International Journal of Advanced Education and Research
ISSN: 2455-5746; Impact Factor: RJIF 5.34
Received: 24-06-2019; Accepted: 27-07-2019
www.alleducationjournal.com
Volume 4; Issue 5; September 2019; Page No. 62-67

Android-based learning media to improve physics learning outcomes of class X MIA students at bitung 2 high school

Viky J Samadi[1], R Palilingan[2], Ferny M Tumbel[3]
[1] Student of Master Program, Study Program of Natural Sciences Education, Postgraduate Program, Manado State University, Indonesia
[2, 3] Postgraduate Program, Manado State University, Indonesia

Abstract
The use of instructional media to improve physics learning outcomes in students in class X in Bitung 2 High School. The use of media in learning can enhance new desires and interests, increase motivation and stimulation of learning activities, and even psychologically affect students. The purpose of this study is 1) Knowing the android-based learning media to improve student learning outcomes. 2) Creating and developing android-based learning media. This research uses Research and Development methods by following the process and stages of research according to Sugiyono. Samples were obtained randomly from the population of students in class X MIA, amounting to 60 students and divided into 2 classes, classes K1 and K2. The product passed the validation stage by the instructional media experts then entered the limited trial with 10 respondents. Field trials were carried out with pretest posttest control techniques in the design group and two design cross-over periods. The first period, class K1 gets treatment A (conventional learning) and class K2 gets treatment B (media learning based on android). The second period, cross-over learning method was carried out so that K1x class got treatment A and class K2x got treatment B. The results of the study were analyzed using the t test. The results of the comparison of the average value of learning outcomes is the first period gets the value of t_{count} = 3.019 and the second period t_{count} = 2.744. Research results show that 1) This Android-based learning media received a positive response during the research process, both from expert lecturers and respondents in accordance with the results of the questionnaire shared. 2) The average student learning outcomes showed an increase in students in the class who were treated with an android-based learning media method, not only in the class in the first period but also the same results obtained in the second period class.

Keywords: learning media, learning outcomes, android, cross over design

1. Introduction
Educators are qualified educational staff as teachers, lecturers, counselors, tutors, tutors, instructors, facilitators and other designations that are in accordance with their specificities, such as participating in the administration of education (Law No. 20 of 2003 concerning the National Education System) Teachers are required to have creativity and innovation in achieving the goals of National Education. The development of Science and Technology enables all innovations and creations to be realized. For example developing media or learning materials to improve the potential and learning outcomes of these students (Ahmad Rohani, 1997) [1]. Although the development of media or the use of media is very useful in the teaching and learning process, only 11 out of 75 teachers in Bitung 2 High School use media in the teaching and learning process. For example the use of animation, or videos that are displayed to students with a projector. On the other hand, this development is also accompanied by increasing progress in the field of communication. For now, one of the results of the development of science and technology in the field of communication that is booming and is seen as mandatory for everyone is a smartphone. Smartphones are one part of lifestyle in this era of globalization. Everyone can always interact with their smartphone. No wonder this smartphone is very fast penetrating among teenagers especially students. Smartphones can not only have a positive impact but their use can have a negative impact Below is the observation of smartphone usage in students as a whole in SMA Bitung 2, there are 61% or about 883 students using an Android type smartphone. The smartphone will be used as a medium to help the teaching and learning process in the classroom by installing applications that contain learning material. The importance of using media in the learning and teaching process in the classroom encourages research and development in a study entitled "Android-Based Learning Media to Improve Student Learning Outcomes in Bitung 2 High Schools." The purpose of this study:

1. Knowing that Android-based learning media is used to improve student learning outcomes.
2. Creating and developing android-based learning media.

Research methods
The type of research used by researchers is research and development or often also called Research "Research and Development" (Sugiyono, 2015) [24]. With the following stages:

1. Learning Planning
2. Prodak Planning
3. Literature Study and Field Observation
4. Product design making
5. Revision of the design
6. Making Products
7. Product Validation
8. Product Revision
9. Limited testing

10. Product Revision
11. Field Trial
12. Product Revision
13. Product Desimination

The study population was students of Bitung 2 High School. The research sample was class X students of SMA 2 Bitung. The sample was 60 students randomly selected and divided into 2 classes, namely classes K1 and K2 with 30 students per class. Data collection techniques used pretest posttest design group control which was continued with two periods of cross over design. The study was conducted in two periods. In the second period there was a loss of learning methods. Research hypothesis

Ho: There is no difference in the average student physics learning outcomes when the learning process uses android-based media with conventional learning.

Ha: There are differences in the average student physics learning outcomes when the learning process uses android-based media with conventional learning.

Results and discussion

a. Learning Planning

Good planning determines the success of a study. Broadly speaking, this stage has the purpose of preparing things that will support the learning process in the classroom, namely:

1. Develop a Research Schedule. The schedule of this study was carried out from February to May 2016. For the student teaching schedule adjusted for student learning activities in the classroom.
2. Determination of Research Subjects The subjects of this study were students of class X MIA taken randomly and separated into 2 classes and given the names Class A and Class B.
3. Learning Devices (RPP) and Teaching Materials

b. Product Planning

Product planning is the stage where researchers begin designing products that will be used in the teaching and learning process. At this stage, material selection will be included in the learning media. This stage starts with:

1. Making interface layout until inside the application
2. Material input
3. Application rendering
4. Validate the product
5. Try the product

c. Literature Study and Field Observation

Articles, journals and development research regarding the use of android-based learning media were also collected as reference material for this study. Some of these studies also obtained very satisfactory results about the development of android-based learning media. Suppose the development of learning media in Dawarblandong 1 Public High School Mojokerto recorded 97.37% of students strongly agree if the presentation of material uses Android learning media (Nisfatun *et al*. 2015). In line with the research obtained in the development of learning media in the form of digital pocket books in MAN 1 Yogyakarta with 99.19% research results that the media used are very feasible to be used as learning media (Gian, Dwi. 2015). In this stage researchers also collect teaching materials that will be used in the learning media At this stage, a study of the teaching and learning process and the curriculum system used in Bitung 2 Senior High School were carried out. Some things obtained include:

1. The curriculum system used in Class X MIA at Bitung 2 High School is a 2013 Curriculum modified with SKS.
2. The process of teaching and learning in the classroom that is centered on the teacher as the giver of information. Students in the tertiary class receive every material from the teacher so students tend to be lazy to look for additional information.
3. The survey results on the use of smartphone in Class X MIA show that the high use of smartphone is also experienced by students in Bitung 2 High School

d. Development of initial product design

The researcher simultaneously collects materials such as Learning Design, teaching material (Straight Motion Kinematics), images related to the material, practice questions and exam questions to use to make the product. After everything has been collected and it is considered sufficient, at this stage all the ingredients are compiled and processed to produce Android-based learning products with the Unity 3D program. The initial layout of the product interface can be seen in the image below.

Fig 1: Picture Layout of the initial product interface

e. Initial validation of design

At this stage, the product from the initial design development will be validated. Expert validation includes the validation of the design and validation of this learning material.

1. Validation of Learning Design Experts In this validation, the examiner will review and assess the product design as the initial development of the product. It is expected that the results of the initial validation will be in the form of information and input as a reference for designing and developing the product in accordance with the learning needs of physics.
2. Learning Material Expert Validation Learning material created will be validated by experts.

f. Design Revision

After being validated by experts in terms of design and learning material. This product is included in the design revision stage. In this stage the researcher revises and revises the design and completes the learning material. The improvements made by the researcher refer to the results of the validation carried out by the expert. For product design is done using Adobe Photoshop CS 5.0 Master. Below is a screenshot of the design revision of the application

Fig 2: Screenshot of Making Product Design in Adobe Photoshop CS 5

Revisions are also made to the learning material. In many learning materials that must be completed, for example, adding pictures and adding metrics from some of the literature presented by experts.

g. Product Making

After the product is revised according to the results of the validation of the initial design development, at this stage the product will be produced through the Unity 3D application. Below is a sceenshoot of the Unity 3D application in the product manufacturing process

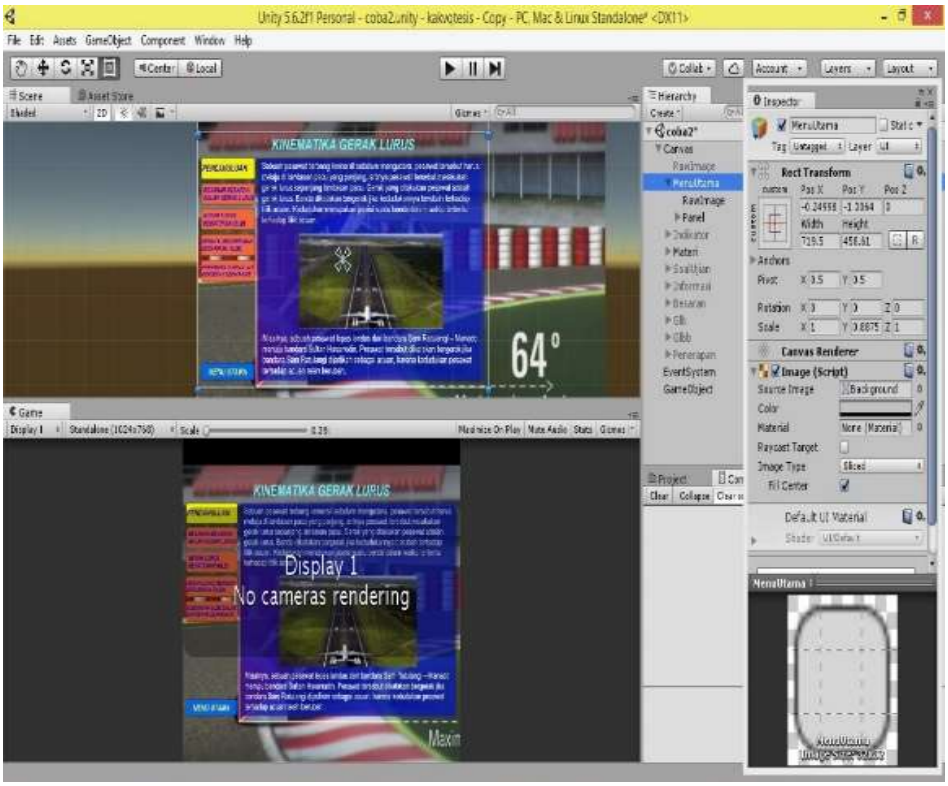

Fig 3: Products on Unity 3D (version 5.6.2)

After the product is designed in Unity. The product will be loaded into the apk extension. This Apk is an application file type on Android. After that the application is installed on Smarthphone.

h. Product Validation

At this stage, the product that has been installed on the smartphone, will be validated as a whole, whether in the form of design or learning material by learning media experts.

i. Product Revision 1

At this stage, the researcher revises the product according to the validation results from the learning media expert. Some

things that become notes according to the validation results are the size and type of letters, also the shape and position of the image. Limited Trial

j. Product Revision

This stage is a revision of the product in accordance with the results of limited trials conducted previously. After getting a lot of information through interviews and discussions conducted with 10 respondents, the researcher conducted a review and revised the learning media according to the responses and input from the respondents.

k. Field Trial

Field trials were conducted in 2 classes that had been randomly selected in the X MIA class at Bitung 2 High School. This study applies the Pre Test Post Method of Group Design Control Test and Two Period Cross-over design. Field trials consist of 2 test periods.

1. Period 1

Learning outcomes data were obtained from 2 classes namely K1 and K2 classes, in the first period K1 class behaved as a control class and K2 class behaved as an experimental class. Class K1 will receive treatment A, namely conventional learning methods and K2 class will get behavior B, which is a learning method using android-based media. Both classes will get a pretest before getting treatment and posttest after treatment.

a. K1 physics learning outcomes (control) with conventional learning methods. The learning outcomes of the K1 class, obtained from written tests on students with 30 people. Learning outcomes data class K1 with the highest value 81 and the lowest value 43. If the standard completeness with a value of 70, then the number of students who complete with the number of 15 people with complete predicate and 15 people with the predicate has not been completed. (attached)
b. The results of learning physics class K2 (Experiment) with learning methods using android-based media. The learning outcomes of the K2 class are obtained from written tests on students with 30 people. K1 class learning outcomes data with the highest score of 95 and the lowest score of 62. If the standard completeness with a value of 70, then the number of students who complete with a total of 28 people with complete predicate and 2 people with predicate is not yet complete

2. Period 2

In this second period, we will use a research method cross over design. This method begins by crossing the learning methods used in the K1 and K2 classes in the first period. In the first period class K1 gets behavior A, while class K2 gets behavior B. By applying the cross over design method, the treatment of class K1x (using the addition of x to distinguish the second period) is B and the class K2x is A. In the second period the K1x class behaves as experimental class and K2x class behave as control classes. K1x class will get treatment B, which is a learning method using android-based media and K2x class will get behavior B, which is a conventional learning method. Both classes will get a pretest before getting treatment and posttest after treatment.

The two classes will only take the posttest value. But before a cross occurs, the researcher enters the washing out stage, which is by giving a little free time before getting treatment, and given a material interlude that is different from the expectations of the students returning to the starting point without being influenced by treatment in period 1.

a. Results of learning physics class K1x (Experiment) with an Android-based learning method Learning outcomes obtained from class A, obtained from written tests on students with 30 people. Class A learning outcomes data with the highest score of 99 and the lowest score of 55. If the standard is completed with a value of 70, then the number of students who complete with a total of 27 people with complete predicate and 3 people with a predicate are not yet complete
b. The results of learning K2x class physics (Control) with conventional learning methods. The results of learning class B physics (Control) with an Android-based learning method. Learning outcomes obtained from class B, obtained from written tests on students with 30 people. Learning outcomes data class B with the highest score 81 and the lowest score 47. If the standard completeness with a value of 70, then the number of students who complete with the number of 17 people with complete predicate and 13 people with the title have not been completed. Overall the learning outcomes of class A and class B can be seen in the graph below.

After the test results data in the first and second periods. Then we will enter the stage of analyzing the results obtained.

Based on the results obtained from the SPSS 17 test then for period 1 the comparison with the intensity level is 0.05, obtained t = 3.019 and T table = 2.00, then tcount (3.019)> t table (2.00) is obtained. This shows that for period 1 it will reject H0 and accept Ha.

Period 2, the comparison of the level of intensity is 0.005 obtained t count = 2.744 and t table = 2.00, then obtained t count = 2.744> t table = 2.00. This shows that for period 2 it will process H0 and accept Ha.

The average learning outcomes obtained from students who were treated with learning methods based on Android showed an increase in physics learning outcomes that were higher than conventional treatment methods. Researchers wanted to be more sure whether the learning media used could actually be used to improve learning outcomes. , then the researcher used the desaign two period cross-over method for the two classes, the results after being crossed over had higher mean values with the conventional method.

l. Revised results of field trial results

At this stage the previously produced products will be revised and modified according to the results of field trials. Some of the obstacles obtained in the field trials are:

a. Applications that run are not smooth due to the RAM from a smartphone that has not been able to handle many applications running simultaneously
b. The small smartphone screen makes writing a little difficult to read

These constraints were only experienced by 3 out of 60 students conducted the study. Some changes made to the application, namely:

1. Change the font size used to be larger
2. Bottom size from one slide to another slide is changed

to bigger
3. Technical in the field, before students run the application, the smartphone first closes all applications that have previously been running / opened, this will make the performance will be more optimal when running the application.

m. Desimination of products

The results obtained after conducting research and development on android-based learning media that have an impact on improving physics learning outcomes include:

1. The use of android-based learning media on students increases the average value of physics learning outcomes both in the first period for the K2 class (experimental class) and the second period K1x (experimental class) compared to the class given conventional learning methods.
2. This learning media is an initial development. Teachers are also invited to develop this media to be better, for example in terms of layout, material presented, as well as color games. Future development is expected from researchers so as to give an influence on the attractiveness of students to learn physics lessons and facilitate students to deepen these lessons.

n. Discussion of Research Results

Android-based learning media is a product that is produced through the stages of R & D research (Sugiyono, 2015) [24]. The purpose of this development is to produce a product in the form of learning media that can be used in the teaching and learning process to improve learning outcomes and students' interest in learning physics. Like the use of electronic lab module-based learning media (Wolter, 2014) [28], media in the form of practicum modules have an impact on increasing student interest and participation in the teaching and learning process.

The products produced have gone through revisions and improvements in terms of the product and the material presented in the product. The results of the development of the product are based on design validation, limited testing, product validation, and field trials. After going through these stages one by one the product was revised and adjusted to the results of the questionnaire filled out by the respondents and experts who assessed it.

The process and stage of the product begins with the results of the assessment carried out by two learning design experts who came from lecturers in Manado State University Physics Education and teachers at Bitung 2 Public High School who are also the chair of the Bitung City Physics MGMP. Both provide assessments that emphasize the visuals of the products to be made, for example text and formulas must be read, as well as products that are made must be made attractive from the design and color scheme. After making a revision to the design, this product is subject to limited testing. This limited test was conducted on 10 student respondents with 46% results very good, 45% good, 7% sufficient, 1% less, 1% very less. The results obtained from this limited test concluded that the respondent gave a positive response, therefore this product is feasible to enter the next stage, namely a field trial with regard to matters that need to be corrected after conducting a limited test.

In the field trial, we used the pretest postet method in 2 classes namely K1 and K2, in the first period K1 was treated with method A (conventional learning method) with an average learning outcome of 69, and K2 class was treated with method B (learning method android-based media) with an average learning outcome of 85. Values obtained from the results of the first period of analysis were analyzed using spss. The results of the comparison of the average value of learning outcomes between classes K1 and K2 get the value of tcount = 3.019. Because the tcount is greater than the table, it can be concluded that we will accept Ha. The research process was continued by using cross over design, but before entering the research process washing out or treatment was done to make the students' condition expected to be as before. Washing out needs to be done in a cross over design research method, as some previous studies were treated such as giving intervals, giving different material and time lags before the start of the research process (Yuanita, 2018; M.Rihaldy, 2017) [14]. The learning method is crossed, the K1x class (x giving class marks in period 2) will be treated with method B and get an average learning outcome of 81. The K2x class is treated with method A and gets a score of 70 learning outcomes. the learning outcomes of class K1x and K2x get the value of tcount = 2.744 greater than t table = 2.00, so it can be concluded that it will accept Ha and reject H0. From the 2 periods obtained, the use of android-based learning media in the Class both the first period and the second period showed an increase in the average value of learning outcomes that were superior compared to using conventional learning methods in class X MIA in SMA Bitung 2.

These results also imply that media-based learning methods (Rohmani *et al*., 2015; Irnin *et al*., 2017; Wahyuni, 2014) [18, 12, 27] also have an impact that when learning media is implemented it will improve learning outcomes, interest and participation of students during the learning process. so the development of this learning media must be developed continuously.

Conclusions

The results of research and development of android-based learning media have been carried out by following the stages systematically so that they can be summarized as follows:

1. This android-based learning media received a positive response during the research process, both from expert lecturers and respondents in accordance with the results of the questionnaire shared.
2. The average student learning outcomes showed an increase in students in the class who were treated with android-based learning media methods, not only in the class in the first period but also the same results were obtained in the second period class.

References

1. Ahmad, Rohani. Media Intruksional Edukatif. Jakarta: Rineka Cipta, 1997.
2. Ali. Muhammad. Psikologi. Jakarta. Penerbitan Bumi Aksara, 2004.
3. Ananda Nugroho DKK. Keefektifan Diskusi Crosses-Over Group untuk Meningkatkan Kreativitas Siswa. Jurnal Program Studi Bembingan Konseling. 2017; 5:1.
4. Arif Sadiman S. *dkk*. Media Pendidikan, Pengertian, Pengembangan, dan Pemanfaatannaya. Jakarta: CV. Rajawali, 1990.
5. Aris Nugroho P. dkk. Pengembangan Media Pembelajaran Fisika Menggunakan Permainan Ular

Tangga Ditinjau Dari Motivasi Belajar Siswa Kelas VIII Materi Gaya. Jurnal Pendidikan Fisika. 2013; 1:1.
6. Arsyad A. Media Pembelajaran, Jakarta: Rajawali Pers, 2002.
7. Djamarah. Strategi Belajar Mengajar. Jakarta: Rineka Cipta, 2005.
8. Gary B, Thomas J. Discovering Computers: Fundamentals, 3thed (terjemahan). Jakarta: Salemba Infotek, 2007.
9. Hamalik. Media Pendidikan. Bandung: PT Citra Aditya Bakti, 1986.
10. Heinich R, Molenda M, Russel J. Instructional Media and the New Technologies of Instruction. John Wikkey & Sons, Inc. Ottawa. 1985.
11. Heinich R, Molenda M, Russel JD, Smalindo SE. Instructional media and technologies for learning. Engelword Cliffs, New Jersey: Prentice Hall, In, 1996.
12. Irnin dkk. Pengembangan Media Pembelajaran Fisika Mobile Learning berbasis Android. Jurnal Penelitian dan Pengembangan Pendidikan Fisika. 2017; 3(1):57-62.
13. Kemp JE, Dan Dayton DK. Planning and Producing Instructional Media. Cambridge: Harper & Row Publishers, New York, 1985.
14. Rihaldy M. dkk. Estimasi Data Hilang pada Rancangan Cross-over Menggunakan Metode Biggers. Skripsi. Makassar: Universitas Hasanudin, 2017.
15. Oemar Hamalik. Media Pendidikan. Bandung: Cipta Aditya Bakti. Purwadarminta, 1994.
16. Pemerintah Republik Indonesia. Peraturan Pemerintah Republik Indonesia No. 19 Tahun tentang Standar Nasional Pendidikan, Jakarta, 2005.
17. Purnamawati dan Eldarni. Media Pembelajaran. Jakarta: CV. Rajawali, 2001.
18. Rohmani, dkk. Pengembangan Media Pembelajaran Fisika Berbasis Multimedia Interaktif Terintegrasi Dengan Lks Pokok Bahasan Hukum Newton Tentang Gerak Kelas X Sma/Ma. Jurnal Inkuiri. 2015; 4(1):152-162.
19. Sadiman, *dkk*. Media Pendidikan. Jakarta: Rajawali, 1990.
20. Sudjana, Nana. *Dasar-dasar Proses Belajar Mengajar*. Bandung: Sinar Baru Algensido Offset, 1989.
21. Sudjana, Nana. *Penilaian Hasil Proses Belajar Mengajar*. (Cet. XV). Bandung: PT. Ramaja Rosdakarya, 2010.
22. Sudjana. *Dasar- Dasar Proses Belajar Mangajar*. Bandung: Sinar Baru Algesindo, 2002.
23. Sudjana. Metode statistika. Bandung: Tarsito, 2005.
24. Sugiyono. Metode Penelitian & Pengembangan. Bandung: Alfabeta, 2015.
25. Juniardi, T. N.2015. Pengaruh Smartphone Terhadap Rutinitas Mahasiswa Unlam
26. UU No 20 tahun. Tentang Sistem Pendidikan Nasional, 2003.
27. Wahyuni Fakrhiyah. Pengembangan Media Pembelajaran Ipa Fisika Berbasis Multimedia ***Flash Cs5*** Pokok Bahasan Optika Geometri Untuk Meningkatkan Pemahaman Konsep Siswa Kelas Viii Smp Negeri 1 Winongan. Skripsi. Universitas Negeri Malang, 2014.
28. Wolter Lutaan. Pengembangan Media Pembelajaran Fisika Menggunakan Permainan Ular Tangga Ditinjau Dari Motivasi Belajar Siswa Kelas VIII Materi Gaya. Skripsi. Universitas Negeri Manado, 2015.