Idealogy Journal Vol. 11 No. 2, 2026, pp 624-636
DOI: https://doi.org/10.24191/idealogy.v11i2.930
Section: Original Article

Quantitative Analysis of Multimedia Element Through Explainer Video About Malay Archipelago Heritage Firearm

Ahmad Nazrin Ahmad Faisal[1], Syafiq Abdul Samat[2], Sharkawi Che Din[3], Alif Haikal Musa[4]
[1,2,3] Faculty of Art & Design, Universiti Teknologi MARA, Selangor Branch, Puncak Alam Campus, Malaysia

soryumaiden00@gmail.com[1], syafiqsamat@email.com[2], sharkawi237@uitm.edu.my[3]
***Corresponding author**

Received: 11 August 2026; Accepted: 30 August 2026; Published: 1 September 2026

ABSTRACT

The history of Malay Archipelago heritage firearms represents an important yet underrepresented aspect of Southeast Asian cultural heritage. However, limited physical artefacts, conventional teaching approaches, and a lack of interactive learning resources have reduced youth engagement and understanding of this historical subject. This study aims to analyse the effectiveness of multimedia elements used in explainer videos and to examine how these elements enhance learners' comprehension, engagement, and learning experience regarding Malay Archipelago heritage firearms. A quantitative content analysis was conducted on ten selected explainer videos sourced from YouTube, focusing on key multimedia components including text, images, audio, video, and animation. The analysis evaluated the presence and application of these elements across the selected samples. The findings indicate that explainer videos integrating multiple multimedia elements, particularly animation, clear visuals, structured narration, and quality audio, provide more effective explanations and higher engagement compared to videos relying primarily on verbal narration. Animation and digital visualisation were especially effective in illustrating internal mechanisms and compensating for the limited availability of physical artefacts. These results support the Cognitive Theory of Multimedia Learning, which emphasises the integration of visual and auditory information to reduce cognitive load and improve comprehension. Overall, the study demonstrates that multimedia-based explainer videos are a valuable educational and digital preservation tool for enhancing youth awareness, understanding, and appreciation of Malay Archipelago firearm heritage, while contributing to more engaging and effective history education.

Keywords: *Malay Archipelago, firearm, preserve, multimedia, video explanation.*

ISSN: 2550-214X © 2026. Published for Idealogy Journal by UiTM Press. This is an Open Access article distributed under the terms of the Creative Commons Attribution-No Commercial-No Derivatives License (http://creativecommons.org/licenses/by-nc-nd/4.0/), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way.

1 INTRODUCTION

Malaysia is rich in culture in every aspect, including food, tradition, games, and craftsmanship. Moreover, Malaysia also has a rich history of firearm heritage, including rentaka, lelah, lantaka, terangkol, and istinggar. It may come as a surprise to many that long before the arrival of European colonisers, the Malay Archipelago, known as the Nusantara, was already familiar with gunpowder and early firearms. Archaeological findings and historical accounts reveal that local kingdoms such as Majapahit, Aceh, and Melaka not only used gunpowder weapons but were also capable of producing their own cannons and firearms. In fact, the Malays and Javanese were among the first in the region to cast bronze artillery known as lantaka, small swivel cannons often mounted on ships or fortresses. Moreover, after dissemination of gun-casting skills from Java (and possibly other regions), similar weapons including cannon, rentaka and swivels gun. The knowledge about firearm spread to other parts of the archipelago (Kuchewar, 2021). These weapons symbolised both power and prestige, showing

that the peoples of the Nusantara were far from technologically backward. They stood as innovative participants in the global exchange of weapon technology that connected Asia, the Middle East, and Europe. Additionally, in later periods (16th–19th centuries), small cannons such as lantaka, lela, rentaka sometimes became more than mere weapons: they were used as status items, sometimes outliving their military function. For example, in parts of Borneo miniature cannons served as a kind of symbolic currency or bride-price. (Miniature cannons could be traded for brides in pre-war Borneo, 2024)

Although Malaysia has a rich cultural heritage, including the development of firearms, the understanding of these heritages remains limited due to insufficient artefacts in museums and general explanations in learning (Reid, 1988; Peterson, 2007). Moreover, limited access to the "materials of historical and pedagogical utility" meant that teaching often defaulted to lecture mode rather than enquiry or source-based learning (History Education Research Journal, 2025). However, without interactive or visually guided learning resources like explainer videos, it's hard for students to understand complicated cultural and mechanical ideas of historic guns (Manguin, 1993). Without innovative digital learning approaches, the valuable knowledge about the Malay Archipelago's firearm heritage probably would faces the risk of fading over time, which makes it difficult to preserve for future generations (Andrade, 2016; Hall, 2011).

Therefore, enhancing the knowledge about the heritage of the Malay Archipelago's firearms through by use of multimedia elements via explainer video could improve the engagement and curiosity among the people and youth. Multimedia is defined as the presentation of information using both words and pictures, rather than words alone. According to Richard E. Mayer, Multimedia learning occurs when learners build mental representations from words and pictures." (Mayer, 2009). The use of multimedia elements in education has become a powerful strategy for enhancing learners' engagement, comprehension, and retention of information. Among various multimedia formats, explainer videos have emerged as an effective instructional tool due to their ability to combine visual, auditory, and textual components into a cohesive learning experience. Rooted in the principles of multimedia learning, explainer videos help reduce cognitive load, clarify complex concepts, and support diverse learning styles. According to Mayer's Cognitive Theory of Multimedia Learning, students learn more deeply from words and pictures together than from words alone, as multimedia facilitates dual-channel processing and meaningful knowledge construction (Mayer, 2009). Furthermore, research shows that well-designed educational videos can significantly improve motivation and learning outcomes by presenting content in a concise, engaging, and accessible manner (Guo, Kim, & Rubin, 2014). Nevertheless, integrating explainer videos into teaching practices can transform traditional learning environments and provide a richer, more interactive educational experience. Therefore, this project could contribute to heritage preservation for future generations through digital education and serve as a reference or educational tool for schools, museums, or online cultural platforms.

1.1 Research Objectives

1. To analyse the effectiveness of multimedia components such as colour, typography, and animation in enhancing learners' comprehension, visibility, and engagement when learning complex historical and cultural subjects.
2. To design and develop an educational explainer video that presents historical and cultural content about Malay Archipelago heritage firearms to improve learners' understanding and learning experience.

1.2 Problem Statements

The limited engagement with the history of the Malay Archipelago towards youth. History teaching sometimes focuses on facts and dates rather than the stories, events, reasons of history, primary sources, or interactive learning. This is because the history taught in school often relies on textbooks and rote memorisation only to pass exams. Therefore, this could make the youth feel abstract and disconnected from the story of the path. For example, people wouldn't imagine the advantage of the Malacca Empire

during its prime era. Moreover, not enough exposure to museums, historical sites, original documents, or multimedia could make history more vivid and lead to misunderstanding historical texts. According to the previous study, in a more practice-oriented study (Jurnal Akademik IPGK), researchers found that using a historical multiple document-based lesson method, for example, giving students several historical documents to analyse, significantly engaged students' motivation to learn history.

Next, a lack of interactive learning for the student. This is because most of the traditional teaching formats are less effective at giving engagement to the students to acknowledge the history of the Malay Archipelago's heritage, for example, like reading a plain textbook with a few images. According to Norhasimah Shari, Nurul Atiqah Zulkifle, Diane Christine Fernandez, et al. (2023), gamification helps increase learner motivation, engagement, and performance by applying interactive learning; for example, games and quizzes can make history more fun and effective. Therefore, providing the multimedia learning experience could contribute to the development of historical thinking skills, such as analysis, interpretation, and critical evaluation of cultural heritage, rather than rote memorisation.

Moreover, the insufficiency of artefacts found nowadays. This is because many existing artifacts are privately owned, poorly documented, or kept in regional collections without proper conservation. This could make them inaccessible for academic study or public conservation. For example, the archaeological excavations along the Johor River valley revealed that weapons such as keris and lances were rarely found, and artifacts such as royal weaponry or regalia have largely remained undiscovered in situ. (Asyaari Muhamad, 2020). This limitation reduces youths' ability and attraction to visualise historical events and contexts effectively. Therefore, developing a multimedia explainer video can bridge this gap, merge technology, cultural heritage, and historical teaching, and offering theoretical and practical improvements in educational research. An example of the past research is Sanuri (2016), who developed an interactive multimedia CD for the Year 4 history topic "Parameswara's Journey" and showed that its use significantly improved students' understanding of that historical subtopic (Sanuri, 2016).

Therefore, despite existing studies demonstrating the effectiveness of multimedia and video-based learning in enhancing students' motivation and engagement in history education, there remains a specific gap in the use of explainer videos to reconstruct and communicate the underrepresented firearm heritage of the Malay Archipelago, particularly for youth audiences. Current multimedia applications in history education largely focus on general historical narratives or well-documented topics, while heritage firearms, due to limited physical artifacts and restricted access, remain insufficiently visualised and explained in educational contexts. This gap limits students' ability to understand the technological, cultural, and historical significance of these weapons within the Malay Archipelago. An explainer video addresses this gap by transforming complex historical and mechanical information into clear, engaging, and visually guided content through animation, narration, labelled diagrams, and motion graphics, enabling the reconstruction of missing artifacts and internal mechanisms that cannot be effectively conveyed through static materials (Mayer, 2009; Höffler & Leutner, 2020). According to multimedia learning theory, such visual–auditory integration reduces cognitive load and improves comprehension among modern learners (Moreno & Mayer, 2012). In addition, digital visualisation tools contribute to heritage preservation by increasing access to culturally significant objects despite the scarcity of physical artifacts (Balletti et al., 2020). By applying this approach to the teaching of Malay Archipelago firearm heritage, the explainer video not only enhances students' understanding but also increases learning motivation and engagement, as supported by previous multimedia-based history studies (Romualdi & Sudrajat, 2024; Ibrahim et al., 2022). The combination of images, sound, and storytelling enables students to visualise historical contexts more effectively and retain historical knowledge, thereby extending the application of multimedia learning research to a heritage domain that has received limited educational attention.

2 LITERATURE REVIEW

Malay Archipelago firearm heritage is one of the important parts in the history of weapons and the

region's culture, yet the traditional teaching methods do not fully engage the interest of the youth in this modern era. The multimedia resources, especially explainer videos, offer more creative and visually rich learning digital experiences. The research has been shown to improve engagement and understanding by combining visuals, narration and audio in a meaningful way (Mayer, 2009). Moreover, the digital tools also play an important role in heritage education to help the historical subjects become more accessible to modern audiences (Hooper-Greenhill, 2007). This literature review explores studies on how multimedia elements, examples like audio, text, video, visual, and animation, can enhance the learning experience by using an explainer video to preserve the Malay Archipelago firearm heritage.

2.1 Malay Archipelago Firearm Heritage

Malay Archipelago firearm heritage refers to the traditional imported firearm that has cultural symbolism developed across the Malay world including present-day Malaysia, Indonesia, Brunei, Singapore, southern Thailand, and the southern Philippines. The firearm technology blend local craftmanship with influences from Arab, Indian, Chinese, and European traders from the 15th to 19th century. The firearms were not only tools of warfare but also status symbols, ceremonial items, and markers of political power among sultanates and local chiefs. According to traditional historical weapon manuscripts such as Kitab Ilmu Bedil ("Book of Malay Traditional Weaponry"), firearms became integrated into Malay martial traditions by mixing technical knowledge like gun making with local cultural and spiritual elements. Moreover, the firearms played important roles in defending port cities, participating in maritime trade networks, and resisting from colonial invasion from Portuguese and British.

2.2 Overview About Multimedia

Multimedia is the use of multiple forms of content such as text, images, audio, video, animation, and graphics to present information or create an interactive experience. In simple terms, multimedia combines different types of media rather than relying on just one. The development of multimedia can be traced through key milestones: in the 1960s and 1970s, computers evolved from machines limited to numeric processing to systems capable of handling text and basic graphics, laying the groundwork for digital multimedia. Personal computers in the 1980s brought graphical user interfaces and expanded capabilities for audio and visual content, and the introduction of CD-ROM drives in the mid-1980s greatly increased storage capacity, enabling rich multimedia applications and interactive software distributed on disc. In the 1990s, multimedia became widespread with multimedia-capable PCs, educational titles, and web technologies that combined text, images, audio and video over the World Wide Web; this era popularised interactive CD-ROMs and early web-based multimedia. From the 2000s onward, web-based multimedia, mobile applications, and video-based learning tools such as explainer videos have become fundamental for engaging and accessible content across multiple fields. The use of multimedia in educational contexts is further supported by research suggesting that presentations combining words and pictures enhance learning compared to single-mode presentations (Mayer, 2009).

2.3 Elements of Multimedia

The elements of multimedia are the building blocks that enable the creation of rich, dynamic, and interactive learning or communication experiences. There are six elements of multimedia like text, images, audio, video and animation (Mayer, 2009). Each element contributes uniquely to the understanding and retention of information like text provides clarity and context, images and graphics help visualise concepts, audio reinforces learning through narration or sound effects, video demonstrates processes dynamically, and animation illustrates abstract ideas. Interactivity allows learners to engage actively with content, while hyperlinks and other navigational tools connect information meaningfully. The strategic combination of these elements enhances comprehension, maintains attention, and accommodates diverse learning styles (Mayer, 2009). In educational settings, multimedia elements are particularly valuable because they transform passive learning into an active,

multisensory experience, making complex concepts more accessible and memorable. By leveraging these elements effectively, educators and content creators can design instructional materials that maximise learner engagement and knowledge retention.

2.3.1 Audio

Audio is one of the key elements of multimedia and refers to any sound component used to enhance communication, understanding, or engagement (Mayer, 2009). Audio can include narration, music, sound effects, voice-over, environmental sounds, and dialogue (Smaldino et al., 2019). In multimedia projects, especially in explainer videos, audio plays an important role in setting the tone, guiding the audience, and helping them understand information more effectively by supporting verbal and auditory learning processes (Moreno & Mayer, 2007).

2.3.2 Text

Text is one of the fundamental elements of multimedia and functions to deliver key facts, definitions, explanations, guidance, and instructions to audiences (Mayer, 2009). Text can appear in many forms, such as titles, subtitles, paragraphs, captions, or on-screen labels (Smaldino et al., 2019). Even though multimedia includes more dynamic elements like audio and video, text remains essential because it provides clarity, structure, and emphasis in learning materials (Clark & Mayer, 2016).

2.3.3 Graphic

Graphics refer to all visual images used in multimedia to represent information, illustrate concepts, and enhance the viewer's understanding (Mayer, 2009). Graphics can include photos, illustrations, diagrams, icons, charts, maps, and other static visual representations (Lester, 2014). Graphics play a key role in making content more impressive and easier to understand, especially when explaining historical objects such as Malay Archipelago heritage firearms (Smaldino et al., 2019). They also support youth learning by helping students understand and remember information better when it is presented through images and diagrams (Paivio, 1991).

2.3.4 Video

Video is a dynamic multimedia element that combines moving images with or without audio to present information in a visually engaging way (Mayer, 2009). It can show real-life footage, recorded demonstrations, reenactments, or sequences of motion visuals to communicate information effectively (Smaldino et al., 2019). Video is especially powerful for education because it can demonstrate processes, tell stories, and present complex concepts that are difficult to explain using text or images alone (Zhang et al., 2006). It can also show how something works, how it is used, or how it looks in real life, making it ideal for explaining the operation or history of heritage firearms (Kay, 2012).

2.3.5 Animation

Animation refers to the technique of creating the illusion of movement using a sequence of images, drawings, graphics, or digital models (Wells, 1998). It allows objects, text, or illustrations to move, transform, or change over time (Mayer, 2009). In multimedia, animation is used to explain ideas visually, demonstrate processes, simplify complex concepts, and make content more engaging (Smaldino et al., 2019). Animation can show internal mechanisms or processes that cannot be easily captured by video, such as how parts of a heritage firearm move during firing (Höffler & Leutner, 2007). Moreover, stylised motion graphics and transitions help make explainer videos look polished and professional (Lowe & Schnotz, 2014).

2.4 Video Explainer

A video explainer is a short, focused, and informative video designed to explain a concept, product, process, or topic in a simple and engaging way. It combines audio, visuals, text, graphics, and sometimes animation to help viewers understand information quickly and clearly. Explainer videos are widely used in education, marketing, training, and awareness campaigns because they make complex topics easier to understand and retain. Typically, these videos are 1–5 minutes long and aim to deliver key information in a concise and accessible format (Chen, 2020).

2.5 Summary of Literature Review

The reviewed studies indicate that multimedia elements, including audio, visuals, animation, and structured narration, play a significant role in enhancing learners' comprehension, engagement, and retention, particularly for complex historical and cultural topics (Mayer, 2009; Moreno & Mayer, 2012; Ibrahim et al., 2022). Dynamic visuals and animations are especially effective in explaining processes or historical content that are difficult to convey using text alone (Höffler & Leutner, 2020). These findings support the idea that carefully designed multimedia components, such as colour, typography, and animation, can improve learners' understanding and interaction with content (Chen, 2020; Clark & Mayer, 2016).

Despite these advantages, several research gaps remain. First, there is a subject-specific gap, as few studies focus on Malay Archipelago heritage firearms, leaving limited scholarly work that documents or visually reconstructs these historically significant artefacts (Balletti et al., 2020). Second, an application gap exists because multimedia learning principles have rarely been applied to heritage content in Southeast Asia (Ibrahim et al., 2022). Third, there is an effectiveness gap, with little research examining how explainer videos can enhance learners' comprehension, engagement, and historical awareness in cultural heritage education (Chen, 2020; Fajardo et al., 2021). Finally, a quality gap is evident, as many publicly available videos lack structured instructional design, accurate historical representation, or integration of evidence-based multimedia principles, reducing their educational impact (Clark & Mayer, 2016; Höffler & Leutner, 2020).

These gaps highlight the need for this study, which aims to analyse the impact of multimedia components on learners' comprehension and engagement and to develop an educational explainer video on Malay Archipelago heritage firearms. By addressing these gaps, the study will contribute to the creation of a structured, engaging, and educationally sound video that not only conveys accurate historical information but also enhances learners' understanding and overall learning experience, aligning directly with the research objectives (Mayer, 2009; Moreno & Mayer, 2012).

3 RESEARCH METHODOLOGY

The research methodology for the study used a quantitative analysis of 10 videos of explainer videos about the Malay Archipelago firearm heritage. The evaluation system was created to assess the quality and impact of specified multimedia elements, including text, images, video, audio, and animation, ensuring an accurate assessment. The prevalence of various multimedia components was examined using percentages or ratios once the data were properly gathered.

3.1 Research Design

This study employed a quantitative research design utilising data analysis to examine the effectiveness of multimedia elements in explainer videos. Quantitative data analysis refers to the systematic examination of numerical data using statistical and mathematical techniques to identify patterns, relationships, and trends. According to Wooldridge (2013), quantitative data analysis involves the application of econometric and statistical methods to analyse measurable variables, test hypotheses, and draw objective conclusions based on numerical evidence. This approach emphasises techniques

such as regression analysis, correlation, and statistical inference to explain relationships between variables in a structured and empirical manner. In this study, quantitative data analysis is applied to systematically evaluate multimedia elements, including visuals, narration, text, animation, and sound, used in explainer videos.

The purpose is to determine how these multimedia elements contribute to improving learners' comprehension, interest, and information retention regarding heritage firearms of the Malay Archipelago. A total of ten explainer videos containing multimedia elements were selected and visually analysed as the dataset for this study.

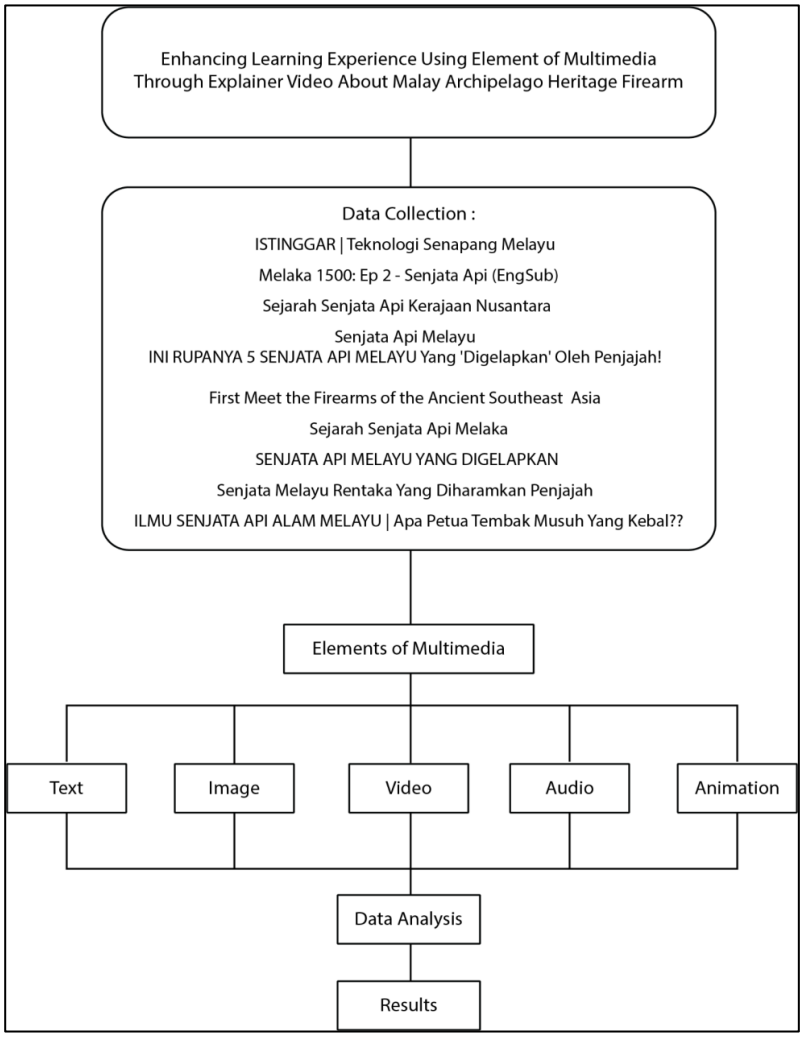
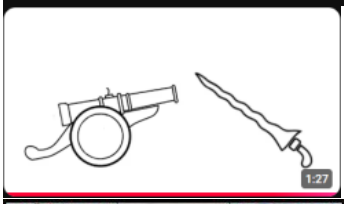


Figure 1 Framework of study

3.2 Sample of Selection Videos

The selection videos that were taken from YouTube were based on the content about firearm heritage between 2019 to 2025. These videos were chosen based on their relevance to historical firearm content, educational purpose, and use of multimedia elements such as animation, narration, and visual graphics. The selected samples provide sufficient variation to allow meaningful qualitative content analysis in Table 1.

Table 1 Selection Sample of Video Explainer About Malay Firearm Heritage
List of Video Explainer About Malay Firearm Heritage from YouTube

No.	Video Title	Year of Publish	Duration	Producer	Thumbnail	Code
1	ISTINGGAR | Senapang Melayu	2022	4:54 minutes	UTUSAN TV		V1
2	Melaka 1500: Ep 2 - Senjata Api (EngSub)	2025	15:43minutes	Suloh Silam		V2
3	Sejarah Senjata Api Kerajaan Nusantara	2020	22:49 minutes	Lycma Mil - Tech		V3
4	Senjata Api Melayu	2025	0:52 minutes	abcyber63		V4
5	INI RUPANYA 5 SENJATA API MELAYU Yang 'Digelapkan' Oleh Penjajah!	2019	6:20 minutes	SULALATUS SALATIN		V5
6	First Meet the Firearms of the Ancient Southeast Asia	2023	9:31 minutes	Seb'xArmedCafé		V6
7	Sejarah Senjata Api Melaka	2020	1:26 minutes	Sejarah Channel		V7
8	SENJATA API MELAYU YANG DIGELAPKAN	2019	9:52 minutes	Channel 20 sen (Channel 20 sen)		V8

9	Senjata Melayu Rentaka Yang Diharamkan Penjajah	2021	1:54 minutes	Demi Malaiu		V9
10	ILMU SENJATA API ALAM MELAYU | Apa Petua Tembak Musuh Yang Kebal?	2020	8:03 minutes	SULALATUS SALATIN		V10

3.2 Copyright Notice

This research project and its accompanying materials, including text, images, illustrations, animations, and multimedia content, are protected by copyright law. No part of this publication may be reproduced, distributed, transmitted, or adapted in any form or by any means without prior written permission from the authors, except for brief quotations used for academic, educational, or research purposes with proper citation.

4 DATA ANALYSIS

The data were analysed thematically to identify the component of multimedia elements, such as text, image, video, audio, and animation across all 10 selected video explainers.

Table 2 Analysis of Component of Multimedia Elements in Explainer Video

Element of Multimedia	Component of Elements	Code									
		V1	V2	V3	V4	V5	V6	V7	V8	V9	V10
Text	Subtitle Usage		/		/	/	/			/	
	San Serif Font	/	/		/	/	/				/
	Label and highlight	/	/	/	/						/
Image	Historical Photograph	/		/		/	/	/	/	/	/
	Illustration Artwork		/	/	/	/	/	/	/		/
	Clear quality image	/	/	/	/	/	/	/	/	/	/
	Usage of graph		/							/	
Video	Documentary Footage		/	/	/			/	/	/	/
	Archival Footage	/		/		/	/		/	/	/
	Various Camera Shot	/		/					/	/	/
	Scene Transition	/	/	/	/	/	/	/	/	/	/
Audio	Sound Effect		/	/		/				/	/
	Music Background	/	/			/		/	/	/	/
	Audio Footage		/	/		/					/
	Voice Over	/	/	/	/		/	/	/	/	/
Animation	Clear Visual flow animation		/				/	/	/	/	/
	Consistent Animation Style		/					/	/		/
	Slow Animation Pacing		/				/		/		/
	Clarity of Animation		/				/	/	/	/	/

5 RESULTS

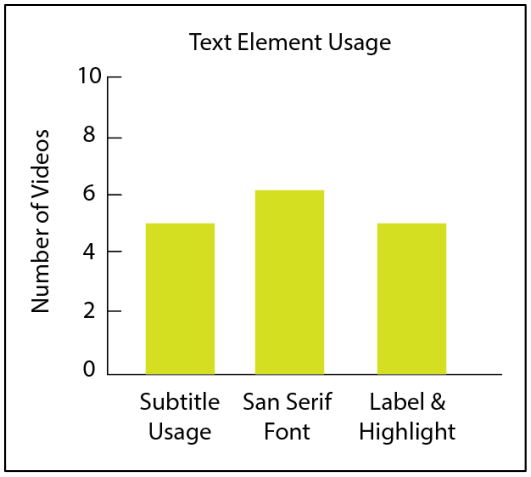


Figure 1 Results of Analysis of Text Elements in Explainer Video

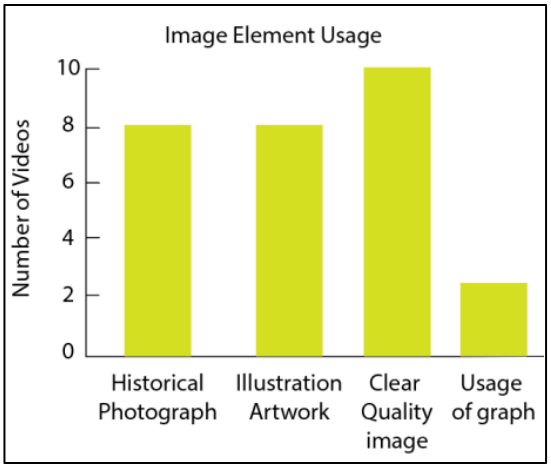


Figure 2 Results of Analysis of Image Elements in Explainer Video

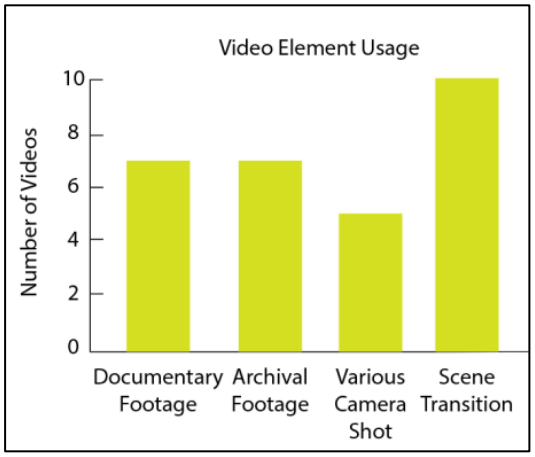


Figure 3 Results of Analysis of Video Elements in Explainer Video

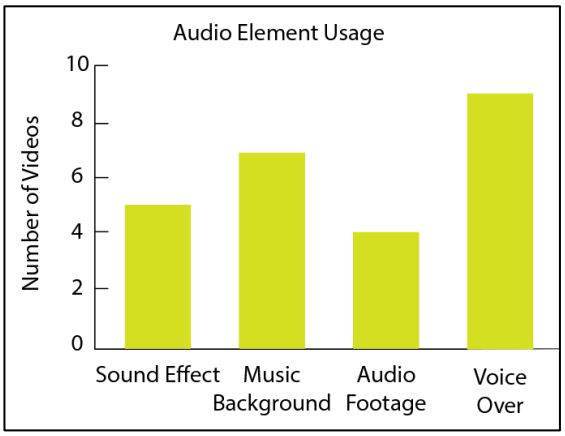


Figure 4 Results of Analysis of Audio Elements in Explainer Video

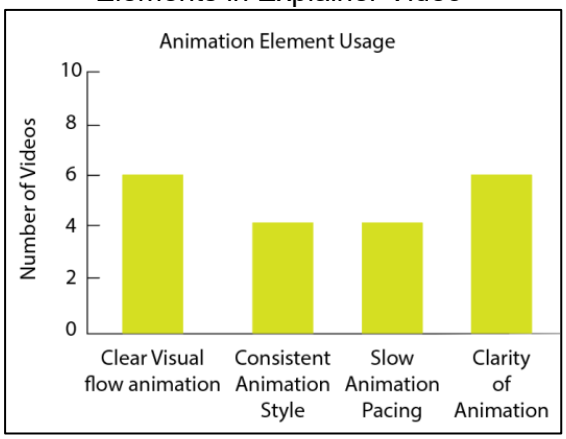


Figure 5 Results of Analysis of Animation Elements in Explainer Video

6 FINDING

The findings of this study are based on a qualitative content analysis of ten explainer videos related to the Malay Archipelago firearm heritage. The analysis focused on the application and effectiveness of multimedia elements such as text, graphics, audio, video, and animation in supporting learning and

engagement.

The analysis reveals that explainer videos, which effectively integrate multiple multimedia elements provide clearer explanations and higher engagement levels compared to videos that rely mainly on verbal narration. This supports Mayer's Cognitive Theory of Multimedia Learning, which states that learners understand information more effectively when words and visuals are presented together rather than separately (Mayer, 2009)

Animation was identified as one of the most effective multimedia elements. Animated visuals and motion graphics were particularly useful in explaining the internal mechanisms and firing processes of heritage firearms, which are difficult to demonstrate through static images or live-action footage. This finding is consistent with Höffler and Leutner (2020), who found that dynamic visualisations significantly improve comprehension of mechanical and abstract processes.

In addition, the use of clear graphics such as labelled diagrams, illustrations, and reconstructed visuals helped compensate for the limited availability of physical artefacts. Digital visualisation allowed viewers to better imagine the form, structure, and function of heritage firearms, supporting findings by Balletti et al. (2020) that digital tools enhance accessibility to rare or inaccessible cultural artefacts

Audio quality also played a crucial role in learning effectiveness. Videos with clear narration, appropriate pacing, and minimal background noise were more engaging and easier to understand. This aligns with Moreno and Mayer (2012), who emphasised that well-designed audio narration reduces cognitive load and supports meaningful learning.

Finally, videos that followed a clear educational structure by introduction, explanation, and summary were more effective in sustaining viewer attention and improving understanding. Short to medium-length explainer videos with focused content were found to be more suitable for youth audiences, supporting findings by Guo, Kim, and Rubin (2014) on video engagement and attention span.

CONCLUSION AND RECOMMENDATION

This study concludes that multimedia elements significantly enhance the learning experience when applied through explainer videos, particularly for complex historical and cultural subjects such as the heritage firearms of the Malay Archipelago. The integration of animation, graphics, text, audio, and video allows abstract historical narratives and mechanical processes to be communicated more clearly and effectively.

The findings support established multimedia learning theories which suggest that learners achieve deeper understanding when visual and auditory information are combined strategically (Mayer, 2009; Moreno & Mayer, 2012). Furthermore, explainer videos function not only as educational tools but also as digital preservation methods, enabling the reconstruction and documentation of heritage artefacts that are rare, inaccessible, or poorly preserved.

Overall, multimedia-based explainer videos show strong potential in increasing engagement, comprehension, and historical awareness among youth, while simultaneously contributing to the preservation of underrepresented cultural heritage within the Malay Archipelago.

ACKNOWLEDGEMENT

I would like to express my heartfelt appreciation to all who supported me throughout the completion of this study. My deepest gratitude goes to Associate Prof. Dr. Sharkawi Che Din, my lecturer and supervisor, for his invaluable guidance, expertise, and continuous encouragement. I am also sincerely thankful to the Research Ethics Evaluation Committee of the College of Creative Arts Studies, MARA

University of Technology (UiTM), for granting approval to conduct this study (Research Number: CCA/SRGK/2025 (EXM02)). Lastly, I extend my warmest thanks to my family and friends for their unwavering support, motivation, and understanding, all of which have been instrumental in helping me achieve this milestone.

FUNDING

This research is self-funded.

AUTHOR CONTRIBUTION

All authors played equal contributions towards the production of this paper.

CONFLICT OF INTEREST

There is no conflict of interest.

REFERENCES

Adler, M. V., Madsen, J., Hedberg, J., Steinberg, R., & Parra, L. C. (2025). Effect of explanation videos on learning: The role of attention and academic performance. *Education and Information Technologies, 30*(9), 11797–11825. https://doi.org/10.1007/s10639-024-13292-9

Al-Khalidi, I. (2021, November 13). How to make learning effectiveness with Mayer's multimedia instructional model. *International Journal of Sciences: Basic and Applied Research (IJSBAR).* https://www.gssrr.org/index.php/JournalOfBasicAndApplied/article/view/13392

Balletti, C., Beltrame, C., Costa, E., Guerra, F., & Vernier, P. (2020). Underwater photogrammetry and 3D reconstruction of shipwrecks: Evaluation of emerging technologies for cultural heritage documentation. *Journal of Cultural Heritage, 43*, 214–226. https://doi.org/10.1016/j.culher.2019.12.003

Balletti, C., Guerra, F., & Mancuso, S. (2020). Digital heritage and 3D modeling for cultural preservation. *Journal of Cultural Heritage, 45*, 1–12.

Boadu, G., Donnelly, D., & Sharp, H. (2020). History teachers' pedagogical reasoning and the dynamics of classroom implementation in Ghana. *History Education Research Journal, 17*(2). https://doi.org/10.14324/herj.17.2.04

Book of Malay Traditional Weaponry – UNESCO Malaysia (MNCU). (2025, May 20). https://www.unesco.org.my/unesco-recognition/communication-information/memory-of-the-world-committee-for-asia-and-the-pacific-mowcap-regional-register/book-of-malay-traditional-weaponry

Çeken, B., & Taşkın, N. (2022). Multimedia learning principles in different learning environments: A systematic review. *Smart Learning Environments, 9*(1). https://doi.org/10.1186/s40561-022-00200-2

Chen, J. (2020). The power of explainer videos in education and marketing. *Journal of Digital Media, 15*(3), 45–52.

Clark, R. C., & Mayer, R. E. (2016). *E-Learning and the Science of Instruction* (4th ed.). Wiley.

Computer History Museum. (n.d.). Networking & the Web | Timeline of Computer History. https://www.computerhistory.org/timeline/networking-the-web/

Fajardo, D., Lopez, M., & Torres, P. (2021). Explainer videos in history education: Engagement and comprehension outcomes. *Education and Information Technologies, 26*(5), 5675–5692.

Fiveable. (2025, August 22). Historical development of multimedia technologies. https://fiveable.me/multimedia-skills/unit-1/historical-development-multimedia-technologies/study-guide/aOoGgsMvfraPRrI0

Guo, P. J., Kim, J., & Rubin, R. (2014). How video production affects student engagement: An empirical study of MOOC videos. *ACM Conference on Learning at Scale.*

Höffler, T. N., & Leutner, D. (2007). Instructional animation versus static pictures: A meta-analysis. *Learning and Instruction, 17*(6), 722–738.

Höffler, T. N., & Leutner, D. (2020). The role of dynamic visualizations in multimedia learning. *Educational Psychology Review, 32*(1), 1–28. https://doi.org/10.1007/s10648-019-09496-8

Ibrahim, R., Leng, N. M., Yusoff, M. R., & Wahid, N. H. A. (2022). Explainer videos as an instructional tool: Effects on student engagement and learning outcomes. *Journal of Education and e-Learning Research, 9*(3), 330–336. https://doi.org/10.20448/journal.509.2022.93.330.336

Ibrahim, R., Rahman, A., & Tan, C. (2022). Multimedia learning in Southeast Asian heritage education. *Asian Journal of Educational Technology, 8*(2), 50–65.

Kay, R. H. (2012). Exploring the use of video podcasts in education: A comprehensive review. *Computers in Human Behavior, 28*(3), 820–831.

Khamis, Z., Hanafi, H. F., & Saari, E. M. (2023). Investigation of the guidelines for developing animation videos for History subject in Malaysia. *Journal of ICT in Education, 10*(1), 67–76. https://doi.org/10.37134/jictie.vol10.1.6.2023

Krippendorff, K. (2013). *Content Analysis: An Introduction to Its Methodology* (3rd ed.). Sage.

Kuchewar. (2021, May 5). Cannon. https://mr.kuchewar.com/cannon/

Lester, P. M. (2014). *Visual Communication: Images with Messages* (6th ed.). Cengage Learning.

Lowe, R. K., & Schnotz, W. (2014). *Learning from Dynamic Visualizations*. Springer.

Mahmun, H. A., & Din, S. C. (2025). Enhancing children's learning of Malay traditional musical instruments using multimedia elements in augmented reality book. *Idealogy Journal*. https://doi.org/10.24191/idealogy.v10i2.817

Mayer, R. E. (2002). Multimedia learning. *Psychology of Learning and Motivation, 41*, 85–89.

Mayer, R. E. (2009). *Multimedia Learning* (2nd ed.). Cambridge University Press.

Miniature cannons could be traded for brides in pre-war Borneo. (2024, August 14). *The Vibes.* https://www.thevibes.com/articles/news/103097/lead7am-in-pre-war-borneo-a-man-could-buy-a-bride-with-miniature-cannons

Moreno, R., & Mayer, R. E. (2007). Interactive multimodal learning environments. *Educational Psychology Review, 19*(3), 309–326.

Moreno, R., & Mayer, R. E. (2012). Learning from audiovisuals: Cognitive theory of multimedia learning. In S. Graham (Ed.), *Theories of Learning in the Digital Age* (pp. 87–104). Routledge.

Paivio, A. (1991). Dual coding theory: Retrospect and current status. *Canadian Journal of Psychology, 45*(3), 255–287.

SEGMENT 3: Malay Weaponry and Armours | Malay Heritage Museum. (n.d.). https://muziumwarisanmelayu.upm.edu.my/permanent_exhibition/indoor_gallery/segment_3_malay_weaponry_and_armours-3963

Smaldino, S. E., Lowther, D. L., & Russell, J. D. (2019). *Instructional Technology and Media for Learning* (12th ed.). Pearson.

Wooldridge, J. M. (2013). *Introductory econometrics: A modern approach* (5th ed.). South-Western Cengage Learning.

Wells, P. (1998). *Understanding Animation*. Routledge.

Yunus, M., Salehi, H., & John, D. S. A. (2013). Using visual aids as a motivational tool in enhancing students' interest in reading literary texts. arXiv. https://arxiv.org/abs/1305.6360

Zhang, D., Zhou, L., Briggs, R. O., & Nunamaker, J. F. (2006). Instructional video in e-learning: Assessing the impact on learning effectiveness. *Information & Management, 43*(1), 15–27.