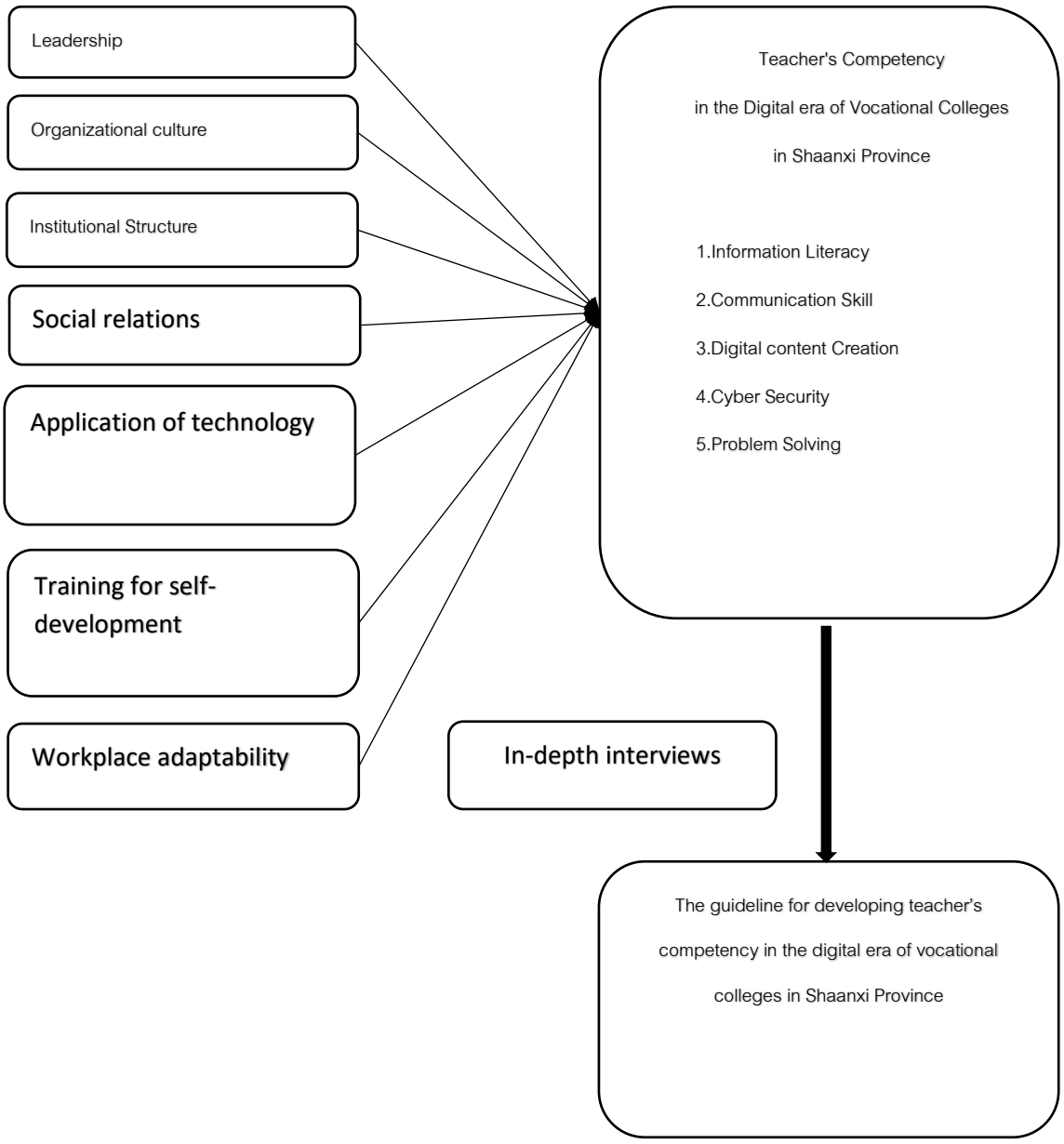

Figure 1 Conceptual framework

Research results

Part 1: The levels of the Organizational Factors in the digital era of vocational colleges in Shaanxi Province

The analysis shows that organizational factors of vocational colleges, overall, are at a moderate level. When considering each aspect in descending order, the highest average is in social relations, followed by organizational culture and training for self-development. Next is workplace adaptability, followed by leadership. The lowest averages are found in institutional structure and application of technology.

Part 2: The level of Teacher Competency in the digital era of vocational colleges in Shaanxi Province.

It is found that teacher's competency in the digital era, overall, is at a moderate level. When considering each aspect in descending order, the highest average is in problem solving, followed by safety and digital content creation. Other aspects include communication skill and information literacy, which has the lowest average but remains within the moderate level.

Part 3: Result of analysis of the Pearson Product Moment Correlation coefficient

From the Pearson correlation coefficient analysis, it is found that the Pearson correlation coefficient analysis between organizational factors (independent variable) and teachers' competency in the digital era (dependent variable) of vocational colleges in Shaanxi province reveals a significant positive correlation. The analysis demonstrates that these relationships are statistically significant at the 0.01 level ($p < 0.01$).

According to the Pearson's correlation coefficient data, there is a broad and significant positive correlation between the factors of organizational factors (X_1 – X_7) and teachers' competency in the digital era of vocational colleges in Shaanxi Province. This fully highlights the importance of personal, social, organizational, policy, cultural, and work-life balance factors in shaping female leadership effectiveness. The findings emphasize that institutions should focus on enhancing leadership development programs, promoting gender-inclusive policies, fostering cultural awareness, and ensuring work-life balance to empower female leaders in vocational education. This optimization will help strengthen leadership confidence, decision-making ability, motivation, adaptability, and overall leadership success, ensuring that female leaders can thrive and contribute effectively to their professional environments.

This fully highlights the importance of leadership, organizational culture, institutional structure, social relations, application of technology, training for self-development, and workplace adaptability in shaping teachers' competency in the digital era. The findings emphasize that vocational colleges should focus on strengthening leadership support, fostering a digitally inclusive organizational culture, enhancing institutional structures, and promoting continuous technological training to empower teachers. This optimization will help improve teachers' digital literacy, adaptability, innovation in teaching, and overall competency, ensuring they can effectively integrate digital tools into their professional practices and enhance the quality of education in the digital era.

Part 4: Results of stepwise multiple regression analysis of Organizational Factors affecting Teacher Competency in the digital era of vocational colleges in Shaanxi province

The model reveals that the identified organizational factors significantly explain the variation in teachers' competency in the digital era within vocational colleges in Shaanxi Province. Key factors include Application of Technology, which plays a crucial role in enhancing teachers' ability to integrate digital tools into their teaching. Workplace Adaptability strengthens digital competency by enabling teachers to adjust to evolving technologies and teaching methodologies. Leadership provides institutional support and strategic direction, fostering digital integration. Social Relations contribute to competency development through collaboration, peer support, and professional networking. Organizational Culture promotes a shared vision for digital education, encouraging innovation and continuous learning. Training for Self-development enhances teachers' digital skills by offering professional development opportunities. Institutional Structure ensures access to digital resources, clear policies, and a well-organized support system. Together, these factors significantly influence teachers' digital competency, demonstrating the importance of a well-rounded organizational framework in fostering effective technology integration in education.

Part 5: Results of the guideline for developing Teacher Competency in the digital era of vocational colleges in Shaanxi province.

The study of teacher competency in the digital era of vocational colleges in Shaanxi Province identified seven key organizational factors that collectively influence teachers' digital competency. These factors include leadership, organizational culture, institutional structure, social relations, application of technology, training for self-development, and workplace adaptability. The model demonstrated a strong multiple correlation, explaining a significant portion of the variance in teachers' competency in digital education. Among these factors, application of technology had the most substantial impact, followed by workplace adaptability and leadership. Organizational culture, institutional structure, social relations, and training for self-development also contributed positively to teachers' digital competency. Each factor in the model represents a critical aspect of digital competency development. Leadership provides strategic direction, professional development, and institutional support. Organizational culture fosters a digital-first mindset, encouraging innovation and collaboration. Institutional structure ensures clear policies, governance, and access to digital resources. Social relations promote teamwork, mentorship, and professional networking. Application of technology strengthens digital teaching by providing advanced tools and structured institutional support. Training for self-development enables continuous learning and adaptation to new digital advancements. Workplace adaptability enhances teachers' resilience and readiness for technological changes.

By strengthening these organizational factors, vocational colleges in Shaanxi Province can significantly enhance teachers' digital competency, ensuring effective technology integration and sustainable improvements in digital teaching and learning.

Based on the analysis results, the development of teacher competencies in the digital era of vocational colleges in Shaanxi Province has been formulated as follows:

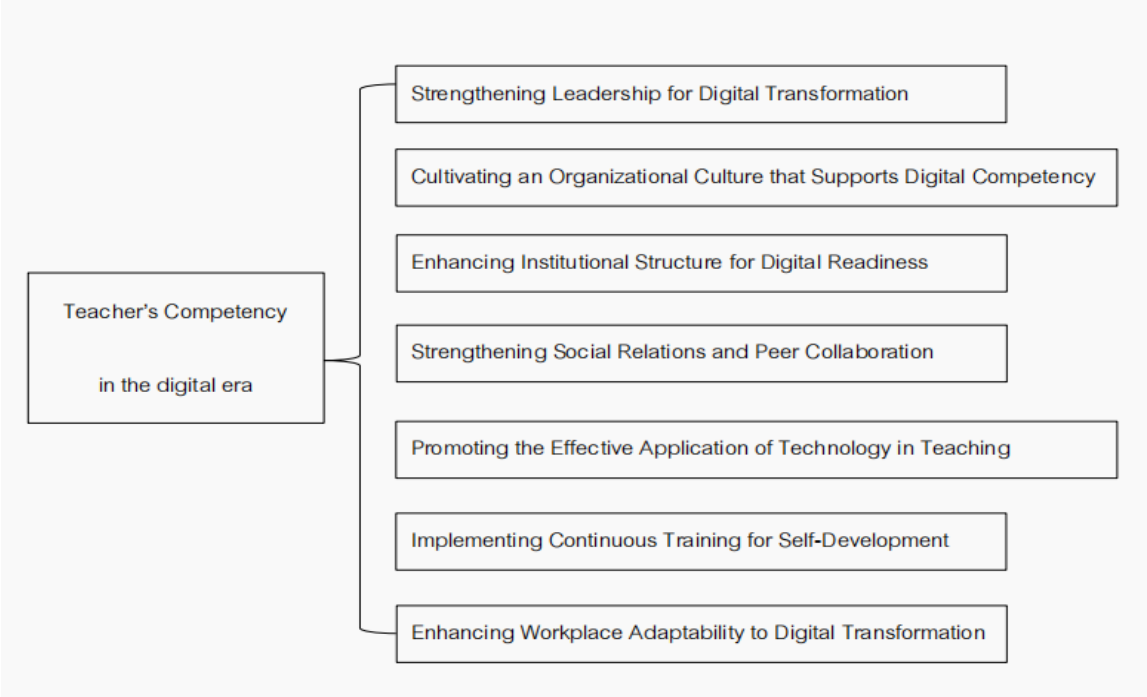

Figure 2 The development of teacher competency in the digital era of vocational colleges in Shaanxi Province

Discussion of research results

1. The Level of Organizational Factors in the Digital Era of Vocational Colleges in Shaanxi Province

The study examined organizational factors affecting teachers' digital competency in vocational colleges in Shaanxi Province, identifying seven key attributes: leadership, organizational culture, institutional structure, social relations, application of technology, training for self-development, and workplace adaptability.

Social relations, ranked highest, provided emotional and professional support, fostering teamwork and collaboration in overcoming digital teaching challenges. This aligns with findings emphasizing that strong interpersonal collaboration enhances teachers' engagement and adaptability in digital environments (Adeniyi et al., 2024; Lazarević & Ružičić, 2023). Organizational culture, ranked second, promotes participation, innovation, and openness toward the adoption of digital technologies, consistent with the argument that a supportive culture fosters digital transformation in education (Holilah & Hajjaj, 2024; Garifullina & Gilmanov, 2024).

Training for self-development, which ranked third, ensures that teachers have continuous access to professional learning opportunities, reinforcing the importance of lifelong learning in digital competency development (Ismail, 2024; Lian & Juliansyah Putra, 2022).

Workplace adaptability, ranked fourth, highlights teachers' resilience and willingness to experiment with new teaching strategies, supporting findings that adaptability is a key trait in digital-era educators (Li, 2024).

Leadership, placed fifth, supports digital teaching initiatives but shows a need for clearer strategic direction in digital competency development—echoing studies that stress the pivotal role of leadership in guiding digital innovation (Adeniyi et al., 2024). Institutional structure, ranked sixth, facilitates digital integration into curricula, yet gaps remain in technological infrastructure and administrative support (Hu & Shen, 2022). Finally, application of technology, ranked lowest, reflects the need to strengthen teachers' motivation and perception of digital tools as essential for modern pedagogy (Zheng et al., 2021).

Overall, these findings suggest that while organizational factors substantially enhance teachers' digital competency, improvements in leadership focus, institutional support, and infrastructure are essential to deepen digital integration in vocational colleges (Castañeda et al., 2021; Méndez et al., 2022).

2. The Level of Teachers' Digital Competency in Vocational Colleges in Shaanxi Province

The analysis of teachers' digital competency revealed five main dimensions: problem-solving, safety, digital content creation, communication and collaboration, and information literacy.

Problem-solving ranked highest, indicating that teachers demonstrate strong abilities in troubleshooting and addressing digital teaching challenges. This is consistent with previous findings that link problem-solving skills to teachers' effective use of educational technology (Méndez et al., 2022). Cybersecurity, ranked second, reflected teachers' awareness of data protection, copyright, and privacy laws, though more efforts are needed to promote ethical digital citizenship among students (Aksay Albuz, 2023).

Digital content creation, the third dimension, highlighted teachers' abilities to design customized and creative digital materials, but also revealed a need to integrate more multimedia and interactive elements (Castañeda et al., 2021). Communication and collaboration, ranked fourth, demonstrated teachers' strengths in using digital platforms for discussion and teamwork but showed gaps in engaging with parents and external stakeholders (Lian & Juliansyah Putra, 2022).

Finally, information literacy, ranked lowest, revealed teachers' competence in guiding students to access online information but indicated limited emphasis on evaluating the credibility of sources (Zheng et al., 2021). These findings confirm that while teachers in Shaanxi vocational colleges possess moderate digital competency, there remains a need for greater emphasis on ethics, creativity, and collaborative digital practices to improve overall competency (Garifullina & Gilmanov, 2024; Hu & Shen, 2022).

3. Enhancing Teachers' Digital Competency Through Organizational Factors

The findings indicate that several organizational factors—application of technology, workplace adaptability, organizational culture, training for self-development, social relations,

leadership, and institutional structure—significantly influence teachers' digital competency in vocational colleges in Shaanxi Province.

Application of technology emerged as the most impactful factor, showing that teachers' ability to integrate digital tools into instruction is central to improving competency (Méndez et al., 2022). Workplace adaptability closely followed, underscoring the importance of flexibility and openness to technological change (Li, 2024). Organizational culture and training for self-development both played crucial roles in sustaining digital transformation by providing supportive environments and continuous learning opportunities (Holilah & Hajjaj, 2024; Ismail, 2024).

Social relations and leadership contributed by encouraging collaboration and providing strategic direction (Adeniyi et al., 2024; Lazarević & Ružičić, 2023). Finally, institutional structure, though least influential, still supports digital competency through policy frameworks and resource allocation (Hu & Shen, 2022).

These findings align with international research emphasizing that technological readiness, adaptability, institutional culture, and professional development are key drivers of teachers' digital proficiency (Castañeda et al., 2021; Creswell & Clark, 2017). Therefore, vocational colleges should prioritize comprehensive digital integration, structured professional training, and flexible institutional frameworks to enhance teachers' digital readiness and sustain innovation in teaching and learning.

Recommendations

Recommendations for Practical Implementation

1) Strengthening Leadership for Digital Transformation

Effective leadership is crucial in developing teachers' digital competency in vocational colleges. Administrators should undergo training programs to enhance their strategic leadership skills, provide clear digital transformation policies, and allocate resources for digital infrastructure and professional training. Encouraging innovation in teaching and fostering the use of emerging digital tools will further improve teaching effectiveness.

2) Cultivating an Organizational Culture that Supports Digital Competency

Creating a strong digital culture in colleges is essential to boosting teachers' confidence and motivation in adopting technology. Colleges should involve teachers in decision-making related to digital education, promote collaboration through knowledge-sharing platforms, and recognize teachers' achievements in integrating technology into their teaching.

3) Enhancing Institutional Structure for Digital Readiness

To support digital readiness, colleges must optimize their institutional structures by facilitating collaboration, reducing unnecessary workloads, and providing access to modern technology. Promoting knowledge sharing and rewarding teachers who successfully integrate digital tools into their teaching will also strengthen the institutional framework for digital competency.

4) Strengthening Social Relations and Peer Collaboration

Fostering positive relationships among teachers is key to enhancing their digital competency. Colleges should establish support networks like Professional Learning Communities (PLCs), implement mentoring programs where senior teachers guide less experienced ones, and encourage participation in online professional communities to discuss digital teaching strategies.

5) Promoting the Effective Application of Technology in Teaching

Colleges should provide teachers with hands-on digital training and encourage experimental learning to help them integrate digital tools into their teaching. Teachers should also be trained to use AI-based tools and analytics to enhance learning outcomes, ensuring they are well-equipped to utilize technology effectively in the classroom.

6) Implementing Continuous Training for Self-Development

Continuous professional development programs should focus on digital skills, including content creation, platform usage, and assessments via technology. Personalized digital training programs, access to online resources, and encouragement of self-directed learning will ensure that teachers stay updated with digital advancements.

7) Enhancing Workplace Adaptability to Digital Transformation

Workshops and activities should be organized to enhance teachers' adaptability to digital transformation. Fostering a growth mindset, providing contingency plans for digital disruptions, and offering stress management support will help teachers remain confident in their ability to use new technologies and cope with changes in their work environment.

Recommendations for Policy

The policy recommendations highlight the importance of strategic collaboration, investment in digital infrastructure, providing incentives for skill development, and creating support systems to foster continuous improvement. Implementing these strategies will enhance teachers' competency and ensure the successful integration of digital technology in vocational colleges.

1) Establish a Systematic Digital Skill Development Framework

Government agencies and educational institutions should collaborate to develop national and institutional policy frameworks that cover teachers' digital skill training, professional development, and competency standards. Digital technology training should be integrated into continuous professional development (CPD) plans to ensure teachers systematically enhance their digital competencies.

2) Increase Investment in Digital Infrastructure and Resources

Policies should focus on investing in high-speed internet, digital devices, educational software, and online learning platforms to provide teachers with essential tools for effective digital teaching. The government should collaborate with the private sector and technology industries to ensure digital competency development aligns with market trends and workforce demands.

3) Encourage and Support Teachers’ Digital Skill Development

Policies should introduce rewards, financial incentives, and career advancement opportunities to motivate teachers to develop digital skills. Additionally, help centers and mentoring systems should be established to provide guidance and support in applying digital technology in teaching.

4) Establish Monitoring and Sharing Mechanism

Evaluation criteria and key performance indicators (KPIs) should be developed to monitor teachers' progress in using digital technology and provide continuous feedback for improvement. Furthermore, networks or online communities should be created to facilitate the sharing of best practices, experiences, and digital technology resources, fostering collaborative learning and sustainable digital competency development.

Recommendations for Further Research

1) Comparative Research in Diverse Contexts: Future research should explore vocational colleges in other regions or countries with varying organizational structures, organizational cultures, and educational policies. This would allow for a comparative analysis of how organizational and individual factors influence teachers' digital competencies in different settings.

2) Exploration of Technology-Student Outcome Relationships: Further studies should investigate the relationship between teachers' use of technology and students' academic outcomes. This would help analyze how the integration of technology by teachers impacts students' learning experiences and outcomes and identify contexts where technology use maximizes effectiveness.

3) Development of Conceptual Framework for Digital Competency: Research should focus on developing conceptual frameworks and measurement tools for assessing teachers' digital competencies in the context of vocational colleges. This would help establish clear benchmarks for evaluating and enhancing teacher competencies and provide an in-depth analysis of the components that significantly influence digital competencies.

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