



Advantages and challenges in implementing digital transformation in some high schools in the Mekong Delta

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Abstract

The rapid advancement of technology has significantly accelerated the digital transformation in Vietnamese education, introducing innovative teaching methods and yielding promising results. This study involved surveying 45 high school teachers from three different provinces and cities in the Mekong Delta: Can Tho, Soc Trang, and Ca Mau. The aim was to evaluate their perspectives on the benefits and challenges of digital transformation in educational institutions. The findings indicate that while digital transformation offers several advantages—such as enhancing student engagement, streamlining document preparation, and improving student management—teachers still face notable challenges, particularly concerning inadequate infrastructure and a lack of reference materials. Further research involving a broader participant base and a more extensive exploration of the root causes is recommended to gain a deeper understanding of these issues.

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Introduction

Currently, there are several different definitions of Digital Transformation. Basically, Digital Transformation is understood as the application of breakthrough technologies to increase productivity, creative value, and social welfare. The research team of Ngo Tu Thanh has clarified the difference between the definition of “Digital Transformation” and “Digitization”. Accordingly, “Digitization” is simply the process of converting

real values into digital form. Conversely, “Digital Transformation” is the process of using digital technologies such as artificial intelligence (AI) and big data to analyze, process, and create new value from digitized data (Ngo & Le, 2024). Digital Transformation in education is the process of applying and integrating digital technology into the educational environment to improve and enhance the effectiveness of teaching, learning, management, and interaction among educational community members (Le, 2022; Mai, 2021).

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During the fourth industrial revolution, the education system has undergone considerable reforms to enhance the quality of teaching and educational management. As a result, the use of technology in education has become a widespread trend, particularly in Vietnam's education system. This move is supported by policies such as the "National Digital Transformation Program to 2025, with a Vision to 2030," as defined in Decision No. 749/QĐ-TTg dated June 3, 2020. This program focuses on creating remote teaching and learning platforms, using digital technology in administration and instruction, and digitizing documents and textbooks. It prioritizes education for digital transformation because of its quick impact on society awareness, efficiency, and cost savings (Prime Minister, 2020).

According to the Ministry of Education and Training, 63 educational institutions and 710 education departments have created a shared database, while 82 percent of high schools use school administration software. Digital technology has made a substantial contribution to lifelong learning programs and the availability of online materials, including around 5,000 electronic lectures, over 7,000 theses, and more than 31,000 multiple-choice questions shared by highly qualified teachers (Nguyen, 2022).

High schools are utilizing digital technologies to innovate and improve the quality of education. Many schools in the Mekong Delta and across the country have adopted new teaching methods, allowing teachers and students to develop initiatives and creativity. However, many secondary school teachers still face challenges with digital transformation, particularly in teaching practices and student management. Thus, further research study is required to address these issues, supplement reference materials, and promote ongoing educational innovation.

Literature review

Studies on Implementing Digital Transformation in Education

The advancement of information and communication technology (ICT) has considerably accelerated transformation processes in several areas, including education. In recent years, the academic community has expressed a rising interest in studying digital transformation in the educational sphere. Using scientific measuring methodologies, Luong has comprehensively analyzed digital transformation research since 2020, selecting 1,130 articles and conference papers from

the Web of Science database. This collection of work focuses mostly on psychology and education, with interconnected themes. This research has shown two main themes: strategy and digital competency. Vietnamese writers have recognized four critical areas: teachers' digital competency, digital transformation preparedness, digital universities, and human resources (Luong, 2023).

Phan and colleagues (2020) developed a theoretical framework for developing an information technology competence model, outlining the prerequisites for instructors' skills in using technology for online teaching in educational institutions (Phan et al., 2020). Ha's research looked into the role of stakeholders in school readiness for digital transformation and lecturers' satisfaction with online learning (Ha, 2020). Beginning in 2022, Vietnamese researchers have concentrated more on creating digital transformation competencies in education for both instructors and students, and some research has developed a framework of information technology competencies for teachers, which includes ten competency groups and particular indications and levels for each component. These competency groups help teachers identify learning objectives for students in the subject, thereby building teaching content and choosing more appropriate teaching methods (Nguyen et al., 2022).

Tran's team identified digital competency evaluation techniques applicable globally and in Vietnam, significantly adding to teachers' professional development programs' theoretical underpinning and practical application (Tran & Nguyen, 2022). Nguyen's group also investigated the perceptions of online learning platforms among students, educators, and administrators in Vietnamese and Singaporean universities (Nguyen et al., 2023). According to Nguyen's research, incorporating artificial intelligence into education has recently received significant attention, as indicated by the growing number of searches and research projects. Higher education institutions are implementing digital transformation through online training programs and distance learning technologies (Nguyen, 2024b).

Research on digital transformation in education has produced exciting results on a global scale. Elango's team believes that the Internet is an essential educational instrument capable of overcoming barriers and allowing individuals to become 21st-century learners by enabling tailored learning based on their interests and cognitive capacities (Elango et al., 2008). Benavides and colleagues' research shows increased interest in digital transformation among institutions, as seen by increased published publications since 2016. Furthermore, the team underlines the importance of delving deeper into concepts

and approaches for implementing digital transformation in universities to ensure the project's success (Benavides et al., 2020).

Studies on the Advantages and Difficulties of Implementing Digital Transformation in Education

Ho's study used a mixed-methods approach, including questionnaires and observations, and interviewed 205 instructors from 20 kindergartens around Thanh Hoa province. The findings show that teachers have considerable problems implementing digital transformation in kindergartens, mainly when using technical equipment and support software, both of which are critical issues for kindergarten teachers today (Ho, 2023). Nguyen's research team discovered several challenges in digitally transforming kindergarten and general school activities. Their findings identify 12 significant difficulties teachers face, including limited human resources, inadequate infrastructure, and excessive expenses connected with technology implementation. These problems impede schools' successful digital transition (Nguyen et al., 2024).

Nguyen and Pham identified five key hurdles to digital transformation in higher education in Vietnam. These include changes in training methods, content, and programs; inaccuracies and unreliability in data warehouses; slower technological development than global standards; a lack of understanding of core digital transformation technologies and basic platform systems; resistance to online learning methods; and training institutions' perspectives on digital transformation. The research team stressed that successful digital transformation necessitates shifting executives' mindsets from traditional to practical digital business methods and thinking (Nguyen & Pham, 2023). E-learning technology makes education more accessible and flexible, with courses adapted to specific student needs (Reigeluth et al., 2008). However, the availability of educational materials and video lectures in the virtual environment has created challenges for young people, such as diminished face-to-face communication and fewer communication channels. While students frequently see access to high-quality instructional materials as a benefit of educational digitalization, not everyone can fully use this possibility (Frolova & Rogach, 2021).

The research above shows that digitalization in education is becoming a global trend, particularly in Vietnam. Educators and administrators are exploring, implementing, and refining digital approaches to improve their efficacy. However, this issue has been somewhat

overlooked in the Mekong Delta. Recognizing this reality, this essay aims to examine teachers' perspectives on the advantages and challenges of adopting digital transformation in educational institutions, offering a comprehensive overview of the situation.

Methodology

Research method: The author group closely combined qualitative and quantitative research models for 45 high school teachers in the Mekong Delta (Louis et al., 2007). Specifically, they used the grounded theory research method and survey methods to approach the research issue more objectively and scientifically.

Theoretical research method: The author group synthesized and analyzed data from secondary sources, mainly collected from books, newspapers, scientific journals, etc., to inherit the necessary information for the article and thereby interpret and form new theoretical foundations (Glaser et al., 1968). At the same time, the study of secondary materials helped inherit studies related to the research topic that were published in books, scientific articles, programs, projects, and local report data.

Survey method: The survey used a standardized list of questions to collect data, as Pham and Nguyen (2011) described. The Likert scale was employed to quantify replies, allowing for more precise assessments of levels of agreement (Allen & Seaman, 2007). A five-point Likert scale with intervals $(5-1)/5=0.8$ (Narli, 2010; Yavuz et al., 2013). The scale View points were described as follows: $1.0 \leq M < 1.8$: Do not agree; $1.8 \leq M < 2.6$: Slightly agree; $2.6 \leq M < 3.4$: Somewhat agree; $3.4 \leq M < 4.2$: Mostly agree; $4.2 \leq M \leq 5.0$: Strongly agree.

Data processing method: Following data collection, the data were encrypted and analyzed with the Jamovi v.2.4.11 software. The Mann-Whitney U test was used to determine potential differences in view points between central and suburban areas. Furthermore, the Kruskal-Wallis H test was used to determine any differences in views among different age and professional groups. All tests used a significance level of $p < .05$.

The study team coded qualitative data to categorize and classify them into research-relevant categories. This enabled detailed analysis and debate based on the acquired data.

Results and Discussion

Digital Transformation Training in High School Education

After completing a survey on the digital transformation training process in high schools, the research team found that the majority of the 45 instructors had not received formal training. Only, 18 teachers, or 40 percent, had participated in training or attended a seminar on digital transformation in education, while 60 percent had no such experience.

The topic of these training programs differed by province/city. In Can Tho and Ca Mau, the emphasis was on practicing information technology in student management and instruction. The key topics covered were designing lectures, scheduling online teaching, using software for testing and evaluation, and managing students. Meanwhile, the training sessions in Soc Trang were more varied, providing an overview of the theoretical foundation, encompassing principles, implementation methodologies, and instances of digital transformation in education. These workshops also included practical applications, software for teaching and learning, student management, and, most importantly, the use of artificial intelligence (AI) in digital transformation.

Most teachers rated these training sessions highly effective, claiming to have learned much about digital transformation. They learned how to use technology in teaching to save time and maximize efficiency. Even while some instructors had not received formal training or attended seminars, they had learned about digital change in education through various communication channels. The majority (51.1%) learned via the Internet and social

networks. In recent years, the Ministry of Education and Training and related agencies have organized and coordinated many domestic and international conferences and seminars to promote the application of information technology (IT) in educational innovation and management in Vietnam. Additionally, the publication of information on government portals/websites and social media platforms such as Facebook, Zalo, and YouTube has been given more attention. At the 2024 Conference on Government Information Connectivity and Management in the Online Environment with the Portals of Ministries, Sectors, and Localities, the Deputy Minister of Information and Communications, Bui Hoang Phuong, emphasized that current portals/websites were important “bridges” between the government and the people in the digital age (Office of the Government of Vietnam, 2024). Furthermore, on November 30, the Ministry of Information and Communications developed and launched the National Book and Newspaper Platform with the domains sachdientu.vn and ebook.gov.vn to meet the information access needs of the people, especially in remote, isolated, and particularly difficult areas (Nguyen, 2024a). Learned via books and newspapers, friends, and colleagues, although not the majority, such still have a certain influence, with respective rates of 28.9 percent and 33.3 percent (Figure 1).

This finding revealed that digital transformation training in the Mekong Delta was inconsistent, resulting in diverse opinions among teachers on digital transformation. This gap could exacerbate the challenges of implementing digital conversion in secondary schools. The research group’s conclusion aligns with earlier studies, which have shown that the lack of synchronized training negatively impacts teachers’ instructional activities (Vo et al., 2024).

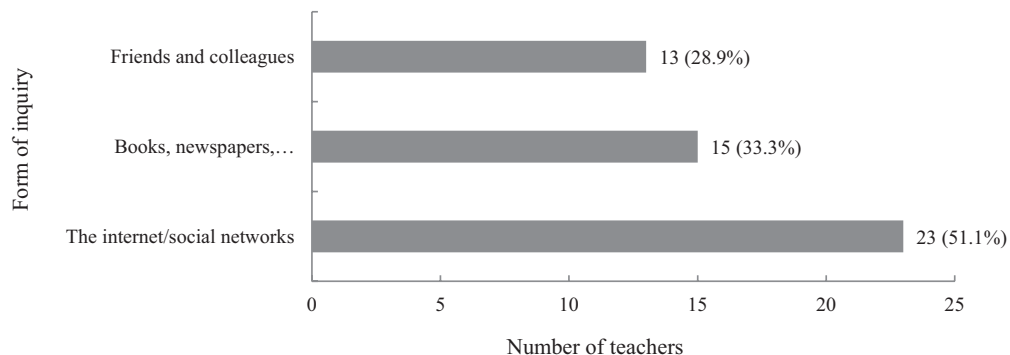


Figure 1 Information channels teachers used to learn about digital transformation

Advantages and Difficulties in Implementing Digital Transformation in Some High Schools in the Mekong Delta

This study used a 5-point Likert scale to examine the benefits and obstacles of digital transformation in high schools in three Mekong Delta provinces/cities: Can Tho, Soc Trang, and Ca Mau. Additionally, Mann-Whitney U and Kruskal-Wallis H were used to compare the differences in mean evaluations among the 45 teachers who participated in the survey.

Advantages of digital transformation in Mekong Delta high schools

When the research team examined the benefits of digital transformation in several secondary schools in the Mekong Delta, they discovered the following results. Most of the participating teachers “mostly agree” with the assertions offered by the research team, such as Q111 through Q117 (Table 1). The mean ratings of the four age groups of teachers (22–30, 31–40, 41–50, and over 50 years old) (Table 2) were as follows: There were no statistically significant differences among the groups of teachers in their evaluations of Q111 (Reducing the

burden of document preparation), Q113 (Developing digital skills for teachers and students), Q114 (Promoting research and innovation in education and improving teaching methods), Q116 (Enabling flexible learning for students without spatial or time constraints), and Q117 (Helping students self-study). Conversely, Q112 (Making lessons more fascinating for students) and Q115 (Teachers, students, and parents can track students’ learning progress using score processing software) had significantly different opinions from instructor groups. In Q112, teachers aged 41–50 and over 50 “mostly agree,” but instructors aged 22–30 and 31–40 “strongly agree” (Kruskal-Wallis H test, $\chi^2 = 8.14$, $df = 3$, $p = .04$). For Q115, instructors aged 41–50 “mostly agree,” while other age groups “strongly agree” (Kruskal-Wallis H test, $\chi^2 = 8.57$, $df = 3$, $p = .04$).

The Likert scale provides a precise quantitative measure of teachers’ perspectives on the benefits and challenges of digital transformation. The Kruskal-Wallis H test was helpful in identifying age-related perception changes, notably for assertions Q112 and Q115 (Table 2). These findings indicate that younger teachers are more enthusiastic about using digital technologies to make lessons more exciting and accessible to track students’ progress.

Table 1 Evaluation of teachers on the advantages of implementing digital transformation in teaching

Code	Content	$M \pm SE$	View point
Q111	Reducing the burden in document preparation	3.91 $\pm$.82	Mostly agree
Q112	Making lessons more interesting and exciting for students	4.04 $\pm$.77	Mostly agree
Q113	Developing digital skills for teachers and students	4.07 $\pm$.69	Mostly agree
Q114	Promoting research and innovation in education, improving teaching methods	4.13 $\pm$.55	Mostly agree
Q115	Allowing teachers, students, and parents to monitor student learning progress through grade management software	4.13 $\pm$.69	Mostly agree
Q116	Enabling flexible learning for students without spatial or time limits	4.11 $\pm$.57	Mostly agree
Q117	Helping students self-study and review knowledge at home	4.02 $\pm$.72	Mostly agree

Note: $1.0 \leq M < 1.8$: Do not agree; $1.8 \leq M < 2.6$: Slightly agree; $2.6 \leq M < 3.4$: Somewhat agree; $3.4 \leq M < 4.2$: Mostly agree; $4.2 \leq M \leq 5.0$: Strongly agree.

Table 2 Evaluation of teachers participating in the survey on the advantages of implementing digital transformation in teaching categorized by age

Code	Age group (Year) ($M \pm SE$)				Kruskal – Walis H ($df = 3$)
	22–30	31–40	41–50	Over 50	
Q111	3.75 $\pm$.48	4.00 $\pm$.24	3.84 $\pm$.12	4.00 $\pm$.00	$\chi^2 = 2.12$, $p = .55$
Q112	4.25 $\pm$.25	4.25 $\pm$.23	3.79 $\pm$.10	4.00 $\pm$.00	$\chi^2 = 8.14$, $p = .04$
Q113	4.25 $\pm$.25	4.25 $\pm$.18	3.84 $\pm$.14	4.00 $\pm$.00	$\chi^2 = 5.42$, $p = .14$
Q114	4.25 $\pm$.25	4.30 $\pm$.15	3.89 $\pm$.07	4.50 $\pm$.50	$\chi^2 = 7.07$, $p = .07$
Q115	4.75 $\pm$.25	4.20 $\pm$.17	3.89 $\pm$.13	4.50 $\pm$.50	$\chi^2 = 8.57$, $p = .04$
Q116	4.25 $\pm$.25	4.25 $\pm$.14	3.89 $\pm$.11	4.50 $\pm$.50	$\chi^2 = 5.24$, $p = .16$
Q117	4.25 $\pm$.25	4.10 $\pm$.20	3.89 $\pm$.13	4.00 $\pm$.00	$\chi^2 = 2.60$, $p = .46$

Note: $1.0 \leq M < 1.8$: Do not agree; $1.8 \leq M < 2.6$: Slightly agree; $2.6 \leq M < 3.4$: Somewhat agree; $3.4 \leq M < 4.2$: Mostly agree; $4.2 \leq M \leq 5.0$: Strongly agree; Q111: Reducing the burden in document preparation; Q112: Making lessons more interesting and exciting for students; Q113: Developing digital skills for teachers and students; Q114: Promoting research and innovation in education, improving teaching methods; Q115: Allowing teachers, students, and parents to monitor student learning progress through grade management software; Q116: Enabling flexible learning for students without spatial or time limits; Q117: Helping students self-study and review knowledge at home.

In contrast, older teachers may perceive the benefits but are less likely to express strong approval, probably due to a more extended period of adaption to new technologies. These findings are crucial for adapting professional development and support programs for different age groups, ensuring that all instructors can effectively use digital resources in their teaching practices. To promote clarity and engagement, ensure the findings are presented concisely and with appropriate statistical details. Including a discussion that analyzes the statistical data and provides practical consequences can make the research more engaging and accessible to a broader audience.

Among the specialist categories, only Q111 exhibited a difference in mean evaluation among teachers in Natural Sciences, Social Sciences, and Others (Technology, Arts,

etc.). Teachers in the Natural Sciences group “mostly agree,” but teachers in the other two groups “strongly agree” (Kruskal-Wallis H, $\chi^2 = 6.86$, $df = 2$, $p = .03$). In contrast, there were no significant variations in the mean assessments for Q112–117 (Kruskal-Wallis H, $df = 2$, $p > .05$ in all cases) (Table 3).

Furthermore, when assessing differences between high schools in the two study regions—the central region schools (An Khanh High School in Can Tho, Hoang Dieu High School in Soc Trang, and Cai Noc High School in Ca Mau) and the suburban region schools (Phan Van Tri High School in Can Tho, Doan Van To High School in Soc Trang, and Vam Dinh High School in Ca Mau)—using the Mann-Whitney U test, the research team found no statistically significant differences between these regions (Mann-Whitney U, $p > .05$ in all cases, Table 4).

Table 3 Evaluation of teachers on the advantages of implementing digital transformation in teaching categorized by expertise

Code	<i>M±SE</i>			Kruskal – Wallis H ($df = 2$)
	Natural Sciences	Social Sciences	Other	
Q111	3.70±.16	4.25±.16	4.43±.20	$\chi^2 = 6.86$, $p = .03$
Q112	3.93±.15	4.25±.16	4.29±.29	$\chi^2 = 1.81$, $p = .41$
Q113	4.00±.14	4.13±.13	4.29±.29	$\chi^2 = 1.00$, $p = .61$
Q114	4.03±.10	4.13±.13	4.57±.20	$\chi^2 = 5.64$, $p = .06$
Q115	4.03±.14	4.13±.13	4.57±.20	$\chi^2 = 4.01$, $p = .14$
Q116	4.03±.10	4.25±.16	4.29±.29	$\chi^2 = 1.73$, $p = .42$
Q117	3.93±.14	4.13±.13	4.29±.29	$\chi^2 = 1.43$, $p = .49$

Note: $1.0 \leq M < 1.8$: Do not agree; $1.8 \leq M < 2.6$: Slightly agree; $2.6 \leq M < 3.4$: Somewhat agree; $3.4 \leq M < 4.2$: Mostly agree; $4.2 \leq M \leq 5.0$: Strongly agree; Q111: Reducing the burden in document preparation; Q112: Making lessons more interesting and exciting for students; Q113: Developing digital skills for teachers and students; Q114: Promoting research and innovation in education, improving teaching methods; Q115: Allowing teachers, students, and parents to monitor student learning progress through grade management software; Q116: Enabling flexible learning for students without spatial or time limits; Q117: Helping students self-study and review knowledge at home.

Table 4 Evaluation of teachers on the advantages of implementing digital transformation in teaching categorized by geographical distribution

Code	Content	<i>M±SE</i>		Mann Whitney U
		Central area	Suburban area	
Q111	Reducing the burden in document preparation	3.96±.15	3.83±.22	$Z = -.312$ $p = .755$
Q112	Making lessons more interesting and exciting for students	4.15±.12	3.89±.23	$Z = -.780$ $p = .435$
Q113	Developing digital skills for teachers and students	4.07±.15	4.06±.13	$Z = -.501$ $p = .616$
Q114	Promoting research and innovation in education, improving teaching methods	4.22±.11	4.00±.11	$Z = -1.367$ $p = .172$
Q115	Allowing teachers, students, and parents to monitor student learning progress through grade management software	4.19±.16	4.06±.10	$Z = -1.275$ $p = .202$
Q116	Enabling flexible learning for students without spatial or time limits	4.22±.12	3.94±.10	$Z = -1.671$ $p = .095$
Q117	Helping students self-study and review knowledge at home	4.15±.15	3.83±.15	$Z = -1.932$ $p = .053$

Note: $1.0 \leq M < 1.8$: Do not agree; $1.8 \leq M < 2.6$: Slightly agree; $2.6 \leq M < 3.4$: Somewhat agree; $3.4 \leq M < 4.2$: Mostly agree; $4.2 \leq M \leq 5.0$: Strongly agree.

The results from Tables 1, 2, 3 and 4 show that the evaluations were typically fair despite disparities in mean assessments between teacher groups. Teachers generally agree with the research team's recommended criteria from Q111 to Q117, indicating digital transformation's benefits in secondary schools. This finding suggested that participating instructors understood the roles and benefits of digital transformation in teaching and learning. It was a trend and a necessity to keep up with societal change. Digital transformation was viewed as developing an educational ecosystem that makes data more accessible and diversifies teaching, testing, and evaluation approaches. The findings of this study were congruent with previous research on the current state of digital revolution in education. Leshchenko et al. (2021) found that digital transformation in education improved the ability to do scientific research (organize, plan, and execute) and the capacity to use technology in teaching and learning. Furthermore, studies by Ipatov et al. (2020), Tsarapkina et al. (2021), Lattouf (2022), Srichailard (2023), and Timotheou et al. (2023) have backed up the benefits of digital transformation in education.

Difficulties of digital transformation in Mekong Delta high schools

In addition to evaluating the benefits, the research team studied the difficulties of adopting digital transformation in high schools across three provinces/cities in the Mekong Delta. The findings are as follows: Teachers evaluated most of the difficulty criteria in Table 5 as "Somewhat agree", except Q132, which was rated as "Mostly agree" ($3.49 \pm .89$ SE). Overall, these assessments were relatively neutral. As a result, comparing means across different groups was required to explain these assessments and discover the causes behind the scores.

There were no significant differences in the mean ratings of the four instructor groups for criteria Q131–Q1310 across age groups (Kruskal-Wallis H, $df=3$, $p > .05$ in all cases). However, to provide a more accurate assessment of the opinions in Table 5, the research team examined the evaluations of teachers aged 22–30, 31–40, 41–50, and over 50 years, as shown in Table 6. While most evaluations indicated "somewhat agree" other groups scored criteria as "mostly agree". Specifically, Q131 (for teachers aged 31–40 and above 50), Q135 (for teachers aged 31–40), Q139 (for teachers aged 31–40), and Q1310 (for teachers aged 41–50) were identified, demonstrating that, although *instructors' judgments across the four age groups tend to be neutral, they generally agree with the criteria proposed by the research team.*

Based on expertise groups in Table 7, evaluations from natural sciences teachers, social sciences teachers, and other instructors (technology, arts, etc.) showed no significant differences (Kruskal-Wallis H, $df = 2$, $p > .05$). However, mean ratings found disparities across groups, with some instructor groups rating some criteria as "Mostly agree". Notably, Q132 (natural sciences and social sciences teachers), Q139 (other instructors), and Q1310 (other teachers) were all given this rating, showing that while overall evaluations were impartial, there was agreement on the stated criteria.

Regarding geographical distribution, the Mann-Whitney U test was used to compare high schools in central and suburban locations, and there were no significant differences between Q131 and Q1310. Table 8 revealed differences in the suburban area. Teachers at suburban schools rated criteria Q131, Q132, Q135, Q136, Q137, Q139, and Q1310 as "Mostly agree", suggesting that *suburban teachers face more challenges with digital transformation than their central area counterparts.*

Table 5 Evaluation of teachers on the difficulties of implementing digital transformation in teaching

Code	Content	$M \pm SE$	View point
Q131	Inadequate facilities, lack of equipment (computers, phones, laptops...)	$3.36 \pm .88$	Somewhat agree
Q132	Unstable Internet infrastructure	$3.49 \pm .89$	Mostly agree
Q133	Time-consuming and labor-intensive	$2.87 \pm .94$	Somewhat agree
Q134	Lack of necessary technical knowledge to use technology in teaching	$3.04 \pm .98$	Somewhat agree
Q135	Limitations in software for assessing student learning	$3.20 \pm .97$	Somewhat agree
Q136	Difficulty in changing students' learning habits	3.29 ± 1.04	Somewhat agree
Q137	Student's ability to use information technology is still different	$3.20 \pm .94$	Somewhat agree
Q138	Lack of support from professional staff and leaders	$3.07 \pm .91$	Somewhat agree
Q139	Digital learning resources are widespread, not strictly controlled in terms of content	$3.27 \pm .91$	Somewhat agree
Q1310	Legal regulations on education are still not comprehensive, affecting intellectual property rights	3.29 ± 1.04	Somewhat agree

Note: $1.0 \leq M < 1.8$: Do not agree; $1.8 \leq M < 2.6$: Slightly agree; $2.6 \leq M < 3.4$: Somewhat agree; $3.4 \leq M < 4.2$: Mostly agree; $4.2 \leq M \leq 5.0$: Strongly agree.

Table 6 Evaluation of teachers participating in the survey on the difficulties of implementing digital transformation in teaching categorized by age

Code	Age group (year) ($M \pm SE$)				Kruskal – Wallis H ($df = 3$)
	22–30	31–40	41–50	Over 50	
Q131	3.00 $\pm$.71	3.45 $\pm$.18	3.26 $\pm$.20	4.00 $\pm$.00	$\chi^2 = 1.79, p = .62$
Q132	3.75 $\pm$.48	3.50 $\pm$.21	3.37 $\pm$.21	4.00 $\pm$.00	$\chi^2 = 1.62, p = .65$
Q133	2.75 $\pm$.25	3.00 $\pm$.25	2.79 $\pm$.20	2.50 $\pm$.50	$\chi^2 = 1.72, p = .63$
Q134	2.75 $\pm$.25	3.05 $\pm$.28	3.16 $\pm$.18	2.50 $\pm$.50	$\chi^2 = 1.77, p = .62$
Q135	2.50 $\pm$.29	3.45 $\pm$.22	3.16 $\pm$.22	2.50 $\pm$.50	$\chi^2 = 5.89, p = .12$
Q136	2.75 $\pm$.75	3.35 $\pm$.25	3.37 $\pm$.19	3.00 $\pm$ 1.00	$\chi^2 = 1.42, p = .70$
Q137	2.75 $\pm$.48	3.15 $\pm$.22	3.39 $\pm$.21	2.60 $\pm$.50	$\chi^2 = 3.30, p = .35$
Q138	2.75 $\pm$.25	3.25 $\pm$.24	3.00 $\pm$.19	2.50 $\pm$.50	$\chi^2 = 2.56, p = .47$
Q139	3.00 $\pm$.41	3.41 $\pm$.22	3.26 $\pm$.20	2.50 $\pm$.50	$\chi^2 = 2.89, p = .41$
Q1310	2.75 $\pm$.25	3.25 $\pm$.26	3.47 $\pm$.22	3.00 $\pm$ 1.00	$\chi^2 = 2.12, p = .55$

Note: $1.0 \leq M < 1.8$: Do not agree; $1.8 \leq M < 2.6$: Slightly agree; $2.6 \leq M < 3.4$: Somewhat agree; $3.4 \leq M < 4.2$: Mostly agree; $4.2 \leq M \leq 5.0$: Strongly agree; Q131: Inadequate facilities, lack of equipment (computers, phones, laptops...); Q132: Unstable Internet infrastructure; Q133: Time-consuming and labor-intensive; Q134: Lack of necessary technical knowledge to use technology in teaching; Q135: Limitations in software for assessing student learning; Q136: Difficulty in changing students' learning habits; Q137: Student's ability to use information technology is still different; Q138: Lack of support from professional staff and leaders; Q139: Digital learning resources are widespread, not strictly controlled in terms of content; Q1310: Legal regulations on education are still not comprehensive, affecting intellectual property rights.

Table 7 Evaluation of teachers on the difficulties of implementing digital transformation in teaching categorized by expertise

Code	$M \pm SE$			Kruskal – Wallis H ($df = 2$)
	Natural Sciences	Social Sciences	Other	
Q131	3.37 $\pm$.16	3.38 $\pm$.32	3.29 $\pm$.36	$\chi^2 = .04, p = .98$
Q132	3.57 $\pm$.16	3.50 $\pm$.38	3.14 $\pm$.34	$\chi^2 = 1.21, p = .55$
Q133	2.77 $\pm$.16	3.13 $\pm$.40	3.00 $\pm$.38	$\chi^2 = 1.46, p = .48$
Q134	2.97 $\pm$.18	3.25 $\pm$.41	3.14 $\pm$.34	$\chi^2 = 1.07, p = .59$
Q135	3.20 $\pm$.18	3.25 $\pm$.41	3.14 $\pm$.34	$\chi^2 = .21, p = .90$
Q136	3.37 $\pm$.19	3.25 $\pm$.31	3.00 $\pm$.44	$\chi^2 = .91, p = .63$
Q137	3.20 $\pm$.17	3.25 $\pm$.41	3.14 $\pm$.34	$\chi^2 = .20, p = .91$
Q138	3.07 $\pm$.15	3.13 $\pm$.40	3.00 $\pm$.44	$\chi^2 = .46, p = .79$
Q139	3.27 $\pm$.15	3.13 $\pm$.40	3.43 $\pm$.43	$\chi^2 = .26, p = .88$
Q1310	3.27 $\pm$.17	3.13 $\pm$.44	3.57 $\pm$.48	$\chi^2 = .52, p = .77$

Note: $1.0 \leq M < 1.8$: Do not agree; $1.8 \leq M < 2.6$: Slightly agree; $2.6 \leq M < 3.4$: Somewhat agree; $3.4 \leq M < 4.2$: Mostly agree; $4.2 \leq M \leq 5.0$: Strongly agree; Q131: Inadequate facilities, lack of equipment (computers, phones, laptops...); Q132: Unstable Internet infrastructure; Q133: Time-consuming and labor-intensive; Q134: Lack of necessary technical knowledge to use technology in teaching; Q135: Limitations in software for assessing student learning; Q136: Difficulty in changing students' learning habits; Q137: Student's ability to use information technology is still different; Q138: Lack of support from professional staff and leaders; Q139: Digital learning resources are widespread, not strictly controlled in terms of content; Q1310: Legal regulations on education are still not comprehensive, affecting intellectual property rights.

Table 8 Evaluation of teachers on the difficulties of implementing digital transformation in teaching categorized by geographical distribution

Code	Content	$M \pm SE$		Mann Whitney U
		Central area	Suburban area	
Q131	Inadequate facilities, lack of equipment (computers, laptops...)	3.22 $\pm$.18	3.56 $\pm$.18	$Z = -1.069$ $p = .285$
Q132	Unstable Internet infrastructure	3.37 $\pm$.19	3.67 $\pm$.18	$Z = -1.160$ $p = .246$
Q133	Time-consuming and labor-intensive	2.85 $\pm$.19	2.89 $\pm$.21	$Z = -.195$ $p = .846$
Q134	Lack of necessary technical knowledge to use technology in teaching	2.85 $\pm$.18	3.33 $\pm$.24	$Z = -1.727$ $p = .084$
Q135	Limitations in software for assessing student learning	3.00 $\pm$.20	3.50 $\pm$.19	$Z = -1.748$ $p = .080$

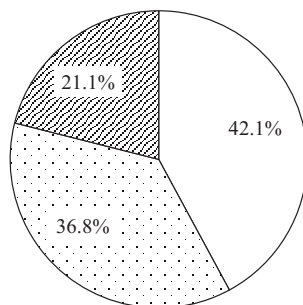
Table 8 Continued

Code	Content	$M \pm SE$		Mann Whitney U
		Central area	Suburban area	
Q136	Difficulty in changing students' learning habits	3.15 $\pm$.20	3.50 $\pm$.25	$Z = -1.198$ $p = .231$
Q137	Student's ability to use information technology is still different	3.04 $\pm$.20	3.44 $\pm$.18	$Z = -1.404$ $p = .231$
Q138	Lack of support from professional staff and leaders	3.00 $\pm$.19	3.17 $\pm$.19	$Z = -.665$ $p = .506$
Q139	Digital learning resources are widespread, not strictly controlled in terms of content	3.24 $\pm$.20	3.61 $\pm$.14	$Z = -2.153$ $p = .301$
Q1310	Legal regulations on education are still not comprehensive, affecting intellectual property rights	3.22 $\pm$.22	3.41 $\pm$.22	$Z = -.652$ $p = .514$

Note: $1.0 \leq M < 1.8$: Do not agree; $1.8 \leq M < 2.6$: Slightly agree; $2.6 \leq M < 3.4$: Somewhat agree; $3.4 \leq M < 4.2$: Mostly agree; $4.2 \leq M \leq 5.0$: Strongly agree.

Tables 5, 6, 7 and 8 show that teachers ranked criteria Q131–Q1310 at the “Somewhat agree” level, indicating a neutral approach. Although the mean values in Tables 6, 7, and 8 (by age group, competence, and geographical distribution) did not differ much, they leaned toward “Mostly agree”. This finding suggested that, while the obstacles highlighted by the research team did not significantly influence, they partially impacted the target groups, particularly those in suburban regions. Schools in these areas frequently faced obstacles such as poor transportation infrastructure, restricted access to critical services, and varying levels of information technology use compared to urban centers. These factors added to the more significant problems teachers face in suburban settings.

In addition to investigating teachers' judgments of the benefits of digital transformation using non-parametric statistical approaches, the research team investigated this problem with an open question: “What difficulties do you encounter during the digital transformation process in general schools?” Figure 2 depicts the responses to some significant challenges.



□ Lack of facilities and equipment □ Lack of references ▨ Other

Figure 2 Typical difficulties in implementing digital transformation

Figure 2 shows that issues with facilities (42.1%) and a lack of reference materials (36.8%) present substantial challenges for teachers undergoing digital transformation. Typical answers include:

“Some schools have not ensured facilities, equipment, and have unstable internet connections, making it difficult to implement digital transformation effectively”

Opinion of teachers at Hoang Dieu School, Soc Trang.

“Access to new technologies is limited due to continuous innovations, which makes it difficult for teachers to engage in digital transformation activities”

Opinion of teachers at Phan Van Tri School, Can Tho.

“There have not been many training sessions; the training and guidance for teachers is limited, and knowledge about digital transformation is mainly self-taught without proper reference materials, leading to errors in the implementation of digital transformation”

Opinion of teachers at Doan Van To School, Soc Trang.

These obstacles were consistent with studies on digital transition. According to Shang and Li (2023)'s research, fundamental obstacles in digital transformation arose from a lack of investment, poor educational infrastructure, and challenges related to teacher and student capacities (Shang & Li, 2023). Similarly, a study by Yang and Wang (2023) identified problems with ineffective digital resources and an over emphasis on data volume and technology innovation while overlooking human development. As a result, digital transformation necessitates a holistic approach that addresses three key pillars: (1) culture and skills, (2) infrastructure and technology, and (3) ecosystem (Brunetti et al., 2020).

Conclusions and Recommendations

The study investigated teachers' perceptions of the benefits and challenges of implementing digital transformation in institutions. The findings show that digital transformation has various benefits, including enhanced student involvement, reduced workload, and improved student management, monitoring, and connectivity. However, teachers faced substantial hurdles regarding infrastructure and a lack of reference resources. From the researched results, the research team has proposed several solutions to support the implementation of digital transformation, such as Investing in infrastructure and equipment; Organizing training sessions to raise awareness about digital transformation; Completing policies, and proposing measures to encourage the implementation of digital transformation; Additionally, raising awareness among everyone, especially teachers and educators, about the issue of digital transformation and the importance of implementing digital transformation in education; Creating a positive learning environment, encouraging teachers and students to participate in digital learning, and effectively utilizing and exploiting online materials and resources.

Additional studies with a bigger and more diverse sample size need to be conducted to acquire a more thorough and nuanced knowledge of these challenges. Expanding the scope of the study will aid in identifying the causes of these issues and provide insights into potential solutions. This future research should strive to develop solutions to improve the infrastructure and availability of reference resources, resulting in a more seamless digital transformation process in educational institutions.

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Conflict of Interests

The authors declare no potential conflicts of interest concerning the research.

References

- Allen, I. E., & Seaman, C. A. (2007). Likert scales and data analyses. *Quality progress*, 40(7), 64–65. <https://www.bayviewanalytics.com/reports/asq/likert-scales-and-data-analyses.pdf>
- Benavides, L. M. C., Tamayo Arias, J. A., Arango Serna, M. D., Branch Bedoya, J. W., & Burgos, D. (2020). Digital transformation in higher education institutions: A systematic literature review. *Sensors*, 20(11), 3291. <https://doi.org/10.3390/s20113291>
- Brunetti, F., Matt, D. T., Bonfanti, A., De Longhi, A., Pedrini, G., & Orzes, G. (2020). Digital transformation challenges: Strategies emerging from a multi-stakeholder approach. *The TQM Journal*, 32(4), 697–724. <https://doi.org/10.1108/TQM-12-2019-0309>
- Elango, R., Gudep, V. K., & Selvam, M. (2008). Quality of e-learning: An analysis based on e-learners' perception of e-learning. *Electronic Journal of E-learning*, 6(1), 29–41. <https://files.eric.ed.gov/fulltext/EJ1098757.pdf>
- Frolova, E. V., & Rogach, O. V. (2021). Digitalization of higher education: Advantages and disadvantages in student assessments. *European Journal of Contemporary Education*, 10(3), 616–625. <https://doi.org/10.13187/ejced.2021.3.616>
- Glaser, B. G., Strauss, A. L., & Strutzel, E. (1968). The discovery of grounded theory; strategies for qualitative research. *Nursing research*, 17(4), 364. http://www.sxf.uevora.pt/wp-content/uploads/2013/03/Glaser_1967.pdf
- Ha, T. T. (2020). Promoting the role of the people in the cause of industrialization, modernization, and digitization for economic growth in Vietnam today. In *Proceedings of the 2nd international scientific and practical conference "Modern management trends and the digital economy: From regional development to global economic growth" (MTDE 2020)*. <https://doi.org/10.2991/aebmr.k.200502.053>
- Ho, S. H. (2023). The situation of preschool teachers' information technology application capacity in the trend of digital transformation: A study in some kindergartens in Thanh Hoa province. *Hong Bang International University Journal of Science - HIUJS*, 25(9/2023), 55–62. <https://doi.org/10.59294/HIUJS.25.2023.502>
- Ipatov, O., Barinova, D., Odinokaya, M., Rubtsova, A., Pyatnitsky, A., & Katalinic, B. (2020). The impact of digital transformation process of the Russian university. In *Proceedings of the 31st DAAAM international symposium*. <https://doi.org/10.2507/31st.daaam.proceedings.037>
- Lattouf, O. M. (2022). Impact of digital transformation on the future of medical education and practice. *Journal of Cardiac Surgery*, 37(9), 2799–2808. <https://doi.org/10.1111/jocs.16642>
- Le, D. V. (2022). *Chuyển đổi số trong trường tiểu học Hoàng An - Cơ hội và thách thức [Digital Transformation at Hoang An Elementary School - Opportunities and Challenges]*. The Electronic Portal of the Education and Training Office of Hiep Hoa District, Bac Giang Province. <http://pgdhiephhoa.edu.vn/tin-tuc-thong-bao/hoat-dong-chung/chuyen-doi-so-trong-truong-tieu-hoc-hoang-an-co-hoi-va-thach-thuc.html> [In Vietnamese]
- Leshchenko, M., Kolomiets, A., Iatsyshyn, A., Kovalenko, V., Dakal, A., & Radchenko, O. (2021). Development of informational and research competence of postgraduate and doctoral students in conditions of digital transformation of science and education. *Journal of Physics: Conference Series*, 1840(1), 012057. <https://doi.org/10.1088/1742-6596/1840/1/012057>
- Louis, C., Lawrence, M., & Keith, M. (2007). Surveys, longitudinal, cross-sectional and trend studies (Chapter 9). In t. Edition (Ed.), *Research Methods in Education* (pp. 20). Routledge. <https://doi.org/10.4324/9780203029053>

- Luong, D. H. (2023). Digital transformation in education between 2020 and 2022: A scientometric approach. *Vietnam Journal of Educational Sciences (VJES)*, 875, 77.43. <https://doi.org/10.15625/2615-8957/12310401>
- Mai, N. T. (2021). *Tầm quan trọng của chuyển đổi số đối với giáo dục đào tạo trong giai đoạn hiện nay [The importance of digital transformation for education and training in the current period]*. Learning Resources and IT Center - Da Nang University of Education. <https://lrel.ued.udn.vn/vi/news/cong-nghe-giao-duc/tam-quan-trong-cua-chuyen-doi-so-doi-voi-giao-duc-dao-tao-trong-giai-doan-hien-nay-12.html#:~:text=Chuy%E1%BB%83n%20%C4%91%E1%BB%95i%20s%E1%BB%91%20trong%20gi%C3%A1o%20d%E1%BB%A5c%20%C4%91%C3%A0o%20t%E1%BA%A1o%20t%E1%BA%ADp%20trung> [In Vietnamese]
- Narlı, S. (2010). An alternative evaluation method for Likert type attitude scales: Rough set data analysis. *Scientific Research and Essays*, 5(6), 519–528. <http://www.academicjournals.org/SRE>
- Ngo, T. T., & Le, T. M. T. (2024). Application of digital transformation in university teaching. *Pedagogy & Psychology. Theory and practice*, 2(52), 20–25. <https://journals.indexcopernicus.com/api/file/viewByFileId/1944449>
- Nguyen, A. T., Tran, P. C., & Nguyen, T. P. A. (2023). Digital transformation in higher education from online learning perspective: A comparative study of Singapore and Vietnam. *Policy Futures in Education*, 21(4), 335–354. <https://doi.org/10.1177/14782103221124>
- Nguyen, D. L., Truong, M. H. V., Le, A. V., & Nguyen, N. T. C. (2022). The Study on Awareness, Ability and Policy Suggestions to Meet Job Requirements of the Digital Transformation. *International Journal of Instruction*, 15(2), 1017–1038. <https://doi.org/10.29333/iji.2022.15256a>
- Nguyen, H. D. (2022). *Enhance the application of information technology and digital transformation in education*. Center for Educational Communication. Retrieved 16/07 from <https://moet.gov.vn/giaoducquoedan/tang-cuong-ung-dung-cntt/Pages/Default.aspx?ItemID=8349> [In Vietnamese]
- Nguyen, M. T., & Pham, D. H. (2023). The impact of digital transformation in higher education: the case study from vietnam. *Journal of Higher Education Theory and Practice*, 23(5). <https://articlearchives.co/index.php/JHETP/article/view/5542/5495>
- Nguyen, T. (2024a). *Ra mắt nền tảng sách, báo điện tử [Launch of the E-book and E-newspaper Platform]*. Nhan Dan Newspaper. <https://nhandan.vn/ra-mat-nen-tang-sach-bao-dien-tu-post848129.html> [In Vietnamese]
- Nguyen, T. H. C. (2024b). Nghiên cứu tổng quan về sử dụng trí tuệ nhân tạo trong dạy học [Overview study on the use of artificial intelligence in teaching]. *TNU Journal of Science and Technology*, 229(04), 140–147. <https://doi.org/10.34238/tnu-jst.8541>
- Nguyen, X. A., Pham, K. L., & Trinh, V. H. (2024). Current situation of some difficulties in implementing digital transformation of activities of preschool and high schools. *TNU Journal of Science and Technology*, 229(04), 222–229. <https://doi.org/10.34238/tnu-jst.8568>
- Office of the Government of Vietnam. (2024). *Cổng Thông tin điện tử là cầu nối quan trọng giữa chính quyền và người dân [The Electronic Information Portal is an important 'bridge between the government and the people]*. Office of the Government of Vietnam. <https://vpcp.chinhphu.vn/cong-thong-tin-dien-tu-la-cau-noi-quan-trong-giua-chinh-quyen-va-nguoi-dan-115241114162902929.htm> [In Vietnamese]
- Prime Minister. (2020). *Decision No. 749/QĐ-TTg: Approving the National Digital Transformation Program to 2025, with orientation to 2030*. Government of the Socialist Republic of Viet Nam: Government of the Socialist Republic of Viet Nam Retrieved from <https://datafiles.chinhphu.vn/cpp/files/vbpq/2020/06/749.signed.pdf> [In Vietnamese]
- Pham, V. Q., & Nguyen, Q. T. (2011). *Phương pháp nghiên cứu Xã hội học [Methods of sociological research]*. Hanoi National University Publishing House. <http://thuvien.sptwnt.edu.vn/Ebookview.aspx?id=2021052400201> [In Vietnamese]
- Phan, T. C., Ngo, T. T., & Phan, M. T. (2020). Assessment of information technology use competence for teachers: Identifying and applying the information technology competence framework in online teaching. *Journal of Technical Education and Training*, 12(1). <https://doi.org/10.30880/jtet.2020.12.01.016>
- Reigeluth, C. M., Watson, W. R., Watson, S. L., Dutta, P., Chen, Z., & Powell, N. D. (2008). Roles for technology in the information-age paradigm of education: Learning management systems. *Educational Technology*, 32–39. <http://www.jstor.org/stable/44429625>
- Shang, J., & Li, X. (2023). The difficulties and corresponding strategies of educational digital transformation. *Journal of East China Normal University (Educational Sciences)*, 41(3), 72. <https://doi.org/10.16382/j.cnki.1000-5560.2023.03.008>
- Srichailard, P. (2023). The development learning model of flipped classroom with digital storytelling for department of computer education. *Kasetsart Journal of Social Sciences*, 44(3), 929–938. <https://doi.org/10.34044/j.kjss.2023.44.3.31>
- Timotheou, S., Miliou, O., Dimitriadis, Y., Sobrino, S. V., Giannoutsou, N., Cachia, R., Ioannou, A. (2023). Impacts of digital technologies on education and factors influencing schools' digital capacity and transformation: A literature review. *Education and information technologies*, 28(6), 6695–6726. <https://doi.org/10.1007/s10639-022-11431-8>
- Tsarapkina, J. M., Anisimova, A. V., Gadzhimetova, B. D., Kireycheva, A. M., & Mironov, A. G. (2021). The impact of digital education transformation on technical college teachers. *Journal of Physics: Conference Series*, 2001(1), 012030. <https://doi.org/10.1088/1742-6596/2001/1/012030>
- Tran, T. T. H., & Nguyen, K. Q. (2022). Educators' digital competencies: related concepts and assessment toolkits. *Vietnam Journal of Education*, 22(16), 24–28. <https://tcgd.tapchigiaoduc.edu.vn/index.php/tapchi/article/view/505>
- Vo, L. T. T., Tran, A. N., Phan, T. Q., Nguyen, P. L. H., Tran, L. T. C., & Dinh, Q. M. (2024). Strategies for biological lesson plan designing and applying: A case study at Cai Nuoc high school in Ca Mau Province, Vietnam. *Kasetsart Journal of Social Sciences*, 45(1), 113–120. <https://doi.org/10.34044/j.kjss.2024.45.1.12>
- Yang, X., & Wang, R. (2023). Difficulties and solutions: Next step in the digital transformation of education. *Journal of East China Normal University (Educational Sciences)*, 41(3), 82. <https://doi.org/10.16382/j.cnki.1000-5560.2023.03.008>
- Yavuz, G., Gunhan, B. C., Ersoy, E., & Narlı, S. (2013). Self-efficacy beliefs of prospective primary mathematics teachers about mathematical literacy. *Journal of College Teaching & Learning (TLC)*, 10(4), 279–288. <https://doi.org/10.19030/tlc.v10i4.8124>