The utilization of digital transformation applications in history learning at high schools in Ca Mau Province

Lua Tran Thi[1*], Bui Thanh Vu[2] and Vo Hong Cam[2]

[1] Vice Dean, Faculty of Political Science, Ho Chi Minh City Campus of the Vietnam Youth Academy, Ho Chi Minh City, Vietnam

[2] Ho Chi Minh City Campus of the Vietnam Youth Academy, Ho Chi Minh City, Vietnam

Corresponding author: Lua Tran Thi

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Abstract

The article focuses on analyzing the current state of leveraging digital transformation applications in the study of History among high school pupils in Ca Mau province. The research was conducted using sociological survey methods with a sample of 1,728 pupils from five high schools, along with in - depth interviews with 15 teachers and 30 pupils. The results show that pupils are aware of the role and importance of digital transformation in studying History, especially in researching documents, watching historical films and reviewing knowledge. However, the actual level of exploitation remains moderate, mainly focusing on information reception activities, white application activities that require creativity, interaction and systematic knowledge organization have not been effectively utilized. Based on this, the article also discusses specific aspects of applying digital transformation to exams and semester tests, and expands on historical knowledge research, and proposes some solutions to improve the situation.

Keywords: Digital transformation, Application, General education system, History subject, High school pupils

1. Introduction

Digital transformation is creating significant changes in the organization and operation of education systems worldwide. In Vietnam, digital transformation in education has been identified as one of the key tasks to improve human resource quality and meet sustainable development requirements in the context of the Fourth Industrial Revolution. For high school History subject, innovative teaching methods are important to encourage pupils to learn actively, memorize lessons, and develop an interest in the subject.

Kharisma Lutfiyatul Ilmiyah, Nurul Umamah, Anis Syatul Hilmiah (2024) in "Using Digital Platforms in 21st Century History Learning: A Case Study of website usage in High Schools" demonstrated that this qualitative research focused on the application of websites as digital resources in History teaching at the upper secondary level [6]. The results indicate that website usage increases engagement, improves critical thinking skills in History, and simultaneously enhances....

Bilalova et al. (2020) argue that: On the one hand, the application of digital educational resources not only enables vivid presentation of various types of historical materials, such as texts, images, audio and videos, but also helps recreate the atmosphere of History classrooms, construct historical scenarios and stimulate pupils' emotions. This is very beneficial for cultivating pupils' core competencies [1].

Bui Kim Luyên (2024) in "High School Experience Initiative: Applying information technology and digital transformation in innovation of teaching methods, assessment, and evaluation in grade 10 History" pointed out that digital tools play an important role in enhancing experience for teaching and assessment in grade 10 History. It emphasizes the requirement for teachers to be familiar with various tools and support software that can enhance learning experiences to provide digital learning materials and software tools for teaching grade 10 History [2].

According to Tran Thi Thu Ha (2024) in "Pupils applying digital technology to learning and research," it is argued that pupils nowadays must access and apply digital technology to learning. Therefore, in addition to striving to study at school, pupils always seek to understand and apply digital technologies to improve the quality of their learning and research, and to participate in creative competitions. With dedicated guidance and orientation from teachers and parents providing computers for studying, pupils have many advantages in applying digital technology, which helps improve their academic performance [8].

Resolution of Congress 57-NQ/TW (2024) of the Politburo, digital transformation along with science, technology, and innovation is identified as the most important driving force for the rapid and sustainable development of the country. The resolution calls for the development of digital infrastructure, digital human resources, and the application of technology in all fields, with education considered a key priority [4].

Resolution of Congress 71-NQ/TW (2025) continues to affirm the Party's view that digital transformation in education and training is a comprehensive and profound breakthrough, going

beyond the scope of traditional information technology application [5].

In the current context, exploring the application of digital transformation in the study of History not only contributes to innovative teaching methods but also expands the learning space, enhances visual and engaging aspects, and increases pupils' proactive abilities. However, research on this topic for high school pupils in Ca Mau province is still limited. The study results clarify the role and importance of digital transformation applications for high school pupils in the subject of History.

2. Research methods

The article uses document analysis to systematize the theoretical basis of digital transformation in education in general and the exploitation and application of digital transformation in teaching History in particular. The sociological survey method was implemented with a sample size of 1,728 pupils from five high schools in Ca Mau province, including An Vien High School, Dam Doi High School, Nguyen Van Nguyen High School, Vo Thi Hong High School, and Ho Thi Ky High School, to assess the level of implementation and the effectiveness of exploiting and applying digital transformation in History learning. Additionally, the article employs in-depth interviews conducted with 15 teachers and 30 pupils from the five high schools to clarify and supplement the quantitative results, with data processed using descriptive statistics and comprehensive analysis methods.

Table 1: Description of the characteristics of the research subjects using a survey form

Research subjects	Research site	Quantity	Percentage (%)
High School	Vien An High School	283	16.4
	Dam Doi High School	494	28.6
	Nguyen Van Nguyen High School	307	17.8
	Vo Thi Hong High School	354	20.5
	Ho Thi Ky High School	290	16.8
	Total	1.728	100
Gender	Male	754	43.6
	Female	974	56.4
Student Grade	Grade 10	520	30.1
	Grade 11	631	36.5
	Grade 12	577	33.4

(***Source:*** Survey results December 2025)

3. Research Results and Discussion

3.1. Research Results

3.1.1 Types of applications and duration of technology use among upper secondary school pupils in Ca Mau Province

In addition to evaluating the effectiveness of digital transformation applications in history learning, the research results analyze the frequency and priority level of pupils' use of digital technology tools. Examining the tools that pupils frequently use allows for a clearer identification of technology adoption trends as well as how pupils leverage digital platforms to support their learning process. The survey results are summarized as presented in Table 2 differences in usage levels among information search tools, artificial intelligence, and online teaching support platforms.

Table 2: Digital technology applications pupils commonly use in learning

Application of digital technology	Percentage (%)
Gemine	30.2
Chat GPT	58.3
Google	58
Kahoot!	7.3
Google Meet	16.6
Google Classroom	7.9
Total	100

(***Source:*** Survey results December 2025)

Based on table 2, it shows that the level of digital technology application among high school pupils is clearly differentiated, mainly focusing on search support tools and artificial intelligence (AI). Specifically, Google (58%) and Chat GPT (58.3%) are the most commonly used, reflecting proactive learning habits of seeking information and utilizing AI to solve exercises or summarize knowledge. According to in-depth interview results (IDI, Male, a student at Dam Doi High School), he stated: “I usually use Google, Gemini, and Chat GPT to support my studies, search for materials, and exchange information”. Conversely, other AI support tools like Gemini (30.2%) have a lower usage rate, and notably, applications for managing classes, interaction, and group learning such as Google Meet (16.6%), Google Classroom (7.9%), and Kahoot! (7.3%) are used very little. This indicates that pupils' application of digital technology currently remains at the level of self-study, while the integration of technology into teaching and learning processes is still underdeveloped. In-depth interviews also clarified additional information: (IDI, female, student, Khanh Lam High School) stated: “I usually use Google and Chat GPT the most to search for information and get help with our homework. These applications help us learn quickly and understand more deeply. Conversely, interactive tools like Kahoot! or Google Classroom are rarely used spontaneously and are mainly used when teachers assign tasks”.

The research results indicate that high shool pupils have actively adopted digital technologies, demonstrating adatability and proactive engagement in knowledge acquisition. However, current technology use is primarily oriented toward information retrieval and formal learning management between teachers and pupils remain underutillzed and lack systematic implementation. To comprehensively advance the digital transformation process, targeted solutions are required to more deeply integrate digital applications across all aspects of teaching and learning white encouraging teachers to employ interactive tools so that technology becomes an integral component of the formal learning environment.

After identifying the specific digital tools that pupils prioritize for learning, to comprehensively assess the level of

commitment and extensive use of digital transformation, the next step is to quantify learners' time investment. Table 3 below provides key quantitative data, clearly illustrating the amount of time pupils spend on technology-based learning activities, thereby establishing the role of technology in their daily study routines, as follows:

Table 3: Time spent using digital technology for learning by high school pupils

Level of digital technology use	Percentage (%)
Rarely (< 1 hour/day)	19.1
Occasionally (2 hour - 3 hour/ day)	45.3
Frequently (4 hour - 5 hour/day)	24.3
Very frequently (more than 6 hour/ day)	11.3
Total	100

(***Source:*** Survey results December 2025)

Through the survey results in Table 3, it is shown that high school pupils have a fairly frequent level of technology use, with a significant proportion falling into the medium to high usage groups. Specifically, the group of pupils who use digital technology occasionally (2 to 3 hours/ day) accounts for the highest percentage (45.3%), indicating this is the most common habit and suggesting that digital technology is used as a supplementary support tool rather than the sole learning medium. However, when combining the groups that use technology regularly (4 to 5 hours/day) at 24.3% and very frequently (more than 6 hours/day) at 11.3%, a total of 35.6% of pupils spend 4 hours or more each day on digital learning. On the other hand, the group that uses technology rarely (< 1 hour/day) accounts for only a small portion (19.1%). Additionally, (IDI, Male, student, Vien An High School) believed: "Most of us use digital technology occasionally, about 2-3 hours per day. Moreover, many pupils use it frequently (4-5 hours) and very frequently (more than 6 hours). This time includes browsing, doing homework, and learning through applications. This indicates that the majority of pupils actively dedicate a significant amount of time each day to interacting with digital applications for learning purposes, beyond their official school hours. According to in-depth interview results (IDI, female, management staff, Nguyen Van Nguyen High School), it was stated: "Most pupils use digital technology for learning occasionally (2-3 hours per day). However, the rate of frequent use (more than 4 hours per day) is also very high. This indicates that technology has become an essential tool, but monitoring is necessary to ensure pupils are not overloaded or distracted from other learning activities."

In summary, survey data indicate that high school pupils demonstrate a high and stable level of digital technology use for learning, with nearly 80% of pupils spending at least 2 hours each day for this purpose. Although the most common group is occasional users (2-3 hours per day), the fact that nearly 40% of pupils spend 4 hours or more each day indicates that digital technology has become an indispensable part and plays an important role in supporting self-study and research. This highlights the need for appropriate time management strategies and guidance on effective study methods from schools and families to maximize the benefits of digital technology while ensuring health and maintaining a balance with other learning activities.

3.1.2 Current use of digital transformation applications for information retrieval and knowledge expansion in History learning among high school pupils

The survey results show that high school pupils have a high and stable level of digital technology use for learning, with nearly 80% of pupils spending two hours or more each day. Digital technology has become an essential tool, strongly supporting self-study and research. The most popular applications are Chat GPT (58.3%) and Google (58%), reflecting a trend of proactive information seeking and AI utilization. However, current usage mainly serves personal needs. This highlights the need for reasonable time management and deeper integration of these applications into formal teaching and learning processes at schools. Table 4 below reflects the extent of pupils' use of digital tools for research purposes and evaluates the effectiveness of these activities, thereby identifying habits and skills in searching for and receiving historical knowledge in a digital environment.

Table 4: The level of implementation and effectiveness of pupils when applying digital transformation in researching and expanding knowledge of History during the learning process

Contents	Appropriate level (%)				Appropriate level (%)			
	Never	Occasionally (3 times/term)	Frequently (6 times/term)	Very Frequently (10 times/term)	Not effective	Slightly effective	Effecti ve	Very Effective
Searching for information related to historical lessons, topics and historical events	14.4	42.3	27.1	16.1	9.3	56.2	15.6	18.9
Seeking historical documentary films and explanatory videos on revolutionary movements to broaden knowledge and preview new lessons	15.4	44.2	25.8	14.6	9.5	54.9	14.8	20.9
Summarizing lessons to develop practical illustrative examples for history learning	17.5	44.3	23.8	14.1	9.9	53.9	17.7	18.5
Use AI to recreate battles and simulate the lives of people throughout different historical periods.	31.5	37.0	20.0	11.5	14.0	44.4	24.9	16.7

Pupils use “Mind mapping tools” to create a mind map of a country's historical timeline.	35.3	35.0	19.3	10.4	15.4	45.0	25.0	14.2
Pupils use digital technology to create flashcards about lessons and historical events.	33.0	37.5	17.8	11.7	14.5	45.3	24.7	15.5
Pupils engage in online mock multiple – choice quizzes to assess historical knowledge	22.1	42.2	21.4	14.3	12.7	50.9	17.4	19.0
Design a presentation (using Canva, PowerPoint).	21.8	39.9	22.7	15.6	13.1	49.7	18.4	18.8

(***Source:*** Survey results December 2025)

The result in Table 4, it shows that the level of implementing digital technology applications in researching and expanding knowledge of History varies significantly across activities. The activity “searching for historical documentary films, explanatory videos...” has the highest proportion of occasional and frequent use (70%), indicating that pupils are very interested and actively use audiovisual tools to expand their historical knowledge. Conversely, the activity “using AI to recreate battles, simulate life...” has a high percentage of never used (31.5%) and the highest proportion of occasional use (37.0%), suggesting that exploring AI for creative activities and historical reconstructions is still quite new and not widely familiar to pupils. Activities involving systematizing knowledge and personal creativity are performed less frequently.

In particular, pupils have never used or occasionally use tools such as: Mind mapping tools, with the highest percentage of never using at 35.3% and occasionally at 35.0%. At the same time, the application of designing presentation materials (charts, Canva, PowerPoint) has a percentage of never using at 21.8% and occasionally at 39.9%. This indicates that pupils still focus more on gathering input information rather than processing, organizing, and presenting output information using digital technology.

Based on the survey results in table 3.3, regarding effectiveness, pupils rated the activities as somewhat ineffective. Most activities had a lower percentage of effective and highly effective ratings compared to ineffective ratings. Specifically, the activity “using digital technology to create Flashcards and lessons” was rated as the most effective (less than 40%), indicating that pupils consider this tool extremely useful for reviewing and memorizing history knowledge, but they are not yet sure how to use it more effectively. Next is the activity “searching for historical documentaries, explanatory videos about revolutions to expand knowledge and preview new lessons,” which received a low percentage.

Although pupils regularly perform all activities but the effectiveness is not high when applying digital technology for research. Most of them feel that this method brings significant benefits in understanding, expanding knowledge, and systematizing lessons in History. According to in-depth interview results (IDI, Female, student, Dam Doi High School), she said: “I often use digital technology to look up documents, in-depth lectures on History and other subjects”. Additionally, (IDI, Male, student, Nguyen Van Nguyen High School) stated: “I frequently use digital technology to search for basic information or watch documentary films about History. I find this very effective for understanding the lessons and expanding my knowledge. However, activities like using AI to recreate history or drawing digital mind maps are rarely done by me, mainly due to a lack of guidance or suitable tools”.

The analysis results indicate that the application of digital transformation in searching for and expanding knowledge in History is highly evaluated by pupils in terms of effectiveness (with most activities achieving effectiveness levels above 60%), however, the level of implementation remains disproportionate to its potential. Pupils tend to prioritize audiovisual and entertainment – oriented resources (such as videos and documentaries) as well as more traditional activities (information searching and lesson summarization) to broaden their knowledge. Creative and reconstructive activities (use of AI) and advanced knowledge – organization practices (digital mind – mapping tools), although perceived as effective are still infrequently implemented. These findings suggest a need for increased instructional guidance and encouragement from teachers, together with the provision of appropriate tools and specific resources, to enhance pupils engagement in creative and high – impact digital transformation activities, thereby fully exploiting the potential of digital technologies in History education.

Research by Ta Van Ngoc (2023), the current situation of managing the application of information technology in teaching at high schools was analyzed, clarifying the role of school administrators in planning, organizing, directing, and inspecting. The research identified difficulties and limitations in infrastructure, teachers' information technology capacity, and management mechanisms, and from there, proposed several solutions to improve the effectiveness of managing information technology application, contributing to innovative teaching methods and enhancing the quality of secondary education [7].

In summary, the survey and in-depth interviews show that pupils highly appreciate the effectiveness of digital technology in learning History, with many activities achieving over 60%, particularly those involving the search for documentaries and educational videos. However, the level implementation remains below its potential. Pupils prioritize gathering input information, while advanced creative and systematic knowledge activities such as using Mind Mapping tools and AI for re-creation are still quite new and infrequent. Therefore, it is necessary to strengthen guidance and provide tools to encourage pupils to fully exploit the potential of digital technologies in History education.

3.1.3 The current situation of applying digital transformation in mid-term exams and final exams for high school pupils in the subject of History

Assessing the level of digital technology utilization in activities that significantly impact pupils academic performance. Midterm exams and final assessments are the most important stages, especially for History, which requires pupils to use technology effectively to reinforce knowledge and organize information. Table 5 below will focus on analyzing the extent of implementing digital technology activities and evaluating the effectiveness pupils gain from these tools during their preparation for the History exam.

Table 5: Pupils' levels of implementation and perceived effectiveness of digital transformation applications in midterm and final History examinations

Contents	Appropriate level (%)				Appropriate level (%)			
	Never	Occasionally (3 times/term)	Frequently (6 times/term)	Very Frequently (10 times/term)	Not effective	Slightly effective	Effective	Very Effective
Complete exercises and assessments on digital platforms (Google Form, LearnWorlds).	19.3	40.8	25.3	14.6	12.2	51.7	21.6	14.5
Use infographics and digital mind maps (on Canva, MindMeister) about the History subject.	24.7	39.2	23.6	12.5	13.3	47.7	25.1	13.9
Participate in online multiple-choice quizzes (on Quizizz, Kahoot!) to review historical knowledge by chapter and lesson before taking the test.	18.1	38.6	29.7	13.6	12.4	51.1	19.8	16.7
Use AI tools (Gemini, Chat GPT) to summarize the lesson content.	14.6	37.6	31.5	16.3	11.5	51.3	20.8	16.4
Try passing the midterm and final exams for the History course online using specialized software.	18.4	39.2	28.0	14.4	12.3	50.2	19.6	17.9

(***Source:*** Survey results December 2025)

The result in table 5, the level of digital technology application in testing and exams shows that pupils mainly use technology to support their learning and review processes rather than creating content. Specifically, the activity "participating in online multiple-choice tests (on Quizizz, Kahoot!) for review" has the highest overall rate of occasional and frequent implementation (accounting for 68.3%), reflecting a high demand for self-assessment and systematization of knowledge before exams using interactive tools. Similarly, the activity "using AI tools (Gemini, Chat GPT) to summarize lesson content" is also performed occasionally and frequently at the highest rate (69.1%).

Conversely, activities that require design skills and complex knowledge synthesis are performed less frequently, especially "using infographics and mind maps (on Canva, MindMeister) for History," with a never or occasionally used rate of 63.9%. According to (IDI, female, Dam Doi High School): "I rarely use Canva to design products during lessons because I haven't had the opportunity or guidance to practice." Similarly, (IDI, male, Nguyen Van Nguyen High School) said: "I also use AI to assist in designing products, but I still face many difficulties in using it and don't know how to operate it." This indicates that although pupils actively review using technology, visualizing and systematizing knowledge with digital tools has not yet become a regular habit in their preparation for tests and exams in History.

Based on the survey results in table 3.4, the assessment of the effectiveness of digital tools during midterm and final exams in History shows that it is still not high. The notable advantages are in activities that provide direct support and quick feedback: "Participating in online multiple-choice tests" received an effectiveness and very effective rating of less than 40%, indicating that the application of digital transformation in learning History has not been effective. Pupils use these tools regularly but have not fully exploited their features in learning. Similarly, "using AI tools to summarize lesson content" also received relatively low ratings for effectiveness and very effectiveness, demonstrating that pupils see artificial intelligence as a helpful assistant to shorten processing time and condense complex knowledge, but they have not yet fully exploited its potential.

The most important highlight is the paradox in application behavior: even activities with modest frequency, such as "using infographics and mind maps," are still perceived by pupils as effective and highly effective, albeit at a low level. This awareness highlights untapped potential; if barriers related to design skills, time, and familiarity are removed, and teachers actively provide training, pupils will quickly adopt these visualization tools to significantly improve review quality and learning outcomes. According to in-depth interview results (IDI, Male, management staff at Vien An High School), it was said: "Pupils regularly take history tests using digital technology. This shows a high acceptance of digital testing formats, enabling the school to expand the use of specialized testing platforms in the future." Additionally, (IDI, Female, student at Ho Thi Ky High School) mentioned: "I often take tests on digital platforms like Google Forms. This helps me get used to..."

3.2 Discussion

The survey results show that most high school pupils in Ca Mau province have access to and use digital technology devices such as smartphones, computers, and the Internet. Pupils highly appreciate the effectiveness of using digital technology in the learning environment for History, especially in activities like researching materials, watching documentary films, historical videos, and reviewing for exams.

There is an imbalance between the awareness of benefits (high effectiveness) and actual behavior (moderate implementation) in pupils' use of digital transformation applications in History learning. Pupils are focusing on search tools and consuming visual content. To optimize the digital transformation process, the solution should shift from convincing pupils of the benefits (since they are already aware) to removing practical barriers, including providing in-depth digital skills training for creative activities, and encouraging teachers to integrate systematic tools and knowledge presentation into more frequent assignment requirements.

However, the level of implementing digital transformation in practical learning is not yet commensurate with pupils' awareness. Activities that are creative and highly interactive, such as building mind maps, online group work, and using digital tools to organize and present historical knowledge, are still conducted infrequently. Interview results indicate that the main reason stems from pupils' limitations and digital skills, as well as the lack of synchronization in integrating digital technology into teachers' learning requirements and the technological infrastructure conditions in some areas, which are still challenging. This shows that to truly harness the effectiveness of digital transformation in history education, it is necessary to focus on raising awareness among pupils and schools, and to provide specific guidance on the systematic use of digital technology.

3.3 Solutions to enhance the exploitation of digital transformation applications in the study of history by high school pupils in Ca Mau province

The research results show that high schools have implemented and effectively used basic digital tools, specifically in History, during digital transformation. However, there are still certain limitations and the following solutions should be implemented to improve effectiveness:

Firstly, the research indicates the need to enhance digital capacity for History teachers so they can guide pupils to use technology more effectively. Teachers should receive regular training on designing digital lessons, using digital learning materials, online teaching platforms, and digital tools that support historical thinking such as mind maps, digital maps, and historical simulations. Improving teachers' digital skills is a key factor in encouraging pupils to explore technology in a productive and creative way.

Secondly, build and develop a digital learning resource system for History that aligns with the general education program and local characteristics, enabling pupils to use it effectively. The constructed learning materials should focus on visual appeal, vividness, and connection to the history of Cà Mau province, thereby helping pupils access the content easily, increase their interest in learning, and enhance their ability to apply knowledge in their studies.

Thirdly, innovate the organization of learning activities and assessment methods towards digital transformation integration. Teachers need to design learning tasks that require pupils to use digital technology for group work, presenting learning products, systematizing digital knowledge for group work, presenting learning products, systematizing knowledge, and solving historical problems, implementing a shift from technology-based information reception to developing thinking and creativity skills.

Fourthly, for high schools in Ca Mau province, the farthest province in our country, there is a need to strengthen technological infrastructure and ensure equitable access for pupils. For schools in difficult areas, support from the education sector and local authorities is necessary to upgrade infrastructure, internet systems, and digital teaching equipment to bridge the digital gap among schools within the province.

Fifthly, strengthen the coordination between schools, families, and society in guiding and supporting pupils to effectively, safely, and purposefully utilize digital technology in the effective study of History.

4. Conclusion

In conclusion, the research findings have clarified the current state of the use of digital transformation applications in History learning among high school pupils in Ca Mau province, based on large – scale survey data combined with in – depth interviews to further elucidate the findings. The results indicate that although pupils demonstrate positive perceptions regarding the role of digital transformation in learning, the actual level of application remains limited. In particular, pupils have not fully exploited the functionalities of digital technologies, resulting in relatively low learning effectiveness. On this basis, the study affirms that the effective utilization of digital transformation applications is an inevitable pathway toward comprehensive innovation in teaching and learning in general and in History education in particular, especially in localities facing considerable challenges in learning conditions. The coordinated implementation of solutions, including enhancing digital competencies for teachers and pupils, developing digital learning resources, innovating teaching methods and ensuring adequate technological infrastructure, will contribute to improving the quality of History learning and meeting the requirements of general education reform in the context of contemporary digital transformation.

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