The Influence of Educational Policy, Organizational Culture, Communication, and Ethics in Technology Use on the Digital Teaching Competency of Vocational College Instructors in the Guangxi Zhuang Autonomous Region, China

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Abstract

Pedagogical digital competence has become a core capability for vocational teachers amid accelerating digital transformation. While existing studies highlight the role of individual skills or policy support, limited empirical research has integrated policy, organizational mechanisms, and ethical practices within a single analytical framework. This study examines the relationships among educational policy, organizational culture, communication, ethics in technology use, and pedagogical digital competence of vocational university teachers in Guangxi Zhuang Autonomous Region, China. A mixed-methods sequential explanatory design was adopted. Survey data from 400 vocational teachers were analyzed using Structural Equation Modeling (SEM), followed by qualitative interviews to contextualize the findings. The results show that educational policy has a significant direct effect on pedagogical digital competence. Organizational culture and communication play important mediating roles, while ethics in technology use contributes to sustainable and responsible digital teaching practices. The study provides empirical evidence for a multi-level framework of vocational teacher preparation and offers practical implications for digital transformation in vocational education.

Keywords

Vocational Education, Teacher Preparation; Pedagogical Digital Competence, Educational Policy Organizational Culture.

I. INTRODUCTION

Digital transformation has reshaped vocational education systems by integrating digital platforms, intelligent technologies, and data-driven teaching practices. As a result, vocational teachers are increasingly expected to redesign instructional processes and align teaching with rapidly changing industrial demands. Pedagogical digital competence is widely recognized as a core dimension of contemporary teacher professionalism, emphasizing not only technical proficiency but also the pedagogical integration of digital technologies into teaching and learning processes [1] [2].

This understanding is further aligned with international teacher digital competence frameworks, which conceptualize digital competence as a professional and pedagogical capability rather than a purely technical skill [3]. In China, national initiatives such as Education Informatization 2.0. In China, recent studies indicate that national policies have increasingly emphasized the role of digital competence in vocational education reform, particularly in relation to teacher development and institutional governance [4] [5]. Digital China emphasize the digital upgrading of vocational education. However, regional disparities persist, particularly in western and border areas. Guangxi Zhuang Autonomous Region, a key area under the Belt and Road Initiative, faces challenges related to uneven digital infrastructure and limited institutional support for teacher digital development.

Existing research has largely focused on policy frameworks or individual digital skills, while insufficient attention has been paid to organizational mechanisms that translate policy into teaching practice. This study addresses this gap by examining how educational policy influences vocational teachers' pedagogical digital competence through organizational culture, communication, and ethics in technology use.

II. LITERATURE REVIEW

Research on vocational teachers' digital competence can be grouped into three main strands. First, policy-oriented studies emphasize the guiding role of national and regional policies in promoting digital infrastructure, teacher training, and curriculum reform. However, these studies often lack micro-level explanations of how policy affects teaching practice.

Second, organizational research highlights the importance of organizational culture and internal communication. Supportive and collaborative cultures encourage teachers to adopt digital technologies, while effective communication facilitates policy implementation and knowledge sharing within institutions. Empirical research in vocational education has shown that

organizational culture and internal communication significantly shape teachers' responses to policy initiatives and innovation processes, particularly by facilitating collaboration and shared understanding within institutions [6] [7]. From an organizational perspective, shared values, norms, and leadership practices constitute the cultural context in which teachers interpret and enact reform initiatives [8].

Third, recent studies increasingly focus on ethics in technology use, including data privacy, professional responsibility, and responsible digital behavior. Ethical awareness is essential for ensuring the sustainability and credibility of digital teaching practices.

Despite these insights, existing studies remain fragmented. Few empirical studies integrate policy, organizational, and ethical factors into a unified model, particularly within vocational education contexts. This study seeks to fill this gap through structural modeling and mixed-methods analysis.

III. RESEARCH FRAMEWORK AND HYPOTHESES

Based on the literature review and theoretical foundations, this study proposes a conceptual framework to examine the relationships among educational policy, organizational culture, communication, digital skills, and vocational teachers' digital teaching competence. The framework adopts a multi-level perspective, in which educational policy represents a macro-level institutional factor, organizational culture and communication function as meso-level organizational mechanisms, and digital skills reflect teachers' individual-level capacities.

Educational policy is assumed to shape the institutional environment of vocational colleges by providing strategic direction, regulatory guidance, and resource support for digital transformation. Organizational culture and communication are conceptualized as key organizational processes through which policy intentions are interpreted and enacted in daily teaching practices. Digital skills are positioned as an enabling factor that directly supports teachers' effective use of digital technologies in instructional design and delivery.

Accordingly, the following hypotheses are proposed:

H1: Educational policy has a significant positive effect on vocational teachers' digital teaching competence.

H2: Educational policy has a significant positive effect on organizational culture.

H3: Educational policy has a significant positive effect on communication.

H4: Educational policy has a significant positive effect on teachers' digital skills.

H5: Organizational culture has a significant positive effect on vocational teachers' digital teaching competence.

H6: Communication has a significant positive effect on vocational teachers' digital teaching competence.

H7: Digital skills have a significant positive effect on vocational teachers' digital teaching competence.

H8: Organizational culture mediates the relationship between educational policy and digital teaching competence.

H9: Communication mediates the relationship between educational policy and digital teaching competence.

H10: Digital skills mediate the relationship between educational policy and digital teaching competence.

IV. METHODOLOGY

A. Research Design

This study adopted an explanatory sequential mixed-methods design, in which quantitative data collection and analysis were conducted first, followed by qualitative inquiry to further interpret and contextualize the quantitative findings. This research design is particularly suitable for examining complex educational phenomena that involve both structural relationships among variables and contextual influences within institutional settings.

The quantitative phase aimed to test the hypothesized relationships among educational policy, organizational culture, communication, ethical technology use, and teachers' digital teaching competence. The qualitative phase complemented the statistical results by exploring how institutional practices and teachers' experiences shaped the enactment of digital teaching policies in vocational colleges.

B. Participants and Data Collection

The quantitative data were collected through a structured questionnaire administered to teachers from four public higher vocational colleges in Guangxi Zhuang Autonomous Region, China. A total of 400 questionnaires were distributed using a stratified sampling approach to ensure representation across disciplines and teaching experience levels. After data screening, valid responses were retained for subsequent analysis.

The questionnaire employed a five-point Likert scale, ranging from 1 ("strongly disagree") to 5 ("strongly agree"). Measurement items were adapted from validated instruments used in previous studies on digital competence, organizational culture, communication, and technology acceptance, with wording adjusted to fit the vocational education context.

C. Measurement and Reliability

To ensure measurement quality, reliability and validity tests were conducted prior to structural analysis. Internal consistency was assessed using Cronbach's alpha, with all constructs exceeding the commonly accepted threshold of 0.70. Construct validity was examined through confirmatory factor analysis, indicating satisfactory convergent and discriminant validity among the latent variables.

These results suggest that the measurement model was statistically robust and suitable for further structural equation modeling.

D. Data Analysis

Structural equation modeling (SEM) was employed to examine the hypothesized relationships among the study variables. SEM was selected due to its ability to simultaneously assess multiple dependency relationships and account for measurement error in latent constructs. Data analysis was conducted using SPSS 26.0 for descriptive statistics and AMOS 24.0 for model estimation.

Model fit was evaluated using multiple indices, including the chi-square statistic, comparative fit index (CFI), Tucker–Lewis index (TLI), and root mean square error of approximation (RMSEA). The overall model demonstrated acceptable fit, supporting the proposed theoretical framework.

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In the quantitative phase, a questionnaire survey was conducted among 400 vocational university teachers from four institutions in Guangxi using multistage random sampling. The questionnaire measured five constructs: educational policy, organizational culture, communication, ethics in technology use, and pedagogical digital competence. Measurement items were adapted from established digital competence and technology acceptance studies and assessed using a five-point Likert scale.

Data were analyzed using SPSS 26.0 and AMOS 24.0. Reliability analysis showed Cronbach's alpha values above 0.80 for all constructs. Confirmatory factor analysis confirmed acceptable convergent and discriminant validity. Structural Equation Modeling (SEM) was applied to examine direct and mediating relationships among variables. Structural Equation Modeling has been widely applied in studies examining technology acceptance and digital competence in educational contexts, particularly for testing direct and mediating relationships among latent variables [9] [10].

In the qualitative phase, semi-structured interviews were conducted with selected teachers and administrators. Thematic analysis was used to explore how policies were interpreted and implemented at the institutional level, providing contextual explanations for the quantitative results.

V. FINDINGS

Recent systematic reviews further confirm the suitability of such analytical approaches for investigating digital and mobile learning adoption among teachers [11] [12]. The SEM results indicate that educational policy has a significant positive effect on vocational teachers' pedagogical digital competence. Organizational culture and communication partially mediate this relationship, suggesting that policy influence is largely realized through institutional environments and interaction mechanisms. Ethics in technology use also shows a positive effect, reinforcing responsible and sustainable digital teaching practices.

Qualitative findings further reveal that supportive leadership, transparent communication, and shared ethical norms are critical conditions for effective digital transformation in vocational institutions.

VI. DISCUSSION

The findings of this study have several important implications for vocational teacher preparation and professional development. First, the significant role of educational policy suggests that teacher training programs should be closely aligned with national and regional digitalization strategies. Rather than treating digital competence as an optional or supplementary skill, vocational teacher preparation should systematically integrate digital pedagogy into both pre-service and in-service training frameworks.

Second, the mediating effects of organizational culture and communication highlight the need for institutional support mechanisms in teacher development initiatives. Training programs should therefore go beyond individual skill acquisition and address organizational conditions that facilitate collaborative learning, peer support, and shared understanding of digital teaching goals. Leadership practices that promote open communication and participatory decision-making can further enhance teachers' engagement with digital transformation initiatives.

Third, the influence of ethical technology use underscores the importance of incorporating ethical considerations into digital competence development. Vocational teachers often work with industry-oriented platforms, student data, and digital assessment tools, which raises concerns related to data privacy, professional responsibility, and appropriate technology use. Teacher preparation programs should explicitly address these issues to foster responsible and sustainable digital teaching practices.

Finally, the proposed framework provides a reference for vocational education institutions in developing regions that are undergoing digital transformation. By emphasizing the interaction between policy, organizational context, and ethical practice, this study offers a transferable approach to understanding and enhancing digital teaching competence across diverse vocational education settings.

VII. CONCLUSION

This study demonstrates that vocational teachers' pedagogical digital competence is shaped by a multi-level interaction among educational policy, organizational culture, communication, and ethics in technology use. Rather than being solely an individual capability, digital competence emerges from the alignment between policy intentions and organizational practices.

The findings suggest that vocational teacher preparation should move beyond technology training alone and focus on strengthening institutional culture, communication mechanisms, and ethical awareness. Although based on data from Guangxi, the proposed framework offers insights relevant to other developing regions undergoing similar digital transformation processes. Similar challenges related to regional disparities and uneven digital development have been reported in studies focusing on rural and developing contexts, suggesting that the findings of this study may offer transferable insights beyond the specific regional setting examined [13] [14].

VIII. RESEARCH LIMITATIONS AND PROSPECTS

This study is limited by its regional focus and cross-sectional design. Future research may adopt longitudinal or comparative international approaches, incorporate leadership and learning outcome variables, and further explore vocational teacher digital competence in diverse institutional contexts.

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