

INTERACTIVE MULTIMEDIA BASED ON ANDROID APPLICATIONS: DEVELOPMENT OF LEARNING MEDIA FOR NON-FORMAL SCHOOLS

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Abstract

Learning media encourages learning. Limitations of learning media in Buddhist education in Sunday schools give impetus to researchers to develop multimedia to develop appropriate media. This research aims to build Android application-based learning media on the material of puja facilities and infrastructure in Buddhism. A Multimedia set is expected to be able to provide good results in learning. This approach uses research and development methods to develop Android-based Multimedia as a learning medium for Buddhist Sunday Schools in Pesawaran Regency. The study population was 144, with a sample of 21 learners. The development flow refers to the Bord and Gall development steps. The data analysis technique used is descriptive percentages to determine the questionnaire's validity and reliability and evaluate the product's effectiveness—assessment of product trials tested to media experts, material experts, and teacher and student users. The results showed that Android-based Multimedia had passed validation and operational tests with reasonable criteria, and the effects of field tests showed a significant difference between the average scores before and after using the application. Therefore, the application developed can be an effective learning medium for Buddhist Sunday Schools.

Keywords: Interactive multimedia, android apps, learning

Abstrak

Media pembelajaran mendorong pembelajaran. Keterbatasan media pembelajaran pendidikan agama Budha di Sekolah Minggu memberi dorongan kepada peneliti untuk mengembangkan multimedia untuk mengembangkan media yang tepat guna. Penelitian ini bertujuan untuk membangun media pembelajaran berbasis aplikasi Android pada materi sarana dan prasarana puja agama Buddha. Satu set Multimedia diharapkan mampu memberikan hasil yang baik dalam pembelajaran. Pendekatan ini menggunakan metode penelitian dan pengembangan untuk mengembangkan Multimedia berbasis Android sebagai media pembelajaran Sekolah Minggu Budha di Kabupaten Pesawaran. Populasi penelitian sebanyak 144 orang, dengan sampel sebanyak 21 peserta didik. Alur pengembangan mengacu pada langkah-langkah pengembangan Bord dan Gall. Teknik analisis data yang digunakan adalah deskriptif persentase untuk

mengetahui validitas dan reliabilitas angket serta mengevaluasi efektivitas produk—penilaian uji coba produk diujikan kepada ahli media, ahli materi, serta pengguna guru dan siswa. Hasil penelitian menunjukkan bahwa Multimedia berbasis Android telah lolos uji validasi dan operasional dengan kriteria wajar, dan efek uji lapangan menunjukkan perbedaan yang signifikan antara rata-rata skor sebelum dan sesudah menggunakan aplikasi. Oleh karena itu, aplikasi yang dikembangkan dapat menjadi media pembelajaran Sekolah Minggu Budha yang efektif.

Kata Kunci: Multimedia interaktif, aplikasi android, pembelajaran

INTRODUCTION

Education is essential in equipping a person to work, help, or serve others well. The values of education, teaching, and development are instilled through formal education and non-formal education. One form of structured and tiered non-formal education is Buddhist Sunday school. Buddhist Sunday schools aim to help students discover their potential and learn the Buddhist teachings as capital for further self-development. Through this non-formal education, it is hoped that quality humans with optimal resources can be created. As educators, it is essential to pay attention to developing students' potential and creating opportunities in learning activities. One way to create such opportunities is by utilizing educational technology; selecting the suitable media can help the learning process more effectively, and multimedia provides convenient options. The development of information technology in Indonesia is increasingly rapid day by day and from year to year. Therefore, as educators, it is necessary to utilize these technologies in learning.¹

In an era of increasingly modern globalization, the need for high-quality human resources is increasing. One way to improve the quality of human resources is through education. Education is a deliberate or planned effort to help people learn, develop, take responsibility, change behavior, and benefit themselves and society. Buddhist Sunday School aims to help children learn to be responsible for their actions through thoughts, speech, and physical activities that follow Buddhist teachings. To achieve this goal of adequate facilities and infrastructure within the scope of Buddhist Sunday School are needed.²

Learning media is used to motivate students to experience the learning process. The purpose of using learning media is to facilitate the delivery of material so that students can understand the message. In addition to learning the subject matter, students can be taught character education through media and visual content such as images and text. This can be done as part of the learning process to develop character and positive values in students. Improving the

¹ Aiman Faiz and Imas Kurniawaty, "Urgensi Pendidikan Nilai Di Era Globalisasi," *J. Basicedu* 6, no. 3 (2022); Hadi Sutrisno, "Metodologi Research Jilid 2," *Yogyakarta: Andi Offset*, 2004.

² Amirul Bakhri, "Tantangan Pendidikan Agama Islam Di Madrasah Pada Era Globalisasi," *Madaniyah* 5, no. 1 (2015): 63–86; Faiz and Kurniawaty, "Urgensi Pendidikan Nilai Di Era Globalisasi"; Krisnanda Mukti Wijaya, "Wacana Buddha Dhamma," *Jakarta: Yayasan Dharma Pembangunan*, 2006; Heri Susanto and Helmi Akmal, "Media Pembelajaran Sejarah Era Teknologi Informasi (Konsep Dasar, Prinsi Aplikatif, Dan Perancangannya)" (FKIP Universitas Lambung Mangkurat, 2019).

quality of education depends on the critical role of an educator. An educator is expected to be able to create various exciting innovations in the learning process, to optimize effective learning.

Meanwhile, according to Sanjaya, the benefits of learning media are: "The benefits of learning media are to facilitate interaction between educators and students, clarify the presentation of material, create an interesting and interactive learning atmosphere, provide real experience for students, increase student learning motivation, streamline learning time and so on." This is also true in education in the Buddhist Sunday school environment. The need for media provides opportunities to develop learning media following learning. Using smartphones in learning activities certainly provides a breakthrough in learning innovation. With the rapid advancement of technology, knowledge can use developing technology as a tool or medium to achieve learning objectives. Technology products such as smartphones owned by educators and students can be used as learning media, and smartphones can be a very effective tool or media to help the learning process. By using smartphones, educators and students can access various online learning resources, such as learning videos, e-books, podcasts, and various educational applications.³

Inevitably, the concept of technology-oriented learning (technology conception of education) is a must. Advances in information technology have greatly influenced the development of learning media. Explore the learning development process using context-aware sensing technology to facilitate the identification of specific ways of applying new technologies in formal and informal learning environments. The steps include identifying learning needs, conducting context analysis, designing and developing learning materials, and conducting continuous evaluation and improvement. However, students and teachers have not used smartphones as aids for learning but are more often used to play and communicate with friends. Apart from the initial findings, the results of Meigi's research, "The test results obtained that the interactive multimedia-based learning media application of the android platform in class X PPKN subjects of SMK Negeri 1 Tondano, can be used as teaching materials that are more informative for teachers and can help students in the learning process". In line with this, Ade Kurniawati, from her research, showed that the use of interactive multimedia in learning can effectively improve

³ Evi Fatimatur Rusydiyah, "Media Pembelajaran (Implementasi Untuk Anak Di Madrasah Ibtidaiyah)," *Buku Perkuliahan Program S-1 Jurusan Pendidikan Guru Madrasah Ibtidaiyah Fakultas Tarbiyah Dan Keguruan UIN Sunan Ampel Surabaya*, 2015; Gilang Mawardi, Tuti Iriani, and Daryati Daryati, "Pengembangan Media Pembelajaran Berbasis Multimedia Pada Mata Kuliah Kompetensi Pembelajaran Pokok Materi Keterampilan Dasar Mengajar," *Jurnal Pensil: Pendidikan Teknik Sipil* 8, no. 1 (2019): 24–30; Nurul Aini, Rasyid Hardi Wirasasmita, and Muhammad Zamroni Uska, "Pengembangan Mobile Learning Berbasis Android Pada Mata Pelajaran Jaringan Dasar," *EDUMATIC: Jurnal Pendidikan Informatika* 2, no. 1 (2018): 34–41; Susanto Susanto, "Pengembangan Multimedia Interaktif Berbasis Problem Based Learning Pada Materi Pancasila Buddhis Dan Pancadhama Pendidikan Agama Buddha Kelas Vii Smp Di Kabupaten Pesawaran," *Jurnal Pendidikan Buddha Dan Isu Sosial Kontemporer (JPBISK)* 1, no. 1 (2019): 50–67; Moh Jazuli, Lutfiana Fazat Azizah, and Nisfil Maghfiroh Meita, "Pengembangan Bahan Ajar Elektronik Berbasis Android Sebagai Media Interaktif," *LENSA (Lentera Sains): Jurnal Pendidikan IPA* 7, no. 2 (2017): 47–65.

students' learning outcomes and critical thinking skills. This is important to help students face challenges in the era of globalization and revolution 4.0, which are increasingly complex and require good thinking skills. By improving learning outcomes and critical thinking skills, learners will be better prepared and able to face various challenges that may be encountered in the future.⁴

A study was conducted at the University of Lampung to develop interactive multimedia-based teaching materials on listening materials for grade VI students in elementary schools. The result of the research is software made using the Adobe Flash CS 3 application. Data analysis shows that interactive multimedia-based teaching materials are compelling and exciting for students and can improve their learning outcomes.⁵ Based on some of these studies, this research will focus on developing Interactive Multimedia Based on the Android Application as a learning media for Non-Formal Schools; how to create Android-based learning media? The purpose of using learning media is to facilitate communication and improve learning outcomes. Learning media plays a significant role in introducing information and preventing disruption in the learning process. With suitable learning media, the message conveyed by the teacher can reach students effectively and efficiently. This is very important so the learning process can run smoothly and effectively. Learning developers can work with material experts to package electronic-based learning materials using pre-made software.⁶

RESEARCH METHOD

The research method used is a research and development method. This method is used to produce specific products and test the effectiveness of these products. This is related to the

⁴ Seungmin Rho and Dongwann Kang, "Introduction to the Special Issue on Advances in Multimedia and Educational Technology," *New Review of Hypermedia and Multimedia* (Taylor & Francis, 2019); Vivien Lin et al., "Outcomes-Based Appropriation of Context-Aware Ubiquitous Technology across Educational Levels," *Interactive Learning Environments* 30, no. 8 (2022): 1515–38; Meigi Nivgi Hingide, Alfrina Mewengkang, and Cindy Pamela Cornelia Munaiseche, "Pengembangan Media Pembelajaran Berbasis Multimedia Interaktif Platform Android Pada Mata Pelajaran PPKN SMK," *Edutik: Jurnal Pendidikan Teknologi Informasi Dan Komunikasi* 1, no. 5 (2021): 557–66; Rusydiyah, "Media Pembelajaran (Implementasi Untuk Anak Di Madrasah Ibtidaiyah)"; Annisa Kurniawati, Festiyed Festiyed, and Asrizal Asrizal, "Analisis Efektifitas Multimedia Interaktif Dalam Menghadapi Tantangan Pendidikan Di Era Globalisasi Industri 4.0," *Jurnal Penelitian Pembelajaran Fisika* 5, no. 2 (2019).

⁵ Novi Niarti, "Pengembangan Bahan Ajar Berbasis Multimedia Interaktif Pada Materi Menyimak Untuk Siswa Kelas vi Sekolah Dasar" (UNIVERSITAS LAMPUNG, 2017); Rosyid Supriadi, "Media Pembelajaran Interaktif Perangkat Lunak Pengolah Angka Untuk Kelas XI SMA Negeri 2 Wates," *Skripsi. Universitas Negeri Yogyakarta*, 2012; Moh Zaiful Rosyid, Halimatus Sa'diyah, and Nanda Septiana, *Ragam Media Pembelajaran* (CV Literasi Nusantara Abadi, 2021); Nurdyansyah Nurdyansyah, "Media Pembelajaran Inovatif" (Umsida Press, 2019).

⁶ Niarti, "Pengembangan Bahan Ajar Berbasis Multimedia Interaktif Pada Materi Menyimak Untuk Siswa Kelas vi Sekolah Dasar"; Supriadi, "Media Pembelajaran Interaktif Perangkat Lunak Pengolah Angka Untuk Kelas XI SMA Negeri 2 Wates"; Abrista Devi, "Peran Orientasi Kewirausahaan Sebagai Mediasi Antara Pendidikan Dan Minat Berwirausaha Pada Mahasiswa," *Li Falah: Jurnal Studi Ekonomi Dan Bisnis Islam* 2, no. 2 (2017): 108–30; Rusydiyah, "Media Pembelajaran (Implementasi Untuk Anak Di Madrasah Ibtidaiyah)"; Nurdyansyah, "Media Pembelajaran Inovatif."

general purpose of research, namely to develop an interactive multimedia application suitable for achieving the expected learning objectives; research and development at the next stage serve to validate and develop products.⁷ The research and development that will be carried out aim to produce new products. The research and development phase is level 3, as shown in Figure 3.1. The first to third activities are the research stage, while the fourth to eleventh activities are the development stage.⁸

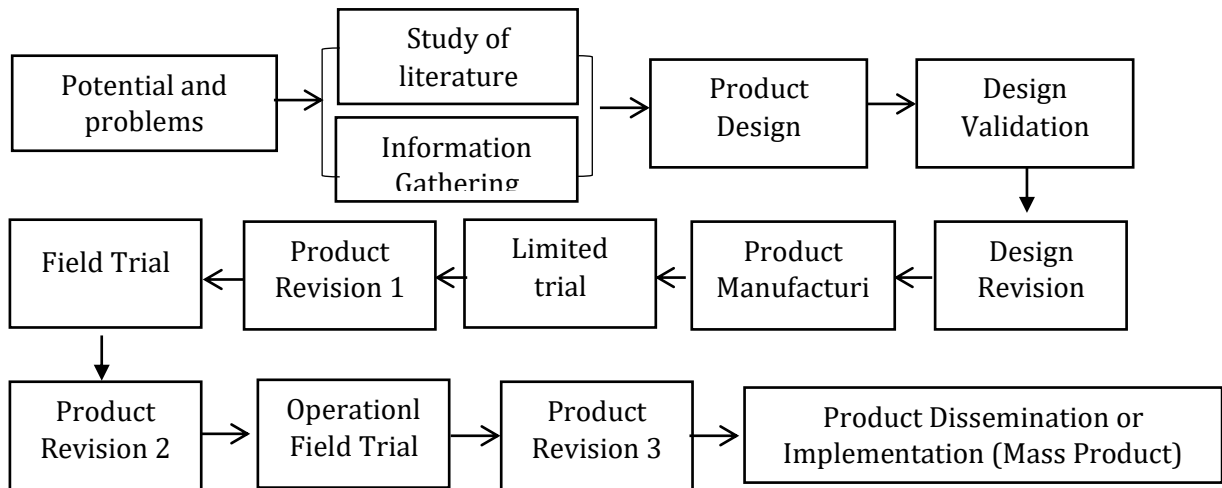


Figure 1. R&D Research Steps with an Existing Product Developing

The research phase consists of three stages: the initial study stage, the model design development stage, and the model validation stage. Researchers used the Borg and Gall development model as a guide in these stages of research.⁹ The analysis of this research data is qualitative and descriptive. This model outlines the general steps to follow to produce the product. The procedure consists of several steps: development needs analysis, learner characteristics analysis, etc.¹⁰ At the development stage of product design, media will be created by applying predetermined procedures. The product design development results will then be validated by material and media experts to determine whether the product is suitable for use.

⁷ Sugiyono, *Metode Penelitian Dan Pengembangan (Research and Development/ R & D)* (bandung: CV. Alfabeta, 2015); Dr Sugiyono, "Metode Penelitian Pendidikan Pendekatan Kuantitatif, Kualitatif Dan R&D," 2013.

⁸ P D Sugiyono, "Metode Penelitian Kuantitatif, Kualitatif, Kombinasi Dan RD," *CV Alfabeta*, 2018.

⁹ Sugiyono, *Metode Penelitian Dan Pengembangan (Research and Development/ R & D)*.

¹⁰ Mawardi, Iriani, and Daryati, "Pengembangan Media Pembelajaran Berbasis Multimedia Pada Mata Kuliah Kompetensi Pembelajaran Pokok Materi Keterampilan Dasar Mengajar"; Lin et al., "Outcomes-Based Appropriation of Context-Aware Ubiquitous Technology across Educational Levels"; Hingide, Mewengkang, and Munaiseche, "Pengembangan Media Pembelajaran Berbasis Multimedia Interaktif Platform Android Pada Mata Pelajaran PPKN SMK."

In this research plan, research methods emphasize the designed product's results and effectiveness. The orientation of this research development design is an Android-based software product called Dhammapada and designed to be as attractive as possible and support educators and learners in media mastery. This study conducted internal testing on two validators, material experts and learning media experts. Furthermore, product testing is limited to Sunday school learners as subject to fieldwork ability tests and functional tests with Sunday school students. Analysis of test design data using group pretests and posts, which can be described as follows:

$$O_1 \times O_2$$

Figure 2. Pretest post-test analysis.

This design is used to measure the extent to which the product that has been developed successfully achieves the goals and objectives set to know the level of effectiveness. The study was conducted at 12 Buddhist Sunday schools in Pesawaran District with two media feasibility validation data sources and 144 Sunday school students as field trial subjects. Proportional random sampling is used in selection which aims to make the sample obtained representative. Negerikaton sub-district became the research base because it is the most significant Buddhist base in the Pesawaran district, taking 15% of the total population. The samples used were 21.¹¹

RESULT AND DISCUSSIONS

Based on the needs analysis conducted on Buddhist Sunday school teachers, it was found that there was a need for Android-based media in learning, so development was carried out. The basis for further development was the results of interviews with Buddhist Sunday school teachers, who showed the lack of availability of Mahayana bhakti puja tools, even though some Sunday schools did not have such devices. Using puja bhakti tools is an effort to introduce Buddhism, but the lack of these tools hinders learning to recognize puja bhakti tools.

The results of preliminary studies become the basis for determining the direction of design development. Making media design is the stage of a design application with the program. The program is created based on a carefully designed pre-designed design. Essential programming is done inside the Adobe Animate cc program. The steps performed are as follows: The main display and material creation are carried out in the adobe photoshop cs3 program.

¹¹ Sutrisno, "Metodologi Research Jilid 2"; Hingide, Mewengkang, and Munaiseche, "Pengembangan Media Pembelajaran Berbasis Multimedia Interaktif Platform Android Pada Mata Pelajaran PPKN SMK"; Suharsimi Arikunto, "Arikunto, Suharsimi.(1993). Prosedur Penelitian Suatu Pendekatan Praktik. Jakarta: PT. Rineka Cipta," 2010.

Furthermore, the design is adjusted to the program flowchart and combined with Adobe animate cc in the application. The flow is adjusted to the flow of the application that has been compiled. The material is prepared with Microsoft Word and included in Adobe animate cc. The results of the design of media design development get four significant components, opening, main menu, tool introduction, and tool practice.

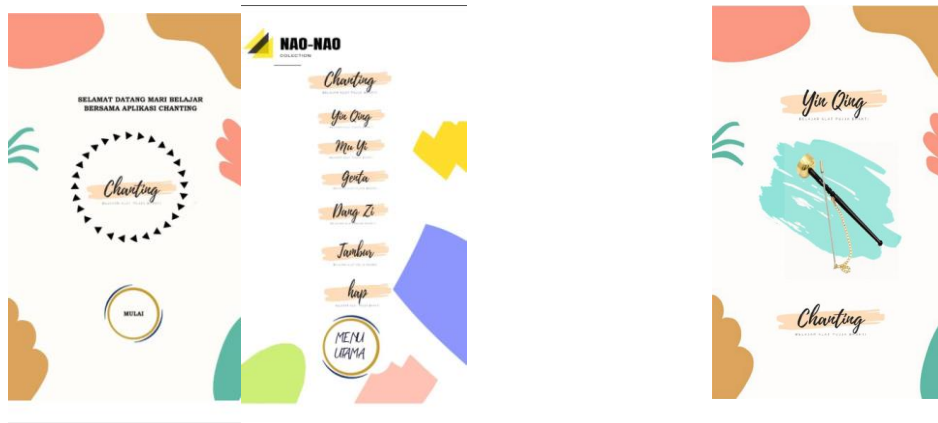


Figure 3. Android-based multimedia images.

Media validation tests are conducted by experts in Buddhist learning materials and learning media experts. The validity used in this study is logical validity (Arikunto, 2010); after product validation tests by both experts, product revisions were carried out to complete the products' shortcomings.¹²

Implementation and results of media validation tests

Table 1: Recapitulation of product validation test results by media experts

No	Aspect	Media Expert		
		Skor	Mean	Category
a.	Norm	17	4.47	Excellent
b.	Governance	4	4.75	Excellent
c.	Application	9	4.22	Excellent
d.	Relevance	9	4.33	Excellent
Total		39	4.44	Excellent

Learning media experts carry out the first media product Validation or expert test. This review entrusts researchers to learning media experts. Got a total score of 39 with an average of

¹² Sugiyono, *Metode Penelitian Dan Pengembangan (Research and Development/ R & D)*.

4.44 with excellent criteria or worthy of use; however, validators provide some notes. The first drawback is that the video display shows a jump sound (the sound remains on even though the video has moved so that it becomes a double sound).



Figure 4. Multimedia design revision

After testing, the second media product validation or expert test is carried out by Buddhist education experts. The results of the review from material experts get input on the media developed in the future to be created with sutras and intonation reading from sutras for each sutra so that readers get more knowledge about how to read the sutras. In response, researchers have not taken more development action because of the limited efficiency of research time. Validation results in the table :

Table 2. Recapitulation of material expert validation test results

No	Aspect	Expert material		
		Skor	Mean	Category
a.	Norm	17	4.5	Excellent
b.	Governance	4	4.4	Excellent
c.	Application	9	4.3	Excellent

d. Relevance	9	4.2	Excellent
Total	39	4.27	Very good

Based on the table above, a score of 39 with a mean of 4.27 is classified as suitable for use in learning. An overview of the results of the indicator analysis with the product validation test results obtained with the four aspects analyzed to get an average test presentation result of 86% included in the very high category with the following description: It can be seen that the assessment of media principles in learning by elaborating the objectives of developing media in learning in conveying messages, limitations of space and time, the accuracy of use, and characteristics in messages transmitted, emphasizing punctuation, teacher and student interaction, and ease of use. The function domains include Interesting media, Interactive, Quality Time of use, and Increasing students' role. Media in the scope of benefits in clarifying material, equating students' perceptions, and attracting students' attention in learning; all indicators of media rules in education are outstanding criteria. Management in learning includes goals, formulation of objectives and material, with an overview of the application on target, the application objectives are achieved, and the material follows the dreams in the outstanding category. Media developed with Software and Usability aspects with indications of Navigation, Features, Performance, Functions, Effectiveness, Efficiency, Security, Usability, Ease of Learning, and Ease of Remembering in excellent criteria. Relevance of content with indications of scope, sequence, completeness, clarity, systematic media in learning to describe usage guidelines, completeness of the content, attractiveness of content, suitability of content, conformity with the contents of the book, appearance of a coherent application, complete application content, clear display, overall application systematic.

Conclusion, Limitations, & Recommendations

In developing multimedia based on Android applications, the research and development steps used based on the Bord and Gall steps at level 3 are divided into research and development. Research activities include implementing technical and administrative preparation, data collection of preliminary studies, and analysis of data findings in prior studies.

The second part of the multimedia development phase based on Android applications includes the findings of preliminary studies consisting of an overview, forms of effective smartphone use, productive teacher obligations, and the availability of adequate facilities and tools. Furthermore, development activities include developing multimedia design based on Android applications, including analysis of development needs, design, and design making. This development stage also consists of the results of validation tests and product tests, namely the implementation and

outcomes of application validation tests which include validation by media experts and material experts, operational tests of media products, and product tests of applications that have been developed.

The results of the validation test by media experts get an average score of 4.2 with a total score of 39 and a percentage of 8.4%. While the material expert test gave an average score of 4.27 with a total score of 78 and a percentage of 8.3%, the two validation tests were then totaled to get a comprehensive picture of the two internal tests that had been carried out. The media has passed the validation test with an average rating that is classified as "very good" or worthy of use.

Limitation

Researchers realized that some of the weaknesses in this study were limitations of the study population that focused on Buddhist Sunday schools in Pesawaran district. The developed media cannot be uploaded to the Google Play Store.

Recommendation

This research proves that computer technology can effectively develop learning media in various educational contexts. This can motivate education actors to develop learning media that are more creative, innovative, and varied, both in formal and non-formal environments.

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