

Development of Android Applications Based on Discovery Learning for Interactive Learning Media for Islamic Religious Education

Ikhsan Rifai¹, Nurhaliza²

^{1,2}UIN Sunan Kajijaga Yogyakarta

Received: 5 November 2024
Revised: 18 November 2024
Accepted: 26 November 2024

Abstract

The use of Android smartphones is predominant in schools, including in Islamic Education (PAI) subjects. Studies show that smartphones are frequently used in learning, but they also contribute to gaming addiction among students. Banning smartphone use is not always effective; however, if utilized properly, they can offer significant benefits. Criticism of PAI in schools includes an overemphasis on memorization, particularly in history lessons. Research at SMA Negeri 1 Kalasan indicates that students are allowed to use smartphones in class, highlighting the need for a more directed approach to technology use. This study employs a Research and Development (R&D) model, specifically the 4D model, which consists of define, design, develop, and disseminate stages. Data was collected through questionnaires and validation sheets. The learning media was validated in two stages, assessing instructional, media, and content aspects. The learning media was trialed in both small and large groups to gauge student responses. The subjects of the study were students in class X-1 Phase E at SMA Negeri 1 Kalasan. The instruments used were developed and validated by experts in Educational Technology. Data analysis techniques involved calculating averages and converting them into percentages. The research findings indicate: 1) Initial analysis identified significant needs from PAI teachers and students for Android-based learning media. The learning media focused on the Walisongo material for class X, with the final product in .apk file format. 2) First-stage assessments by instructional, media, and content experts showed validity scores of 76.67% (valid), 80.00% (valid), and 73.33% (valid), respectively. In the second-stage assessments, validity scores improved to 91.67% (very valid), 98.00% (very valid), and 86.67% (very valid). 3) Student responses from both small and large group trials indicated a validity level of 87.2% (very valid) and 90.0% (very valid). The learning media is deemed suitable and practical for use and has been disseminated through the application store, registered with a Copyright Registration Certificat.

Keywords: *Android, discovery learning, Walisongo, interaktif.*

(*) Corresponding Author: 20104010020@student.uin-suka.ac.id

How to Cite: Rifai, I., & Nurhaliza, N. (2024). Development of Android Applications Based on Discovery Learning for Interactive Learning Media for Islamic Religious Education. *International Journal of Education, Information Technology, and Others*, 7(4), 56-65. Retrieved from <https://jurnal.peneliti.net/index.php/IJEIT/article/view/11102>

INTRODUCTION

The development of wireless, information and communications technology has encouraged the use of mobile devices in Indonesia, making it the fourth largest smartphone market in the world. Android dominates the smartphone operating system market share in Indonesia with almost 89%. Data shows that 66.36% of Indonesian people use smartphones in various places, including at school. In the context of Islamic Religious Education (PAI), the use of smartphones is very intensive for various purposes, such as assignments, Islamic

history applications, Google Forms, and quizzes, which raises the attention of researchers and educators to their advantages and challenges.

Challenges in using smartphones in PAI learning include addiction, attention disorders, and communication problems, which can have a negative impact on learning achievement. Research shows that avoiding distractions from smartphones can increase student learning scores. Smartphone use also has a negative impact on students' social behavior, such as lack of verbal interaction and interest in reading. There is a low correlation between smartphone use and interest in studying in high school students, who more often use these devices to play games than to study. Banning the use of smartphones in class is considered ineffective in overcoming addiction, distraction and behavior change, considering that smartphones have become an integral part of education. Educators need to create a supportive learning environment and change teaching methods to make them more relevant to the interests of the younger generation.

Integration of learning materials with technology and innovative approaches could be a solution. Smartphone and mobile technology offers many advantages, including portability, operating system responsiveness, and ease of social interaction, which supports the development of various learning media. Educators are now utilizing mobile technology to help students learn both inside and outside the classroom, emphasizing the importance of technology integration in education in the digital era.

The use of smartphone devices in education has a positive effect, with an average effect size of 0.523 on student learning outcomes, which supports the development of more effective educational policies in technology integration. The integration of media and technology in PAI learning provides great benefits, such as the visualization of complex religious concepts, which can improve students' understanding and learning experiences. However, there are still few learning applications designed specifically for PAI compared to informal contexts. Therefore, PAI teachers need to adapt to technological advances and adopt modernization in learning to utilize media and technology effectively.

The integration of technology in education must consider technological and pedagogical aspects in a balanced way. Research on learning technologies often focuses more on the exploration of the technology and less on its impact on the teaching and learning process, and emphasizes the functional features of the application rather than the theoretical and pedagogical basis of its use. The Discovery Learning model encourages students to be active, even though it requires more time. The integration of appropriate learning media can increase student engagement and interest, as well as accelerate understanding, making it effective in PAI subjects.

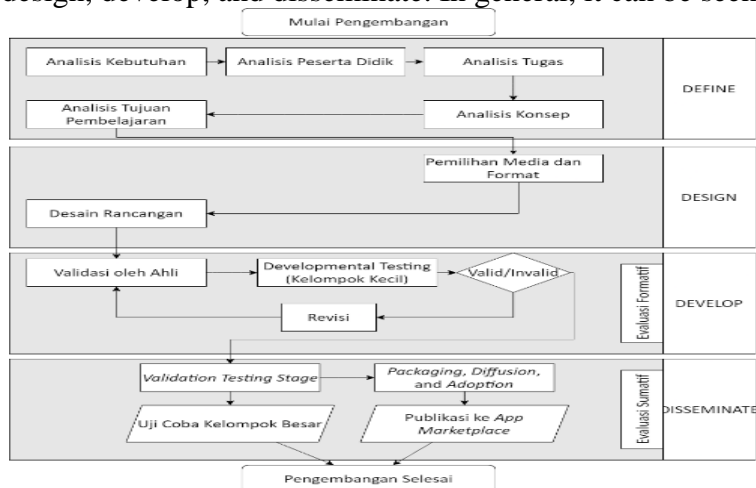
The historical element in PAI aims to provide a comprehensive understanding of the development of the Islamic religion, but learning the History of Islamic Culture in schools is often criticized for being too dependent on memorization and boring lecture methods. Initial research at SMA Negeri 1 Kalasan shows the potential and challenges of using smartphones in PAI learning, which requires guidance and strategies from teachers, schools and parents to maximize the benefits and minimize the negative impacts.

Literature on the use of smartphones in learning still focuses on technological aspects, and little has examined the pedagogical aspects. This is in accordance with the recommendations of researchers who state the need for comprehensive development of instructional design with mobile devices. Smartphone integration in learning must be done with careful planning to maximize benefits and minimize negative impacts. Based on this background, researchers are interested in offering solutions by developing learning media as an applied innovation.

METHOD

Development Model

This research uses research and development (RnD) methods to create innovation in the field under study, focusing on the development of effective products in the school context rather than theory formulation or testing, as suggested by Gay et al. and Priyanto. This research adopts a Research and Development design with a 4D model. The 4D model involves the steps define, design, develop, and disseminate. In general, it can be seen in the image below



Development Procedure

First, at the define stage, this research includes several analyses: (i) initial analysis of the needs for Android-based PAI learning media through a questionnaire for PAI teachers; (ii) analysis of the characteristics of class X students at SMA Negeri 1 Kalasan using a questionnaire; (iii) a task analysis that includes the work, tools, and knowledge required; (iv) concept analysis of Walisongo material; and (v) analysis of learning objectives related to Walisongo material.

Second, at the design stage, format and media selection is carried out by considering the characteristics of the material, concept analysis, tasks and student needs. The initial design is the first step in developing learning tools which includes all planning before testing is carried out.

Third, at the develop stage, the learning media is validated by experts to test the product. This media was tested by experts from instructional, media and material aspects. Next, the learning media was tested in small groups. Data collection was carried out using a 1-5 Likert scale and an open questionnaire for suggestions

regarding the media being developed. The research instrument was developed and validated by educational technology expert lecturers, with validation results attached in Appendix II. Data analysis was carried out quantitatively by calculating the total score and converting it into a percentage.

Fourth, at the disseminate stage, trials are carried out on large groups as well as product packaging, diffusion and adoption. The media is packaged in the form of an .apk file which is then distributed so that it can be accessed and used by other students. This process includes uploading media to a platform or app store for easy access for other users.

According to Riduwan, conclusions drawn from the questionnaire results based on the percentages above can be seen in the following table:

Table I. Decision Making

Test results (<i>p</i>)	Qualification
81% - 100%	Very Valid
61% - 80%	Valid
41% - 60%	Fairly Valid
21% - 40%,	Invalid
0% - 20%	Invalid
Riduwan, 2012	

RESULTS AND DISCUSSION

Define Stage Results

Data was collected from questionnaires distributed to 14 PAI teachers out of 5 SMA/K in the 2023/2024 academic year. The results of the analysis of PAI teachers' needs for learning media can be said that more than half of the teachers often use technology devices. This is in accordance with Alkhadad Feri and Zulherman's research which found that teachers showed variations in creating technology-based learning media innovations. All teachers have access to technology-based learning media (ICT) from the internet, even though schools have limitations in providing it. Teachers also show high interest in using technology-based learning media.

Learner analysis is in line with instructional design principles which emphasize the importance of understanding user characteristics in designing learning products or services. The results of the student analysis can be seen in the following table:

Table 2. Analysis of Student Needs

Use of Technology Devices in Learning Activities	
GOOD	
Often	14
Neutral	10
Seldom	7
Always	1
Android Device Usage	
Often	11

Neutral	9
Always	12
Support for Infrastructure in Using Technology in Learning	
Support	12
Neutral	15
Very Supportive	4
Does not support	1
Motivation for Using Android Learning Media for PAI Learning	
Motivated	21
Very Motivated	3
Ease of Using Android-Based Learning Media	
Neutral	8
Easy	22
Neutral	7
Very Easy	3

Android-based learning media offers extraordinary convenience for its users by providing practical and intuitive access to a variety of learning resources that can be accessed anytime and anywhere via their mobile devices. This is also in accordance with the data above that students have no difficulty in using Android devices.

The role of researchers in designing learning applications includes designing applications with intuitive features and interfaces, selecting or creating quality content according to the curriculum, collaborating with educational practitioners to obtain feedback, revising products based on input, and testing the functionality and accuracy of the content. Concept analysis was carried out to explore various concepts contained in the material regarding the role of ulama figures in the spread of Islam in Indonesia, especially in Chapter The results of the concept analysis are represented in a chart, while the results of the learning objective analysis can be seen in Appendix VI of the Teaching Module.

Results of the Design Stage

Based on the needs analysis that has been carried out, researchers designed a mobile-based learning media concept which will be developed using several software such as FlutterFlow for programming and Canva for graphic design. The choice of media in designing learning materials involves text, audio, visuals and video, each of which provides clarity, sound dimensions, visual images and movement visualization. The media format used is the Android APK application (.apk), which allows distribution and installation of applications on Android devices via the provided APK files.



Figure 2. Sketch

Design Design uses an initial sketch of the layout for each screen, with a pre-designed asset and text composition template. Initial sketches or paper prototyping are used to visualize design ideas and test initial concepts quickly and cheaply. Layout is also concerned with the arrangement of elements in a digital space, which can improve functionality, aesthetics and user experience.

Develop Stage Results

1. Validation I

The validators assess the quality of the learning media to determine the feasibility of using a questionnaire with a Likert scale and provide comments for the revision stage.

Table 3. Validation Results I

Aspect	Percentage	Criteria
Instructional	76.67%	Valid
Media	80.00%	Valid
Material	73.33%	Valid

Validation of the material aspect received the lowest level of validity because the learning material did not match the level of difficulty or ability of students, especially because of the existence of terms that were considered foreign by students at the secondary school level.

There are several suggestions from instructional experts, including adding interactivity to chat, including learning videos, and adding reflections in the conclusion section. Additionally, media experts recommend increasing text font size, better organization to avoid stacking elements on the screen, and improving layout. Meanwhile, from material experts, suggestions given include increasing the text font size, better arrangement to avoid a pile of elements on the screen, improving the layout, as well as adding additional reading material about Walisongo. From the point of view of instructional experts, the media and materials are suitable and can be used in small group trials in the learning process of Wali Songo material based on discovery learning.

2. Small Group Trial

This application was tested on a limited basis with Class X high school students. This trial activity aims to obtain readability results for the product that has been developed. Small group trial activities will be held on April 22 2024.

Table IV. Small Group Trials

Learners	Percentage	Category
HAES	86.67 %	Very Valid
on	100 %	Very Valid
FAITH	76.67 %	Valid
Rerata	87.20%	Very Valid

Data from the questionnaire shows that students are very interested in "Islamic History Kuber", finding it very useful and helpful in understanding the lesson due to its simple and systematic explanations and attractive design. They also see this application as a practical learning tool because it can be used mobile. The majority of students proposed that the app be uploaded to the Play Store and App Store, enabling independent learning outside the classroom. The use of Android-based learning media offers new experiences that are more meaningful and interesting for students, utilizing various elements such as text, sound, animation, video and interactivity to convey messages clearly.

3. Validation II

After carrying out revisions and trials in small groups, the researchers again consulted with educational practitioners to get input and improve the learning media

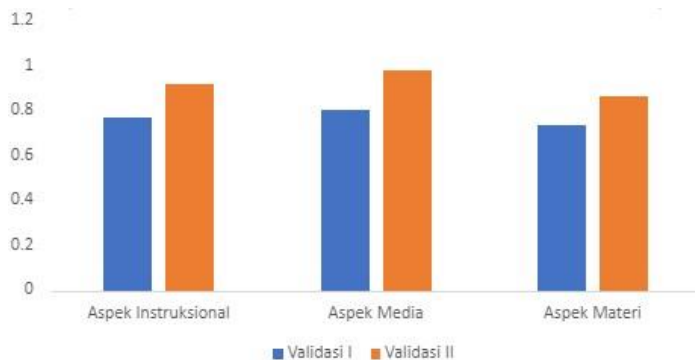
Table 4. Validation Results II

Aspek	Persentase	Kriteria
Instruksional	91.67%	Sangat Valid
Media	98.00%	Sangat Valid
Materi	86.67%	Sangat Valid

Based on the table above, it can be seen that the research instrument has been well tested for its validity. The instructional and media aspects received very valid percentage scores, namely 91.67% and 98.00%. This shows that the instructions in the research instrument are clear and easy to understand, and the media used in the research instrument is appropriate and in accordance with the learning objectives.

Overall, the learning media used in this research is valid and ready to be used for large group trials. However, it is necessary to revise and refine the material aspects so that this research instrument becomes more perfect and valid.

Figure 3. Differences between Validation I and II

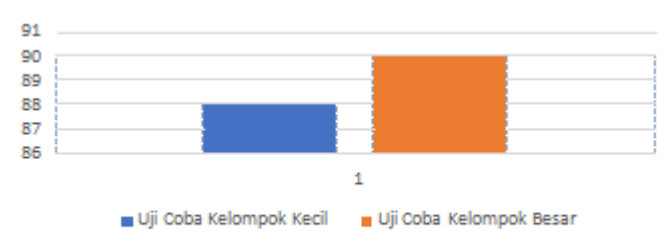


Based on the results of Validation I and Validation II, it shows a significant increase in validity in all aspects, namely Instructional, Media and Material. The Instructional Aspect increased from 76.67% to 91.67%, indicating that revisions and small group trials have resulted in instructions that are clearer, easier to understand, and well structured. The Media aspect has increased from 80.00% to 98.00%, indicating the selection of appropriate media and in accordance with learning objectives. The material aspect has increased from 73.33% to 86.67%, indicating that material revisions and improvements have been carried out well. This improvement is the result of revisions and improvements made based on input from educational practitioners and the results of small group trials

Disseminate Stage Results

1. Large Group Trial

As with small group trials, large group trials also aim to determine students' responses to learning media. The large group trial subjects were taken from class XE1 of SMA Negeri 1 Kalasan, with samples selected using purposive sampling techniques. Large group trial activities will be held on May 2, 2024.



Gambar 4. Perbedaan Hasil Uji Coba

The results of student responses showed differences between small group and large group trials, with a percentage of 87.20% for small group trials and 90.0% for large group trials. The result of 90.0% shows that "Islamic History Kuber" obtained a very valid level of validity for the responses of large group trial students.

2. Packaging, Diffusion, and Adoption

The results of the dissemination process in the research and development stage are important to reach a wider audience. These steps involve packaging the Android application "Islamic History Kuber" in apk file format and diffusion through various distribution channels, such as APKPure. The main goal is to increase the accessibility of the application to high school students, teachers and the general public to use it as an effective learning resource in PAI learning. These steps also include registering a Copyright Registration Letter to protect the application's intellectual property rights

CONCLUSION

Based on the results of research and development of an Android application based on discovery learning as an interactive learning medium for Islamic Religious Education (PAI), it can be concluded that this application has significant potential in increasing students' involvement and understanding of PAI material. This is evident from the initial analysis which shows the great need from PAI teachers and students for Android-based learning media, with Walisongo Class X SMA material as the focus of development. The final application format was an .apk file, which received very positive reviews from instructional, media, and materials experts. Phase I assessment resulted in validation of 76.67%, 80.00%, and 73.33%, respectively, while in phase II it increased to 91.67%, 98.00%, and 86.67%, all of which were in the "very valid" category. Student responses from small and large group trials also showed very valid results, with 87.20% and 90.0% respectively. Thus, this learning media is declared suitable and practical to use and has been distributed via the APKPure platform, accompanied by a Copyright Registration Letter.

THANK-YOU NOTE

Thank you to all personnel who have assisted in this research as well as to the editorial board of the IJEIT journal who have accepted to publish this manuscript.

REFERENCES

- A. M. Putri and A. P. Astutik, "Tiktok as a Generation-Z Islamic Religious Learning Media During the Covid-19 Pandemic," *Jurnal pendidikan agama Islam*, vol. 18, no. 2, Art. no. 2, Dec. 2021, doi: 10.14421/jpai.2021.182-04.
- A. Nawati, M. I. Hamzah, and A. A. A. Rahim, "Teachers Acceptance of Mobile Learning for Teaching and Learning in Islamic Education: A Preliminary Study," *TOJDE*, vol. 16, no. 1, Art. no. 1, Feb. 2015, doi:10.17718/tojde.30611.L. P. Agesti, R. Fitryasari, N. K. A. Armini, and A. Yusuf, "Hubungan smartphone addiction dan Self-efficacy dengan prestasi akademik pada remaja," *Jurnal Keperawatan Jiwa*, vol. 1, no. 1, pp. 1–6, 2019.
- A. R. Daulay, S. Halimah, and N. Anas, "Pengembangan media pembelajaran berbasis aplikasi game quiz pada mata pelajaran pendidikan agama Islam,"

- Jurnal EDUCATIO: Jurnal Pendidikan Indonesia*, vol. 9, no. 2, Art. no. 2, Sep. 2023, doi: 10.29210/1202323205.
- J. H. Kuzneoff and S. Titsworth, "The Impact of Mobile Phone Usage on Student Learning," *Communication Education*, vol. 62, no. 3, pp. 233–252, Jul. 2013, doi: 10.1080/03634523.2013.7679
- M. M. Santoso, B. Rezia, M. Yusuf, D. Irawan, and H. Ashari, "Implementasi Penggunaan Teknologi Informasi dan Komunikasi untuk Penilaian Kognitif pada Pembelajaran PAI Di Sekolah Dasar," *Jurnal Basicedu*, vol. 7, no. 5, Art. no. 5, Oct. 2023, doi:10.31004/basicedu.v7i5.4669.
- N. Nurdin, N. Nurliana, and S. Mashuri, "Online Islamic Religious Education Learning During Covid-19 Pandemic," *INTERNATIONAL JOURNAL OF CONTEMPORARY ISLAMIC EDUCATION*, vol. 4, no. 1, Art. no. 1, May 2022, doi: 10.24239/ijced.Vol4.Iss1.46.
- Pusat Penelitian dan Pengembangan Aplikasi Informatika dan Informasi dan Komunikasi Publik, "Survey Penggunaan TIK 2017 Serta Implikasinya terhadap Aspek Sosial Budaya Masyarakat," Badan Penelitian dan Pengembangan Sumber Daya Manusia Kementerian Komunikasi dan Informatika Republik Indonesia, Jakarta, 2017.
- R. Metruk, "Smartphone English Language Learning Challenges: A Systematic Literature Review," *SAGE Open*, vol. 12, no. 1, p. 21582440221079627, Jan. 2022, doi: 10.1177/21582440221079627.
- S. Z. Kulbi, "Mobile Learning Berbasis Android Sebagai Media Pembelajaran Pendidikan Agama Islam," *Nazhruna: Jurnal Pendidikan Islam*, vol. 2, no. 3, Art. no. 3, Nov. 2019, doi: 10.31538/nzh.v2i3.1110.
- Statista, "Indonesia: smartphone users 2028," Statista. Accessed: Jan. 31,
- W.-H. Wu, Y.-C. Jim Wu, C.-Y. Chen, H.-Y. Kao, C.-H. Lin, and S.-H. Huang, "Review of trends from mobile learning studies: A meta-analysis," *Computers*