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Historical Virtual Tour for Learning About the Yellow War in Lasem

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ABSTRACT

This study aims to develop the virtual tour of the 18th century Lasem History (VISUM) and its effectiveness in historical learning. This study used a design thinking approach, comprising five steps of empathising, defining, ideating, prototyping, and testing, to develop the VISUM for university students enrolled in the Indonesian Colonial History module. The 18th century Lasem History, as a learning material, was used to represent the complexity of early modern Indonesian history. The researchers integrated the historical method in the defined stage to compose historical learning material properly. The researchers also used various tests, ranging from validity tests and reliability tests to normality tests, to assess the effectiveness of the VISUM. After giving the tests, the results show a significant increase from 71.4 to 91.7 in the average scores. The finding also suggests that the virtual tour could improve the students' comprehension of complex historical content and historical thinking skills. Furthermore, the use of virtual tours could support the students to strengthen specific historical concepts of cause-and-effect analysis and historical significance.

Keywords: History education, Lasem, university students, virtual tour, Yellow War

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INTRODUCTION

Historical reconstruction helps a person to understand an event that occurred in the past. Over time, historical narrative could be displayed in the form of textual or visual historiography. A virtual tour could be used to reenact historical events

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based on its sites. The virtual tours can also be used as a medium to study history in depth. Through virtual tours, historical relics can be represented in a real form (Di Natale et al., 2020). The use of visual digitalisation in learning history can be a solution to the problem of history, which has been considered grey. By utilising digital technology, it can bring users to explore historical sites from inside the classroom. *Perang Kuning* (Yellow War) in Lasem, Central Java, could be promoted to be learned by the historical students in the module of Indonesian colonial history at the university level.

The Sino-Javanese cooperation in the context of the Yellow War in Lasem has represented an interesting cultural dynamic and historical events (Basiroen & Manuaba, 2022). Lasem, a coastal city on the North Coast of Java, became a strategic area that functioned as a port city since the Majapahit period. In addition to the maritime culture, a 7th-century boat wreck can be found in Lasem and its surroundings (Unjiya, 2014). This proves that the maritime culture in Lasem existed before the Majapahit era. However, during the Majapahit period, Lasem became the centre of economic development as well as a meeting point between Chinese, Arab, and Javanese cultures (Adhitya et al., 2023; Atabik, 2016).

In the middle of the 18th century, Lasem experienced the war against the Dutch colonial masters. Administratively, Lasem was under the Mataram Kingdom during the 17th century. The Dutch attempted to control the North Coast of Java. When the Dutch invaded Mataram, the Javanese ruling class did not counter their invasion. The Lasem people did not want to transfer their trading control to the Dutch. In 1741, the Lasem community, led by Oei Ing Kyat, Raden Panji Margono, and Tan Sin Ko, rebelled against the Dutch (Wijaya et al., 2024). The 18th-century Yellow War, not merely dealing with the colonial war, but also representing the cooperation between the Chinese and the Javanese to gain their shared aim and have freedom from the Dutch coloniser. Their alliance could be a lesson on cultural tolerance for historical students.

The cultivation of historical learning through the integration of digital devices can be an answer to the challenges of the disintegration of values and culture for the students (Marpelina, 2024). Showing historical sites, integrated with face-to-face interaction, could increase the depth of understanding of historical learning (Zhang et al., 2023). The incorporation of digital tools and interactive learning approaches can also change the old paradigm of history learning. Marpelina (2024) states that the selection of digital technology and the utilisation of interactive learning approaches can affect the depth of students' understanding in learning. As technological development and learning innovation continue to develop, they will also have an impact on the quality of history learning.

Virtual tours, as a medium, could facilitate an interactive learning experience. The integration between virtual tours and the historical material of the Yellow

War could support historical teaching based on the 21st-century teaching skills of creative thinking, critical thinking, communication, and collaboration. One of the ways to stimulate those teaching skills is to develop interactive visual media (Harshbarger, 2016). The visual media, such as virtual tours, could bridge the students to the learning material (Susianti, 2024). Virtual tours could realise actual creation and communication. This media would encourage students' attention and active engagement to create a progressive learning environment (Ariesta et al., 2024).

Previous studies have already studied the use of virtual tours in bringing history to real life. Therefore, virtual tours could be a historical learning innovation and useful to communicate and reenact past events (Wijaya, 2015). The visualisation of historical traces, evidence, and artefacts could strengthen the imaginative thought and in-depth understanding of the event. The use of virtual tours cannot only ease the learning material but also foster the learner's historical empathy and understanding of the age (Ofianto et al., 2023b). Schaper et al. (2018) demonstrate that digitally reconstructing cultural heritage sites and artefacts, such as those related to the events of the Spanish Civil War, can enhance learning about the past. In addition, Argyriou et al. (2020) argue that the 360-degree visualisation has great potential as an engaging experiential medium, especially in learning about cultural heritage.

Applying a similar technique to historical events is a visually appealing and informative option for students. However, the existing studies do not integrate virtual tour technology to the local historical event in the context of the teaching and learning process. They frequently digitalise the existing museum to attract online viewers (Aurindo & Machado, 2016; Bandarsyah & Sulaeman, 2021; Nafi'ah, 2023; Syukur et al., 2022). This study considers the student's need analysis as a pedagogical framework to design and implement the Virtual Tour of the 18th century Lasem History. The use of the virtual tour could elevate to the students' historical understanding, as revealed by Chotimah et al. (2024) and Agustinova et al. (2025), and enrich the diversification of the historical learning media. This study, therefore, tends to utilise the potential of Virtual Tour in learning the history of the 18th-century Lasem history, especially the Yellow War in Lasem. Therefore, this study focuses on the development of a virtual tour learning media for the history of the Lasem Yellow War. This study also aims to assess the effectiveness of the VISUM media in supporting the critical thinking skills of students in the History Department of State University of Malang.

LITERATURE REVIEW

Historical Thinking

History could be defined as past events. However, a historical event arises due to a construct carried out by a writer, as a story (Kartodirdjo, 1992). History itself is created through the creative process of a historian in interpreting historical evidence, which then produces a story (Seixas & Morton, 2013). In the context of

education, historical events can be used as a fundamental component to shape students' understanding of the meaning taken from past events. The historical meaning, also known as the historical pattern, could be a compass to direct the present and chart the future (Kindenberg, 2021; Wineburg, 2001). History also builds students' critical understanding of an event, involving thinking historically (Seixas, 2017).

Seixas and Morton (2013) explain six concepts in historical thinking, including historical significance, evidence, cause and consequence, the ethical dimension, continuity and change, and historical perspectives. Historical thinking skills include the ability to analyse and understand cause-and-effect relationships in historical events, as well as to identify continuity and change that occur over time.

Causal thinking in a historical context refers to the ability to identify and analyse relationships between events, actions, and outcomes that occur within a specific time and space. According to Sukma (2023), effective learning must be able to develop students' critical and analytical thinking skills. They can understand how historical events are interconnected and influence each other. For Fitria et al. (2022), developing the potential of historical heritage can help students understand the historical context and its impact on contemporary society. Thus, learning media development can provide a broader context for students to understand causal relationships in history.

Furthermore, continuity in historical thinking encompasses an understanding of how past events influence current and future circumstances. In this context, Astuti and Muslim (2018) argue that the use of interactive media can enhance students' understanding of continuity and change in historical events. The students need to understand that history is not simply a series of isolated events, but rather an ongoing process that shapes the identity and culture of a society. Therefore, the learning media must be able to present information that not only explains historical events but also relates to broader social, political, and cultural contexts.

Historical thinking skills also involve the ability to interpret and evaluate historical sources. Effective learning strategies must involve critical analysis of historical sources to help students understand different perspectives and construct strong arguments (Inayah, 2022). In this regard, the learning media must incorporate a variety of historical sources, including documents, images, and narratives, which can assist students in critically analysing and evaluating information. In this way, students not only learn about historical events but also how to think critically and analytically when dealing with historical information.

The causality and continuity of thinking skills in history education is also essential. Muhammad (2023) states that the use of historical books as teaching materials can train students' chronological thinking skills. These chronological thinking skills are crucial for understanding the sequence of events and how they relate to each other. Therefore, the learning media developed must be designed in such a way that it is

easy for students to follow the historical flow and understand the interrelationships between events.

In the context of developing learning media, it is important to consider interactive and engaging approaches. Karmedi et al. (2021) suggest that the use of technology, such as virtual reality, can enhance students' learning experiences by providing direct access to historical sites. This suggests that integrating technology into history learning can help students engage more effectively and better understand the historical context. Therefore, the learning media must consider interactive elements that can enhance student engagement in the learning process.

To support historical thinking skills, learning media should also include reflective questions and assignments that encourage students to think critically about the relationship between historical events and their impact on contemporary society. Fitri and Yefterson (2021) demonstrate that the use of learning media can help students to identify change and continuity in historical events. Therefore, learning media should include elements that encourage students to reflect on and analyse the historical events that they are studying.

Virtual Tour in Education

A virtual tour is a digital depiction of a place that can allow users to explore the location (Nicolaidou et al., 2022). In educational context, virtual tours have transformed the learning medium beyond the physical constraints of classrooms by integrating immersive visualisation. Some previous studies also mention several applications for virtual tours for educational purposes. Those are for the virtual labs (Cardona et al., 2023), cultural tourism education (Chiao et al., 2018), education in second life (Calongne & Hiles, 2007), digital branding tool for higher education (Aryani et al., 2022), and synchronous distance education (Partin & Worch, 2011).

In the process of teaching and learning, the utilisation of virtual tours integrates digital visualisation. A virtual tour of the Lasem history is considered to have significant potential to improve student understanding. Through a virtual tour, students can explore the site location digitally, in this case, the historical sites of the Yellow War in Lasem. Even, the students could explore inaccessible and endangered places, such as Dutch Factory in the Lasem Mount. They also could experience contextual authenticity through panoramic imagery. Virtual tours can provide students with broader access and encourage their involvement in understanding history through innovative media (Pasaribu et al., 2022).

Virtual tours can be used as an effort to improve students' ability to process historical information (Safitri, 2021). The historians should also have the ability to analyse the historical data (Kuntowijoyo, 2018). Thus, the use of virtual tours also influences the improvement of historical thinking skills and students' learning outcomes (Rosmah et al., 2023). The virtual tours could allow users to experience new learning experiences.

Lasem has a long history, especially the Yellow War. It has various sites that can be used as learning material on a virtual tour. By incorporating this content into the virtual tour, students not only learn from textbooks but also get a real visual overview of historical locations related to the Yellow War. This allows students to understand the material easily (Doğan, 2023). In addition, the integration of virtual tour technology in learning history is a more modern and relevant approach to the students' learning style.

Integrating virtual tours to the learning media is also useful in multidisciplinary learning. In the virtual tour of Lasem history, it covers all aspects of life comprising socio-political and cultural history. Kartodirdjo (1992) also reminds that historical understanding requires cross-disciplinarity, using a multidimensional approach in the historical method. Thus, this creates a learning experience that applies critical analysis and deep understanding. The utilisation of virtual tours could advance the progress of history education, compared to other educational fields. In the learning material of the yellow war history, the virtual tour could facilitate broader and deeper access for students to understand the origin of cross-cultural history and heritage in Lasem (Purwanto & Titiek, 2017).

METHODOLOGY

This study used a design thinking approach as a Research and Development (R&D) model. Design thinking is used to solve a problem, focusing on understanding and creativity to create an innovation (Lewrick, 2023). This approach addresses the emotional impact, aesthetics, and interactions that connect the system with the users. Thus, the innovations look at the conditions of users (history students). The design thinking process includes several stages of empathise, define, ideate, prototype, and test (Figure 1).

The first is to empathise, which aims to understand the needs and challenges faced by potential users, in this case, history students who take the Indonesian Colonial

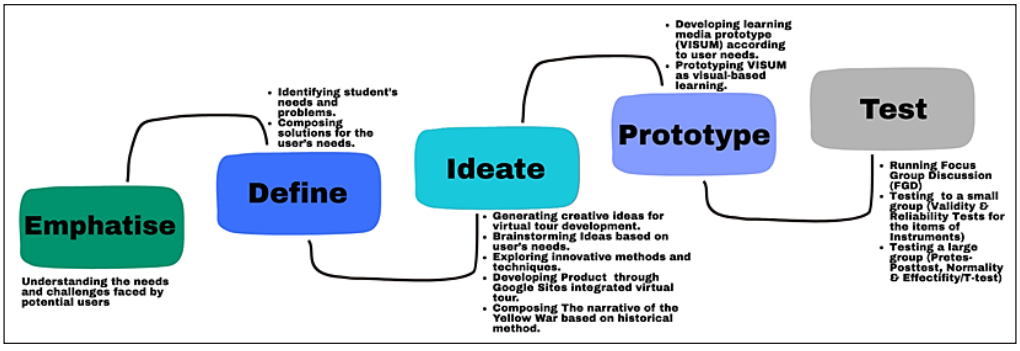

Figure 1. The steps of the design thinking approach to develop the VISUM
Source: Modified from Soegaard (2018)

History module. The data were collected through analysing the needs of prospective users, obtained through questionnaires and observations. The respondents were students in the History Department of State University of Malang, taking a course in Indonesian History during the Colonial Period. For the ethical considerations, the researchers conducted research in accordance with established ethical guidelines in Indonesian higher education system. The research protocol was reviewed and approved by the relevant ethics committee. The consent was also obtained from all respondents prior to data collection. At the time of the study, the students were in their second year. To determine the product to be developed, the researchers conducted a needs analysis, including materials, media, and student learning styles. The needs analysis revealed that students needed learning media that could effectively support their learning.

After collecting data on the need analysis, the next step is to define it. At this stage, we tried to find out the problems and the users' needs. In the defined stage, the researchers composed an alternative solution to cope with the problems and needs. After defining the needs and problems, the researchers offered their creative ideas for the users' problems and needs. Those ideas would be processed in the form of a prototype before being realised as a product. The researchers composed the learning material based on the historical method. The researchers used all available data comprising the Dutch archives and local chronicles, mainly *Carita Sejarah Lasem* (The Chronicle of Lasem). The researchers narrated the learning material in a more accurate and in-depth way. The researchers compared the colonial records with the local chronicles to ensure the accuracy, reliability, and balance of the reconstructed historical narrative of the Yellow War.

After the product had already been produced, it was then validated by two experts of learning media and learning material. They also gave some feedback to revise the existing product. Several experiments were also needed to determine the product's effectiveness as a learning medium. Those experiments were conducted in small and large groups. A small group of experiments was conducted to determine the validity and reliability of the test instrument for the larger test. Samples were taken to assess the validity and reliability of the test instrument based on criteria determined by the researcher (purposive sampling). The criteria were selected from students deemed to have superior abilities. From a class of 36 students, the sample was taken from 10 students with the best achievements. After the instrument was valid and reliable, the researcher conducted a large-scale test to determine the effectiveness of the VISUM learning media as a support for teaching Indonesian history during the colonial period.

RESULTS

It is necessary to follow the design thinking model (empathise, define, ideate, prototype, and test) to conduct research and development (R&D) of a virtual tour of 18th-century Lasem History, as follows.

Empathise

This step was taken with the main objective of analysing user needs and problems in the context of history learning (Nasution & Nusa, 2021). The needs analysis process was carried out by distributing questionnaires to students who took the Indonesian Colonial History module as the research subject. Of the 36 students who responded, 88.2% stated that they needed learning media that could visualise historical sites. This finding shows a gap between abstract learning materials and students' needs for concrete representations that are easier to understand. Furthermore, the diagnostic test results indicated that most students had a visual learning style. Visual learning style is a category of learning styles that emphasises an individual's preference for the presentation of information in visual representations such as pictures, diagrams, graphs, maps, and symbols. Students with this learning style tend to find it easier to understand material through pictures, maps, videos, and virtual tours than through descriptive text alone. Thus, the use of visual-based learning media such as VISUM is considered capable of meeting students' learning needs because it is in line with the characteristics of their learning styles and can increase the effectiveness of history learning. Furthermore, the integration of visual media also has the potential to encourage higher cognitive engagement, facilitate contextual learning, and strengthen students' ability to develop historical thinking skills.

Define

After the empathise stage, the define step aims to identify the student's needs and problems (Dewi et al., 2022). Thus, the identification of needs and problems could ease the research process to find solutions that are relevant to the user's needs. If we look at user needs, the developed product is a visual learning medium. Students, having a visual learning style, tend to understand the material better if there is a visual display. Without visual instructions in learning, students will be bored in learning (Clarke et al., 2006). In learning history, visual aspects can also help students to imagine historical remains and events (Garvey & Krug, 2015).

Virtual tour is one of the learning media that can create new experiences for its users (Aristeidou et al., 2022). By using virtual tour learning media, students can easily understand the material to be taught. In addition, the background of students who have a visual learning style also supports the use of virtual tours as a learning medium. Therefore, the researchers strive to develop a virtual tour with the material of Yellow War History to address the user's needs.

Ideate

This stage allows the researchers to create creative ideas and an alternative for the development of the virtual tour. The researchers' ideas can be used as a basis for developing products according to the users' criteria. At this stage, researchers could explore innovative techniques and methods to develop a product (Ye, 2024). In developing a product, we compose a Google-

based website (Google Sites), integrated with a virtual tour. Before developing the website, the researchers re-narrate the historical event of the Yellow War, based on the historical primary sources of *Carita Sejarah Lasem* (the Lasem Chronicle) as well as the Dutch archives and chronicles. We also revisit historical sites related to the Yellow War. The researchers take photos in a 360-degree picture at each predetermined point. Then, the researchers compile either textual or visual data before displaying it on Google Sites.

At this stage, we also compose the historical material of the 18th-century Lasem History for the development of virtual tours. The researchers visualise the historical sites related to the Yellow War in Lasem. Those sites are the diorama of Yellow War Lasem in Cu An Kiong Temple (Figure 2), the Lasem Mosque (Figure 3), and the Panji Margono Statue inside the Gie Yong Bio Temple (Figure 4).

In developing Google Sites, the researchers, as product developers, have four working steps. First, the developers



Figure 2. Virtual tour of the diorama of Yellow War in Cu An Kiong Temple
Source: Authors' Document



Figure 3. Virtual tour of the Lasem Mosque
Source: Authors' Document



Figure 4. Virtual tour of the statue of Panji Margono inside Gie Yong Bio Temple
Source: Authors' Document

create a Google Sites account and select a template on the Google Sites page. Second, the developers edit and add content. After setting up the main page or homepage, the developers add textual, visual, and audio-visual information related to the Yellow War and the history of Lasem in the 18th century. The developers also add virtual tours and digital maps to Google Sites. Third, the developers customise their appearance by changing the theme and adjusting the colour and font style accordingly. In addition, developers also arrange the layout of Google Sites such as Home, History, Tourist Destinations, Culinary, Geography, Virtual Tour, Digital Maps, Videos, and Profile. The content on each page can be text, photos, videos, digital maps, Virtual Tours, Google Maps, or website links. The developers, lastly, preview and publish it to the public.

Prototype

This stage directs the researchers to create a prototype of the learning media, based on the users' needs (Stewart, 2011). Product development is carried out by considering the needs and problems of potential users (Dukała et al., 2023). Based on user needs analysis, we are trying to develop a website-based learning media integrated with a virtual tour called VISUM. VISUM is a web-based learning medium designed to emphasise visual aspects. The main feature of this medium is the Virtual Tour. Although the main feature of this medium is the virtual tour, it also has various advantages for conveying historical information in learning. The first page of VISUM presents an overview and summary of the entire VISUM display. This display functions as user navigation to understand the flow and scope of information contained in VISUM. The next page is about history. This page contains a long narrative about the history of Lasem, particularly the Lasem Yellow War that occurred in the 18th century. This page broadly covers the geopolitics of Lasem in the 18th century, social life, culture, economy, and the events of the Lasem Yellow War in the 18th century. The selection of material and time period used in VISUM is contextualised with the secondary

education curriculum. In addition, the material on the Lasem Yellow War is rarely highlighted in colonial historiography. By adding this material to the learning process, it can provide students with new insights into the historiography of Lasem. Thus, VISUM can improve students' analytical skills in relation to the influence of global historical events on local historical events.

In the next section, VISUM presents a list of historical sites in Lasem that serve as a guide for users to identify important locations related to historical events in the region. This list not only serves as an inventory of historical sites but also as an educational tool that helps students understand the connection between space, events, and the collective memory of the Lasem community. Furthermore, VISUM also displays a page on local cuisine that provides information about Lasem's specialty foods. The presence of this culinary content is not only informative for tourists but also emphasises the importance of material culture as an integral part of local historical studies. Furthermore, VISUM provides a "Geography" page that presents information about accessibility to Lasem from various major cities such as Jakarta, Semarang, Surabaya, and Malang. This information has strategic value because it shows the geographical relationship between urban centres and historical areas, while also strengthening understanding of mobility and communication networks in both historical and contemporary contexts. Thus, VISUM not only serves as a medium for learning history but also as a multidimensional tool that integrates educational, cultural, and geographical aspects to enrich the learning experience of students.

The most important part of VISUM as a learning medium that provides experiences is the virtual tour feature. This feature is designed to provide an interactive and contextual history learning experience. Through virtual tours, students can explore various historical sites without having to visit them. This provides an opportunity to access more in-depth historical knowledge because it presents actual visualisations of historical sites. For students who have limitations in understanding written text, this feature can be a platform for students with a visual learning style. To support the process of understanding the geospatial locations of important sites in Lasem, VISUM is also equipped with an interactive digital map feature. This feature allows users to explore the strategic locations of historical sites in Lasem. With this feature, VISUM is not limited to classroom learning. It can also be used for field learning. In fact, VISUM can also be used as a guide for history-based tourism activities.

To clarify the historical narrative of each site contained in VISUM (Figure 5), this website contains short documentary videos that provide explanations of each site. The videos contained in this feature provide information about the historical context of the sites related to the Lasem Yellow War in the 18th century. These features not only serve as a means of exchanging information but also as a learning tool that encourages active student participation, contextual



Figure 5. The display of Learning Media VISUM
Source: Authors' own work

understanding, and the strengthening of historical thinking skills for students.

Test

The last step, which is the test, aims to evaluate the effectiveness of the product in historical learning. In addition, there are several experiments to be conducted before testing the students. Those experiments are given to a small and large group of students. Before doing the experiments, the researchers also run the Focus Group Discussions (FGD) to receive inputs concerning the detailed information related to the Lasem history from the local perspective (Figure 6). Those inputs could maximize the developed product. The participants of FGD consist of researchers,



Figure 6. Focus Group Discussion in Lasem on April 23, 2024
Source: Authors' Document

historians, and cultural experts from Lasem. The FGD also aims to refine the product before testing it on students. Based on the FGD, several inputs were received from participants. Several points need to be revised to ensure the completeness of the narrative and the chronology of historical events in the media. Additionally, the use of local sources, such as *Carita Sejarah Lasem*, is used to examine the history of the Yellow War from a local perspective.

Validity

This study used a questionnaire instrument to be administered during the field of expert trials and product expert trials. The questionnaire, which already had answers, was then compiled using a Likert scale. The used scale was a score with intervals of 1-4. The use of a scale with intervals of 4 was to obtain more objective answers from respondents (Likert, 1932). The used formula to determine the percentage was as follows:

$$\frac{\Sigma X}{\Sigma X1} \times 100\% = \text{Percentage} \qquad [1]$$

Notes:
X: the gained score
X1: the maximum score

From the distributed questionnaire, the learning media expert gave a score of 33 out of 36. This score resulted in a percentage of 91.66%. Meanwhile, the learning material expert gave a score of 58 out of 64. Therefore, the total result was 90.625%. Researchers also conducted a validity test on each question item (Table 1).

The question item is valid if the calculated r value is equal to the table r and the significance value (sig) is <0.05. The

Table 1
Validity test for the question items

Q	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Q1	1.000	.167	.802**	.250	.612	.167	.802**	.089	.802**	.000
Q2	.167	1.000	-.089	.250	.102	.583	-.089	.535	.356	.408
Q3	.802**	-.089	1.000	.089	.218	.089	1.000**	.048	.524	.518
Q4	.250	.250	.089	1.000	-.102	.250	.089	.802**	.089	.408
Q5	.612	.102	.218	-.102	1.000	.102	.218	-.218	.764*	.000
Q6	.167	.583	-.089	.250	.102	1.000	-.089	.089	.356	.816**
Q7	.802**	-.089	1.000**	.089	.218	-.089	1.000	-.048	.524	-.218
Q8	.089	.535	-.048	.802**	-.218	.089	-.048	1.000	-.048	.218
Q9	.802**	.356	.524	.089	.764*	.356	.524	-.048	1.000	.218
Q10	.000	.408	-.218	.408	.000	.816**	-.218	.218	.218	1.000

Source: Authors' own work
Notes:
**: significance on the level of 0,01 (2-tailed)
*: significance on the level of 0,05 (2-tailed)
Q: question
r: coefficient value of correlation

question is a valid question if the calculated r > table r (because there are 10 questions then the table r = n - 1 or table r = 10 - 2 = 8, so the table r is 0.542. Based on the significance table, question numbers 1 to 10 are valid because the calculated r is greater than the table r.

Reliability

Reliability testing was used to assess the validity of a research instrument. A questionnaire was considered valid if a person's answers to the questions were consistent or stable over time. An instrument was considered reliable if its Cronbach's alpha value was >0.6. The results of the reliability test showed Cronbach's alpha value of 0.773, which was greater than 0.6. Therefore, the instrument can be considered reliable (Table 2).

Table 2
Reliability statistics

Reliability Indicator	Value
Cronbach's Alpha	0.774
Cronbach's Alpha (Based on Standardized Items)	0.773
N of Items	10

Source: Authors' own work

Normality and Effectivity

Thirty-five students are tested, both pre-test and post-test, using the multiple-choice test based on assessment indicators (see Table 3). This success indicator is adapted from Seixas and Morton (2013) concept of historical thinking. They argue that, to understand a past event, one should think like a historian by viewing the event with the perspective and significance of the past. By instilling this mindset, students can see

Table 3
Assessment indicators for students' multiple-choice tests, developed from Seixas

No	Indicators	Multiple-Choice Tests
1	Students are able to analyse the impact of the Dutch monopoly policy on the socio-economic life in Lasem.	What was the main impact of the VOC's trade monopoly policy on the socio-economic conditions of the Lasem people in the 18th century? a. Improving public welfare through free trade b. Sparking popular resistance due to limited access to trade c. Opening new job opportunities for the people of Lasem d. Improving diplomatic relations between Mataram and the VOC
2	Students are able to explain the strategic and military factors influencing the cause and end of the war.	Why did Oei Ing Kiat and Panji Margono decide to withdraw their troops after the attacks on Juana and Jepara? a. They had achieved a major victory in Rembang b. They wanted to develop a new strategy for the next attack c. The defeat of the militia and the superior strength of the VOC forced them to retreat d. Pakubuwono II ordered them to cease resistance

Table 3 (*continued*)

No	Indicators	Multiple-Choice Tests
3	Students are able to identify and explain the military tactics used in the resistance against the Dutch.	What military strategy was used by Laskar Dampo Awang in the resistance against the VOC in Rembang, Juana, and Jepara? a. Attack from the interior and surround the city from all directions b. Use guerrilla warfare and stealth to approach the enemy c. Attack head-on with a large force in the city center d. Wait for assistance from the Mataram kingdom before launching an attack
4	Students are able to analyse the changes in the social structure in Lasem after the locals failed to defeat the Dutch.	What was the impact of the defeat of the Lasem people on the social structure of their society after 1751? a. The people of Lasem experienced mass slaughter without a trace. b. The Chinese were moved to the city and strictly monitored. c. Lasem became the main administrative center of the VOC. d. The natives gained more power than before.
5	Students are able to take the values of struggle and unity from the resistance against Dutch colonialism.	The main lesson that can be learned from the resistance of the Lasem people against the VOC is? a. Resistance against colonialism will only lead to destruction. b. Unity across ethnicities and groups can be a force against oppression. c. The VOC is the only party with the right to control trade in Java. d. Puppet governments are more effective in confronting colonialism.
6	Students know about the Yellow War in Lasem and its impact on society.	How did the Yellow War end in Lasem? a. Victory of the Lasem people b. Victory of the VOC and defeat of the Lasem people c. Peace agreement between the VOC and the Lasem people d. Withdrawal of the VOC from the Lasem region
7	Students are able to explain the involvement of the Chinese community in the resistance against the Dutch.	The role of the Chinese community in the Yellow War in Lasem can be linked to? a. Their dominance in the VOC colonial government b. Dissatisfaction with VOC policies that restricted their trade c. Their desire to gain political power in the Mataram kingdom d. VOC support for their trade ventures
8	Students are able to identify the main causes of the Yellow War in the context of colonial history.	What was the main trigger for the Yellow War in Lasem in the 18th century? a. People's resistance to the VOC's trade monopoly b. Power struggle between Javanese kings c. The people of Lasem's desire to join the British d. Conflict between natives and Arab merchants

Table 3 (*continued*)

No	Indicators	Multiple-Choice Tests
9	Students are able to describe the impact of the conflict between the people of Lasem and the Dutch.	One of the social impacts of the Yellow War in Lasem was? a. The increasing number of Chinese people in Java b. The decreasing influence of the VOC in the archipelago c. The decline in public trust in local leaders d. The increasing trade relations between Lasem and the VOC
10	Students are able to explain the Dutch interests on the North Coast of Java, especially Lasem.	Why was the VOC so interested in controlling Lasem? a. Lasem is an important trading and shipping center on the north coast of Java. b. Lasem had gold mines that the Dutch East India Company (VOC) coveted. c. Lasem was the administrative center of the Mataram kingdom. d. Lasem had strong diplomatic relations with England.

Source: Authors' own work

the implications, impacts, and values that can be taken from past events.

As a result of implementing learning using VISUM, quantitative findings were obtained which showed a significant increase in student learning achievement. The average score achieved by students in the pre-test stage was 71.4, while in the post-test stage it increased to 91.7. However, to find out whether the collected data is normal or not. Researchers conduct a normality test as a basis for conducting an effectiveness test (T-test). If the sigmoid > 0.05 = normal, however, if the sigmoid < 0.05 = not normal, the results of the normality test that have been carried out are (a) Sigmoid in the Shapiro Wilk pretest shows a value of 0.034 < 0.05 so that the data distribution is not normal. (b) Sigmoid in the Shapiro Wilk posttest shows a value of <0.001 < 0.05 so that the data distribution is not normal (see Table 4).

Based on the normality test that has been conducted, the collected data shows abnormality. Therefore, the Effectiveness test is conducted using the non-parametric Mann Whitney. If the Asymp. Sig value (2 tailed) <0.05, it is concluded that there is a significant difference. Meanwhile, if the Asymp. Sig value (2 tailed) > 0.05, it is concluded that there is no significant difference. From the test that has been

Table 4
Normality test

Class	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest	.192	36	.002	.934	36	.034
Posttest	.252	36	< .001	.774	36	< .001

Source: Authors' own work

conducted, the Asymp. Sig value (2 tailed) is <0.001, which indicates that there is a significant difference so that the results of the pretest and posttest that have been carried out indicate that the learning media is effective (see Table 5).

Table 5
Table of T-test

	Result
Mann–Whitney U	214.000
Wilcoxon W	880.000
Z	-5.010
Asymp. Sig. (2-tailed)	< .001

Source: Authors' own work

DISCUSSION

It is undeniable that technological development has an impact on historical learning innovations. The existence of innovations in history learning is one of the means to support the success of learning. However, in the context of the Indonesian colonial history module, few learning innovations have been developed yet. Therefore, the development of learning innovation is needed in history learning, especially in the material on the 18th-century Lasem war, to increase the effectiveness of historical learning in the module on Indonesian colonial history.

Based on the needs analysis conducted, 88.2% of the 36 students require visualisation in historical learning. When the researchers conducted preliminary observations, there was a student stating, "visualisation in learning will be meaningless if the historical data and visual form are not real; it will actually cause distortion of events." The researchers suggest that VISUM learning media should be developed because it will be mainly focused on visualisation-based learning. In addition, it also strengthens the aspect of historical narrative. Referring to Ofianto et al. (2022), history learning media that is appropriate to students' needs can improve chronological thinking skills. Chronological thinking skills are part of historical thinking skills (Seixas, 2017).

After analysing and identifying the students' needs, the researchers composed the learning material based on the historical method. The researchers exploit all available data from either primary or secondary sources. Reading the Dutch archives and local chronicles also allows the researchers to narrate the learning material in a more accurate and in-depth way. Few researchers narrate the learning material by following the historical method. Most of them focus on the aspects of media display and visualisation. They believe that interesting media could attract students to learn theory (Anderson, 2006; Barsch & Mathis, 2020; Insani et al., 2023).

However, history would be labelled as the material of redundancy and memorisation if we merely compose the same information as already written in the textbook. The use of primary sources is pivotal to providing new information for the students. One historical narrative that has not been widely written about in Indonesian historiography is the *Geger Pecinan* (The Chinese War) in Lasem, in the north coast of central Java. The strategic Lasem developed as an

economic center and a stage for cultural diversity. Lasem is known as a city with a long history involving interactions between Javanese and Chinese cultures, as well as global cultural influences. At that time, social life in Lasem was marked by the presence of a Chinese community that had settled for several generations, mixed with the Javanese (Wijaya et al., 2025). The relationship between these two communities was dynamic and mutually influential. Recently, people of Lasem celebrate the cultural crossroads and social tolerance in public spaces such as markets and social events (Astuti et al., 2019; Wijaya et al., 2025).

Their cooperation was strengthened under the Dutch threat. The Dutch imposed quotas on Chinese immigrants, considering the Chinese had already controlled the economy of Batavia. The Dutch started to persecute and murder the illegal Chinese in Batavia. In 1740, Chinese fled to the east of Batavia, including Lasem (Figure 7), where they were welcomed by Raden Panji Margana and Oey Ing Kiat. These refugees united with the Javanese community in Lasem to resist the Dutch. This alliance marked the beginning of a series of wars between the Chinese Javanese against the Dutch and its allies (Daradjadi, 2013).

The narrative of the Lasem War as a textual historiography is accompanied by a series of visual and audio-visual data. All data were displayed on a Google-based website (Google Sites) entitled VISUM (Virtual Tour of the 18th Century Lasem History). In the VISUM, the researchers integrate the textual content, 360-degree pictures, maps, and other related audio-visual content into Google Sites. Various forms of information are provided to the students, considering they have their own learning styles. By utilising virtual tours, users can be directly involved with sites related to the Yellow War in Lasem (Poetry, 2021). Virtual tours can be used as a medium to know the Lasem history as a trading centre for centuries. The students could reenact the process of Sino-Javanese

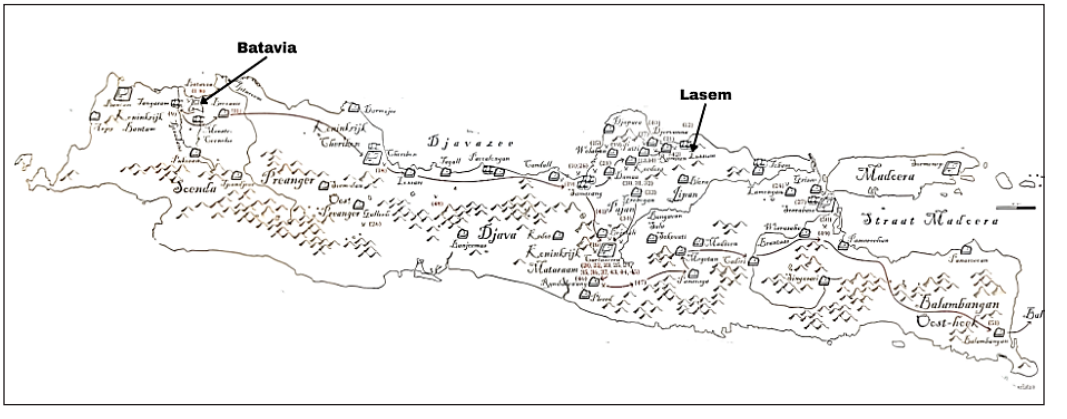

Figure 7. Lasem within the wider Dutch conflict zone from 1740 to 1743
Source: Daradjadi, 2013

interaction in Lasem by observing the related sites. Visualising the material culture in Lasem could help to realise the past event (Ilamsyah et al., 2020). The use of virtual tours in an educational setting could also support contextualised learning and overcome geographical constraints (Figueroa Jr, 2023).

Wibowo et al. (2023) point out that virtual tours-based websites are effective for use in the teaching and learning process. Websites that contain sources and content of historical information also have the potential to improve historical thinking skills (Widiadi et al., 2022). For this study, the use of VISUM is quite effective as a learning medium for historical students in higher education. Based on the results of the pre-test and post-test, the students' historical thinking skills have significantly improved. It means that VISUM development meets the students' needs. During the pre-test, the students depend on their prior knowledge when responding to some multiple-choice tests during the Lasem War. Their result is an average score. However, after reading VISUM, their score increases dramatically.

The posttest results have a higher mean rank (48.56), compared to the pretest results (24.44). The Mann-Whitney U test statistic value is 214.00 with a Z value of -5.010 and an asymptotic significance (2-tailed) of $p < 0.001$. These findings indicate that there is a statistically significant difference between the pretest and posttest results. This shows that the use of VISUM as a learning medium is effective. This effectiveness lies in their ability to provide contextual, interactive, and immersive visual representations, making it easier for students to relate factual knowledge to the spatial and visual experiences of the historical sites being studied. Furthermore, this improvement in achievement also contributes to developing historical thinking skills. Abidin et al. (2020) also argue that the use of virtual tours provides a deeper understanding of historical material and contextual experiences. One of the students also argues that "the use of virtual tours could strengthen specific historical concepts of causality and historical significance".

In learning history, students should possess the skills to think, read, and analyse historical sources (Ofianto et al., 2023a). These skills are the foundation for students to learn from historical events. Analysing historical sources indirectly familiarises students with analysing the causes and effects of past events (A. Widiadi, 2021). However, to improve these skills, appropriate learning media is required. Ofianto et al. (2023a) shows that utilising Virtual Field Trips (VFT) based on historical events and primary sources can improve these skills.

Besides cause-and-effect analysis, historical significance is a key component of historical thinking, emphasising students' ability to understand the importance of events, figures, and historical sites (Seixas & Morton, 2013). To understand the significance of historical relics from the past, fundamental knowledge of those events is required. Through virtual tour-based learning, students can see historical relics in real life. The use of virtual field

trip-based learning media can stimulate students' experiences in directly accessing historical sites (Ofianto et al., 2023a). Experiential learning can enhance students' understanding of the relevance of the relationship between the past and the present (Andresen et al., 2020). Understanding historical context and significance can improve one's analytical skills regarding the importance of past information to the present (Weimann, 2022).

The VISUM, as an integrated visual and textual learning medium, aims to encourage students to use their imagination to think about past events (Garvey & Krug, 2015). Students should use it to picture the past and bring its values to the present life. It helps them to understand the spirit of age and see historical events from different perspectives. Imagination also allows for more engaging learning and establishes critical thinking. Students could connect the past with the present and think like historians. Virtual tour is a dynamic learning medium and continues to grow; therefore, it has the potential to provide a more real learning experience. By utilising virtual tour media as learning, it could impact the future of education.

CONCLUSION

This study produces a virtual tour-based learning media on the Yellow War in Lasem. Briefly, the history of Lasem cannot be separated from the Yellow War. This conflict has taught the importance of resolving disputes peacefully and building mutually beneficial relationships for all parties. As a historical event, the Yellow War in Lasem is an important lesson for maintaining peace and harmony between ethnicities and cultures. The researchers successfully documented all the yellow war sites in the form of a virtual tour. All 360-degree images were embedded in Google Sites entitled VISUM (Virtual Tour of the 18th Century Lasem History). The researchers also validated the learning material and media in the development of VISUM. Validation was carried out by two experts. Various inputs related to the technical aspects of map display and the addition of primary sources greatly helped researchers to improve VISUM. The researchers also held FGD with Lasem historians. The researchers received a lot of input related to renarrate the Yellow War properly. The researchers then revise the VISUM based on suggestions and comments from material experts, media experts, and Lasem historians. In addition, the researchers also tested the effectiveness of using VISUM in learning Indonesian colonial history. It was found that VISUM is effective in supporting historical thinking skills.

The virtual tour is not only a means of conveying historical information but also plays as an acculturative medium for fostering tolerance values. This study suggests that the next developer should integrate virtual tours into historical learning in higher education. Virtual tours could bridge the gap between historical narratives and real experiences. However, the students should be accompanied by using VISUM effectively. Some students need further explanation related to either textual or

visual historiography in the VISUM. The lecturers should also prepare the printed historiography if the learners do not have adequate digital devices or stable internet access.

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