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Bridging Digital Technology and Local Heritage: An E-Magazine Model for Contextual History Learning in Post-Colonial Urban Spaces

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ABSTRACT

This study develops and evaluates "SERAYA," a digital e-magazine integrated with Google Street View, designed as an innovative medium for cultural heritage education and local history learning in Semarang, Indonesia. Employing the Research and Development (R&D) method with the ADDIE model, the research involved needs analysis, expert validation, and a limited trial with 30 members of a historical organization. Results from material and media expert validation confirmed the product's high feasibility. User trials indicated that SERAYA effectively enhanced understanding of Semarang's history and culture, raised awareness of heritage preservation, and stimulated interest in visiting historical sites. The integration of Google Street View provides dynamic, cost-effective visual documentation, supporting sustainable monitoring. This study contributes to the discourse on media innovation in history education by offering a replicable model that leverages digital technology to foster historical literacy, connect communities with local heritage, and support preservation in a post-colonial urban context.

KEYWORDS
Inquiry Model; Artificial Intelligence; Digital Archives; Local History Teaching Materials

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ABSTRAK

Studi ini mengembangkan SERAYA, majalah elektronik digital terintegrasi Google Street View, sebagai media inovatif pembelajaran sejarah lokal dan warisan budaya Semarang. Menggunakan metode Research and Development (R&D) dengan model ADDIE, penelitian melibatkan analisis kebutuhan, validasi ahli, dan uji coba terbatas bersama 30 anggota komunitas sejarah. Hasil validasi materi dan media menunjukkan kelayakan produk sangat tinggi. Uji coba membuktikan SERAYA efektif meningkatkan pemahaman sejarah, kesadaran pelestarian warisan, dan minat kunjungan ke situs bersejarah. Integrasi Google Street View menyediakan dokumentasi visual dinamis dan ekonomis. Studi ini berkontribusi pada inovasi media pendidikan sejarah dengan menawarkan model teknologi digital yang dapat direplikasi untuk membangun literasi sejarah dan melestarikan warisan di ruang urban pascakolonial.

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Introduction

Cultural heritage is a site that has historical value, encompassing both tangible and intangible objects. Cultural heritage has been regulated in Law Number 11 of 2010 concerning cultural heritage, which ratifies the 1972 UNESCO Convention on Cultural Heritage. This cultural heritage is national in nature but is passed down to the respective regional levels, so that each region has a cultural heritage (Bura & Ando, 2023; Koch & Gillespie, 2024; Yanita Mila Ardiani et al., 2022). In line with this regulation, it is explicitly stated that buildings and their surrounding environment, which have been designated as cultural heritage, must be protected and maintained to ensure their sustainability. This statement is outlined in Law Number 28 of 2002 of the Republic of Indonesia concerning Buildings. Buildings designated as cultural heritage are a series of regional structures or complexes consisting of natural or artificial materials used to meet spatial planning needs (Taylor & Verdini, 2022; Yasmin et al., 2025). These buildings are divided into several parts and require protection and maintenance.

The preservation of cultural heritage has the primary objective of maintaining or restoring the artistic value that exists in a place, which involves continuous preservation efforts (Kemp, 2024; Nakonieczna & Szczepański, 2024). This can be seen in Central Java Province, which has a regulation regarding cultural heritage, Number 13 of 2013, which has the aim of implementing central or national rules that focus on the function of cultural heritage as a regional icon and a driving force in the fields of culture and science, especially history (Rahdriawan et al., 2021; Yuliati et al., 2023). Many historical areas are located in Central Java, one of which is the Old City, a cultural icon of Semarang City. This area was designated as a regional cultural heritage site because it contains traces of colonial culture that developed in the Semarang area in the past. The old city preserves numerous buildings and traditional heritage sites that have contributed to cultural acculturation and evolved into intangible cultural heritage in Semarang (Yuliati et al., 2023). Cultural heritage revitalization in Semarang aims to restore the historical area's nuances, including its form, layout, social function, and cultural significance, to its original characteristics. However, in the digital era, this revitalization is not regularly documented. This means that documentation is only carried out periodically and is not continuously automated (Li et al., 2025).

Many cultural heritage sites in Semarang City lack historical narratives and automatic updates on current conditions, resulting in digital documentation that is not automatically updated (Septianto et al., 2025; Wang et al., 2025). On the other hand, media is needed that can introduce cultural heritage sites to the people of Semarang or students in Semarang City, providing automatic updates (Kalsum et al., 2026; Luo et al., 2025; Tham et al., 2024). With this condition, cultural heritage sites in Semarang City are still manually monitored, requiring significant effort, time, and costs to carry out periodic updates annually. Thus, there is a need for innovation that can provide periodic documentation of cultural heritage at minimal cost (Jalandoni et al., 2025). The Cultural Heritage E-Magazine named 'Seraya' is present as a means of education and preservation regarding cultural heritage sites in Semarang City, which is integrated with Google Street View, so that it provides regular visual updates. Seraya comes with Google Street View, historical narratives, vintage photos, and visualizations. Seraya E-Magazine is a modern platform that presents material on cultural heritage and the World Heritage Site (WHS) in Semarang City, as a solution to address the preservation and education of cultural heritage in

Semarang City, utilizing digital technology that is measurable, affordable, and sustainable. This media is expected to increase public understanding and knowledge about cultural heritage in Semarang City. This media serves as a historical learning tool, providing comprehensive visualization and understanding through digital media, thereby enabling a deeper understanding of the context of historical material (Baldi et al., 2025; J. Li et al., 2025).

Theoretical Framework

The community service program conducted by (Nugroho & Wuryani, 2024) in Ngrawan Hamlet, Ngrawan Village (Getasan, Semarang Regency), adopted a holistic approach through workshops, technical training, practice, and mentoring to digitize and document local cultural heritage (e.g., the Ngrawan inscription and punden) and increase community participation in preserving local cultural heritage. Evaluation using a pretest–posttest instrument showed an increase in participants' understanding: the average knowledge of cultural heritage rose from 3.2 to 3.7, while understanding of cultural heritage digitization rose from 2.5 to 3.8; the resulting products included a digitization SOP, 360° photo documentation, profile videos, and barcode signs for cultural heritage objects. Although hampered by limited time for participants and weather constraints (high rainfall), this intervention successfully motivated residents to tidy up the inscription area, widen the footpath, and raise awareness about the use of social media to promote the village's potential as an educational tourism destination. Furthermore, the study shows that community-based digitization can be an effective strategy for preserving and disseminating cultural heritage information.

Kamza, Yusrizal, and Noviana (2024) developed E-Magazine Time (EMT) as a digital-based history learning medium to overcome the limitations and boredom of online learning during the COVID-19 pandemic. This Research and Development study, utilizing the DDD-E (Decide, Design, Development, Evaluation) model, designed content using Canva and exported the final product in the form of a flipbook with Heyzine. It was then validated by material experts, media experts, and learning experts, and tested on student users. The validation results showed that EMT was suitable for use: a material feasibility score of 85%, a media assessment after revision of 83.5%, a learning expert assessment of 95.3%, and a student response of 93.75%. Therefore, the researchers concluded that EMT was effective in increasing engagement and interest in learning history and was able to reduce boredom in online learning.

Recent investigations into how practitioners and local communities utilize digital documentation tools highlight a significant shift toward participatory conservation efforts (Khan et al., 2024). By actively involving local stakeholders in the data collection process, such as utilizing 360-degree photography and digital scanning the authenticity and comprehensiveness of the historical record are significantly enhanced. This collaborative approach not only safeguards tangible artifacts but also ensures that the intangible narratives surrounding these cultural sites are accurately documented for future generations. Ultimately, integrating community-driven data collection into formal preservation

strategies establishes a more sustainable and inclusive model for managing local heritage in the digital age.

Building upon this foundation of digitally documented heritage, the subsequent presentation of these historical spaces plays a crucial role in public engagement and educational tourism. Empirical research demonstrates that the way cultural heritage is digitally represented profoundly influences the conservational intentions and behaviors of visiting tourists (J. Li et al., 2025). When visitors interact with high-quality, immersive digital representations of historical sites, their appreciation for the cultural significance of the area deepens substantially. This heightened awareness naturally translates into a stronger desire to support local conservation initiatives and respect the physical integrity of the locations they visit (Abunie et al., 2024; Huruta et al., 2024; King et al., 2024). Therefore, utilizing digital media to strategically promote a village's historical assets not only boosts its profile as a tourism destination but also fosters a protective mindset among its audiences.

To ensure that these digital representations are both culturally accurate and technologically effective, developers must bridge the gap between technical design and community knowledge. This synthesis requires the application of collaborative codesign principles, specifically tailored for the development of digital heritage systems within rural communities (Veliz Reyes et al., 2024). By actively engaging rural populations throughout the conceptualization and development phases, media creators can avoid historical misrepresentations and build platforms that truly resonate with the local identity. Much like the structured Decide, Design, Development, and Evaluation (DDD-E) model, this codesign methodology guarantees that the final educational product is rigorously tested and validated by the very people whose history it portrays. Consequently, interactive media developed through such participatory frameworks achieve higher levels of user engagement and remain relevant to both the community and external learners.

Ultimately, the successful digitization and collaborative design of cultural artifacts must culminate in accessible platforms that actively educate and engage the broader public. Transforming raw digital archives into compelling educational narratives, such as digital-based history e-magazines, aligns with modern cultural policies regarding digital heritage infrastructures (Capurro et al., 2024). These digital infrastructures are increasingly recognized not merely as passive storage repositories, but as active, vital instruments for civic education and the enactment of historical awareness. By repackaging digitized historical data into interactive, student-friendly formats like flipbooks, educators can directly combat the boredom often associated with traditional history learning platforms. Thus, the synergy between community-led digitization and interactive digital publishing creates a comprehensive ecosystem that preserves the past while vividly bringing it to life for contemporary digital learners.

Method

Research Design

This study employs a research and development (R&D) approach, which systematically aims to produce new products or enhance existing ones through structured, iterative procedures (McKenney & Reeves, 2019). R&D methodology in educational research focuses on designing, developing, and evaluating instructional products to address specific learning needs while contributing to theoretical understanding of educational design processes. Unlike purely descriptive research, R&D generates tangible outputs validated through empirical testing, bridging the gap between theoretical principles and practical application.

The development model selected for this research is the ADDIE model, comprising five sequential stages: Analyze, Design, Develop, Implement, and Evaluate (Dick et al., 2015). The ADDIE framework provides systematic guidance for educational product development while maintaining flexibility for contextual adaptation. This model was chosen for its comprehensive coverage of the development lifecycle, its emphasis on iterative refinement based on empirical feedback, and its widespread acceptance in educational technology and instructional design research. The researchers adopted a procedural approach, implementing each stage sequentially while allowing for recursive cycles of refinement as findings from later stages informed revisions to earlier design decisions.

Data and Sources of Data

This study utilizes both qualitative and quantitative data obtained from multiple sources to ensure comprehensive understanding of the development process and product effectiveness. Qualitative data were gathered through literature studies examining previous research on historical learning media, digital applications for history education, and instructional design principles. These sources provided theoretical foundations for media development and identified design features associated with effective learning outcomes.

Quantitative data were obtained through two primary sources: expert validation questionnaires and limited-scale media trials. Expert validation involved subject matter specialists who assessed the developed media's content accuracy, pedagogical appropriateness, and alignment with curriculum objectives. Media design experts evaluated technical aspects including user interface, navigation, visual design, and accessibility features. Limited media trials with target users generated quantitative data on usability, engagement, and perceived learning value.

Data sources included participants purposively selected for their relevance to the research objectives. The Exsara (Indonesian History Expedition) organization, a student group focused on historical exploration, was selected as the sample for small-scale media testing. This organization was chosen because its members possess demonstrated interest in historical learning and represent the intended user population for the developed

media. Additional data sources included validation instruments, observation protocols, and documentation of the development process.

Data Collection

Data collection employed multiple techniques aligned with the ADDIE development stages and designed to capture both formative feedback for ongoing refinement and summative evidence of product quality.

Literature studies were conducted throughout the analysis and design stages to establish theoretical foundations and identify best practices in historical media development. Researchers systematically reviewed academic journals, books, and previous research reports examining digital media for history education, focusing on studies addressing Indonesian history content and similar educational contexts. This literature review informed decisions about content selection, pedagogical approaches, and media features.

Questionnaires served as the primary instrument for collecting quantitative validation data. Expert validation questionnaires were developed based on established instructional design criteria, adapted for the specific context of historical learning media. These instruments assessed multiple dimensions including content accuracy (alignment with historical scholarship, freedom from factual errors), pedagogical quality (alignment with learning objectives, appropriateness for target users, promotion of historical thinking), technical quality (functionality, navigation, accessibility), and visual design (aesthetics, clarity, engagement). Validation questionnaires employed Likert-scale items with accompanying comment sections allowing experts to provide qualitative feedback.

User trial questionnaires assessed participant experiences with the developed media, including usability perceptions, engagement levels, and perceived learning benefits. These instruments were administered following small-scale implementation with Exsara organization members.

Observation was conducted during limited media trials to document user interactions, identify usability issues, and capture behavioral indicators of engagement and learning. Researchers observed participants as they navigated the media, noting points of confusion, patterns of use, and spontaneous comments. Observational data complemented questionnaire responses, providing contextual understanding of user experiences.

Trustworthiness of Data

Ensuring data trustworthiness in R&D research requires attention to both qualitative credibility and quantitative validity, given the mixed-methods nature of development studies. For expert validation data, content validity was ensured by developing instruments based on established instructional design frameworks and having instruments reviewed by additional experts before use. Expert validators were selected based on their demonstrated expertise in relevant domains: history education, instructional design, and media development.

For qualitative data from literature studies and observations, credibility was enhanced through source triangulation, examining multiple sources to verify findings and identify consistent patterns. Prolonged engagement with the development process allowed researchers to develop deep understanding of design decisions and their rationales. Detailed documentation of the development process, including design decisions, revision rationales, and validation feedback, created an audit trail supporting dependability.

For quantitative trial data, reliability was enhanced through careful instrument design, including clear item wording and consistent administration procedures. While small-scale trials limit generalizability, they provide essential formative feedback for product refinement and preliminary evidence of product acceptability. Transferability is supported through thick description of the development context, user characteristics, and validation criteria, enabling readers to assess applicability to other settings.

Data Analysis

Data analysis employed different techniques for qualitative and quantitative data, with findings from both informing iterative product refinement throughout the ADDIE stages.

Qualitative data from literature studies and expert comment sections were analyzed using content analysis techniques. Researchers systematically coded textual data to identify themes related to effective historical media design, common challenges in digital history learning, and specific recommendations for media improvement. During the analysis stage, literature findings were synthesized to establish design principles. During validation and trials, expert and user comments were coded to identify specific issues requiring revision and suggestions for enhancement. Qualitative analysis was ongoing throughout the development process, with findings immediately informing design decisions.

Quantitative data from expert validation questionnaires and user trials were analyzed using descriptive statistics. Mean scores for each assessment dimension were calculated to identify areas of strength and weakness requiring attention. Item-level analysis revealed specific aspects of the media needing improvement. Validation criteria included minimum acceptability thresholds; items falling below these thresholds triggered design revisions. Following revisions, revalidation ensured that identified issues had been adequately addressed.

The integration of qualitative and quantitative findings occurred iteratively throughout development. Quantitative ratings identified areas of concern, while qualitative comments provided detailed guidance for addressing those concerns. This integrated approach ensured that revisions were both targeted (based on quantitative identification of problems) and informed (based on qualitative understanding of causes and solutions). The analysis process supported the ADDIE model's iterative character, with findings from evaluation stages feeding back into redesign and refinement.

Results

Analyze User Needs

User analysis is a process of identification conducted by researchers to determine user needs and interests in a product or system. The researchers' target users are the general public with a preference for cultural heritage in the city of Semarang. Researchers employed a literature review method to identify user needs and opportunities for developing the product or media.

Semarang City boasts a diverse cultural heritage, spread across various areas, including the Old Town, Chinatown, and Kampung Melayu. The Old Town is the area with the most significant number of cultural heritage buildings, comprising approximately 101 Dutch heritage buildings (Bensa et al., 2026; Yuliati et al., 2023). However, only a few buildings are known and attract tourists and local residents. Some buildings have not been well-documented, so their data or archives are not yet publicly accessible. Based on researchers' observations from the cagarbudayasemarangkota.go.id website, several cultural heritage buildings, especially in the Old Town area, only have photos without clear descriptions. Semarang City added six Intangible Cultural Heritage (ICH) objects designated by the Ministry of Culture in 2025 (Sugiarto et al., 2025; Yuliati et al., 2023). The addition of these new objects enhances the cultural diversity of Semarang City, which is nationally recognized. Semarang now has 17 ICH objects recognized and designated by the Ministry of Culture. However, the addition of these four new objects is not yet widely known to the public. Furthermore, based on researchers' observations, the Semarang City Government (Pemkot) does not yet have a platform or media to display Warisan Budaya Tak benda (WBTB) objects (Wang et al., 2025; Yuliani et al., 2025; Yuliati et al., 2023).

Based on the user analysis, the researcher saw that there was no media that documented cultural heritage objects, both cultural heritage and WBTB. as a whole. In addition, several media outlets that introduced culture in Semarang City were unable to update their information, including photos and materials, regularly. Seeing this need, the researcher created a Cultural Heritage E-Magazine, called Seraya, which features cultural objects in Semarang City, including cultural heritage buildings and WBTB. The content included in this media is a description of the history, architectural forms, and current preservation practices. This media also displays a QR Code that directs users to enter Google Street View for cultural heritage and an explanatory video for Warisan Budaya Tak benda (WBTB).

Design and Development of E-Magazines and Materials

The design and development stage is a follow-up after the user needs analysis conducted by the researcher. After determining that the Cultural Heritage E-Magazine is an innovative medium for recording and introducing cultural heritage, the researcher proceeded to the design stage by seeking references for the E-Magazine's form and layout. After that, the researcher created a list of cultural objects, identified the materials and images, and then generated QR Codes that linked to Google Street View and relevant videos. The researcher created an outline as a guideline for developing this media. Next, from the design and outline that had been created, the researcher proceeded to the development stage.

Seraya Cultural Heritage Magazine is a digital magazine that features cultural heritage objects, including Cultural Heritage Warisan Budaya Tak benda (WBTB), with Google Street View integration. This integration provides the most up-to-date documentation of places and represents Semarang City as one of the meccas of cultural diversity in Indonesia. The development of this media aims to introduce cultural objects in Semarang City to both local and international communities, thereby increasing their interest in the city's culture and promoting cultural tourism in Semarang City. The development of Seraya E-Magazine media began with identifying cover references and determining the layout of each page's contents.

Figure 1. Reference Cover and Content Layout of E-Magazine

Next, the researcher determined the color palette, font type, and size that would form the basis for coloring and writing the material in the media. The color palette, font, and font size that the researcher chose can be seen in the following table:

Table 1. Color, font and size options

No	Component	Reference/Type
1.	Color	Orange (#fc642c), Cream (#ffefda), White (#ffffff), Yellow (#ffde59), Green (#374b39)
2.	Font & Font size	Poppins, League Spartan, More Sugar, Now 1. Front Cover Section Limited Edition Text; Poppins 12pt. SERAYA Text; Poppins 120pt. Cultural Heritage Text; Poppins 50pt. Magazine Text; Poppins 27pt. Text Equipped with; Poppins 18pt. Funfact & QRcode Text; Poppins 40, 30 & 25pt. Behind every corner of Semarang, there is a story that has yet to be told. Find the trail here; Poppins 8pt 2. E-Magazine Content Section Text for each Cultural Heritage Title; League Spartan 40pt. Text for each cultural heritage discussion content; Poppins 12pt. Text for each fun fact; More Sugar 10pt. Text for each fun fact content; Now 10pt 3. Back Cover Section Back Cover Text; Poppins 12pt

The selection of colors and fonts is adjusted to the nuance or impression that the developer wants to convey to the user. Next, the researcher and developer begin compiling materials and searching for documentation of each cultural object that will be included in the E-Magazine. This process is a crucial stage, where the materials and images compiled by the researcher must be considered in terms of validity and credibility. Sources from research articles, books, and the Semarang City government website serve as references for the researcher. After creating the materials and determining the images, the researcher then enters them into the E-Magazine content template that has been created. Finally, the researcher inserts a QR Code connected to Google Street View for cultural heritage building objects and reference videos for Warisan Budaya Tak Benda (WBTB) objects on each page.

At this development stage, the researcher conducted an expert validation test after the product or media was completed. Material experts, including validator Dimas Anggoro, M.Pd., a lecturer in charge of the Culture course at the History Education Study Program at UNNES, conducted this validation test. At the same time, the media expert is Hany Nurpratiwi, M.Pd., a lecturer in charge of the Media Production course in the History Education Study Program at UNNES. These validators possess the necessary competence and experience in line with the focus of this media development study. The material expert validation was conducted by administering a questionnaire containing 15 statements that assessed the relevance, organization, and usefulness of the material. The researcher developed this questionnaire using a 5-point Likert scale. Based on the results of the material expert validation, Seraya E-Magazine received a score of 75, corresponding to 100% percentage, which led the validator to conclude that the material included in the media was worthy of testing. Although several notes were made, including the need to add a table of contents page and the educational purpose of the media to clarify further the E-Magazine's content, Media expert validation also provided a questionnaire containing 15 statements, each with a 5-point Likert scale. Aspects included in the media expert

validation were media innovation, visual display design, and media features. Based on media expert validation, Seraya E-Magazine received a score of 66, corresponding to an 88% rating. The validator concluded that the E-Magazine media was worthy of being tested with the note that font adjustments were needed for some materials.

After receiving a highly feasible evaluation from media and content experts, the researchers proceeded to the implementation phase. The sample selected was the Indonesian History Expedition (Exsara), an organization focused on the history and culture of Semarang.

Implementation of E-Magazines in the Indonesian Historical Expedition Organization (Exsara)

The implementation phase of SERAYA was carried out through a limited trial involving 30 respondents from the Indonesian History Expedition (Exsara) organization, a community dedicated to the study of history and culture. The selection of Exsara as a trial partner was based on the consideration that its members possess an adequate background in historical knowledge, enabling them to provide critical evaluations of the quality and effectiveness of the developed learning media. During the implementation process, researchers deliberately designed a usage scenario that allowed respondents to independently explore all the featured functionalities within SERAYA. This approach aimed to assess the level of user experience (user experience) and to identify potential technical obstacles that might be encountered by general users. The trial activity took place in an interactive atmosphere, where respondents were not merely research subjects but also acted as evaluative partners, providing valuable input for product refinement. Involving a historical community at this stage represents a strategic step to ensure that SERAYA genuinely addresses the practical learning needs at the community level, while also fostering a sense of ownership over the developed media innovation.

During a 20-minute trial session, respondents were guided to access and delve into the various features embedded within SERAYA. They were progressively introduced to historical material concerning the Kota Lama Semarang area, presented in a popular article format while maintaining academic accuracy. Respondents were also invited to watch short documentary videos showcasing the atmosphere and historical narrative of the area, providing a visual dimension that enriched textual understanding. The most innovative feature, which became the focal point of attention, was the integration of Google Street View technology, accessible by scanning QR codes available on each page. Through this feature, respondents could conduct independent virtual exploration, as if strolling through the Kota Lama Semarang area from a distance. They could observe the architectural details of colonial buildings, view the current condition of historical sites, and comprehend the spatial layout of the area more comprehensively. This immersive experience is unattainable through conventional print media, positioning SERAYA as a significant breakthrough in presenting local historical material.

Observations during the trial process revealed highly positive responses from respondents regarding the use of SERAYA as a history learning medium. They acknowledged that the combination of informative articles, documentary videos, and Google Street View virtual exploration technology was capable of delivering a much more vivid

and memorable learning experience compared to conventional teaching methods. Several respondents stated that the Google Street View feature sparked their curiosity to learn more about the current condition of historical sites, which may have undergone changes or even damage. Awareness of the importance of cultural heritage preservation began to grow as they virtually witnessed how the Kota Lama Semarang area has transformed over time. This trial also demonstrated that SERAYA functions not only as a medium for delivering information but also as an instrument for cultivating critical awareness regarding the preservation of historical heritage in post-colonial urban spaces. These findings reinforce the argument that digital technology-based media innovation holds significant potential to bridge the gap between academic knowledge of history and the community's emotional and cognitive engagement with its own cultural heritage.

Discussion

Researchers administered a questionnaire to users to gauge their responses after they used E-Magazine media to access and study cultural objects in Semarang City. Based on the questionnaire distributed, 53.3% of respondents agreed, and 46.7% strongly agreed that Seraya E-Magazine helped them understand the history and culture of Semarang City more clearly. In addition, regarding the material presentation in Seraya E-Magazine, 60% of respondents agreed, and 40% strongly agreed that the material presented was easy to understand and relevant to cultural heritage objects in Semarang City. Furthermore, in the aspect of concern for the preservation of cultural heritage values, 73.3% of respondents agreed, and 26.7% strongly agreed that Seraya E-Magazine increased awareness of cultural heritage objects in Semarang City. Regarding information on Semarang cultural tourism activities, 36.7% of respondents agreed, 60% strongly agreed, and only 3.3% disagreed with being interested in participating in cultural activities in Semarang City after using Seraya E-Magazine. On the other hand, regarding the increased interest in visiting historical sites in Semarang, 30% of respondents agreed, and 70% strongly agreed that Seraya E-Magazine was able to increase interest in visiting historical sites and cultural heritage sites in Semarang. Regarding the aspect of preserving and appreciating cultural heritage in Semarang, 50% of respondents agreed, 46.7% strongly agreed, and 3.3% disagreed.

The final results, based on the indicators of these statements, showed that respondents gave an upbeat assessment of this media. This conclusion was based on the dominant user responses, which answered "agree" and "strongly agree." Therefore, through this e-magazine trial, users can gain a clearer understanding of the history and culture of the city of Semarang. The material presented is relevant and easy to understand, increasing awareness of cultural heritage objects and fostering interest in visiting cultural sites and participating in cultural activities in Semarang City.

Researchers conducted the evaluation stage to assess the effectiveness and feasibility of the Seraya E-Magazine media. The results of the expert validation questionnaire and user responses showed positive outcomes. However, the experts' assessment included several notes, such as the absence of a table of contents and a foreword that did not clearly state the purpose of the media. Additionally, the adjustment of the font type was also a consideration for researchers, as they received feedback from media experts. The results of the user responses mostly showed positive indicators, which will enable the

researcher to evaluate several displays in the media and add supporting pages, making the media more suitable for use on a broader scale.

The development of this media has undergone a SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis to identify its strengths, weaknesses, opportunities, and threats when implemented en masse (Chen et al., 2025; Kamal Naji et al., 2025). Seraya E-Magazine's strength lies in its comprehensive historical narrative, accompanied by fun facts, presented in simple language, and integrated with Google Street View, providing the latest documentation of Cultural Heritage buildings. For Intangible Cultural Heritage, Seraya E-Magazine is complemented by explanatory videos from relevant sources. The E-Magazine's weakness is that it does not fully cover all aspects of Cultural Heritage and Warisan Budaya Tak Benda (WBTB) in Semarang City. However, this E-Magazine can be further developed through a pentahelix relationship involving the Semarang City Government, historians, the publisher of Seraya E-Magazine, and the Semarang community. The opportunity for Seraya E-Magazine lies in developing media that introduces cultural heritage rarely known to the public. This is achieved through Seraya E-Magazine, which is integrated with Google Street View and is available for unrestricted use. The challenge for Seraya E-Magazine lies in updating videos on intangible cultural heritage, as well as potential obstacles if Google Street View does not accurately capture the object.

Conclusion

This study demonstrates that integrating Seraya E-Magazine Cultural Heritage with Google Street View is an effective educational medium and a means of supporting cultural heritage preservation in Semarang City. Expert validation results indicate that the media falls into the very feasible category. Limited user trials have shown positive responses to the clarity of the material, the attractiveness of the display, ease of access to information, and its usefulness in increasing understanding of the history and culture of Semarang City. The integration of Google Street View makes an important contribution in the form of the latest visual documentation, facilitating the practical and sustainable monitoring of the condition of cultural heritage buildings. The implications of this study suggest that the digital heritage-based E-Magazine model has the potential to serve as an alternative medium for learning history, promoting cultural tourism, and supporting technology-based conservation policies at the regional level. The digital heritage-based e-magazine model has the potential to serve as an alternative medium for learning history, promoting cultural tourism, and supporting technology-based conservation policies at the regional level. However, this study has several limitations, including the non-comprehensive coverage of cultural objects in the media, the limited number of respondents in the trial phase, and the dependence on Google Street View updates and the availability of video content for intangible cultural heritage. Therefore, further research is recommended to expand the content of cultural objects, involve larger and more diverse samples, and develop additional interactive features so that the effectiveness of the media can be tested more comprehensively and sustainably. The results of this study can serve as a consideration for researchers to continue developing Seraya E-Magazine with a broader target user base and as a reference for further research.

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