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Using Emerging Digital Technologies Adoption for History Teaching: A Teacher-Centric Unified Theory of Acceptance and Use of Technology Analysis of Motivational and Environmental Influences

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Abstract: This research exclusively aims to determine the type of digital media most often used in the teaching and learning process of history and the motivation to use digital media by teachers in teaching history based on the unified theory of acceptance and use of technology (UTAUT). This study demonstrates that online learning platforms have become a widely used tool among Indonesian history teachers, with the highest adoption of online learning platform use in Junior and Senior High School, reflecting the high access to this platform across types of schools. The key driving factor for technology in history learning is that the technology must be user-friendly and have sufficient support for its use by educators. This research, using the technology acceptance model (TAM), contributes to teachers about motivational and environmental factors on technology adoption in teaching. Accessibility and proper support are the primary drivers for using technology in education and were the most impactful factors for teachers incorporating technology into history learning. Along with this supportive infrastructure, an effort must also be made to provide a conducive environment, such as teachers working together in this direction, and sufficient infrastructure for teachers so that it becomes easier for them to access and utilize technology. These methods can all help teachers gain confidence in their use of technology.

Keywords: *Digital technologies, environmental influences, history teaching, motivation, UTAUT.*

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Introduction

The teaching of history has a significant function in creating the capacity of students to objectively analyse the evolution of events that took place in the past that affect our reality. The purpose of the use of digital technology in history teaching is to optimise it to make it interactive and relevant and to engage the learner. The advent of digital technology permits the use of visual media, simulations and multimedia resources to develop comprehensive historical concepts where students need to understand much deeper concepts (Moseikina et al., 2022). Moreover, these technologies grant access to digital archives, documents and alternative narratives that expand students' horizons (Mantzou et al., 2023). Teaching history with tech; tech in history teaching — in the digital age, using technology in history teaching also means that students will learn to be digital literate if history teaching is done properly, an important skill in the 21st century. Consequently, utilization of digital technology is thus not only reinforcing historical material comprehension among students, but also providing them with the necessary skills to engage in modern, information-based society (Turgunovna & Tashpolatovna, 2024).

Despite the fact that digital technology is being used to teach history has enormous advantages, there exist a number of problems restricting it to create the most advantageous effect (Kaimara et al., 2021). This is mainly due to either low skills among educators or no training to integrate digital technology into the teaching method. Besides, even in schools,

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the access to digital devices and proper infrastructure is still a limitation especially in a less developed part of the world. At the same time, there also looms a danger of technological overuse that would transform the critical component of history teaching away from analysis and into experiential-with the transmission of information and not the determination of meaning. A separate issue is quality, in context, and locally appropriate digital content not being available to students (Herman et al., 2021). Such issues highlight the necessity for a more strategic effort to ensure that digital technology can in fact contribute much to raising the bar for historical education.

This issue appeals because the integration of digital technology in history teaching has the potential to enhance the quality of learning but also answers the 21st century challenges that requires digital literacy and critical thinking (Ayyildiz et al., 2021; Bereczki & Kárpáti, 2021). By providing answers to immediate schemes for overcoming challenges towards implementation, like lack of know-how among practitioners and infrastructural access, and also investigating modes of effective technology use to deliver experiences that are immersive, contextualised and relatable to learners (Costan et al., 2021). This is valid to guarantee that advanced technology is not just an extra apparatus yet in addition a motor of change in history education.

Using a teacher-focused approach based on the unified theory of acceptance and use of technology (UTAUT) model, this research proposes that the issue can be resolved by incorporating emerging digital technology into historical lessons. It appeared like this was an attempt to get to the bottom of why teachers are so receptive to and comfortable with using new technology in the classroom, as well as the external factors that may be influencing this decision. It also outlines how to create education spaces that dance to the tune of innovation, greater student engagement and the continuity of the process of teaching history with the assurance based on evidence about the improvement of its effectiveness in the digital world.

The use of this methodology has previously been shown with UTAUT to be an appropriate model to make a technological adoption decision in an educational setting (Sewandono et al., 2023). According to research, the work of others is a strong predictor of teachers' use of technology in the classroom (Turgunovna & Tashpolatovna, 2024). The studies also emphasized social influence as well as organizational support, including technology training and availability of sufficient infrastructure, in facilitating technology adoption (Shah et al., 2021). These studies are relevant because they provide insights into how motivational and contextual elements can support the successful implementation of technology in learning, including in the field of history teaching. However, these studies often focus on aspects of technology in general, so further exploration specific to history teaching is needed considering the complexity of the material and the needs of teachers in delivering critical and in-depth historical concepts.

Research by Chatterjee and Bhattacharjee (2020) UTAUT model. The study developed hypotheses and conceptual models, which were validated through surveys using feedback from 329 usable respondents. Plageras et al. (2023) found that when applied science and technology teachers used the UTAUT methodology, they improved learning outcomes and accomplished their teaching objectives more effectively by using FC. The innovative aspect of this study lies in the use of the UTAUT model, which focuses on the adoption of recent digital technologies, particularly Artificial Intelligence (AI), within the context of teaching history. Although several studies have examined AI's potential in the classroom, this one sheds fresh light on the topic by examining its application to the study of history, which requires a more content-specific and sensitive approach to the needs of teachers and students. This research not only explores the factors that influence AI acceptance among educators, but also develops and validates a conceptual model that links motivational and environmental elements to the successful adoption of AI in history teaching.

Concerning the critical necessity to maximize the penetration of digital technologies in history teaching amidst the rapid development of technology and educational challenges. While digital technologies can provide opportunities to improve teaching quality, their adoption among history teachers is often hampered by various motivational and environmental factors. The focus of this study is to understand the most widely used digital media by history teachers in the learning process and to analyze the motivating factors that encourage teachers to use digital media in teaching history, specifically based on the UTAUT model.

Literature Review

It focused on four constructs—performance expectancy, effort expectancy, social impact, and facilitating conditions—to understand what teachers think before adopting digital technology, even if there were not many UTAUTs produced for technology adoption in history. According to Al-Rahmi et al. (2022), performance expectancy in history education is when teachers believe that incorporating technology into their lessons would improve both their own teaching methods and the learning outcomes for their students. According to Wijaya et al. (2022), the term "effort expectancy" describes how easy it is to employ technology when understanding complicated historical events. Peer, institutional, and leader-level social influences, as well as educational norms, provide the third component that drives instructors to embrace technology (Vermote et al., 2023). Facilitating conditions, on the other hand, are those environmental aspects that may support or hinder the effective use of technology (e.g. availability of proper technological infrastructure, training, administrative support) (Shahzad et al., 2021).

Table 1. UTAUT Indicators for Technology Adoption in History Teaching

No	Variable	Indicators	Source
1	Performance Expectancy	Belief that using technology will improve teaching effectiveness. Perception that technology will enhance student engagement and learning outcomes. Expectation that technology will make history teaching more efficient and effective. Belief that technology helps in providing more diverse learning opportunities for students. Expectation that technology will simplify lesson planning and resource management.	Kumari (2025); Wang (2024)
2	Effort Expectancy	Perceived ease of using technology in the classroom. Perception that technology tools are simple to learn and operate. Belief that using technology requires minimal effort or training. Confidence that students can easily interact with technology in lessons. Perception that technology integrates seamlessly with existing teaching methods.	Latumeten et al. (2024); Akintayo et al. (2024)
3	Social Influence	Perceived support from colleagues in adopting technology for teaching. Perception that school leadership encourages the use of technology in teaching. Influence of peers or colleagues who use technology and share its benefits in teaching. Belief that using technology is becoming a social norm within the educational community. Influence from the broader educational community or network promoting technology adoption.	Nassar et al. (2019)
4	Facilitating Conditions	Availability of resources (e.g., hardware, software, internet) to support technology use. Adequacy of technical support and training provided by the school. Availability of time and infrastructure to effectively integrate technology into teaching. Access to a variety of digital tools to enhance teaching and learning processes. Availability of ongoing professional development opportunities focused on technology use.	Graf-Vlachy et al. (2018); Nassar et al. (2019)
5	Behavioral Intention	Intention to continue using technology in teaching history. Likelihood of integrating more technology into future teaching practices. Teachers' motivation to adopt new technologies for improving history education. Belief that technology will become an essential part of future teaching practices. Confidence in the effectiveness of technology in enhancing the learning environment.	Akram et al. (2022; Gupta (2025)
6	Use Behavior	Actual usage of technology in history teaching (frequency of use). Consistency in using technology for teaching purposes. Extent to which technology is integrated into daily teaching activities. Teachers' use of digital resources for preparing lessons and teaching materials. Frequency of incorporating interactive tools and media in the classroom. Extent to which teachers rely on technology to assess student progress and outcomes. Teachers' willingness to experiment with new technologies in the classroom.	Chatterjee et al. (2023); Tian and Yang (2024)

Conceptual Framework

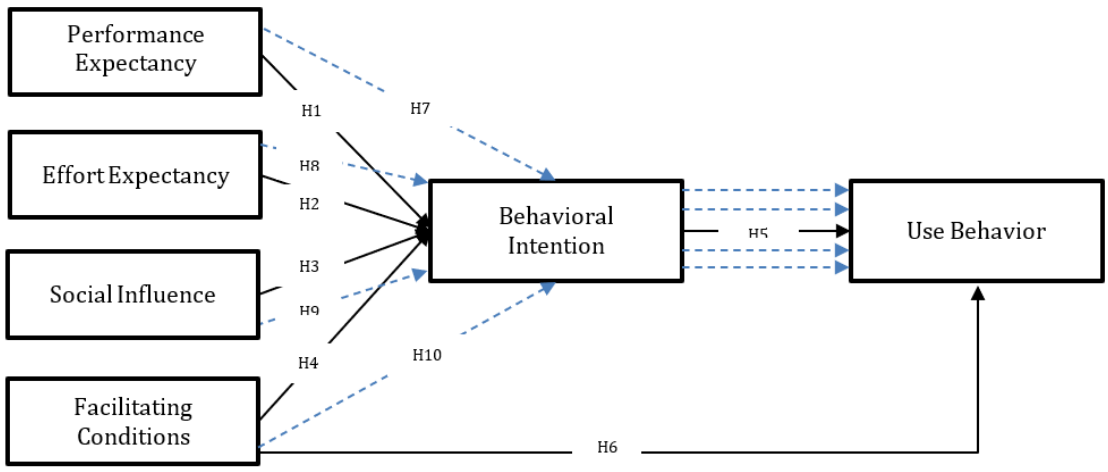

Figure 1. Conceptual Framework

Methodology

Research Design

Using a cross-sectional methodology and a quantitative correlational approach, this study looks at how different contextual and motivational factors affect the use of new digital devices in history classes. Using the UTAUT model as a framework, this study employs a correlational approach to identify and measure the degree of association between variables. Specifically, it focuses on how teachers' intentions and behaviors are impacted by the perceived ease of use, usefulness, social influence, and availability of resources when it comes to using digital technologies in history education. With its cross-sectional methodology, this study captures data at a single instant in time, giving us a glimpse of what factors are impacting history instructors' embrace of technology.

Data Collection Techniques

Information was gathered by a survey that uses a Likert scale from 1 to 5 to evaluate different parts of the UTAUT model, which has six components: performance expectancy, effort expectancy, social influence, facilitating factors, behavioral intention, and use behavior. In order to make sure that everyone could view the survey and participate, we used Google Forms to send it out. Educational technology and history education specialists checked the survey questions for appropriateness and congruence with the constructions to guarantee the content validity. A pilot test, in which a subset of educators filled out the questionnaire and provided feedback, provided additional evidence of construct validity. The validity and reliability of the data collecting tool were further confirmed by assessing reliability using Cronbach's alpha. The results showed that the instrument had acceptable internal consistency for all constructs.

Research Instrument

The population of this study is the Indonesian History Subject Teacher Conference (MGMP) community that is active on social media. This community consists of around 3,147 junior high school (SMP) and senior high school (SMA) teachers from all over Indonesia. From this population, 300 teachers were chosen with the use of a purposive sampling strategy. This method ensured that the sample consisted only of teachers who had adopted digital technology in their history classes, making it relevant to this study, which focuses exclusively on educated individuals whose lessons make use of various technological tools. Data collection was conducted over 5 months from August to December 2024, to ensure that the sample reflected current trends in technology adoption in education.

Data Analysis Techniques

The data analysis method used in this research is PLS SEM (Structural Equation Model). SEM-PLS allows researchers to test the outer model, namely the relationship between observed variables and their related constructs, as well as the inner model, namely the structural relationship between latent variables. This method is suitable for testing high-level latent construct models and can accommodate multi-variable and multi-construct frameworks simultaneously, making it suitable for data analysis in this study. Mediation analysis was conducted to test for indirect effects between constructs. This study intends to discover trends in the ways in which the six UTAUT variables—performance expectancy, effort expectancy, social influence, facilitating conditions, behavioral intention, and use behavior—reflect teachers' views on the use of digital technology in history instruction in relation to factors like age, employment status, school type, teaching experience, and external support. Understanding the elements that motivate and impact the adoption of technology among Indonesian teachers can be gleaned from the results.

Findings/Results

Technology Usage in History Teaching Among Indonesian Teachers

Teachers in Indonesia are making use of various new digital tools to enhance their historical lessons, as seen in the chart below. Overview of the total number and percentage of teachers who use each technology and the statistical data collected from different schools throughout Indonesia from public and private, urban and rural school. The technologies evaluated include virtual reality (VR), augmented reality (AR), three-dimensional models, gamification, e-learning platforms, digital archives, three-dimensional projection mapping, podcasts, interactive timelines, and social media platforms.

Table 2. Distribution of Technology Usage in History Teaching Among Indonesian Teacher

No	Technology	Explanation	Example Media	Use	Number of Teachers Who Use Media	
					Total	%
1	Virtual Reality (VR)	Technology that creates an immersive experience by generating a virtual environment that can be explored.	Oculus Rift, HTC Vive	To provide a deep and interactive historical experience.	130	43.3
2	Augmented Reality (AR)	Technology that adds digital elements to the real world that can be seen through devices like smartphones	Google Lens, ARKit	To enrich the history learning experience with additional information visible in real-time.	140	46.7
3	Interactive 3D Models	The use of 3D models to depict historical artifacts or sites in a more realistic manner.	Sketchfab, Tinkercad	To provide a more realistic visual representation of historical objects.	100	33.3
4	Gamification	The use of game elements in education to make topics more engaging and interactive.	Kahoot!, Quizizz	To increase student engagement with fun and competitive element	190	63.3
5	Online Learning Platforms	Online platforms to access materials, participate in discussions, and take exams.	Moodle, Google Classroom	To facilitate easy access to course materials, discussion forums, and web-based exams.	250	83.3
6	Digital Archives & E-books	A collection of digital archives, journals, and books that can be accessed online for historical research.	Internet Archive, JSTOR	To provide access to historical resources from various digital archives.	180	60.0
7	3D Projection Mapping	Using projection to display dynamic historical visualizations in a physical space.	3D Holograms, Projection Mapping	To present dynamic visualizations of historical events in physical space.	70	23.3
8	Podcasts & Audio Tours	Audio narratives or tours that can be accessed to learn more about historical events.	BBC History, National Geographic Podcasts	To listen to historical stories or interactive guides that can be accessed anytime.	160	53.3
9	Interactive Timelines	Digital timelines that allow interaction with historical events in a chronological order.	TimelineJS, Sutori	To help students understand the chronological order of historical events in an interactive visual format.	130	43.3
10	Social Media Platforms	Using social media platforms to share and discuss historical sources online.	Twitter, Facebook, Instagram	To enable collaboration and discussion on historical topics directly with others.	140	46.7

The results show that online learning technologies are the most widely used by teachers, namely Moodle and Google Classroom, as much as 83.3% of teachers use it, which indicates that these learning platforms have high accessibility in all types of schools in Indonesia. After that is gamification tools, Kahoot! Quizizz was also widely used by many (63.3%), showing a trends toward interactive and competitive learning styles. Digital archives and e-books are also heavily utilized by 60% of teachers, meaning that many are looking for digital resources about history. Meanwhile, more sophisticated technologies like Virtual Reality (VR) and 3D projection mapping have relatively low adoption levels, at 43.3% and 23.3%, respectively, among teachers. These numbers imply that although there may be some early promise of VR for engaging in historical learning that can be immersive, the source of non use would be limited by other factors surrounding resource and infrastructure limitations — including schools that are rural, or underfunded. This is unsurprising as, amidst an abundance of digital tools, the development in any particular school or, at the national level, uniform adoption of cutting-edge technology is the exception rather than the rule.

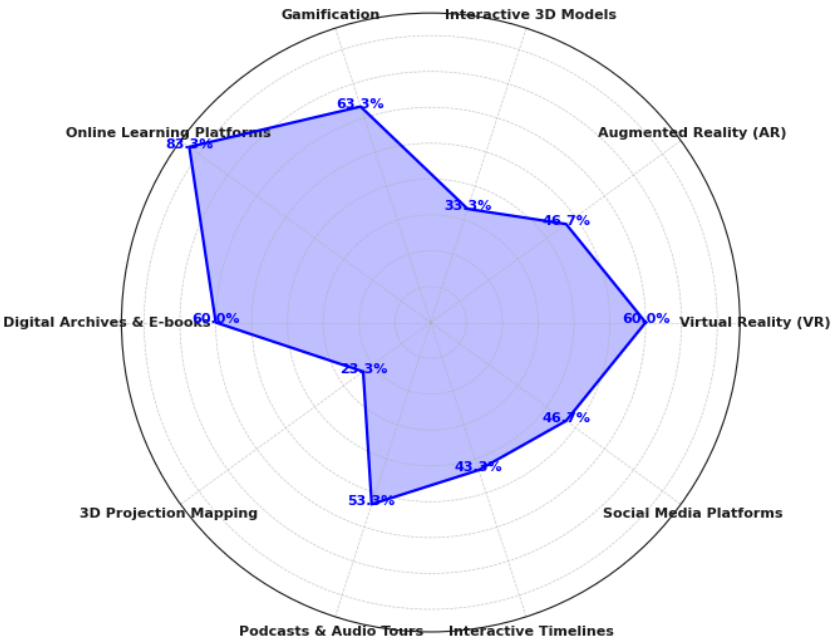

Figure 2. Distribution of Technology Usage in History Teaching Among Indonesian Teachers

Respondent Characteristics Evaluated Through the UTAUT Model

The table summarizes the distribution of teachers' responses regarding their perceptions of using digital technologies in history teaching through the UTAUT model. These analyses focused on several key variables: performance expectancy, effort expectancy, social influence, facilitating conditions, behavioral intention, and use behavior. Teachers' intentions to utilize technology in the classroom, the technology's ease of use, its utility, the support from both colleagues and administration, and other factors all played a role in shaping their views on technology adoption and usage.

Table 3. Distribution of Technology Usage in History Teaching Among Indonesian Teacher

Characteristic Variable	Frequency (n)	Percentage (%)	Performance Expectancy	Effort Expectancy	Social Influence	Facilitating Conditions	Behavioral Intention	Use Behavior
Teacher's Characteristics								
Teacher's age								
21–30 years	90	30.0	3.43	3.50	3.58	3.70	3.80	3.75
31–40 years	120	40.0	3.80	3.60	3.73	3.64	3.90	3.85
>40 years	90	30.0	3.53	3.42	3.62	3.52	3.70	3.65
Teacher's employment status								
PNS (civil servant)	140	46.7	3.89	3.72	3.82	3.70	3.95	3.90
PPP3 (contract employee)	100	33.3	3.52	3.38	3.73	3.58	3.65	3.60
Honorary (temporary employee)	60	20.0	3.31	3.58	3.50	3.60	3.45	3.40
Teacher's teaching experience (years)								
0–5 years	60	20.0	3.42	3.54	3.62	3.70	3.60	3.55
6–10 years	90	30.0	3.58	3.60	3.73	3.64	3.80	3.75
11–20 years	100	33.3	3.69	3.62	3.79	3.68	3.85	3.80
>20 years	50	16.7	3.78	3.70	3.62	3.53	3.80	3.75
School Characteristics								
Type of school								
Public	180	60.0	3.63	3.73	3.79	3.64	3.90	3.85
Private	120	40.0	3.52	3.58	3.73	3.68	3.75	3.70
External Influences								
Support from colleagues in using technology								
No support	40	13.3	3.23	3.30	3.21	3.42	3.40	3.30
Some support	150	50.0	3.68	3.63	3.79	3.71	3.85	3.80
Full support	110	36.7	3.84	3.73	3.71	3.82	4.00	3.90
Support from school administration								
No support	60	20.0	3.34	3.39	3.38	3.49	3.50	3.45
Some support	140	46.7	3.72	3.64	3.80	3.72	3.85	3.80
Full support	100	33.3	3.63	3.71	3.65	3.62	3.90	3.85
Total Average			**3.63**	**3.60**	**3.70**	**3.68**	**3.79**	**3.74**

From the Table 3, the average for the six UTAUT variables shows that the tendency towards the utilization of recently developed digital tools in the context of historical education is typically viewed in a favorable light. With an average score of 3.63, performance expectancy indicates that educators view technology as a powerful resource for enhancing both their own teaching practices and the quality of their interactions with students. Effort expectancy supports this perception as the average score of 3.60 indicates that, in general, teachers find technology use relatively easy and low complexity. Social influence (mean score of 3.70) was found to be an important contributor as well, meaning that colleagues, school-admins, and the broader educational ecosystem play an important role in promoting or enabling use of technology. In addition, the outcomes of the facilitating conditions variable (mean score of 3.68) indicate that there are also moderate resources and infrastructure that support the use of technology in schools, however there is still a need for improvement. Behavioral intention (average score of 3.79) underlines the likelihood that educators will keep incorporating digital tools into the way they teach history. Finally, the use behavior (average score of 3.74) reflects a strong but not universal tendency in encouraging educators to make meaningful use of digital tools in the classroom. These results indicate that while most teachers have a positive perception of technology's utility, the full adoption is contingent on continuous support, adequate resources, and an environment conducive to technology integration. These findings are consistent with the broader trends observed in educational technology adoption studies, where motivation, the attitudes and actions towards technology are greatly influenced by factors such as how easy it is to use and the existence of institutional support.

Figure 3. Respondent Characteristics with UTAUT Variables

Outer Model for UTAUT Model in History Teaching Technology Adoption

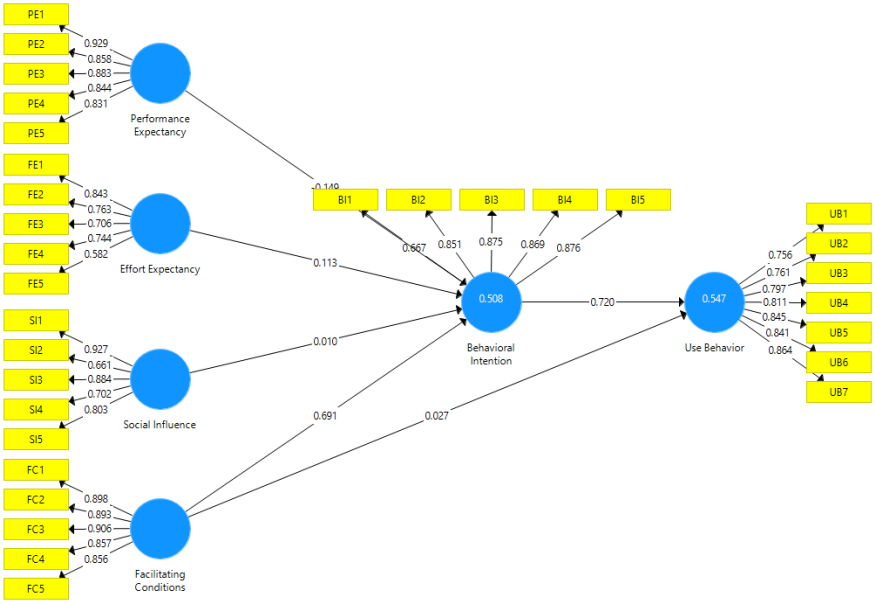

Figure 3. Outer Model for UTAUT Model in History Teaching Technology Adoption

According to the outcomes of the outer model, the indications for each construct exhibit good reliability and validity, as indicated by their factor loadings, which range from 0.582 to 0.929. While some indicators, such as PE1, FE1, SI1, and FC1, have loadings below the 0.7 threshold, these items were retained in the model for several reasons. First, these items are theoretically aligned with the constructs they represent, and their inclusion is justified based on prior research that supports their relevance in measuring the respective UTAUT constructs. Second, while the loadings are below the ideal threshold, they are still above the 0.5 mark, which suggests adequate convergence validity for the constructs. Additionally, the inclusion of these items does not significantly detract from the overall model's reliability, as the other indicators have high loadings and demonstrate strong internal consistency. Therefore, despite the lower loadings for some indicators, they were kept in the model to maintain the integrity of the theoretical framework and provide a more comprehensive representation of the constructs. The latent variables still exhibit acceptable internal consistency, and the overall model meets the criteria for convergent validity. Furthermore, behavioral intention and use behavior show high loadings with their indicators, providing strong evidence of reliability and construct validity. These results indicate that, while some indicators have lower loadings, the outer model overall has good construct validity and supports implementing the assessment framework within the framework of technology adoption for history teaching.

Table 4. Reliability and Correlations for UTAUT Model in History Teaching Technology Adoption

Variable	NID	Mean (SD)	Cronbach's alpha	rho_A	Composite Reliability	AVE	Correlation		Item Loading
							Behavioral Intention (BI)	Use Behavior (UB)	
Performance Expectancy (PE)	5	3.63 (0.71)	0.885	0.888	0.917	0.691	0.78**	0.67**	PE1: 0.929, PE2: 0.858, PE3: 0.883, PE4: 0.844, PE5: 0.831
Effort Expectancy (FE)	5	3.60 (0.81)	0.803	0.768	0.851	0.537	0.73**	0.56**	FE1: 0.843, FE2: 0.763, FE3: 0.706, FE4: 0.744, FE5: 0.582
Social Influence (SI)	5	3.70 (0.77)	0.929	0.933	0.946	0.778	0.81**	0.84**	SI1: 0.927, SI2: 0.661, SI3: 0.884, SI4: 0.702, SI5: 0.803
Facilitating Conditions (FC)	5	3.68 (0.82)	0.927	0.916	0.939	0.756	0.65**	0.56**	FC1: 0.898, FC2: 0.893, FC3: 0.906, FC4: 0.857, FC3: 0.856
Behavioral Intention (BI)	5	3.79 (0.76)	0.886	0.965	0.899	0.643	1**	0.51**	BI1: 0.667, BI2: 0.851, BI3: 0.875, BI4: 0.869, BI5: 0.876,
Use Behavior (UB)	7	3.74 (0.69)	0.917	0.938	0.931	0.659	0.67**	1**	UB1: 0.756, UB2: 0.761, UB3: 0.797, UB4: 0.811, UB5: 0.845, UB6: 0.841, UB7: 0.864

Table 4 displays all of the aforementioned Cronbach's alpha values, seventy, meaning that all UTAUT variables have high levels of intrinsic consistency. There are positive moderate and strong associations found between performance expectancy (PE), effort expectancy (FE), and facilitating conditions (FC) and behavioral intention (BI) (0.73 to 0.78), that is teachers' perception of the use, ease of use, and the existence of support affects their acceptance of these technologies for use in history teaching. The significant correlations of social influence (SI) with both behavioral intention (BI) (0.81) and use behavior (UB) (0.84) also aligned with the finding of colleagues and administrators playing an important role in teachers, attitudes, and actual usage behavior of technological tools. When comparing the FC-UB correlation of 0.56 to the other correlations we observed above, we see that FC was less correlated to UB than the other determinants, suggesting that while conditions related to systematic technology use are important, personal motivation and external support may be stronger determinants of actual technology usage in the classroom. Together, these results highlight the significance of not only cognitive but also social variables for educational technology acceptance and integration, with implications for the provision of infrastructure and peer support to encourage digital technology integration in teaching.

UTAUT Analysis in Digital Technologies Adoption for History Teaching

Table 5. Direct Effects (Bootstrapping Result)

Direct Effect	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	*t* Statistics (|O/STDEV|)	*p* Values
Behavioral Intention -> Use Behavior	0.720	0.729	0.075	9.777	.000
Effort Expectancy -> Behavioral Intention	0.413	0.420	0.125	4.907	.000
Facilitating Conditions -> Behavioral Intention	0.691	0.695	0.055	12.806	.000
Facilitating Conditions -> Use Behavior	0.427	0.430	0.090	5.310	.000
Performance Expectancy -> Behavioral Intention	0.349	0.350	0.114	3.316	.000
Social Influence -> Behavioral Intention	0.010	0.012	0.087	0.116	0.908

Table 5 provides the direct effects, *p*-values and T-statistics for the hypothesized links among the key UTAUT variables in our setting of technology adoption for history teaching. Results highlight a strong and statistically significant effect of behavioral intention → use behavior (0.720, p = .000), indicating that while the BYOD paradigm seems to be picking up across educational institutions, putting technology into practice by teachers is driven by the intent to use it, as evidenced by the high T-statistic and low p value proved the strength of relationship. In the same manner, effort expectancy → behavioral intention (0.413, p = .000) reveals a moderate but significant effect where the greater the perceived ease of use of a technology, the greater the intention to use it will be facilitating conditions → behavioral intention (0.691, p = .000) presents a strong, significant effect, underscoring that adequate resources, support, and infrastructure are critical in shaping teachers' ambitions to incorporate technological. Furthermore, facilitating conditions → use behavior (0.427, p = .000) highlights that instructors' intentions and actual technological use are both affected by the availability of tools and assistance. Performance expectancy → behavioral intention (0.349, p = .000) shows a smaller but significant relationship, indicating that teachers who believe technology will enhance teaching outcomes are inclined to utilize it more frequently. In contrast, social influence → behavioral intention (0.010, p = 0.908) shows a very small and statistically insignificant effect, indicating that administrators and peers do not have a substantial impact on instructors' plans to use technology in their lessons. The results show that teachers' intentions and actual use of technology are driven by facilitating conditions and effort expectancy, with social influence playing a minor role. This suggests that teachers are more motivated by their own perceptions and the resources available to them than by external pressures.

Table 6. Coefficient of Determination (R Square and Adjusted R Square)

	R Square	R Square Adjusted
Behavioral Intention	0.508	0.487
Use Behavior	0.547	0.537

The R^2 results indicate a moderate level of explanatory power for the model. Specifically, 50.8% of the variation in behavioral intention may be accounted for by the factors that influence it, while 54.7% of the variance in use behavior is accounted for by the model. The Adjusted R^2 values for Behavioral Intention (0.487) and Use Behavior (0.537) are close to their unadjusted counterparts, reinforcing the reliability of the model even after accounting for the number of predictors. Although these values are below the 0.75 threshold often considered excellent, they still reflect a reasonable explanatory power for a complex behavioral model. According to these findings, there might be other aspects that the model is missing that could provide a more complete explanation for why people use technology in history classes, even while the model does a good job of explaining why people intend to use technology and why they do use it. However, the results show that the UTAUT model does provide useful information about how educational technology is used and adopted.

Table 7. Indirect Effects (Bootstrapping Result)

Direct Effect	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	*t* Statistics (|O/STDEV|)	*p* Values
Effort Expectancy -> Behavioral Intention -> Use Behavior	0.482	0.680	0.094	8.063	.000
Facilitating Conditions -> Behavioral Intention -> Use Behavior	0.498	0.495	0.061	8.158	.000
Performance Expectancy -> Behavioral Intention -> Use Behavior	0.308	0.401	0.086	5.257	.000
Social Influence -> Behavioral Intention -> Use Behavior	0.007	0.002	0.064	0.114	0.909

Table 7 presents the indirect effects, *t*-statistics, and *p*-values for the relationships between UTAUT variables and their influence on use behavior through behavioral intention. The Original Sample (O) column indicates the magnitude of each indirect effect, while the T Statistics (|O/STDEV|) values show the significance of these effects, with higher values indicating stronger relationships. *p-values* provide statistical significance, where values below 0.05 indicate significant effects. The results reveal that effort expectancy → behavioral intention → use behavior (0.482, $p = .000$) and facilitating conditions → behavioral intention → use behavior (0.498, $p = .000$) have significant indirect effects, suggesting that both the perceived ease of use and the availability of necessary resources and support strongly influence teachers' actual use of technology through their intention to use it. Additionally, performance expectancy → behavioral intention → use behavior (0.308, $p = .000$) shows a smaller yet significant indirect effect, indicating that the belief in the usefulness of technology also contributes to its use through behavioral intention. In contrast, social influence → behavioral intention → use behavior (0.007, $p = 0.909$) shows a very weak and statistically insignificant effect, supporting the previous conclusion that teachers' technology usage is minimally impacted by social influence. These results add weight to the argument that social influence plays a little role in encouraging the use of educational technology, and that perceptions of ease of use and availability of support are significant drivers in this regard.

Discussion

The Digital Media Most Frequently Used by History Teachers in The Teaching and Learning Process

The results demonstrate that online education systems like Google Classroom and Moodle, are the most widely adopted technologies by teachers with the usage rate reaching 83.3%. This reflects the high accessibility of these platforms in various types of schools in Indonesia, both in urban and rural areas. This high rate also indicates that the basic needs of online learning have been met, given that the platform offers easy access and features that suit daily teaching needs. The use of gamification tools, such as Kahoot! and Quizizz, which reached 63.3%, shows the appeal of interactive and competitive learning methods. This reinforces the idea that history content can be delivered to learners in a way that can make them feel engaged in the learning process with enjoyable and interesting game elements. This confirms what previous research has shown: that gamification can significantly boost engagement and motivation among students in the classroom (Zourmpakis et al., 2022). Gamification of learning experiences is an emerging technology that teachers have begun to utilize; however, this type of technology use still depends on advanced teacher knowledge of effective gamification implementation and could revolutionize educational opportunities.

Nonetheless, e-books and digital archives have become increasingly popular (60%) indicates that teachers are making an effort to use digital sources in support of historical investigation. Yet, this number also shows a lack of usage of more advanced technologies. Only 43.3% and 23.3% of teachers are using emerging technologies with great potential, (e.g. virtual reality (VR) and three-dimensional projection mapping, respectively) that could be well-suited for immersive history learning. The low use of MT is probably due to the lack of infrastructure, particularly in remote regions or poor schools. This low adoption of advanced technologies mirrors findings in other studies that show infrastructure and resource limitations as significant barriers in the realm of educational technology (Clark et al., 2021). Although these trends point to increasing openness to digital technologies among history teachers, they also suggest that some of the technologies with innovative potential are still more widely adopted than others. Although these trends point to increasing openness to digital technologies among history teachers, they also suggest that some of the technologies with innovative potential are still less widely adopted than others. Because of the continued difficulties with funding, training, and institutional support, the cultural milieu of Indonesian education, especially in less economically developed and rural regions, greatly influences the uptake of cutting-edge pedagogical tools.

The existence of barriers such as access to resources and infrastructure, the provision of training, and institutional support needs to be addressed to guarantee that all educators may fully harness the power of digital technology to enhance historical education (Timotheou et al., 2023). The need for a combined effort to close this gap is accentuated by these barriers to fair technology adoption. This requires the improvement of educational infrastructure, especially in rural regions and underfunded schools (Kaiser & Barstow, 2022). Moreover, there is an urgent need for targeted training programs that will enable educators to use advanced technologies in the classroom, including VR and 3D projection mapping, effectively. As Musolin et al. (2024) recognise also that advanced technologies cannot be adopted in practice without institutional support, such as the provision of funding, policy framework for education, and hardware and software acquisition. These findings align with research suggesting that institutional support and a clear educational policy framework are essential for the successful integration of emerging technologies (Pramesworo et al., 2023). This will not only enhance the technical preparedness of teachers but also foster innovation towards developing more contextually relevant and stimulating learning processes. A meticulously formulated strategy is instrumental in surmounting the difficulties that come with incorporating cutting-edge technologies, thereby enhancing the efficacy of history education, its inclusivity, and its responsiveness to the diverse learning needs of students across various contexts.

Technologies such as VR allow students to explore historical events immersively, helping them understand the chronology and relevance of history more tangibly. Teachers must also provide learning by integrating pupils in their immediate environment, so that the medium used includes both electronic and actual materials (Astuti et al., 2022). However, the low adoption of these technologies suggests that technological innovation has not been fully integrated in the history learning curriculum. By creating an educational ecosystem that supports digital technology, history teaching can not only increase student engagement but also provide digital literacy skills relevant to the current technological era. This aligns with the call for educational systems to adapt to the digital age by fostering environments that encourage both traditional and innovative teaching methods, the incorporation of technological elements into course materials (Tan et al., 2021).

The Digital Media Most Frequently Used by History Teachers in The Teaching and Learning Process

Indirectly influencing use behavior through behavioral intention, the results demonstrate that the effort expectancy and enabling conditions variables dominate, with values of 0.482 (p = .000) and 0.498 (p = .000), respectively. This discovery suggests that instructors' intentions to utilize technology are affected by the perceived ease of use and the availability of sufficient resources and support, which in turn affects the actual usage of technology. In addition, performance expectancy also showed a significant indirect effect of 0.308 (p = .000), showing that faith in technology's ability to boost performance also played a role, albeit a lesser one than the convenience and support variables. In comparison, social influence only weakly and insignificantly affects technology adoption (value = 0.007 (p = 0.909)) which means teachers are not especially swayed by social views or pressures when making their technology adoption decisions. According to these findings, internal factors—such as the perceived availability of assistance and simplicity of use—are more important than external factors—like social influence—in determining the adoption of e-learning technology. Using technological tools in the classroom can and should be facilitated by strengthening the infrastructure, training, and accessibility of the tools for teachers. Consistent with previous research, this discovery, which emphasizes that internal factors like ease of use and resource availability are often more influential than external social pressures in educational technology adoption (Granić, 2022).

This discovery further shows that the diffusion of educational technology remains strongly conditioned on factors that encourage the individual user such as facilitating conditions, user-perceived ease of use and resource availability. Effort expectancy is highly influential which is also expected since a simple, easy to understand interface has better acceptance (Liu et al., 2022). Contrarily, the strong trajectory from facilitating conditions implies that, in order to improve technology adoption, there must be sufficient technological infrastructure, ongoing training, and simple access to technical support (Faqih & Jaradat, 2021). On the other hand, performance expectancy has impact amongst the test constructs, but low contribution suggests teachers have to wait some time or have concrete proof of the technology effect on academic achievement (Sewandono et al., 2023). This indicates a need for a more hands-on method of introduction to technology — things like live trials demonstrations of concrete teachers benefits. This research Kustiawan et al. (2021) that focused on TPACK skills for hybrid learning based training concludes that strong TPACK skills may enhance teachers in their pedagogical competency.

Social influence exerts the least influence, suggesting that school teachers are more influenced by their professional needs and past experiences than by recommendations or persuasion from colleagues or the community (Smith et al., 2022). Thus, this finding helps to enable more personalized and specific approaches to assist the adoption of technology. For example, it could be by providing self-learn contexts, so that teachers can move through it at their own pace and according to their own needs (Tanaka & Saito, 2021). Results also indicate that teachers may be less likely to try more complex technologies without much higher level of support than is offered, while they plan to use accessible technologies that are better supported. It indicates an incremental approach, starting with simpler technologies and moving to more advanced technologies. The experimental class that is provided with multimedia learning by the scientific approach was superior to the control group that received solely scientific information (Yafie et al., 2021).

If these findings have substance, it means that the crafting of 21st-century policy, the delivery of training and upscaling, and the deployment of edtech resources has to be a collective endeavor, jointly owned by governments, education stakeholders, and tech providers, all aimed at improving access to tech and the resources enabling that access. It might also involve the building of facilities, continuous teacher training, and the development of workable rules for the utilization of technology to ensure equal access and its utilization by various educational institutions (Yazdani et al., 2023). Overall, this research highlights the problematic side of technology adoption by the teacher and provides the tactical means through which these problems can be improved and thus the institutional effectiveness and the road towards a technology-based learning environment.

Conclusion

This study sheds light on the use of digital tools in history classrooms, specifically within the context of the UTAUT paradigm. Historical educators' behavioral intentions and actual use are primarily affected by internal variables including effort expectancy and enabling situations, according to the results. These findings provide credence to the idea that instructors are less swayed by factors like social pressure and more by their own subjective assessments of the system's usability and the accessibility of relevant resources and assistance. These theoretical contributions offer valuable empirical evidence that internal motivational factors play a more critical role than external pressures, making a contribution to the larger comprehension of developing nations' embrace of educational technologies, specifically Indonesia.

Additionally, the study emphasizes the need for personalized training programs and institutional support to enhance teachers' ability to integrate technology in their teaching practices effectively. The low impact of social influence suggests that teachers are less swayed by peer or administrative pressures and more by their professional needs and personal perceptions of technology's utility. This finding contributes to theory by advocating for contextually relevant, individualized approaches to training and policy development rather than relying solely on social influence or top-down mandates. In conclusion, this research offers important theoretical implications for designing effective strategies and policies aimed at improving technology adoption among teachers, with a focus on infrastructure, support systems, and the cultural context in education.

Recommendations

Several recommendations can be made to improve the adoption of technology in history learning in Indonesia. First, more money needs to be put into building up the technological infrastructure, particularly in low-income schools and rural locations, so that advanced technologies such as VR and 3D projection can be more affordable and can be used to their full potential. Second, ongoing training for teachers needs to be strengthened, with a focus on developing skills in using learning technologies, including gamification tools and online learning platforms.

Limitations

The development of policies that support technology procurement, such as adequate hardware and software, as well as training accessibility, will go a long way in accelerating the adoption of educational technology across Indonesia. Lastly, even though social impact may not be significant, it is critical to raise educators' collective understanding of the advantages of technology in the classroom. Only then can we foster an atmosphere that is conducive to technological advancements and their use in teaching and learning about the past. However, there are a number of limitations to this study. To start, it's possible that the experiences and educational contexts of instructors in other nations or disciplines are not adequately reflected in our sample because it only includes history teachers in Indonesia. The second concern is that biases may be introduced by relying on self-reported data, as teachers may overestimate their use of technology or the impact it has on their teaching. Additionally, while the study highlights the significance of internal factors like effort expectancy and facilitating conditions, it does not delve deeply into the specific cultural or regional barriers that might affect the adoption of technology in different areas of Indonesia. By include a larger sample size in future studies, these limitations could be overcome, incorporating objective measures of technology use, and exploring regional and cultural variations in technology adoption.

Ethics Statements

In order to ensure that the study adhered to ethical norms, Universitas Pattimura examined and approved it. The study involved human subjects. History educators who agreed to take part in the study did so by signing an informed consent form. Ensuring anonymity and voluntary involvement, the research adhered to all ethical criteria. The data collected was used solely for the purpose of understanding motivational and environmental influences on digital media adoption in history teaching, and no identifying information was disclosed.

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Authorship Contribution Statement

Hetharion: Conceptualization, Investigation, Writing - Original Draft, Writing - Review & Editing, Supervision; Yafie: Conceptualization, Formal analysis, Writing - Original Draft, Writing - Review & Editing, Software; Bakri: Validation, Formal analysis, Writing - Original Draft, Project administration; Ilyas: Validation, Investigation, Writing - Original Draft, Resources; Nirmala: Methodology, Investigation, Writing - Original Draft, Funding acquisition; Setyaningsih: Methodology, Visualization, Writing - Original Draft, Data Curation.

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