



# Android Application as an Innovative Learning Media: Increasing Students' Historical Empathy Through the History of the Balinese Kingdom

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## ABSTRAK

Kurangnya media pembelajaran digital membuat siswa kesulitan dalam belajar dimanapun. Penelitian ini bertujuan untuk menganalisis media aplikasi sejarah Kerajaan Bali berbasis android yang layak digunakan sebagai media pembelajaran pada materi Kerajaan Hindu dan Buddha kelas X SMA. Metode penelitian ini adalah penelitian dan Pengembangan (R&D) dengan pendekatan 4-D. Subjek penelitian ini adalah kelas X SMA, Proses validasi melibatkan ahli yang ahli di bidang materi dan media. Metode pengumpulan data melalui wawancara, survei, kuesioner dan studi literatur. Teknik analisis data menggunakan analisis deskriptif kuantitatif. Hasil penelitian yaitu media aplikasi sejarah kerajaan Bali berbasis android pada materi kerajaan Hindu dan Buddha sangat layak digunakan sebagai alternatif media pembelajaran untuk meningkatkan empati sejarah. Dengan menggunakan teknologi augmented reality (AR), siswa dapat menjelajahi situs-situs bersejarah dalam bentuk 3D yang realistis, memungkinkan mereka untuk merasakan atmosfer masa lalu dengan lebih nyata. Media pembelajaran menggunakan aplikasi berbasis Android dapat memberi pendekatan yang lebih menarik dan relevan bagi siswa, meningkatkan empati sejarah, dan memperluas aksesibilitas materi pembelajaran. Implikasi penelitian ini adalah Penggunaan teknologi seperti augmented reality (AR) dan interaksi multimedia tidak hanya membuat materi sejarah lebih menarik dan mudah dipahami, tetapi juga memungkinkan siswa untuk terlibat secara emosional dan mendalam dengan materi yang dipelajari.

## ABSTRACT

The lack of digital learning media makes it difficult for students to study anywhere. This research aims to analyze Android-based media applications for the history of the Balinese Kingdom that are suitable for learning media for class X high school Hindu and Buddhist Kingdoms material. This research method is research and development (R&D) with a 4-D approach. The subject of this research is class X SMA. The validation process involves experts in the field of materials and media. Data collection methods through interviews, surveys, questionnaires and literature studies. The data analysis technique uses quantitative descriptive analysis. The research results show that the Android-based media application for the history of the Balinese kingdom based on Hindu and Buddhist kingdom material is very suitable for use as an alternative learning media to increase historical empathy. By using augmented reality (AR) technology, students can explore historical sites in realistic 3D, allowing them to experience the atmosphere of the past more realistically. Learning media using Android-based applications can provide a more exciting and relevant approach for students, increase historical empathy, and expand the accessibility of learning materials. This research implies that the use of technology such as augmented reality (AR) and multimedia interaction makes historical material more exciting and easier to understand and allows students to engage emotionally and deeply with the material being studied.

## 1. INTRODUCTION

One of the priorities in the current global education system is issues related to psychological content such as mental health, tolerance, peace education, sympathy and empathy. Empathy is the ability to put oneself in another person's position and see an event from that person's point of view, both in terms of emotional experiences and other people's thoughts (Aderoben & Darmawan, 2024; çAkmak & Kaçar, 2021)

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Building empathetic competence is an important part of social and emotional development that can influence a person's thoughts, actions and behavior towards other people. Historical empathy is a combination of psychological concepts, history, and practical pedagogy. Historical empathy is a process that involves students' cognitive and affective engagement with historical actors to better understand and relate to their life experiences, decisions, or actions (Bartelds et al., 2021; Eisman & Patterson, 2022; Yang et al., 2019). Empathy refers to "the emotional capacity to engage directly with another person's experience while holding our own thoughts and feelings for a moment" (Retz, 2019). In the context of history education, this often results in students seeking to understand other people's points of view, which hopefully helps them realize that those people's beliefs and actions are "rooted in the specific context of their time and place" (Perrotta et al., 2024). Historical empathy aims to deepen understanding of how emotions shape the thoughts, culture and actions of historical actors (Aderoben et al., 2024). By exercising historical empathy towards historical figures, students learn to understand the experiences, decisions and actions of society in the past (Fitriyah et al., 2020). This empathy activity is similar to the process of understanding one's experiences, decisions and actions in current circumstances and can help students to empathize with different points of view in their own world and current society (Perrotta & Cross, 2020).

Researchers propose several important concepts and stages in fostering historical empathy in history education. This includes a teaching approach in the classroom that emphasizes the formation of empathy as a form of personal awareness and understanding of others (Bleeze, 2024; Karn, 2020). Historical empathy not only helps students connect with the past, but also gives them a better understanding of how the past influences the present (çAkmak & Kaçar, 2021; Leur, 2020). Mastery of historical literacy can shape students' personal attitudes or character towards history, from historical understanding to historical awareness and empathy. Historical literacy is also seen as supporting a series of possible outcomes: the emergence of a personal orientation and positive feelings towards history reflected in concepts such as historical understanding and empathy (Bleeze, 2024; Davison, 2017). Building students' personal connections to history is most clearly seen in relation to the concept of empathy. Decety and Lamm defined empathy as "the tendency to be psychologically attuned to the feelings and views of others" (Bleeze, 2024; Chopik et al., 2017).

To foster historical empathy in students, interesting learning media are very important, such as Android applications. The development of Android-based learning media is an important focus in the field of education (Darwin et al., 2022; Saputri et al., 2014; Tong et al., 2020). Android as a platform that is popular and easy to use by many people offers great potential to improve the learning experience through applications that are interactive, visual, and accessible via mobile devices. By using interesting Android applications, students can be more deeply involved in learning history and more easily understand the views and experiences of people in the past (Hiasa et al., 2019; Setiawan & Yugopuspito, 2020). The Android application presents historical content interactively and in depth, students can feel what life was like in the past and increase their sense of empathy for historical figures and the historical situations they faced (Aderoben & Darmawan, 2024; Angelysca & Kusnadi, 2023).

Several previous studies have examined the use of learning media using Android applications for high school subjects. Previous research revealed the application of the Android application (Edmodo) as a history learning medium at SMA (Usman et al., 2022; Wagner & Dversnes, 2023). Another similar researcher developed Android-based history learning media (Historytoon) in the form of the online comic reading service (Perrotta, 2023; Rahandinasari, 2018). Previous research also developed a maritime history learning media for the Sultanate of Banten based on an Android application for high school and several other similar studies developed the Pontianak Heritage application as an Android-based history learning media that allows displaying descriptions and photos of historical heritage, developing an Android-based mobile learning for Indonesian History subjects at vocational schools, by applying the Alessi & Trollip model (Mahardika, 2021; Nuhayah et al., 2022; Susila et al., 2023).

Although several previous studies have produced interactive multimedia applications for learning, there has been no research that specifically explores how Android applications can increase students' empathy for the historical context being studied. Therefore, there is a need for more in-depth research regarding the influence of Android-based interactive multimedia applications in facilitating the development of students' historical empathy, by paying attention to the visual content, audio narratives and interactive activities presented in these applications. This research makes a significant contribution in expanding the study of the potential application of learning media in building students' empathy for history, so that it can have a positive impact on history learning in the future. This research aims to develop learning media in the form of an Android-based Bali Kingdom History Application to increase students' level of historical empathy in high school.

## 2. METHOD

The research method used is Research and development (R&D), a process for developing new products or improving existing products, which are then tested for effectiveness (Ananda et al., 2024; Yaniawati, 2022). In this method, a model is used as a guide in product development. The subjects in this research were class X high school students. The model applied in this learning is a 4D model which consists of four development stages, namely define, design, develop and spreading. The benefits of media are assessed through questionnaires filled out by educators and students (Aderoben et al., 2024; Wibawanto, 2022). In the field of education, research development focuses on designing and improving products such as media and learning processes (Abdulrahaman et al., 2020; Tiagarajan, 2021). Product validation is carried out by providing research instruments in the form of validation questionnaires to validators using the e-checklist method for evaluation. The validation process involves experts who are experts in the field of materials and media. The validation results from the expert team become the basis for product perfection. After the product meets the specified criteria, a trial is carried out as a first step in determining the feasibility of its application. The trial involved product users and used a questionnaire with a Likert scale score of 1 to 5 to evaluate its feasibility. Validation scores from material experts and media experts are converted into values on a scale with reference to a predetermined table. The conversion values are presented in Table 1.

**Table 1.** Value Conversion

Mark	Data Quantitative	Data Qualitative
A	$X > 4.21$	Very good
B	$3.40 < X < 4.21$	Good
C	$2.60 < X < 3.40$	Enough
D	$1.79 < X < 2.60$	Not enough
AND	$X < 1.79$	Very Not enough

A brief procedure for researching 4D models for developing Android applications as an innovative learning media aimed at increasing students' historical empathy through the history of the Balinese kingdom consists of four stages: defining, designing, developing and disseminating. At the defining stage, a needs analysis is carried out to identify existing learning problems and determine the objectives of the application. This includes collecting data through interviews, surveys, and literature studies to understand student and teacher needs and challenges in current history teaching. Second, the design stage, involves creating an initial application design that includes the design of the user interface (UI), navigation flow, and interactive features such as augmented reality, video documentaries, and quizzes. An initial prototype was developed based on the results of the needs analysis and feedback from stakeholders.

Next, at the development stage, application development is carried out iteratively using research and development (R&D) methods. The prototype that has been designed is tested on a small scale to collect feedback from users, which is then used to make improvements and improvements. This testing involves students and teachers to ensure the app meets educational needs and is effective in increasing historical empathy. The final stage is deployment, where the application that has been developed and refined is distributed to users in a wider scope. The final evaluation was carried out to assess the effectiveness of the application in history learning and its impact on student empathy. The evaluation results are used to make further improvements and develop recommendations for future implementation. This procedure ensures that the applications developed are not only innovative and interactive, but also effective and in line with educational needs in the field.

## 3. RESULT AND DISCUSSION

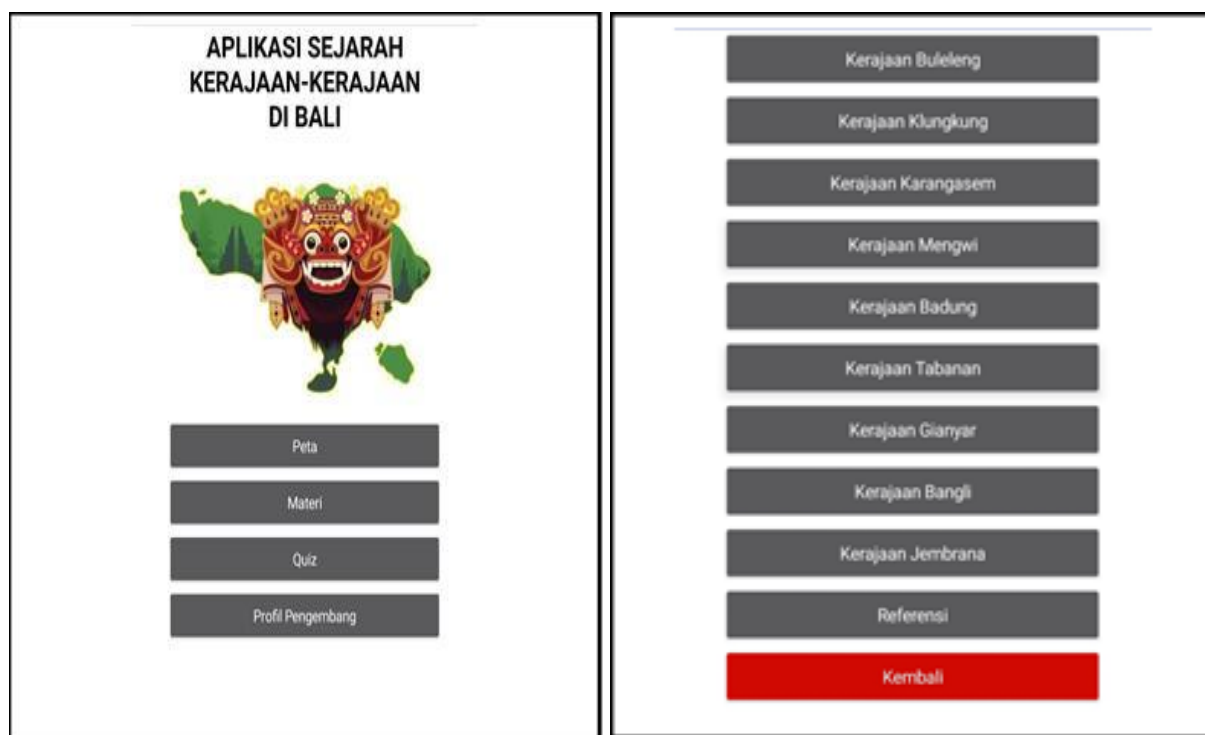
### Result

The media created in this lesson is an application that uses the Android platform. This application was developed using the help of the Codular application. After the Android application has been created, a validation test is carried out to evaluate the quality of the material and media contained therein. The aim is to determine the validity of the media that has been created by the researcher and to make improvements based on input provided by the validator. The stage definition was carried out to get an overview of the conditions of history learning. At this stage, various analyzes are carried out, including needs analysis, student analysis, concept analysis, and the formation of learning objectives, to determine the creation of Android application-based learning media for history learning. Needs analysis is carried out to identify problems and challenges faced during the learning process. The main goal of this analysis is to create solutions that suit learning conditions. Student analysis is carried out to evaluate student abilities,

educational background, and thinking abilities. This analysis is used to identify materials that will be used in making Android applications. Next, an analysis of learning achievement was carried out to evaluate student achievement results when using the Android-based Bali Kingdom application in history subjects.

The planning stage is designing the material that will be used in media that is presented in an effective and attractive display for students. This stage includes creating an attractive display using Microsoft PowerPoint, finding and designing learning images and videos that are appropriate to the material. Hindu and Buddhist kingdoms in Bali, and create validation sheets and student response questionnaires. This planning step begins with designing learning materials, conducting evaluations (practice questions), and creating content that includes images, videos and audio that will be included in Android application-based learning media. The narration of the material highlights the life of Hindu-Buddhist society, including government and socio-economic aspects, with a focus on empathetic values that can be used as role models by students. The aim is to increase students' historical empathy through inspiring examples. Next, the researcher determines the media title by considering Core Competencies (KI), Basic Competencies (KD), and needs analysis. The learning media developed is called the "Bali Kingdom Application". Once the title is set, the next step is to create a storyboard. Making storyboards aims to make it easier to draw media maps and organize the material in them. Storyboard also used to display the initial design that will be displayed on the application. Effective and efficient learning media are needed to help students when facing learning situations that require understanding alternative procedures.

The development stage in this research includes creating interactive media by considering validation results and expert comments. The Android application-based learning media developed in this research was designed using Microsoft PowerPoint, iSpring Suite, And Website APK Builder 2 (Web2Apk). After designing using PowerPoint, the next step is to publish PowerPoint with iSpring Suite, which results in saving the .PPT file in HTML 5 format. After the HTML 5 file has been generated, the next step is to convert the HTML 5 into an application (.APK) using Web2Ap) thus producing Kingdom App Bali. Screenshots of the product development results in this research are presented in [Figures 1](#).



**Figure 1.** Front View of the Application Media

The initial appearance of the media created is shown in [Figure 1](#). The use of this media involves the use of navigation buttons located in several parts, as shown in the picture. Users can click the navigation button to go directly to the desired menu, such as maps, materials, quizzes, and developer profiles. [Figures 1](#) show the content on the Bali Kingdom Application media from one of the menus. This media contains material and examples of exercises in it which aim to help students understand each topic being studied. In [Figure 2](#) there is a button that makes it easier for users to view a gallery of the remaining material being

discussed. This heritage gallery consists of photos and videos related to material to make it easier for students to understand the condition of the Kingdom's heritage.

After the product creation process is complete, the Bali Kingdom Application media undergoes a validation test to evaluate the suitability of the media that has been created by several experts, both material experts and media experts. The media validator team consists of 2 people, consisting of 1 material expert validator and 1 media expert validator. The results obtained from validators show that media validators gave an average score of 4.67 with a very good predicate. Likewise, the results from the material validator obtained a score of 4.7 with a very good predicate. During this validation process, there were several inputs for improvements provided by the validator, which can be seen in [Table 2](#) below.

**Table 2. Suggestions for Improvement from Validators**

NO	Improvement Suggestions
1	Fixed spacing format
2	Improved text formatting in the materials section
3	Reduce app size
4	Fixed typo
5	Added some resources and images
6	Add photos or images to materials

After carrying out validation tests on the Bali Kingdom Application media, the validator provided several suggestions for improvements that need to be considered. These suggestions include improving the spacing format so that the layout is neater, improving the text format in learning material so that it is easier to understand, reducing the overall size of the application to reduce storage load, correcting typing errors that may occur, adding information sources. and images to complement the content. , as well as adding photos or images to the material to provide better visual support. The next researcher will make improvements according to the input provided by the validator to improve the quality and effectiveness of learning media.

## Discussion

To attract students' interest and achieve learning goals effectively, learning media design must contain interesting and relevant content. This opinion is in line with previous research findings which show that interactive technology-based learning media increases student involvement in learning ([Hakiki et al., 2023](#); [Westomi et al., 2024](#)). This is also supported by research which reveals that it is increasingly popular cellular learning platform provides a unique opportunity to engage students in independent learning, thereby encouraging improved learning outcomes and higher motivation. By combining interesting learning materials tailored to students' needs, educators can create an environment that is conducive to students' motivation, focus and active participation in the learning journey ([Eliza et al., 2024](#); [Tania et al., 2020](#); [Yang et al., 2019](#)).

Previous research supports this perspective by highlighting students' preferences for concrete concepts compared to abstract concepts. The presentation of Android application-based learning media must be equipped with interesting content to attract students' interest and encourage their involvement in the learning process. The use of interesting learning media can arouse students' desire to learn, increase motivation, and stimulate interest in the subject matter ([Kandia et al., 2023](#); [Veldkamp et al., 2020](#)). The Bali Kingdom Application learning media which was developed as an Android application offers flexible learning opportunities for students, can be accessed anytime and anywhere. Through this platform, it is hoped that students will demonstrate increased historical empathy. Historical empathy aims to deepen understanding of how emotions influence the thoughts, culture and actions of historical actors. Developing empathetic competence is an important part of social and emotional development that can influence a person's thoughts, actions and behavior towards other people ([Aderoben et al., 2024](#); [Bartelds et al., 2021](#)). Much of the existing research on the lived experiences of historical figures focuses on students' engagement in historical empathy ([Gilbert, 2019](#); [Juni, 2023](#); [Savenije & Bruijn, 2017](#)). This empathy activity is similar to the process of understanding one's experiences, decisions, and actions in the present and can help students learn to empathize with various points of view in their own world and today's society ([Endacott et al., 2023](#); [Wibawanto, 2022](#)).

The application-based Bali Kingdom application has various features that are useful as a learning tool, especially its interesting features. These features include providing interesting and contextual material. Integrated formative evaluation features, allowing students to track their progress through question-based assessments. Learning media that meets students' needs by providing sustainable learning resources, facilitating diverse and focused learning activities, and offering unique learning experiences that

cannot be obtained through other media. Research has examined teachers' beliefs about historical empathy (Bayaer & Cui, 2023; Zembylas et al., 2020), a learning medium that encourages engagement in historical empathy and pedagogical thinking (Endacott et al., 2023; Perrotta & Cross, 2020). This application is designed to overcome the weaknesses of conventional learning methods which are often passive and less attractive to students. Through the use of technology such as augmented reality (AR), interactive videos, and simulations of historical events, this application succeeds in creating a more lively and immersive learning experience. Students can feel the atmosphere of the past and understand the historical context in a more intuitive and emotional way, which cannot be achieved through textbooks alone.

This research also shows that student involvement in the learning process increases significantly. Students who use this application show greater interest in history lessons and participate more actively in class discussions. They also demonstrate improvements in understanding historical concepts and the ability to relate historical events to current social and cultural conditions. The use of interactive features, such as quizzes and simulations, helps strengthen students' understanding and retention of information. From a teacher's perspective, this application provides a very effective tool for teaching history. Teachers report that the app makes it easier for them to explain complex material and makes learning more interesting. Apart from that, this application also supports independent learning, where students can learn at their own pace and explore material more deeply outside class hours. Overall, this research shows that the integration of digital technology in education, particularly through history learning applications, can have a significant positive impact on student motivation, engagement and understanding. This app not only increases students' historical knowledge but also helps develop their empathy and appreciation for cultural heritage. This research also opens up opportunities for further development in the use of innovative technology in education, as well as encouraging the application of more dynamic and interactive learning methods in the future.

The implications of this research show significant potential in transforming history teaching methods in schools. The use of technology such as augmented reality (AR) and multimedia interactions not only makes historical material more interesting and easier to understand, but also allows students to engage emotionally and deeply with the material being studied. This can increase students' engagement and motivation in studying history, which in turn can deepen their understanding of historical context and cultural values. In addition, increasing empathy for historical figures and events through this application can help students develop a broader and more critical perspective on current social and cultural developments. From a pedagogical point of view, this application can be an effective tool for teachers in conveying history material in a more dynamic and interactive way, thereby creating a more inclusive and collaborative learning environment. This research also opens up opportunities for further development in the use of digital technology in education, showing that technology integration can enrich the learning process and produce better results in understanding and appreciation of history among students.

Limitations of this research need to be considered. First, the study was limited to a sample of students and teachers in a particular area, so the results may not be fully representative of the broader population. Second, implementing technology such as augmented reality requires capable devices and a stable internet connection, which may not be available equally in all schools. Third, time limitations in this study may have affected the ability to evaluate the long-term impact of app use on students' empathy and historical understanding. Finally, this research also faces challenges in terms of curriculum adaptation and teacher readiness to integrate this technology into the daily learning process. To overcome these limitations, several recommendations can be given. First, it is recommended to conduct further research with a larger and more diverse sample to obtain more representative results. Second, there needs to be investment in technology infrastructure in schools, including the provision of adequate devices and better internet access. Third, long-term research needs to be conducted to continually evaluate the impact of these applications on students' empathy and understanding of history. Fourth, training and professional development for teachers is essential to ensure they are ready and able to use this technology effectively in teaching. Finally, collaboration between app developers, educators, and policy makers is needed to ensure that these apps comply with the national curriculum and can be seamlessly integrated into existing education systems.

#### 4. CONCLUSION

This research shows that the Android-based historical media application of the Balinese Kingdom is suitable for use as a learning medium for Hindu and Buddhist Kingdom material for class X SMA. The Bali Kingdom application has a positive impact in increasing students' historical empathy. These results confirm the potential of interactive multimedia applications as effective learning media that can increase students' historical empathy, and provide strong evidence of the integration of this technology in the history

education curriculum at the secondary school level. With features such as augmented reality, video documentaries, and simulations of historical events, students can better experience and understand the historical context, as well as develop empathy for past figures and events. Using this application also makes it easier for teachers to convey complex material and increases teaching effectiveness.

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