

DIGITAL EDUCATIONAL TECHNOLOGY USAGE BEHAVIOR MODEL OF HIGHER VOCATIONAL COLLEGE TEACHERS IN SHAANXI PROVINCE*

Chengjun Shi¹ and Suttipong Boonphadung²

¹⁻²Suan Sunandha Rajabhat University, Thailand

Corresponding Author's Email: S65584951033@ssru.ac.th

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Abstract

This research article aims to: 1) To study the level of digital educational technology usage behavior of higher vocational college teachers in SHAANXI Province. 2) To study the confirmatory factors of digital educational technology usage behavior of higher vocational college teachers in SHAANXI Province. 3) To study the digital educational technology usage behavior model of higher vocational college teachers in SHAANXI Province. Collecting data from 550 teachers and administrators from higher vocational colleges in SHAANXI Province; analyze the data using statistical software and thematic analysis of expert interviews.

The research results found that: 1) Descriptive statistical analysis indicates that vocational college faculty demonstrate high levels of endorsement and engagement with digital educational technologies across all observed variables. 2) Confirmatory factor analysis validated the structural integrity of seven latent constructs—each comprising four sub-dimensions with strong internal

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consistency and construct validity. 3) By integrating quantitative findings with qualitative conclusions from expert interviews, a teacher digital technology usage behavior model tailored to Shaanxi's higher vocational education system was successfully constructed.

Keywords: digital educational technology, Technology Usage Behavior model, Higher Vocational Colleges

Introduction

Higher vocational education is undergoing a profound global digital transformation. It needs to meet the immediate and practical demands of the labor market while also providing learners with the enduring and interdisciplinary skills necessary for lifelong adaptation (World Bank, 2023). The Ministry of Education of China released the official "Industry Standards for Teachers' Digital Literacy" (Ministry of Education, 2023), which defines teachers' digital literacy from five key dimensions: digital awareness, digital technology knowledge and skills, digital application, digital social responsibility, and professional development. Although the digitalization process has been vigorously promoted, the development of many vocational colleges in Shaanxi Province is not balanced. This is due to the differences in their educational concepts and basic resources. Although the existing technology acceptance models are relatively common, they often cannot cope with the special technical challenges faced by vocational colleges.

Existing literature typically views digital literacy as a general skill rather than a specialized ability in a specific field. Although some studies have explored digital capabilities in vocational education, these studies often overestimate the degree of actual teaching integration. In addition, there is currently a lack of evidence on how local environmental factors interact with personal anxiety and efficacy. This study adopts a mixed-method design to explore the technology

adoption mechanism, aiming to fill the above research gaps. By combining quantitative factor analysis with qualitative expert insights, this study constructs a comprehensive framework applicable to the vocational education environment in Shaanxi Province of China. The research results have practical value for policy formulation and institutional evaluation, helping managers go beyond simple hardware procurement and achieve true capacity building.

Objectives

- 1) To study the level of digital educational technology usage behavior of higher vocational college teachers in SHAANXI Province.
- 2) To study the confirmatory factors of digital educational technology usage behavior of higher vocational college teachers in SHAANXI Province.
- 3) To study the digital educational technology usage behavior model of higher vocational college teachers in SHAANXI Province.

Literature Review

1. Thematic Synthesis of Digital Transformation in Vocational Education

Mukul, E., et al. (2023) positioned educational digitization at the intersection of automation, data-driven approaches, and novel human-machine collaborative learning models through a review of Education 4.0 literature. The study identified four major obstacles: excessive teacher workload, misaligned assessment systems, uneven digital literacy, and institutional inertia. It also criticized technological solutionism, emphasizing that effectiveness hinges on pedagogical redesign, teacher professional development, and data ethics governance.

2. Theoretical Justification for the Seven-Dimensional Framework

The Technology Acceptance Model (TAM/UTAUT) provides foundational logic but often lacks the targeted details required for technology-intensive professional fields. This study argues for the validity of a seven-dimensional framework by synthesizing three thematic clusters identified in recent academic research:

1) Facilitating Conditions (FC)

Tessmer, M. (2019) systematically identified key factors for promoting the success of technology-enhanced learning, emphasizing that technological support and infrastructure are crucial enabling conditions.

2) Social Influence (SI)

Falk, E., Scholz, C., Cooper, N., & Gomes, V. (2025) point out that the vast majority of human behavior and thought are shaped by social influences, whether deliberate or subconscious.

3) Performance Expectancy (PE)

Zhou (2023) employed the UTAUT model to investigate factors influencing college students' mobile learning behavior. Performance Expectancy (PE) was defined as the belief that "mobile learning can enhance learning effectiveness."

4) Effort Expectancy (EE)

Norman (2020) explores how design influences user experience in his groundbreaking work, emphasizing the importance of usability in everyday objects.

5) Technological Self-Efficacy (TSE)

Hodges, C. B. (Ed.). (2018) Compilation of recent research and literature reviews on self-efficacy in diverse instructional technology contexts. This volume examines self-efficacy among teachers and learners in K-12 and higher education

from an international perspective, emphasizing the concept's critical role in effectively designing technology-integrated learning environments.

6) Technology Anxiety (TA)

Brosnan (2002) synthesizes experimental and survey evidence to demonstrate that technophobia diminishes users' perceived competence with information and communication technologies (ICT).

7) Attitude (ATT)

Venkatesh, V et al. (2003) noted that performance expectancy is the strongest direct predictor of behavioral intention, and indicated that in many contexts, the expected influence operates partially through attitudes.

3. Hypothesized Mechanisms and Model Logic

This model makes the following assumptions based on the following logic: Digital Technology Usage Behavior (DET) constitutes a secondary structure, which is manifested through the following seven dimensions. We assume that FC constitutes the environmental framework, SI plays the main external driving role, while PE, EE, TSE, TEA and ATT act as the core internal driving factors.

Research methodology

1. Research Design

This study employed a mixed-methods research design. Quantitative and qualitative data were collected concurrently and integrated throughout the research process to enhance its validity and contextual relevance. The quantitative component established a CFA model with sound reliability and validity, while the qualitative component elucidated the mechanisms and contextual factors influencing vocational college teachers' digital educational technology usage behaviors.

2. Quantitative Methods

Sampling Technique:

The survey participants comprised administrators and faculty members from higher vocational colleges in SHAANXI Province. A total of 550 questionnaires were distributed, with 500 valid responses retained after screening (response rate: 91.00%). Participants exhibited diversity in disciplinary backgrounds, professional titles, and teaching experience.

Instrument Validation:

The structured questionnaire was adapted from the UTAUT framework and contextualized for vocational education. The instrument underwent review by five experts to calculate the Index of IOC, ensuring all items scored above 0.8. A pilot study was conducted with 50 vocational teachers (outside the final sample) to ensure clarity. Initial Cronbach's alpha values for all seven dimensions exceeded 0.80, confirming strong internal consistency.

3. Qualitative Methods

Inclusion Criteria:

Key informants (n=9) were selected using purposive sampling. Criteria for selection included: (1) at least 10 years of experience in vocational education; (2) current roles in institutional digital transformation or teacher development; and (3) a published record or professional certification in educational technology.

Coding Process and Reliability

Interview content was transcribed and analyzed using thematic analysis. To ensure reliability and minimize researcher bias, inter-rater reliability was assessed. Two researchers independently coded 30% of the interview transcripts, yielding a Cohen's Kappa coefficient of 0.82. This indicates high agreement between the two researchers prior to finalizing the themes (fundamental drivers, internal drivers, and external drivers).

4. Data Integration Strategy

Quantitative analysis. Descriptive statistics (mean, standard deviation) summarize DET levels; correlation matrices analyze associations; confirmatory factor analysis (CFA) evaluates dimensional structure. Reliability and validity assessments utilize Cronbach's alpha, KMO test, composite reliability (CR), average variance extracted (AVE), funnel-lark criteria, and maximum shared variance (MSV).

Qualitative analysis. Thematic categories were identified through inductive coding: foundational conditions, internal drivers, and external drivers.

Integration. Findings were synthesized through narrative weaving, with statistical results supported or elaborated by specific expert citations to construct the final teacher digital competency model.

Results

1. Quantitative Findings

Descriptive statistics. In the five-point scale, the average score range is between 2.55 and 4.07, with a standard deviation ranging from 0.833 to 1.246. This indicates that the overall evaluation is relatively positive and the degree of difference is moderate, which is conducive to differentiation.

Correlation. All seven domains are positively correlated. As shown in Figure 4.1, $CMIN = 652.792$; $DF = 343$; $CMIN/DF = 1.903 < 3$; $GFI = 0.915 > 0.8$; $AGFI = 0.900 > 0.8$; $TLI = 0.943 > 0.9$; $CFI = 0.949 > 0.9$; $RMR = 0.043 < 0.08$; $RMSEA = 0.043 < 0.08$. The results show that all statistical indicators are within the acceptable threshold range, indicating that the model fits well, meets the requirements of structural validity, and reaches or exceeds the conventional threshold.

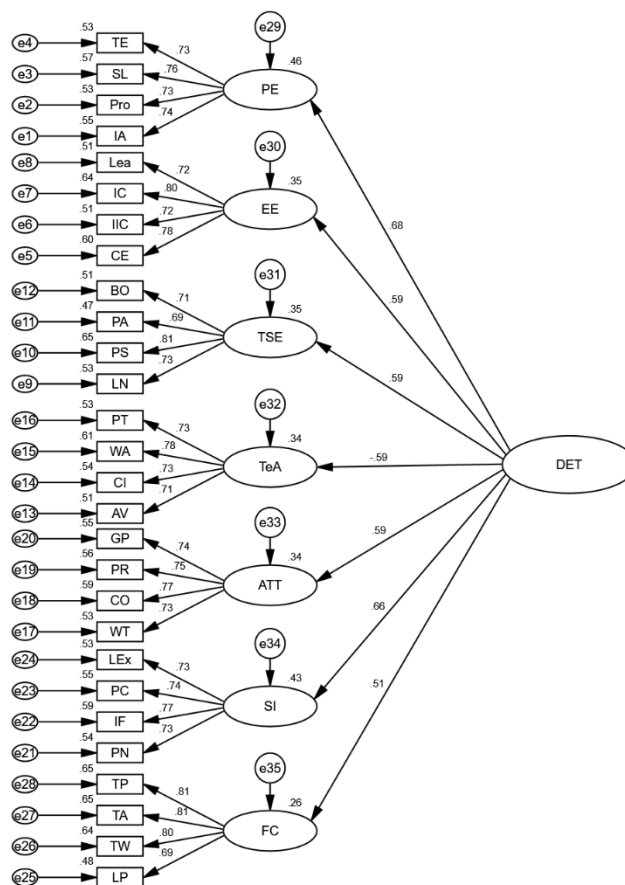


Figure 1 Multiple-Variable Confirmatory Factor Analysis Results

The second-order Confirmatory Factor Analysis (CFA) confirms that Digital Educational Technology (DET) usage behavior is a robust multidimensional construct. While all fit indices meet or surpass conventional thresholds, the factor loadings for individual indicators provide critical insights into the specific behaviors driving each dimension.

2. Qualitative Insights

After conducting expert interviews and applying thematic analysis, the following conclusions were drawn:

Foundational Environment: Organizational enabling conditions (FC) form the "hard environment" for technology adoption. Stable equipment and network infrastructure, coupled with effective training and incentive measures, lay the groundwork for teachers to dare to experiment.

External Drivers: Social Influence (SI) constitutes the "soft environment." Successful examples from colleagues and positive student feedback serve as "catalysts" motivating teachers to experiment.

Internal Drivers: Performance Expectations (PE) and Effort Expectations (EE) effectively elevate individual cognitive levels; Technology Anxiety (TEA) acts as a primary "resistance factor"; while Technology Self-Efficacy (TSE) serves as the core "driving force."

3. Integrated Teachers' Digital Competence Model

The interview data indicate that the digital technology usage behavior of teachers in higher vocational colleges is influenced by seven interrelated factors.

The final model integrates these findings into a logical chain. Quantitative data provides a structural framework, while qualitative insights clarify the "organic chain" situation: once the basic conditions (FC) stabilize, internal psychological driving factors such as self-efficacy and performance expectations will interact with social influences, thereby promoting adoption. This synergy ultimately enhances digital literacy in the vocational education system in Shaanxi.

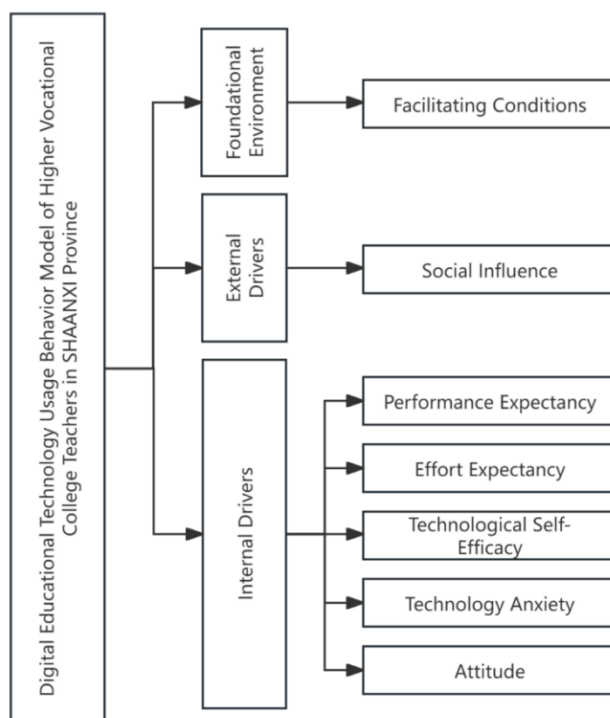


Figure 2 Digital Educational Technology Usage Behavior Model of Higher Vocational College Teachers in SHAANXI Province

Discussion

1. Integrative discussion

This study aims to conduct a benchmark assessment of the digital technology usage behavior (DET) of teachers in higher vocational colleges in Shaanxi Province. Through confirmatory factor analysis, this study verified a multi-dimensional measurement structure and constructed a development model that is consistent with the actual situation in this province. The research results indicate that teachers generally possess high digital literacy and have formed a secondary structure consisting of seven dimensions: performance expectations, effort expectations, technological self-efficacy, technological anxiety, attitude, social influence, and facilitating conditions.

2. Suggestions for Institutions and Policies

Establish "low-risk pilot laboratories": so that teachers can test digital tools without the presence of students. This directly addresses the issue of "fear of embarrassment" raised in the interviews.

Implement a peer mentoring network: The school should shift from top-down administrative pressure to a "peer assistance" model. Designate "digital mentors" in each department and provide the necessary "social influence" to promote behavioral norms.

Distributed technical troubleshooting centers: Deploying technical support staff to digital education laboratories in a distributed manner can provide "hard environmental" support for immediate problem-solving, thereby enhancing teachers' confidence.

Course integration incentive mechanism: A course-oriented digitalization is more effective than a hardware-oriented model. Each institution should link the use of digital tools with specific teaching modules rather than adopting a general performance-based reward approach.

3. Theoretical Contributions

From a theoretical perspective, this study integrates the UTAUT model with the unique practical background of China's vocational education reform, and makes targeted improvements to it to make it conform to specific regional characteristics. These research findings provide a validated framework for the relevant departments in Shaanxi Province, enabling them to move beyond the limitation of "merely accumulating hardware equipment" and shift towards "soft capacity building", thereby focusing on the psychological and social aspects of teachers' behaviors.

Recommendations

Although this study achieved the expected goals, several limitations have pointed out the direction for future research. The geographical limitations of the samples from SHAANXI Province restricted the generalizability of the research conclusions; moreover, classroom observations and analysis of teaching outcomes were not included in the research scope. In the future, it is necessary to establish correlations between teachers' digital technology application capabilities and dimensions such as classroom quality, student performance, employability, and employer satisfaction, which will provide an important basis for constructing an expandable and high-impact digital transformation management system and project development model for higher vocational education.

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