

Teachers' Perceptions and Readiness for Digital Transformation in Education: Empirical Evidence from Vietnam, a Developing Nation

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For countries to remain competitive in the global knowledge economy, digital transformation of education is becoming increasingly important. As a developing nation, Vietnam recognizes this importance and is adopting policies to integrate digital technology into its education system. This study investigates how teachers in Vietnam are prepared for digital transformation in education using the Unified Theory of Acceptance and Use of Technology. An online survey involved 403 teachers across 22 Vietnamese provinces. Its purpose was to understand their readiness and perspectives on digital tech integration in education. The collected data underwent descriptive and inferential statistical analyses. The findings revealed that teachers in Vietnam demonstrated a moderate degree of readiness to integrate digital transformation into their teaching practices, along with a moderate level of acceptance of its implementation (mean = 3.67 and 3.65, respectively). The survey indicated teachers' positive views on digital education transformation (average rating: 3.28) and its user-friendliness (average rating: 3.42). Preparedness, usefulness perception, and ease of use affected 86.1% of teachers' digital transformation acceptance. As a result, it is possible to assume that Vietnamese teachers intend to implement digital transformation in their teaching. Based on the data gathered, the study concludes that targeted interventions and support are critical to assisting Vietnamese teachers in overcoming the challenges of digital transformation in education. Possible interventions encompass better tech access, enhanced training, fostering innovation in classrooms, and professional development. The study's insights can shape education policies and practices, and enrich literature on digital transformation in developing nations .

Keywords: digital transformation; developing country; education; teachers' perception; readiness

Industry 4.0 tech's appeal drives global education's digital transformation, spanning various nations (Cuellar, 2002; Dede, 2011). Digital tech is now integral to daily life, impacting teaching and research significantly (Al-Khresheh et al., 2022; Habes et al., 2021; Nasim et al., 2022). Every school, community, and country is unique, and no single set of action steps will be appropriate for all digital transformation initiatives (Barba-Sánchez et al., 2021). Vietnam acknowledges digital transformation's importance in education (Hai, 2022) and is

implementing strategies for tech integration (Tung, 2022). Policies' success hinges on teachers' readiness to embrace digital transformation in their teaching (Gunadi et al., 2020). Understanding factors shaping teachers' digital transformation readiness is crucial (Tanveer et al., 2015).

This study fills gaps by exploring teacher attitudes toward education's digital transformation in Vietnam, a rapidly advancing developing nation (Nguyen et al., 2018). By uncovering teachers' digital transformation perspectives, this study guides policymakers and educators in formulating effective tech integration strategies for Vietnamese education.

To reach this goal, the study will tackle these questions:

1. How ready are Vietnamese teachers for education's digital transformation?
2. How do Vietnamese teachers perceive digital transformation in education?
3. How do usefulness, ease of use, and readiness affect Vietnamese teachers' acceptance of digital transformation?
4. What are the challenges faced by Vietnamese teachers when integrating digital technology into their teaching practices?
5. What interventions and support can be implemented to help Vietnamese teachers overcome the challenges associated with digital transformation in education?

To answer these research questions, an online questionnaire was distributed to 403 teachers from 22 provinces in Vietnam. Data analysis involves descriptive and inferential statistics. Results will uncover factors affecting Vietnamese teachers' readiness for digital transformation in education. Additionally, interventions and support strategies will be recommended to address related challenges.

This study contributes to digital transformation in education literature, particularly in developing countries like Vietnam, through meticulous investigation and addressing limitations. The implications of the study's findings will inform policy and practice in the education sector, promoting effective integration of digital technologies and facilitating educational advancement in the digital era.

Literature Review

This literature review concentrates on education's digital transformation, notably in developing nations, like Vietnam. Its goal is to outline theoretical frameworks and empirical research on the topic. It will delve into factors impacting teachers' tech adoption and discuss policy implications, challenges, and opportunities in developing countries, particularly Vietnam.

The Technology Acceptance Model (TAM) (Davis, Jr., 1986) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) offer insights into digital tech adoption (Marangunić & Granić, 2015; Wang et al., 2022). Several studies explored teachers' tech integration perceptions. In China, Li et al., (2019), Teo et al., (2018, 2019) investigated classroom tech usage. Teachers with greater computer self-efficacy and perceived usefulness embraced digital tech in teaching. Similarly, Kashada et al., (2018) in Kenya emphasized tech access and attitudes as vital in determining digital tech adoption.

In education, the UTAUT framework is frequently employed to comprehend factors impacting teachers' digital tech acceptance and use (Abbad, 2021; Al-Anezi & Alajmi, 2021). The UTAUT model states four factors—performance expectancy, effort expectancy, social influence, and facilitating conditions—impact the intention to use digital technology

(Venkatesh et al., 2003). This influences actual use behavior. Gender, age, experience, and voluntariness also affect behavioral intentions (Figure 1).

1. Performance Expectancy (PE): Indicates if using the system enhances job performance gains.
2. Social Influence (SI): Measures an individual's perception of others' belief in their new system use.
3. Efort Expectancy (EE): Reflects the perceived ease of using the system.
4. Facilitating Conditions (FC): Gauges an individual's belief in organizational and technical support for system use.

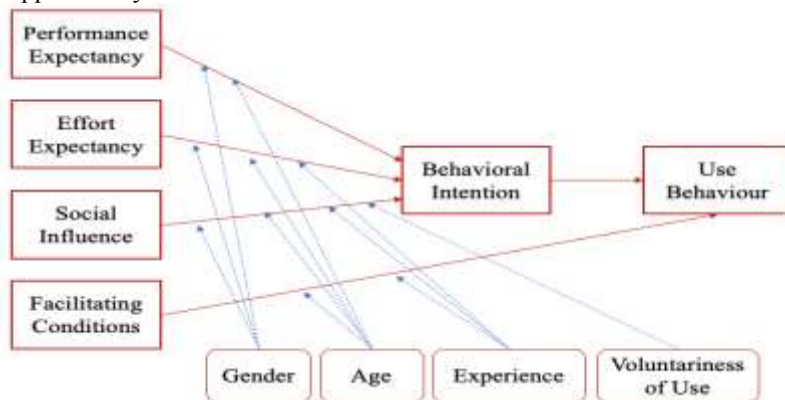


Figure 1. UTAUT model (Venkatesh et al., 2003)

The UTAUT model, widely validated, predicts tech adoption by teachers. This study employs it to explore Vietnamese teachers' digital transformation perceptions and readiness.

Dwivedi et al., (2019) noted many studies utilize a partial UTAUT model, often excluding moderators. They suggest this omission could be due to contextual consistency (Dwivedi et al., 2019). Figure 2 depicts the modified model.

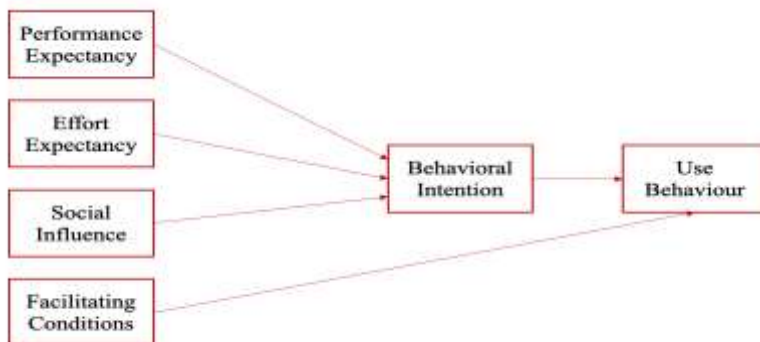


Figure 2. Modified UTAUT model (Dwivedi et al., 2019)

The UTAUT model has been modified to link use behavior to facilitating conditions. Performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC) are all examples of these. PE in this study refers to teachers' belief that digital technology can help them achieve educational goals. EE refers to the usability of digital

technology. SI entails valuing educational digital transformation. FC represents teachers' faith in resources that support the use of digital technology in education.

Numerous education studies used UTAUT to explore factors affecting teachers' tech acceptance and use. Tan (2013) applied UTAUT in Taiwan, finding performance expectancy, effort expectancy, and facilitating conditions as significant predictors of tech use intentions. Empirical studies assessed tech efficacy in education areas like teaching, learning, assessment (Henderson et al., 2017; Nikou & Aavakare, 2021).

Vietnam, as a developing nation, acknowledges digital transformation's role in economic growth and social progress through education (Rhee et al., 2022; Thi et al., 2022; Vasileva et al., 2021). An overview of the educational landscape in Vietnam reveals a growing emphasis on integrating digital technology into teaching and learning practices. The Vietnamese government has implemented various policies and strategies to promote digital literacy and integrate digital technology into its education system (Tran & Tran, 2022). These efforts aim to prepare students for the digital era and create more innovative and effective educational experiences. Government policies and initiatives play a crucial role in driving digital transformation in Vietnamese education. The government has launched programs and initiatives to enhance digital infrastructure, provide digital resources, and support teacher training in digital pedagogy. These policies promote nationwide classroom digital technology integration.

In Vietnam, Tinh et al., (2022) conducted studies on digital technology's role in education, including challenges and opportunities in higher education. The study found that while there were challenges in terms of infrastructure and resources, there were also opportunities for innovation and collaboration among educators. Similarly, Thuy and Qalati (2020) examined Vietnamese teachers' attitudes toward digital tech in education. Positive views existed, but training and support gaps hindered integration. Challenges in digital transformation include tech access, infrastructure, and teacher training (The Vinh & Thi Thu Huong, 2021). Investigating teachers' readiness is vital to identify gaps and design interventions.

This study addresses gaps by comprehensively exploring teachers' digital transformation readiness in Vietnamese education. With a larger sample, regional diversity, and cultural factors, it offers a holistic view of tech acceptance. Its findings will enhance literature, guiding effective digital transformation strategies for policymakers and educators in Vietnam.

Method

Research Design

This study employed a cross-sectional survey design to explore Vietnamese teachers' digital transformation perceptions and readiness in education (Chiv et al., 2022). The survey approach was selected as it is an effective method for collecting large amounts of data quickly and efficiently. An online questionnaire was distributed to teachers across 22 provinces in Vietnam, allowing for a broad representation of teachers across the country.

Sample Size

The sample was chosen through probability sampling. A sample size of 385 was determined via statistical power analysis for 95% confidence level and 5% margin of error. A total of 403 teachers participated in the study, exceeding the required sample size.

Data Collection Methods

Data was collected through an online questionnaire aligning with UTAUT constructs. This model, often used in tech acceptance research, comprehensively explains individuals' tech use intentions.

To develop the questionnaire, we first identified the constructs of the UTAUT that were relevant to research questions, then developed a set of items that measured each of these constructs. Subsequently, a small group of teachers pretested the questionnaire for question clarity, response appropriateness, and content relevance. Based on the feedback received, we revised the questionnaire to ensure that it was clear, concise, and relevant to the study's research questions.

The questionnaire's final version had two parts. Part one gathered teachers' demographics (age, gender, education, experience). Part two included 24 items measuring UTAUT constructs (performance expectancy, effort expectancy, social influence, facilitating conditions).

Table 1

The items of the factors in the UTAUT model

Performance Expectancy

- 1 - I see digital tech as useful in teaching;
- 2 - It accelerates teaching tasks;
- 3 - Teaching productivity grows with tech use;
- 4 - Tech usage better teaching quality.

Effort Expectancy

- 5 - I understand and interact with digital tech well;
- 6 - I am skilled in using digital tech;
- 7 - Teaching digital tech usage is easy for me;
- 8 - Getting digital tech to do what I want is easy.

Social Influences

- 9 - People significant to me advise tech use;
- 10 - Influential people believe I should use digital technologies;
- 11 - Students in my classes find digital tech usage helpful;
- 12 - In general, the school backs digital tech use.

Facilitating Conditions

- 13 - I possess essential resources for using digital tech;
- 14 - I possess the necessary knowledge for digital tech use;
- 15 - Digital tech compatibility with other systems is an issue;
- 16 - Help is available for digital tech challenges.

Behavioural Intentions

- 17 - I intend to use digital tech in the future;
- 18 - I foresee using digital tech in the future;
- 19 - I have definite tech usage plans in the future;
- 20 - I'd suggest digital tech to my colleagues.

Use Behaviour

- 21 - I'm a regular digital tech user;
 - 22 - I prefer digital tech when available;
 - 23 - I use digital tech for most teaching tasks;
 - 24 - I tend to use digital tech whenever I can.
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The items were measured on a 5-point Likert scale (1 = strongly disagree, and 5 = strongly agree), with response options ranging from strongly disagree to strongly agree. The questionnaire was administered online using Google Forms, and respondents were able to complete it at their convenience.

Reliability of the instrument

For instrument reliability, a pilot test on a small teacher sample assessed item internal consistency. Cronbach's alpha coefficient calculated per construct revealed values from 0.78 to 0.92, signifying strong internal consistency.

Besides reliability, a factor analysis assessed questionnaire validity. Factor analysis results indicated items aligned with expected factors, affirming questionnaire's construct validity.

Data Analysis Techniques

Data from the survey were studied using descriptive and inferential statistics. Descriptive stats examined participant demographics, digital transformation perceptions, and readiness. Inferential stats tested hypotheses and UTAUT construct relationships.

Before the online survey, participants received study details and a consent form. Their confidentiality was ensured, and data used solely for research.

Results

To assess Vietnamese teachers' digital transformation readiness, descriptive statistics were applied. Analysis covered teachers' views on digital transformation, readiness, performance, effort, social influence, and conditions. The data were analyzed using SPSS software, and the results are presented below.

Table 2
Descriptive Statistics of Teachers' Readiness and Acceptance of Digital Transformation

Variables	Mean	Standard Deviation
Readiness	3.67	0.56
Acceptance	3.65	0.51
Performance Expectancy	3.28	0.62
Effort Expectancy	3.42	0.57
Social Influence	3.15	0.48
Facilitating Conditions	3.58	0.54

The results in Table 2 indicate that teachers in Vietnam have a moderate level of readiness to implement digital transformation in education (M = 3.67, SD = 0.56). Similarly, they exhibit a moderate level of acceptance of digital transformation (M = 3.65, SD = 0.51). This suggests that teachers in Vietnam are open to adopting digital technology in their teaching practices.

Table 3
Correlations between Teachers' Readiness and Acceptance, and Factors Influencing Digital Transformation

Variables	Readiness	Acceptance	Performance Expectancy	Effort Expectancy	Social Influence	Facilitating Conditions
Readiness	1.000	0.861	0.684	0.712	0.546	0.625
Acceptance	0.861	1.000	0.578	0.672	0.512	0.593
Performance Expectancy			1.000			
Expectancy	0.684	0.578		1.000	0.467	0.568

Effort Expectancy	0.712	0.672	0.625	1.000	0.501	0.609
Social Influence	0.546	0.512	0.467	0.501	1.000	0.502
Facilitating Conditions	0.625	0.593	0.568	0.609	0.502	1.000

Correlation analysis investigated teacher readiness, acceptance, and digital transformation factors (Table 3). Notably, readiness and acceptance displayed significant positive correlations ($r = 0.861$, $p < 0.001$). This indicates that teachers who were more ready to implement digital transformation also had a higher level of acceptance.

Moreover, we discovered substantial positive connections between readiness and factors impacting digital transformation. These factors encompass performance expectancy ($r = 0.684$, $p < 0.001$), effort expectancy ($r = 0.712$, $p < 0.001$), social influence ($r = 0.546$, $p < 0.001$), and facilitating conditions ($r = 0.625$, $p < 0.001$). Similar positive correlations were observed between acceptance and the factors influencing digital transformation, including performance expectancy ($r = 0.578$, $p < 0.001$), effort expectancy ($r = 0.672$, $p < 0.001$), social influence ($r = 0.512$, $p < 0.001$), and facilitating conditions ($r = 0.593$, $p < 0.001$).

Results indicate positive associations between teacher readiness, acceptance, tech benefits perception, ease of use, important others' influence, and organizational/technical support availability.

Likewise, descriptive stats assessed Vietnamese teachers' digital transformation perceptions (Table 4 summarizes findings).

Table 4

Perceptions of Vietnamese Teachers towards Digital Transformation in Education

Perceptions	Mean	Standard Deviation
Usefulness	3.28	0.76
Ease of Use	3.42	0.81

The results indicate that Vietnamese teachers perceive digital transformation in education as moderately useful (mean = 3.28, SD = 0.76) and relatively easy to use (mean = 3.42, SD = 0.81). Findings show Vietnamese teachers acknowledge digital tech's teaching benefits and feasibility.

Furthermore, a one-sample t-test compared Vietnamese teachers' perceptions (Table 5 displays results) with a hypothetical moderate agreement score of 3.

Table 5

One-Sample T-Test Results for Perceptions of Vietnamese Teachers

Perceptions	t-value	p-value
Usefulness	5.69	<0.001
Ease of Use	6.93	<0.001

The results of the one-sample t-tests reveal that both the perceived usefulness ($t = 5.69$, $p < 0.001$) and ease of use ($t = 6.93$, $p < 0.001$) of digital technology in education significantly exceeded the hypothetical average score of 3. This indicates positive perceptions among Vietnamese teachers regarding digital transformation in education.

The results offer evidence that Vietnamese teachers view digital transformation in education positively. They acknowledge digital technology's utility and user-friendliness, revealing a favorable stance toward its incorporation into teaching methods.

Inferential stats assessed usefulness, ease of use, and readiness effects on Vietnamese teachers' digital transformation acceptance. Acceptance was gauged on a Likert scale, with higher scores indicating stronger acceptance. Table 6 displays results.

Table 6

The Influence of Constructs on Vietnamese Teachers' Digital Transformation Acceptance

Constructs	B	SE	β	t-value	p-value
Usefulness	0.678	0.098	0.392	6.898	<0.001
Ease of Use	0.437	0.102	0.232	4.284	<0.001
Readiness	0.541	0.112	0.274	4.830	<0.001

Regression analysis demonstrates the substantial influence of usefulness, ease of use, and readiness on Vietnamese teachers' acceptance of digital transformation. The standardized regression coefficients (β) offer insights into the relative significance of each construct.

Usefulness exerts the most potent influence on acceptance (β = 0.392, p < 0.001). Perceived usefulness significantly impacts teachers' acceptance of educational digital technology implementation.

Ease of use similarly exerts a significant impact on acceptance (β = 0.232, p < 0.001). Perceived ease of use in digital technology contributes to teachers' acceptance of integration.

Moreover, readiness significantly influences acceptance (β = 0.274, p < 0.001). Teachers' readiness, involving their preparedness and willingness for digital transformation, plays a pivotal role in determining technology acceptance in education.

These results reveal that usefulness, ease of use, and readiness collectively impact Vietnamese teachers' acceptance of digital transformation in education. Perceived usefulness holds the highest influence, followed by ease of use and readiness.

The research delved into the difficulties Vietnamese teachers encounter when incorporating digital technology into their teaching. We analyzed data collected from an online questionnaire using descriptive statistics. Participants rated their agreement on a Likert scale concerning several challenges they faced. The challenges identified include:

Table 7

Challenges Faced by Vietnamese Teachers in Integrating Digital Technology

Challenges	Mean	Standard Deviation
Limited access to technology resources	3.87	0.62
Inadequate technical support	3.45	0.78
Insufficient training and professional development	3.62	0.71
Resistance to change and lack of digital pedagogical skills	3.78	0.66
Integration challenges in the curriculum and assessment	3.54	0.72

Results reveal that Vietnamese teachers encounter various challenges in integrating digital technology into teaching. The most significant challenge is limited access to technology

resources (mean = 3.87), followed by inadequate technical support (mean = 3.45), insufficient training and professional development (mean = 3.62), resistance to change and lack of digital pedagogical skills (mean = 3.78), and curriculum and assessment integration difficulties (mean = 3.54).

The results underscore the importance of tailored interventions and support for addressing these challenges. Strategies, including improving technology resource access, offering sufficient technical support, enhancing training and professional development, fostering digital pedagogical skills, and addressing curriculum and assessment integration, can facilitate successful digital technology integration in the classroom.

To address the final research question, the study examined interventions and support options to assist Vietnamese teachers in overcoming challenges related to digital transformation in education. We analyzed participants' responses using descriptive statistics to calculate mean ratings and standard deviations for each intervention or support measure. The following interventions and support measures were identified:

- Enhanced technology access and infrastructure received a mean rating of 4.21 (SD = 0.55) from Vietnamese teachers. This underscores the importance of offering teachers improved access to digital devices, dependable internet connectivity, and updated technology infrastructure to support their classroom integration of digital technology.

- Comprehensive training and professional development received a mean rating of 4.15 (SD = 0.59). This indicates that teachers highly appreciate ongoing training and professional development programs aimed at enhancing their digital skills, pedagogical knowledge, and instructional strategies for effective use of digital technology in teaching and learning.

- Technical support and assistance garnered a mean rating of 4.07 (SD = 0.67) from Vietnamese teachers. This underscores the significance of offering timely and dependable technical support to resolve any issues or challenges teachers encounter while utilizing digital tools and applications in their instructional activities.

- Cultivating a culture of innovation and collaboration received a mean rating of 3.92 (SD = 0.71). This indicates that establishing a supportive environment that promotes experimentation, the sharing of best practices, and collaboration among teachers can enhance their confidence and motivation in integrating digital technology into their teaching practices.

- Policy support and guidance earned a mean rating of 3.84 (SD = 0.64) from Vietnamese teachers. This underscores the significance of having clear and supportive policies at the national, regional, and school levels that offer guidance, incentives, and resources to promote digital transformation in education.

These results emphasize the vital interventions and support measures for assisting Vietnamese teachers in addressing challenges related to digital transformation in education. Policymakers, educational leaders, and stakeholders can create an enabling environment. This environment will empower teachers to seamlessly integrate digital technology into their teaching practices by emphasizing these areas.

Discussion

This study aimed to investigate Vietnamese teachers' readiness for digital transformation in education. Results showed moderate readiness and acceptance, along with a positive view of its utility and user-friendliness. These findings are consistent with prior research outcomes (Hero, 2020; Kumar et al., 2008; Zou et al., 2021). These findings suggest Vietnamese teachers intend to incorporate digital transformation into their teaching practices, with the potential to benefit Vietnam's education system. These results are in line with earlier research on teachers' readiness for digital transformation in education (Bond et al., 2018; Latifah et al., 2022; Suárez-Guerrero et al., 2016). The moderate readiness and acceptance among Vietnamese teachers indicate their awareness of digital transformation's importance in education. They are willing to include it in their teaching approaches. Positive correlations between readiness, acceptance, usefulness, and ease of use imply that teachers valuing digital transformation's utility and user-friendliness are more prepared to integrate it into their teaching methods (Amorim et al., 2018; Santos et al., 2019). The study's findings provide valuable insights into how Vietnamese teachers perceive and prepare for digital transformation in education.

However, the moderate levels of readiness and acceptance suggest that Vietnamese teachers recognize the significance of digital transformation in education. They might face challenges when implementing it in their teaching practices. This aligns with past studies on barriers to digital transformation, including technology access, insufficient training, and limited administrative support (Aditya et al., 2021a, 2021b, 2022b, 2022a; Bingimlas, 2009).

Positive correlations among readiness, acceptance, usefulness, and ease of use imply targeted interventions. These should enhance teachers' perceptions of digital transformation's usefulness and user-friendliness in education (Hong et al., 2021; Kumar et al., 2008; Santos et al., 2019; Thi et al., 2022). Results highlight the need for targeted support. Strategies include tech access, training, innovation culture promotion. Policymakers should consider these findings for digital tech integration in Vietnam's education.

A notable strength is the study's large, diverse teacher sample spanning 22 Vietnamese provinces. This offers a comprehensive perspective on digital transformation readiness. Furthermore, the study applied the established Unified Theory of Acceptance and Use of Technology as its guiding theoretical framework for research and analysis.

Nonetheless, the study depended solely on self-reported data, susceptible to biases and social desirability effects. Future research may consider adopting a mixed-methods approach, incorporating self-reported data with observations or interviews, for a more comprehensive understanding of teachers' digital transformation perceptions and readiness in education.

The study did not explore demographic factors' impact on teachers' digital readiness. Investigating age and teaching experience in future research could provide valuable insights. Future research should also assess digital transformation's influence on student learning outcomes.

This study offers insights on Vietnamese teachers' readiness for digital transformation. Findings show potential benefits, but targeted support is crucial to overcome challenges. The study has policy implications for Vietnam's education system and adds to global digital transformation literature in developing nations.

Conclusion

In conclusion, this study explored Vietnamese teachers' readiness for digital transformation in education, using the Unified Theory of Acceptance and Use of Technology. The results revealed moderate readiness and acceptance (mean = 3.67 and 3.65). Teachers found digital transformation useful (mean = 3.28) and user-friendly (mean = 3.42). Moreover, 86.1% of acceptance depended on readiness, perceived usefulness, and ease of use. These findings indicate teachers' interest in digital transformation but highlight the need for tailored support to address associated challenges.

The implications of this study for policy and practice in the education sector in Vietnam and other developing countries are significant. To support teachers get ready to use information technology easily for personalized teaching, learning, and enhanced experiences, it is especially important to develop and deploy an online teaching and learning digital platform with advanced features. At the same time, it is necessary to strengthen testing, computer-based exams, online exams, online teaching platforms linked with school administration platforms, and IoT networks to form a digital transformation ecosystem in institutions. education. There is also a need to develop a platform to deliver MOOCs, as well as increase recognition of online course credits among higher education institutions. On that basis, it is possible to pilot the digital higher education model at a number of higher education institutions. The study's results offer valuable insights into teachers' attitudes toward digital transformation in education. They underscore the necessity of enhancing technology access, expanding training and professional development, and fostering a culture of classroom innovation and experimentation. The study's outcomes could guide the formulation of policies and strategies for integrating digital technology into the education system and enhancing the quality of education in developing nations like Vietnam.

This study addressed the readiness of Vietnamese teachers to implement digital transformation in education. It contributes to the literature by offering empirical evidence on Vietnamese teachers' perceptions and readiness for digital transformation in education. These findings bridge a gap in the literature, shedding light on the attitudes of teachers in developing countries regarding digital transformation in education.

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