International Journal of Advanced Educational Research
ISSN: 2455-6157; Impact Factor: RJIF 5.12
Received: 06-12-2019; Accepted: 08-01-2020
www.educationjournal.org
Volume 5; Issue 1; 2020; Page No. 27-30

Development of mobile learning model using android application programming in mathematics learning at state senior high school 1 of Remboken

Ardi Akbar Wijaya[1], Victor R. Sulangi[2], Vivian E Regar[3]
[1] Manado State University, Student of Mathematics Department, Faculty of Mathematics and Natural Sciences, Manado State University, Indonesia
[2, 3] Mathematics Department, Faculty of Mathematics and Natural Sciences, Manado State University, Indonesia

Abstract
The present study was conducted to result in mobile learning using the application model in mathematics learning at State Senior High School 1 of Remboken which were deemed valid and practical. The type of this study was Research and Development with ADDIE design consisting of 5 stages including analysis, design, development, implementation, and evaluation. The application developed was tested to 28 X MIA 1 graders of State Senior High School 1 of Remboken. The data collection was conducted by providing a validation sheet to the expert of material, media, mathematics teacher and peer reviewer to assess the product feasibility as well as responding questionnaire for students to give suggestions about the product being developed. The research result revealed that the resulted product of the mobile learning model through android application programming development was considered Very Good in accordance with the valuation of the expert of material, media, mathematics teacher and peer reviewer as well as a questionnaire for the students with a Very Good Classification.

Keywords: Android application, mobile learning, mathematics learning

1. Introduction
Technological developments in the global era are happening continuously and comprehensively in all fields. Education is one of the fields that cannot be separated from technology. Technology is very influential in the development of the quality of education so that learning based on information technology is a must. Educational institutions are required to be able to adapt to changes in the mindset of education from traditional to Information and Communication Technology (ICT).

Teachers are not only required to be able to use technology alone, but teachers are also required to be able to develop various educational media. Teachers are required to be more creative and keep working on the development of learning so that students do not feel bored and can absorb the material well until the learning outcomes or student achievement increases. This subject moves the teacher so that he can utilize the technology that is developing to support the learning process such as learning tools. One of them is a product that uses technology, which is a cellphone. Mobile is a technology product that cannot be separated from everyday life. Not only is it easy to get, but cellphones can also be used anywhere, anytime, and most people today can operate it. Especially now mobile phones have entered the age of smartphones. Smartphones come with some interesting specifications that can make it easy for users to connect various purposes. According to (Indonesian Internet Service Providers Association, 2017) smartphone/tablet users in Indonesia in 2017 reached 50.8% of 143.26 million internet users in Indonesia and accessed chat services 89.35%, social media 87.13%, and online courses 17.85%. In addition, according to the digital marketing research institute Emarketer in KOMINFO RI, in 2018 Indonesia will be the country with the fourth largest active smartphone user in the world after China, India, and America.

Learning media that utilize mobile phones are mobile learning. Mobile learning allows students to learn independently because while at school there are limitations in learning time so that the material is not entirely delivered by the teacher and students are still having difficulty understanding the contents of the material so that the learning outcomes obtained by students are not optimal. Mobile learning that is widely used is a smartphone that uses the Android operating system. This is because smartphones using the Android operating system still dominate the market compared to other smartphones. smartphones using the Android operating system have the highest percentage of market share in Indonesia, namely 93.75% compared to other developing operating systems such as Apple iOS 5.82%, Nokia Unknown 0.08%, Series 40 0.07%, Tizen 0.07% and Windows Phone 0.05% (Statcounter, 2019).

Android is a mobile learning operating system that has developed rapidly and has many applications that have been supported by the Android operating system such as Android Studio, Eclipse Studio, Intel XDK, and Sencha Touch. In addition, Android is an operating system for smartphones and tablets (Zaki and Putra, 2018) [10]

Based on the pre-survey conducted in class X Natural Sciences in SMA Negeri 1 Remboken with a total of 60 students, overall already have smartphones and the majority use android smartphones. In SMA Negeri 1 Remboken there are no learning media that utilize smartphones in learning mathematics and the lack of teaching materials so that learning is only centered on the teacher. In addition, due to a lack of learning time at school, the beginning of the even semester at the beginning of the teacher continues the material the previous semester.

Mobile learning is practical learning because learning can access learning materials, directions, and applications related to learning, anytime and anywhere (Suhartono, 2016) [7]. Not only that, mobile learning can replace the role of the teacher in the class to explain the subject matter. That way the teacher will play a role as a facilitator in learning by utilizing mobile learning as a learning resource. The source of learning is basically everything (objects, data, facts, ideas, people, etc.) that can lead to a learning process (Prastowo 2016) [4].

Thus, the more students who have and use smartphones, the greater the opportunity for the use of technological devices in the world of education. Learning media that use smartphones are mobile learning. Mobile learning allows students to learn independently because when they are in school the minimum time for learning results in the material, not all being delivered by the teacher and it is still difficult for students to understand the contents of the material so that learning outcomes achieved by students are also less than optimal.

Based on these potentials and problems, the researchers conducted a research development of Android-based mobile application programming in android learning models in mathematics learning at SMA Negeri 1 Remboken.

Research Method

This research is a research development Development research is a research method used to produce certain products, and test the effectiveness of these products (Sugiyono 2017). The product produced in this study is in the form of android application programming in mobile learning models in mathematics learning.

This study refers to the design of ADDIE development which includes five stages, namely: analysis, design, development, implementation, and evaluation (Sugiyono, 2017).

The study was conducted at Remboken 1 Public High School in the even semester of the 2018/2019 school year. The research subjects were students of class X MIA 1.

1. Qualitative Data

Qualitative data consisting of suggestions/comments on the Android application programming evaluation sheet by validators, mathematics teachers, and peer reviewers were analyzed descriptively qualitatively with three paths namely data reduction, data presentation, and verification according to Miles and Huberman in (Utomo, 2016) [8].

2. Quantitative Data

Quantitative data for product assessment sheets by experts, mathematics teachers, and peer reviewers is compiled to analyze the validity of the product and the student questionnaire responses are compiled to analyze the practicality of the product. Data from assessment by material experts, media experts, mathematics teachers, peer reviewers, and students' responses were analyzed by stages: (1) calculating the average score obtained from the android application programming assessment sheet by material experts, media experts, mathematics teachers, peer reviewer and student response (Sugiyono, 2017) [6]; (2) convert the average score obtained into a qualitative scale value of four according to the assessment criteria (Lukman and Ishartiwi, 2014) [3]; (3) based on stage 2 valid and practical criteria can be developed (Lukman and Ishartiwi, 2014) [3]; (4) Android application programming developed is said to have valid and practical qualifications if the results of the assessment of media experts, material experts, mathematics teachers, peer reviewers, and students' responses show minimal good criteria.

Results and Discussion

Development of android application programming in mobile learning models in learning mathematics using the ADDIE model. The ADDIE model has 5 stages including Analysis, Design, Development, Implementation, and Evaluation. The ADDIE model development research is carried out only to the Development stage because the purpose of this study is only to produce an android application programming mobile learning model in mathematics learning that is valid and practical to be implemented based on the validator and practical assessment based on student assessment.

1. Analysis

The needs analysis phase is carried out by observing mathematics learning in Remboken 1 High School. Based on observations it is known that most students have an android-based cellphone. The cellphone has not been implemented optimally, most students use mobile phones to open applications such as games, WA, BBM, and so on when learning takes place. This causes the learning process to be less effective. In the curriculum analysis phase, researchers analyzed the new curriculum that was initiated by the government, namely the revised 2013 curriculum. One of the main subjects taught in the 2013 revised curriculum is the Trigonometry Ratio in Cartesian coordinates and the trigonometric relation angle. analysis of the characteristics of the students of SMA N 1 Remboken, especially class X MIA 1. From the observation data, it is known that the age of the majority of class X students is 15-16 years. Based on this age range it is included in the formal operational stage. At this stage, students have been able to understand abstract concepts within certain limits. So that the programming of the android mobile learning model application can be used for learning.

2. Design

A storyboard is a means or technique in conveying a system or process through sketches arranged sequentially according to the flow with the aim that the ideas we convey to others are easy to understand and understand. Storyboard Android application programming mobile learning model in mathematics learning can be seen in Figure 1.

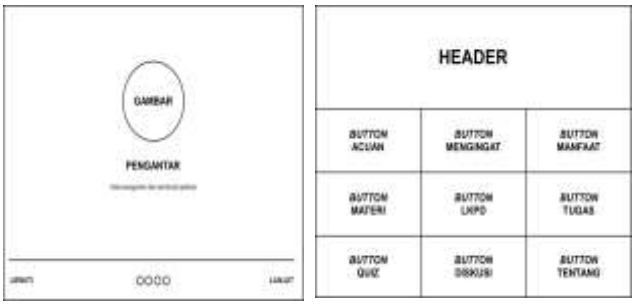

Fig 1: Storyboard

Flow Chart is a tool in helping the analysis of a programming logic or operational processes of a system that is presented in the form of images or symbols so that users

can easily understand the exposure spoken. The flow diagram of Android application programming in the mobile learning model in mathematics learning can be seen in Figure 2.

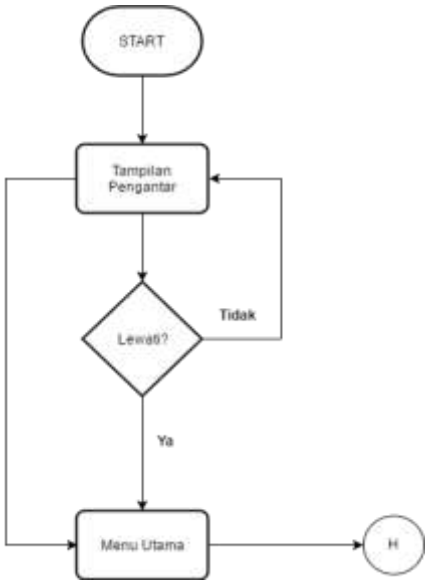

Fig 2: Flowchart

2. Development

(a) Preparation of research data collection instruments that include observations of the implementation of lesson plans, learning implementation plans, product assessment sheets, (b) Implementation of programming code referring to the design stage is shown in Figure 3.

Fig 3: Splash screen page and main menu

If the application has already been opened, it will start with an introduction and a simple intro for 3 seconds accompanied by the version of the application and the name of the application. The main menu page has nine icons, namely reference, remember benefits, material, LKPD, assignments, quiz, discussion, and about.

Table 1: Android application test results

No.	Validator	Average Rating	Criteria
1.	Ahli materi	3.63	Very good
2.	Ahli media	3.34	Very good
3.	Guru matematika	3.57	Very good
4.	Peer reviewer	3.63	Very good
Average		3.57	Very good

The average overall assessment of the android application of mobile learning models in mathematics learning developed is 3.57 with a very good category. This value according to the categories previously described is at intervals of $4 \geq \bar{x} \geq 3{,}25$. Thus, the android application of the mobile learning model is considered to be very good so that it is fit to be used as a learning medium. The results of software maintenance, this stage is the stage of developing mathematics learning applications so that they can be run by various Android devices. This stage is an improvement stage after initial product testing and publication in the Play Store after being declared appropriate by the international age rating coalition.

4. Implementation

Product trials were conducted at SMA N 1 Remboken. The trial of the research product was conducted in 2 meetings at the time of 09 April 2019 and 11 April 2019. The trial of the product in class X IPA 1 was observed by an observer. At the implementation stage, researchers also distributed student response questionnaires aimed at assessing the practicality of the product from aspects of interest to the media, aspects of material mastery, aspects of appearance, and aspects of practicality that were reviewed from students as product users. Questionnaire responses of students were distributed to 28 students from class X who have participated in learning by using mobile learning. The results of the questionnaire responses of students showed an average score of 3.5. This shows that the Android application in the form of Mobile learning that was developed can help and facilitate students in learning and understanding the material. In addition, the Android application in the form of Mobile learning that was developed was also able to increase the enthusiasm of learning and students' interest in learning the material.

5. Evaluation

At the evaluation stage, the researcher analyzes the errors that occur during the study and revises the final stage of the product being developed. The final phase of the revision is done by referring to the suggestions and input provided by students and observers during the implementation phase. The revision made at this stage is an improvement to some writing that is still wrong.

6. Conclusion

The results of the study can be summarized as follows

1. This research has resulted in an Android application of the mobile learning model which is declared valid by media expert lecturers, material expert lecturers, mathematics teachers, and peer reviewers.
2. This mobile learning model android application has been declared valid by the international age rating coalition so it is worth publishing in the play store.
3. This research has resulted in an android application of the mobile learning model which is declared practical by students and peer reviewers.

7. References

1. APJII. Hasil Survei Penetrasi dan Perilaku Pengguna Internet Indonesia 2017. Retrieved 2017-2018, from

Asosiasi Penyelenggara Jasa Internet Indonesia: https://apjii.or.id/survei2017/download/MAwBCnQfHYD7US9Nvq8o6RKrzJ5hL4
2. KOMINFO. Indonesia Raksasa Teknologi Digital Asia. Retrieved Desember 19, 2018, from Kementrian Komunikasi dan Informatika Republik Indonesia:, 2015, https://kominfo.go.id/content/detail/6095/indonesia-raksasa-teknologi-digital-asia/0/sorotan_media
3. Lukman, Ishartiwi. Pengembangan Bahan ajar dengan Model MIND MAP Untuk Pembelajaran Ilmu Pengetahuan Sosial SMP. Retrieved Januari 14, 2014-2019, from Jurnal Inovasi Teknologi Pendidikan: https://journal.uny.ac.id/index.php/jitp/artic%20le/view/2523
4. Prastowo A. Pengembangan Bahan Ajar Tematik . Jakarta: Kencana, 2016.
5. Statcounter. Mobile Operating System Market Share Indonesia. Retrieved 2019, from Statcounter Globalstats: https://gs.statcounter .com/os-market-share/mobile/indonesia
6. Sugiyono. Metode Penelitian dan Pengembangan. Bandung: Alfabeta, 2017.
7. Suhartono. (n.d.). Pasca Sarjana Universitas Negeri Malang. Retrieved Maret, 2019, from Prosiding Seminar Nasional Pendidikan Jasmani Pascasarjana Um: http://pasca.um.ac.id/conferences/index.php/SNPJ/article/viewFile/1012/683
8. Utomo EP. Strategi Komunikasi dalam Menyerap Aspirasi Masyarakat Adat oleh Anggota Dprd Kabupaten Teluk Bintuni Provinsi Papua Barat. Retrieved Januari, 2019, from Jurnal Ilmu Komunikasi, 2016, http://journal.unhas.ac.id/index.php/kareba/article/view/340
9. Yuni Y. Pengembangan Media Pembelajaran Matematika Berbasis ICT yang Berkualitas. Seminar Nasional Pascasarjana X. Retrieved Januari 2010-2019, from https://salamsemangat.files.wordpress.com/2011/05/pengembangan-matematika-berbasis-tik.pdf
10. Zaki B, Putra SD. Aplikasi Bengkel Online Menggunakan Global Positioning System (GPS) Berbasis Android Pada CV. Rumah Otomotif. Retrieved Januari 16, 2018-2019, from Journal of Information System, Informatics and Computing: http://journal.stmikjayakarta.ac.id/index.php/jisicom/article/view/64