

SHORT PAPER

Exploring Colonial Heritage (EXCOTAGE) Application as a Mobile Technology-Based History Learning Education

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ABSTRACT

This research focused on the history learning concerns among 11th-grade Social Science students at MAN Kota Pasuruan, a senior high school. To support research activities, the instruments included a questionnaire to measure the effectiveness of the product. The questionnaire was distributed to validators and users, specifically the 11th-grade students of social science at MAN Kota Pasuruan. The participants in this study were selected using purposive sampling for validation and simple random sampling for testing. During the implementation, this research used the ADDIE research and development model. The product effectiveness analysis technique developed by Nunuk Suryani, Achmad Setiawan, and Aditin Putra was used for analysis of the collected data. Based on the comparison results, it is evident that the developed product is truly valuable, appealing, and aligned with the current advancements in learning technology. Meanwhile, in the effectiveness testing, it was concluded that the product has been highly effective based on expert or user assessments.

KEYWORDS

digital applications, teaching materials, history, heritage, pasuruan

1 INTRODUCTION

Heritage is an important tool for learning about history. The presence of heritage allows us to directly observe the way of thinking and lifestyle of humans in the past [1], [2]. However, in reality, not many people can take advantage of this heritage to teach history. Sometimes, we may come across a significant amount of overlooked heritage that local people or students in the region are unaware of.

This is the condition we found at MAN Kota Pasuruan. The research samples are taken from students in the XI IPS class. It is evident that history learning in this class does not incorporate heritage. The history teacher can take advantage of the historical heritage in the school environment. To address this condition, we are motivated to offer an alternative solution by presenting heritage to the students in the form of digital heritage.

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This alternative solution was developed after conducting interviews with students and teachers and distributing questionnaires for needs analysis. Based on the results of the needs analysis, it is evident that students require digital learning tools that are accessible via smartphones, contain easy-to-understand information, and are capable of presenting digital visualizations of the heritage sites near the school environment.

To follow up on the results of the needs analysis mentioned above, we are presenting digital learning materials that can visually showcase various heritages in the school's area using Unity. This alternative approach is adopted because the use of digital learning materials can demonstrate the teacher's effort to make history more relevant to today's students [3]. Furthermore, the selection of material content based on heritage is determined by its alignment with the results of the needs analysis. Furthermore, utilizing this content can enhance students' empathy for the local historical context in that environment [4].

Through this product, students can also gain a direct historical experience and learn. Since this product is designed to convey the nuances of three dimensions, students may feel psychologically transported to the context of that time [5]. By implementing this learning method, the teacher can enhance the students' comprehension and internalization of life values within the context. Local elements can foster closeness, particularly from an emotional perspective [6]. The use of digital application products created with Unity, combined with heritage material content, will help address the previous issues and complaints of students.

This confidence is based on the ideal state of current history education, which that should be presented in a more engaging and appealing manner. The term "attractive indicator" in the previous sentence refers to a supplementary tool that includes supporting materials and media designed to aid students in understanding the learning materials [7]. Furthermore, history should be able to depict past events visually, not just through text. History learning cannot only be taught through text but also within its context in order to create historical awareness [8].

Based on the preliminary research, it has been suggested that learning through virtual reality technology and 3D animation can provide students with an immersive experience of historical contexts and time periods, visualized in real time. The use of virtual reality and 3D animation can also assist students in exploring and reconstructing their knowledge, indirectly helping them develop their activeness. This advantage can aid in understanding historical materials and improving their learning outcomes [9].

Another consideration when choosing this product for development is that it includes a feature that can help teachers introduce spatial descriptions of heritage, providing them with an advantage. This spatial description is useful for stimulating efforts to strengthen the collective memory of the historical background of a particular heritage [10]. Moreover, the use of virtual reality and 3D animation can also assist students in embracing values that extend beyond their cultural heritage. The information is consistent with the research results conducted by Chai-Arayalet et al., who have discussed the effectiveness of virtual reality in creating a sense of presence in the reconstruction of historical events [11].

Therefore, the students, as users, will have better learning experiences. This learning method can also foster genuine understanding that students directly perceive during the learning process. Through this experience, it helps students develop an interest in learning and achieve academic success. Based on the rationale, we believe it is necessary to test the effectiveness of the exploring colonial heritage (EXCOTAGE) application on students of XI IPS at MAN Kota Pasuruan.

2 RESEARCH METHOD

The EXCOTAGE application was developed using the five-step ADDIE method (see Figure 1) [12]. The stages included activities of analysis, design, development, implementation, and evaluation [13]. This method would help in developing the EXCOTAGE application as a digital learning tool for history education. Furthermore, this method was effective because it included practical steps and was highly suitable for research with limited time allocation [14].

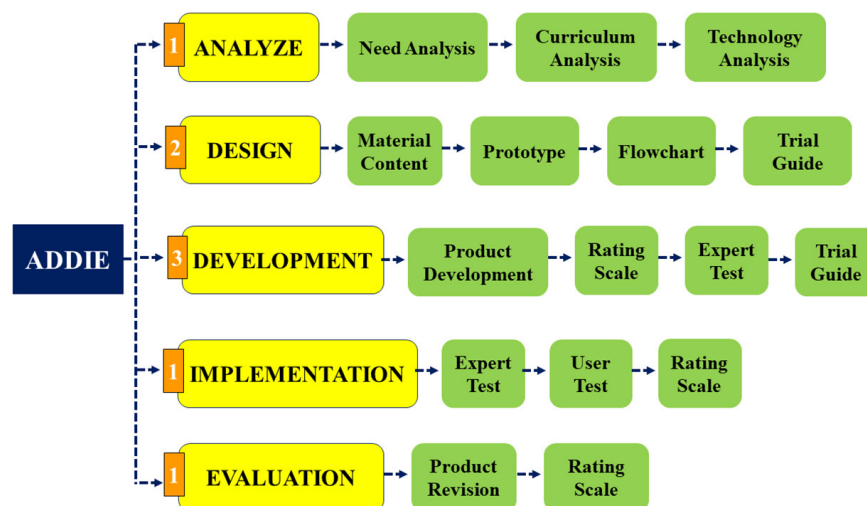


Fig. 1. Research flowchart based on ADDIE method

In the analysis phase, the researchers collected data for needs, curriculum, and technology analysis using interview and questionnaire techniques [12]. According to the results of that step, the students of XI IPS at MAN Kota Pasuruan have access to a digital learning tool that can be used via smartphone. This tool contains easy-to-understand information and presents digital visualizations of local heritage around the school.

Next, in the design phase, the researchers organized the material design, prototype design, flowchart of product use, and testing design. The output resulting from this design step was then followed up in the subsequent development step. During that stage, all material designs and prototypes were developed into a tangible product. In addition, at this stage, we also provide detailed testing design, starting with material expert validation, teaching material, small group trials, and field trials [13].

Furthermore, during the implementation phase, the product was used in two testing steps with the experts. Then, the product was implemented in learning activities with small classes (small group trials) and large-scale classes (field trials) [13]. After that, the product would be evaluated by measuring its validity and effectiveness and then revised to enhance the product.

3 RESULTS AND DISCUSSION

The development of the EXCOTAGE application for history learning in the class XI IPS of MAN Kota Pasuruan could be considered a step towards a solution. The development resulted in the simultaneous resolution of a variety of problems in history learning. This result could not have been achieved without the product features that were highlighted, which involved a virtual exploration to enhance the sense of participation [15].

The concept of attendance requirements has led to the inclusion of users (in this case, students) based on their past presence in the context. The students appeared to be exploring past events in a virtual environment. However, there are limitations to providing virtual space, as users are required to have specific devices in order for the feature to run smoothly [16].

The occurrence of weaknesses in the EXCOTAGE product is normal, as even the most sophisticated technological devices can have weaknesses. However, this product was valid and feasible for use in history learning. During the material expert testing, teaching material, and trial use (both in small group trials and field trials), it has yielded very satisfying results.

The results of the EXCOTAGE application testing conducted by the experts showed that this product is suitable for use as teaching material. The eligibility standard has been established based on several assessment indicators, which are presented in Table 1. The EXCOTAGE application not only undergoes feasibility assessment by expert validators but also effectiveness assessment in historical learning activities. The effectiveness assessment was based on feedback from students who were able to benefit from the EXCOTAGE application, either in small-scale learning activities (small group trials) or large-scale learning activities (field trials). In small-scale testing, the product demonstrated an effectiveness of 83.3%, while in large-scale testing, the effectiveness increased to 86.7%.

Table 1. Standard design

| Material Assessment Indicators | Teaching Material Assessment Indicators |
|--|---|
| The material presented is in accordance with the learning objectives | The material presented is in accordance with competencies and learning objectives |
| In accordance with the abilities and characteristics of students | Make it easier to achieve certain goals or competencies |
| Presents illustrations of the past | Make it easier for students to understand teaching material |
| Making historical material more meaningful | Presents main material and supporting material |
| | The depth of the material is in accordance with references and learning sources |
| | The depth of the material stimulates students to have feelings of curiosity |

Through this trial activity, conducted by experts, and through testing in a learning environment, the results of this product were consistent with the research findings and theoretical review. In the research conducted by Sulistyono et al., the digital application featuring a virtual exploration of General Sudirman’s guerilla route in Pacitan has shown a significant impact on history learning. The result here is that the product has evolved into a medium and supporting learning material. This result was attributed to some attractive features, such as virtual exploration linked to Google Maps on every device. Furthermore, another supporting feature was the video viewer [17].

The development results and effects that emerged from this research have inspired the development of the EXCOTAGE application. This application not only offers 2D virtual exploration but also 3D visualization. The use of 3D visualization can transform abstract information into clearer visuals, helping students gain a better understanding of the material [9]. In addition, 3D visualization was useful for facilitating interaction between the user and the knowledge object. This interaction would provide the student with an experience that cannot be gained from textual information or 2D visualization.

The interaction could also result in a relationship between the past context reconstructed in a virtual environment and the current condition of the student. This argument aligns with the opinion expressed by Taranilla et al., that the impact of 3D visualization on forming or reconstructing student knowledge was significantly

enhanced. Furthermore, in this study, students would benefit from increased motivation and improved learning achievement [5].

The interaction and connection could affect students' psychological well-being, leading them to feel that history learning seemed to be boring. Furthermore, this interaction and connection have provided students with an opportunity to independently construct knowledge through history learning, allowing them the freedom to learn [18].

As a supporting teaching tool, the EXCOTAGE application offers many features that can facilitate student learning. The features included a virtual tour of many cultural heritages in Pasuruan City, an image viewer, infographics, videos, an additional information viewer, and an evaluation activity in the form of a game (see Figure 2). The presence of these features indicates that the EXCOTAGE application aims to provide students with the freedom to acquire information according to their individual learning styles.

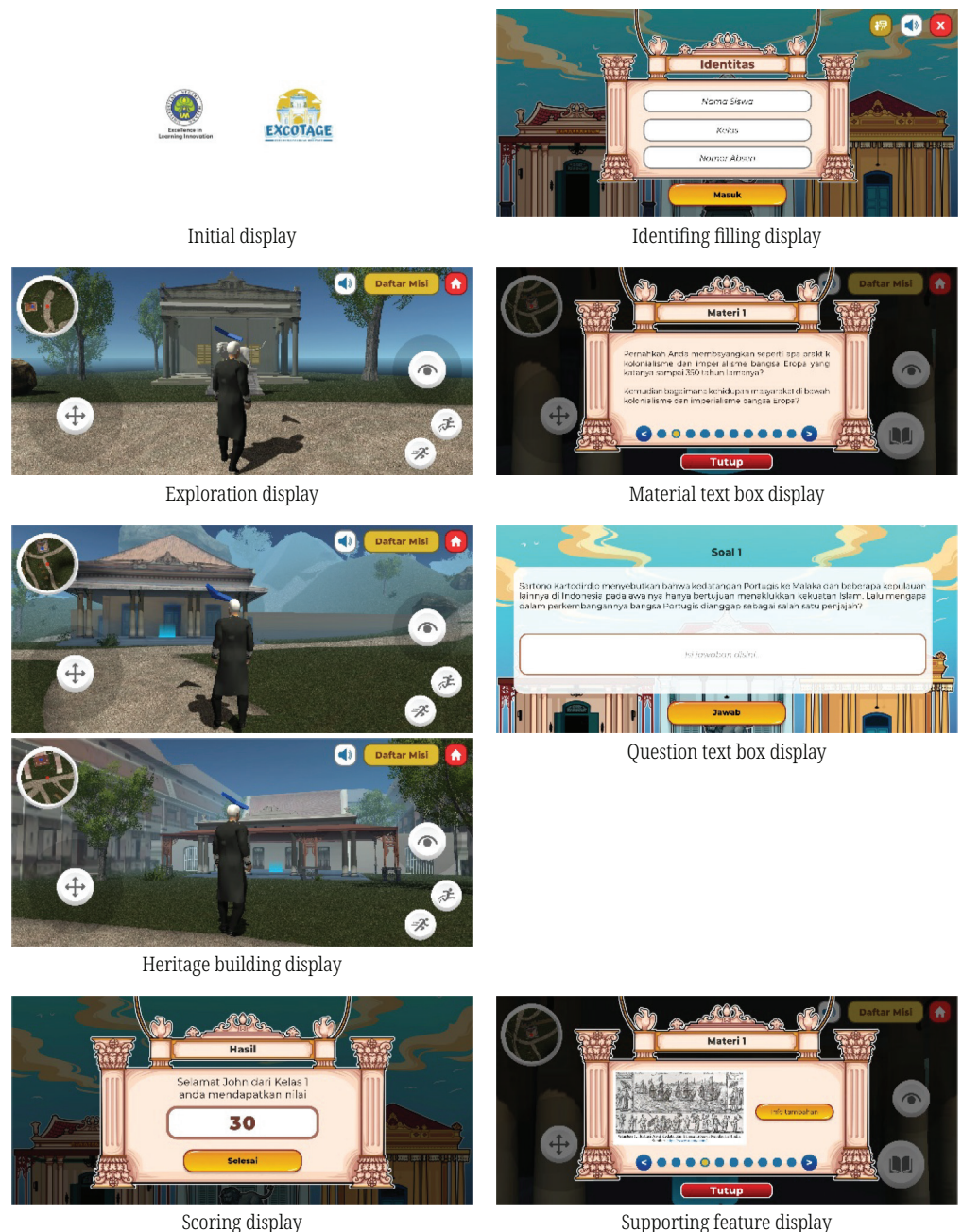


Fig. 2. Displays and features of EXCOTAGE application

Many of the features introduced in the EXCOTAGE application have enhanced its interactivity as a learning tool. The interactive nature of the program allowed students to learn according to their interests and needs, aligning with the current curriculum guidance in Indonesia. Next, the material factor has been formulated based on student needs and the curriculum. Therefore, it could contribute to the attainment of learning objectives [19].

The benefits of developing the EXCOTAGE application as teaching material were not only evident in the process but also in the outcome. In this context, the application has provided evaluation features in the form of a game. This feature was presented not only as a means to measure how well students absorb information but also their ability to think quickly and responsively. Additionally, the game feature has made assessment activities more enjoyable [20].

4 CONCLUSION

This limited research activity has produced several conclusions regarding the development of interactive teaching materials, specifically the EXCOTAGE application. First, during expert testing, the EXCOTAGE application received a favorable assessment for use as a supporting tool for learning history. Second, theoretically and based on literature studies, the application of EXCOTAGE has brought valuable benefits to history learning. This product could help students construct knowledge more concretely within a virtual space. Furthermore, the students found it easier to comprehend the materials due to the contents and features of the application, which facilitated their understanding. Third, the EXCOTAGE application was recognized as a valuable teaching material innovation that could be utilized by both teachers and students to stay updated with current developments. Currently, numerous learning resources have been developed in the form of digital applications or virtual reality.

Last, it was associated with the use of the EXCOTAGE application as a supporting teaching material, which has significantly transformed the learning activities in the classroom. The transformation consisted of two aspects: media transformation and content transformation. In relation to media transformation, there has been a shift towards using smartphones as a learning tool to facilitate students' access to information. In terms of content transformation, the previous learning method solely emphasized rigid, normative, general, and outdated textbooks. This approach has since evolved into a learning support system designed to complement the limitations of textbook learning as a teaching material.

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6 REFERENCES

- [1] B. Suprapta, "Peran dan Partisipasi Masyarakat dalam Upaya Pemanfaatan Cagar Budaya di Kabupaten Bondowoso sebagai Sumber Belajar Sejarah Lokal dan Aset Unggulan Daerah," *JPSI: Jurnal Pendidikan Sejarah Indonesia*, vol. 3, no. 1, pp. 25–42, 2020. <https://doi.org/10.17977/um0330v3i1p25-42>

- [2] G. Selim, M. Jamhawi, A. Holland, and S. Ma'bdeh, "Digitizing heritage as an integrated sustainable tool for informative interpretation of the past: The case of Umm Qais heritage in Jordan," *Traditional Dwellings and Settlements Review*, vol. 32, no. 2, pp. 7–22, 2021.
- [3] K. A. A. Alzubi, "The effectiveness of the application of game-based e-learning on academic achievement in mathematics for students in Jordan," *International Journal of Engineering Pedagogy (iJEP)*, vol. 13, no. 6, pp. 64–75, 2023. <https://doi.org/10.3991/ijep.v13i6.41961>
- [4] Hariyono, "Sejarah Lokal: Mengenal yang Dekat, Memperluas Wawasan," *Sejarah dan Budaya: Jurnal Sejarah, Budaya, dan Pengajarannya*, vol. 11, no. 2, pp. 160–166, 2017. <https://doi.org/10.17977/um020v11i22017p160>
- [5] R. V. Taranilla, R. C. Gutierrez, J. A. G. Calero, and I. L. Cirugeda, "Strolling through a city of the Roman Empire: An analysis of the potential of virtual reality to teach history in Primary Education," *Interactive Learning Environments*, vol. 30, no. 4, pp. 608–618, 2019. <https://doi.org/10.1080/10494820.2019.1674886>
- [6] Kuntowijoyo, *Pengantar Ilmu Sejarah*. Yogyakarta: Tiara Wacana, 2013.
- [7] P. Chatwattana, P. Saisong, K. Rojanapasnichwong, and W. Khiankhokkruad, "The virtual laboratory learning environment: VLLE on metaverse for University in Thailand," *International Journal of Engineering Pedagogy (iJEP)*, vol. 13, no. 5, pp. 30–41, 2023. <https://doi.org/10.3991/ijep.v13i5.38565>
- [8] S. H. Hasan, "Pendidikan Sejarah untuk Kehidupan Abad 21," *HISTORIA: Jurnal Pendidikan dan Peneliti Sejarah*, vol. 2, no. 2, pp. 61–72, 2019. <https://doi.org/10.17509/historia.v2i2.16630>
- [9] H. Suhaizal, K. A. A. Rahman, N. Khamis, U. H. Shukor, N. H. C. Lah, and N. N. Zulkifli, "The design and development of Augmented Reality (AR) application for internet evolution learning topics," *International Journal of Interactive Mobile Technologies (ijIM)*, vol. 17, no. 5, pp. 162–181, 2023. <https://doi.org/10.3991/ijim.v17i05.36483>
- [10] T. P. Kersten, F. Tschirschwitz, and S. Deggim, "Development of a virtual museum including a 4D presentation of buildin history in virtual reality," *The International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences*, vol. 42, pp. 361–367, 2017. <https://pdfs.semanticscholar.org/30ff/58b8f81ebc44781da1e84b7425d25b96223e.pdf>
- [11] S. Chai-Arayalert, N. Sansompron, S. Chodchuang, J. Chantanaphant, and C. Duangjan, "Digital platform-mediated tourism system in small-town destination," *International Journal of Interactive Mobile Technologies (ijIM)*, vol. 17, no. 5, pp. 143–161, 2023. <https://doi.org/10.3991/ijim.v17i05.36835>
- [12] N. Hess and K. Greer, "Designing for engagement: Using the ADDIE model to integrate high-impact practice into an online information literacy course," *Communications in Information Literacy*, vol. 10, no. 2, pp. 264–282, 2016. <https://doi.org/10.15760/comminfolit.2016.10.2.27>
- [13] N. Suryani, A. Setiawan, and A. Putria, *Media Pembelajaran Inovatif dan Pengembangannya*. Bandung: Remaja Rosdakarya, 2018.
- [14] Muruganantham, "Developing of e-content package by using ADDIE model," *International Journal of Applied Research*, vol. 1, no. 3, pp. 52–54, 2015.
- [15] G. A. Farsi et al., "A review of virtual reality applications in an educational domain," *International Journal of Interactive Mobile Technologies (ijIM)*, vol. 15, no. 22, pp. 99–110, 2021. <https://doi.org/10.3991/ijim.v15i22.25003>
- [16] I. W. P. Utami, "Pemanfaatan Digital History untuk Pembelajaran Sejarah Lokal," *JPSI: Jurnal Pendidikan Sejarah Indonesia*, vol. 3, no. 1, pp. 52–62, 2020. <https://doi.org/10.17977/um0330v3i1p52-62>
- [17] W. D. Sulistyono, M. N. L. Khakim, and B. Kurniawan, "The development of 'JEGER' application using android platforms as history learning media and model," *International Journal of Emerging Technologies in Learning (ijET)*, vol. 15, no. 7, pp. 110–122, 2020. <https://doi.org/10.3991/ijet.v15i07.11649>

- [18] Y. Handayani dan and S. Harie, "Museum Bahari sebagai Media Pembelajaran Sejarah," *Alur Sejarah: Jurnal Pendidikan Sejarah*, vol. 4, no. 2, pp. 1–11, 2021.
- [19] A. D. Samala and M. Amanda, "Immersive Learning Experience Design (ILXD): Augmented reality mobile application for placing and interacting with 3D learning objects in engineering education," *International Journal of Interactive Mobile Technologies (ijIM)*, vol. 17, no. 5, pp. 22–35, 2023. <https://doi.org/10.3991/ijim.v17i05.37067>
- [20] M. Valentová and P. Brečka, "Assessment of digital games in technology education," *International Journal of Engineering Pedagogy (ijEP)*, vol. 13, no. 2, pp. 36–63, 2023. <https://doi.org/10.3991/ijep.v13i2.35971>

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