Feasibility of Android-Based Physics Learning Media on Dynamic Electricity

by Apit Fathurohman

Submission date: 07-May-2023 09:49PM (UTC+0700)
Submission ID: 2086509029
File name: 7389-26900-2-PB.pdf (475.94K)
Word count: 3362
Character count: 18812

Feasibility of Android-Based Physics Learning Media on Dynamic Electricity

Gerry Sugiarto[1], Apit Fathurohman[2], Muhamad Yusup[3]
[1] SMA Negeri 4 Lahat, South Sumatera, Indonesia
[2,3.] Universitas Sriwijaya, South Sumatera, Indonesia
Coressponding Author. E-mail:
[1]gerry.sugiarto@gmail.com

Received: July 6th, 2022 *Accepted:* July 27th, 2022 *Online Published:* July 31st, 2022

Abstract

The purpose of this research is to determine: (1) validation of android-based physics learning media on dynamic electricity material for Class XII SMA students (2) the effectiveness of Android-based Physics Learning Media on dynamic electricity material for XII Class SMA students. The research method used is development research which refers to the development of Allesi and Trollip which includes: the planning stage, the design stage, and the development stage. This Learning Media was validated by 2 content validators, 2 media validators, and 5 students to determine its eligibility based on the feasibility aspects of content, language, presentation, and graphics. After being validated and fulfilling the eligibility criteria. The results of the development of android-based learning media are: (1) Learning media is feasible and practical to use (2) Learning media is in accordance with student learning styles and student learning independence

Keywords: Learning Media, android, Dynamic electricity**.**

How to cite this article :

Sugiarto, G., Fathurohman, A. & Yusup, M.(2022). Feasibility of Android-Based Physics Learning Media on Dynamic Electricity. *IJIS Edu : Indonesian Journal of Integrated Science Education*, *4*(2), 102-108 . doi:http://dx.doi.org/10.29300/ijisedu.v4i2.7389

INTRODUCTION

The rapid progress of science and technology in learning is something that cannot be avoided. The pattern of education 4.0 integrates the internet with everyday life, where human interaction with machines can solve problems and can innovate to achieve new things. Education 4.0 has provided developments in communication and information technology that are not limited by space and time, and have changed the learning process to be dynamic. Practical and internet-based communication and information technology has changed the future of education 4.0. In overcoming the industrial revolution 4.0 in the world of education, learning methods combine innovative methods to improve the learning process (Halili, 2019)

Good teaching and learning activities are inseparable from the teacher's role in accommodating students to achieve the expected learning outcomes and goals (Mardiana., et al., 2019). The rapid development of information technology (ICT) should be followed by teachers in creating an interesting and colorful learning atmosphere in the classroom. To create interesting learning in the classroom, the teacher must be able to develop learning media that keeps up with the times.

The development of smartphones has increased from year to year in January 2022, according to research company Data Reportal, reaching 370.1 million. Data on smartphone users in the age range of 9-19 years is more than 60%, so the development of smartphone-based learning media has the potential to be developed. Smartphones have two operating systems that are very popular in use, namely iOS and Android. The development of smartphones with the iOS operating system is rare, this is because the operating system can only be used on Apple products, is expensive and cannot modify the operating system (Adelphia, 2015). Android operating system development is mostly done because the Android operating system is open source, it is easier to modify, besides the costs used are not expensive (Salbino, 2014).

Physics is part of a branch of science or commonly called natural science. The thing that is studied in physics is natural phenomena systematically not only mastering a set of knowledge in the form of facts, concepts or just principles but the process of discovery (Azizah, 2014). One of the physics materials, namely dynamic electricity, is a material in very abstract physics learning. Therefore, it is very difficult for students to understand the concepts in dynamic electricity material. The development of learning media for dynamic electricity material has been carried out a lot from year to year, including the development of macromedia flash-based physics learning media (Qusyairi, 2019). The next development of learning media uses computer animation at MAS Darul Ihsan (Warditon, 2019). according to Tetania et al (2019) it is necessary to develop interactive multimedia on dynamic electricity material for class XII high schools. Research conducted by previous researchers using computer-based macromedia flash requires learning media that is more effective, efficient, and practical. Therefore, from the descriptions of previous researchers, especially on dynamic electricity material, it is necessary to develop Android-based learning media on smartphones..

METHODS

This type of research is research and development (Research and Development) which aims to produce certain products that are valid and practical. The resulting product is an android-based physics learning media on valid and practical dynamic electricity material. The research time is June 10 2022 to June 14 2022. The research location is SMA Negeri 4 Lahat

The development model used (Alessi, 2011) consists of three attributes which consist of three stages. These three attributes are standards, ongoing evaluation, and project management. Whereas the three stages are the planning stage, the design stage, and the development stage.

The subject of research on the development of android-based learning media on dynamic electricity material for class XII SMA. The instrument used in this study is a validation sheet. The validation used is media expert validation and material (content) expert validation. Media expert validators are two lecturers, two material expert validators, one lecturer and one teacher.

Furthermore, data collection was carried out by validating Android-based learning media adapted to the development model (Allesi & Trollip, 2011). For media expert validators the aspects assessed are design and features. For material (content) expert validators the aspects assessed are content and language aspects. For the alpha test the aspects that are assessed are

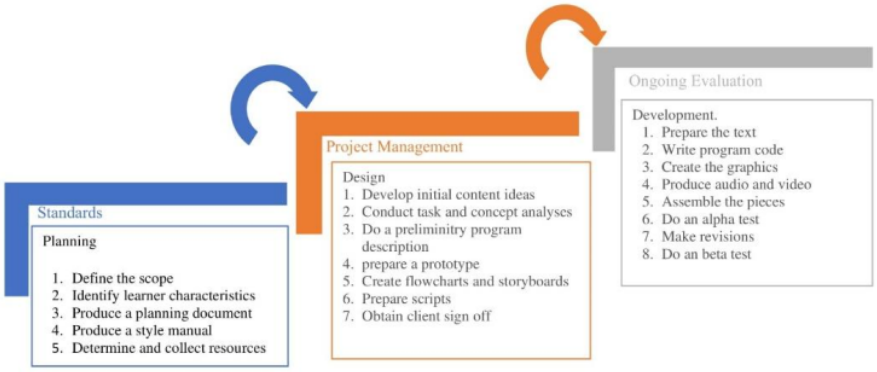

Figure 1. Syntax of Model of Development Learning Media by Allesi & Trollip

programming, content, appearance, application usage.

Furthermore, the planning stage is carried out to determine the scope of dynamic electricity learning material based on the syllabus used by high school physics teachers to identify student characteristics. The next activity was discussion of initial ideas with physics subject teachers and supervisors

The design stage carries out activities, namely making flowcharts, storyboards, and preparing material scripts. The next step is the development stage consisting of four steps, namely the first step is the product elements are prepared. The product elements used in developing dynamic electric material physics learning media are: images, animation, audio and video. In managing images, the Adobe Photoshop CS2 program is used as well as free applications on the web. The second step is product creation. In making a product, the thing that must be done is to combine the product elements that will be used so that they become a unified whole, other applications are needed. The application used is Android Studio. In the process of combining these elements, they have been adjusted to the flowchart (see figure 1) and storyboard (see figure 2).

In testing activities, namely alpha testing, beta testing, and product revision. The alpha test is validating the product which is carried out by two media experts and two material experts. After doing the alpha test, then proceed with the initial revision. The initial revision was carried out based on the assessment and inputs obtained from media experts and material experts. Furthermore, beta testing was carried out on 5 Class XII SMA students. After the beta test is done, then the product is revised last. This last revision aims to improve the product so that there are no more errors and it is ready to be used for field tests (product validation).

RESULTS AND DISCUSSION

Product Results

Product results developed through Android Studio with the .apk file format. On this page students will be faced with menu choices like the picture above. There are also several features on the main page display, namely instructions, competencies, materials, simulations, exercises, concept maps, glossary, references, author, pictures of live speakers and pictures of dead speakers. The results of the development of product learning media are shown in Figure 2.

The instructions feature contains how to use this application regarding the general description of the learning media application. Competency features, containing basic competencies, competency achievement indicators, learning objectives are shown in the table 1

Figure 2. Appearance of Learning Media

Table 1. Basic Competencies, Competency Achievement Indicators (GPA), and Learning Objectives

	Basic Competence
3.1	Analyze the working principle of direct current (DC) electrical equipment along with its safety in everyday life
4.1	Conduct experiments on the working principle of direct current (DC) electric circuits with the scientific method along with presentation of the experimental results.
	Competency Achievement Indicator
3.1.1	Explaining electric current and measurement
3.1.2	dentify current and voltage in series and parallel circuits
3.1.3	Explain the working principle of DC electrical equipment in everyday life.
3.1.4	Explain ohm's law
3.1.5	Explaining Kirchoff's I law and Kirchoff's II law
4.1.1	Experimenting with direct current (DC) electric circuits
4.1.2	Measure current and voltage in a closed circuit
	Learning Goal
3.1.1	Through Literature Study Activities from the internet and discussions students can identify currents and voltages in electrical circuits
3.1.2	Through Literature Study Activities from the internet and discussion students can explain Ohm's law correctly
3.1.3	Through Literature Study Activities from the internet and discussion students can explain Kirchoff's 1st law correctly
3.1.4	Through virtual lab practical activities, namely carrying out work experiments on direct current (DC) electric circuits correctly

In material features, it contains material that has been adapted to basic competencies (KD), indicators of competence attainment, and learning objectives. The material displayed in slide form consists of electric current material, Kirchoff's 1st law, Ohm's law, series circuits, and parallel circuits. Furthermore, there is a simulation feature, containing simulations on the relationship features of voltage (V) and electric current (i) and series and parallel electrical circuits. In the feature there are virtual lab practicum activities using PhET and the Ministry of Education and Culture virtual lab, as well as Student Worksheets (LKPD) that students can do.

In the exercise feature, it contains ten questions that are tailored to basic competencies, indicators of achieving competency learning objectives. Before students can do exercises on learning media students will study two sample questions that will be displayed for 120 seconds. Next, students can continue with practice questions. Students can see the results of the answers they are working on in the form of numbers on a scale of 0-100, after that, students can see the answer keys to the questions they have answered. The concept map feature contains a concept map that is used for the flow of understanding the material. The concept map feature is made by showing the material and the relationships between the material to be studied. The glossary feature contains the terms used in understanding the material. Reference feature, contains asset references used in the use of the media used. Author feature, contains data on learning media developers. The speaker feature turns off and on, contains muting and turning on the sound.

Student responses in the development of android-based learning media. AA students were seen immediately installing the developed application. BB students together with CC students were seen discussing things that would be done in the application being developed. DD students ask the teacher what to do with the application once it is installed. EE students are seen immediately installing applications and studying each part displayed on the learning media. The following is a recapitulation of the results of instrument validation that students have filled out.

Table 2 Recapitulation

No	Nama Siswa	Persentase	Tingkat Kelayakan
1	AA	100 %	Very Proper
2	BB	92 %	Very Proper
3	CC	88 %	Very Proper
4	DD	84 %	Very Proper
5	EE	100 %	Very Proper

Discussion

In the development of learning media, a concept map feature is provided. The concept map created has created a more independent learning attitude for students. Students carry out their own information exploration in achieving goals in dynamic electricity learning. This is certainly in accordance with the statement from (Gawin, 1985) in Hardanti et al (2016) stating that concept maps must meet the existing criteria (1) propositions, (2) hierarchy, and (3) cross-links. Concept maps help students to provide meaningful learning activities, which can improve students' understanding and learning memory.

The independence of student learning in studying dynamic electricity material can be seen when students open the application. They are very enthusiastic about the delivery of dynamic electricity material that will be obtained. This can be seen when students are given time to open the application and students immediately take advantage of the features in the media. Students can repeat each material, sample questions, simulations, and exercises until the student gets the expected understanding. This is in line with the goal of student learning independence, which is to make students plan, monitor, and evaluate. As for learning activities that are based on belief in one's own abilities and there is a commitment to achieving learning goals or academic assignments so that learning objectives such as assignments, knowledge, and skills can be achieved (Mulyadi., et al, 2016).

Each student has his own learning style in utilizing the learning media. This can be seen from the students who turn on the sound on the learning media, meaning that the student is an aural or auditive learning style type. Students then use books and stationery to write down the things they get while using dynamic electricity learning media belonging to the visual (spatial) learning style. The next student is seen immediately working on the exercises in that section. The student tries - tries on the paper by connecting with the formula they know to understand the examples - then doing the exercises. The student has a logical learning style. Furthermore, there are students when they open the features in the learning media individually silent without sound. The student's learning style belongs to the solitary (intrapersonal) learning style. Students then learn to understand learning media that are made with friends or in groups so that they can easily understand the material in the learning media, so these students have a social (interpersonal) learning style.

The learning media developed has one very important feature, namely the simulation feature. In the simulation feature, students will be directed to a virtual laboratory that is connected to the subject of dynamic electricity PhET and the Ministry of Education and Culture's dynamic electricity virtual laboratory. The existing PhET virtual laboratory students will be directed to simulations to create series and parallel electrical circuits. This of course requires students to study existing concepts and prove electric currents and how currents occur in an electric circuit that cannot be seen directly by the naked eye. To make it easier for students to learn it, these students must practice by doing virtual practicum and certainly the Android smartphone must be connected to the internet so that by experiencing it directly students can draw conclusions about the concepts in the material, and students can explain clearly and correctly according to with the LKPD in the learning media. In this activity the students were very enthusiastic because it was a new experience that had never been obtained so far. Several students revealed that they imagined about dynamic electricity, especially how the electric circuit was created and simulated. So far, students have not been able to imagine how series and parallel electrical circuits are made, but on that occasion students did. This is reinforced by the research of Adam, et al in (Saregar, 2016) PhET simulations can well describe material concepts that were initially difficult to understand during the teaching and learning process in the classroom, which were presented through the lecture method. So that in this study learning was carried out using experimental methods with the help of PhET Software. Other research states that dynamic electricity PhET as a virtual laboratory can improve student learning outcomes (Saputri & Rahman, 2018). So far, PhET simulations can only be simulated optimally on computers, laptops or PCs. In the learning media developed, PhET can be

simulated in an Android-based learning media, of course this adds to the attractiveness of the learning media being developed. Then the practicum results can be presented in the form of graphs, tables, or descriptive. Analysis and interpretation of these results is necessary before they are discussed.

CONCLUSIONS

Development of android-based learning media for dynamic electricity material for Class XII SMA with the Alessi and Trollip development models. Products that have been successfully developed in a valid and practical manner are in the form of applications that can support direct learning in class as well as learning that is carried out independently, by utilizing an Android-based smartphone and has been tested to be compatible with various versions of Android. In this application there are features that have been adapted to the needs of the feature instructions, competencies, simulations, exercises, lists. Android-based learning media for class XII high school dynamic electricity material has been tested for feasibility by media experts and material (content) experts with very appropriate categories as well as due diligence by students so that overall this media is very feasible to use.

REFERENCES

Adelphia, A. (2015). *Pintar Mengoperasikan iPhone*. PT Elex Media Komputindo.

Alessi, S. M. and S. R. T. (2011). Multimedia for Learning: Methods and Development. 3rd ed. In *Massachusetts: Allyn & Bacon* (3rd ed.). Allyn And Bacon.

Azizah, N, D. (2014). Penerapan Model Inkuiri Terbimbing untuk Meningkatkan Keterampilan Proses Sains dan Hasil Belajar Fisika Siswa Kelas X.C di MAN 2 Jember Tahun Ajaran 2013/2014. *Jurnal Pendidikan Fisika*, 235–241.

Gawin, N. and. (1985). *Learning How to Learn*. cambridge university press.

Hajar Halili, S. (2019). Technological Advancements in Education 4.0. *The Online Journal of Distance Education and E-Learning*, *7*(1), 63–69. www.tojdel.net

Mardiana, M., Akhyar, M., & Musada, A. A. (2019). Analisis Kebutuhan Siswa di SMA Negeri 3 Bolo Terhadap Bahan Ajar Bergambar pada Materi Plantae. *Proceedings of The ICECRS*, *2*(1), 11–18. https://doi.org/10.21070/picecrs.v2i1.2403

Mulyadi, S., Basuki, M. H., & Rahardjo, W. (2016). *Psikologi Pendidikan Dengan Pendekatan Teori-Teori Baru dalam Psikologi*. PT RajaGrafindo Persada.

Qusyairi, L. A. H. (2019). Pembuatan Media Pembelajaran Fisika Berbasis Macromedia Flash. *Islamika*, *1*(1), 97–114. https://doi.org/10.36088/islamika.v1i1.184

Salbino, S. (2014). *Buku Pintar Gadget Android*.

Saputri, D. F., & Rahman, A. D. (2018). PENERAPAN METODE EKSPERIMEN BERBANTUAN SOFTWARE PhET PADA MATERI LISTRIK DINAMIS DITINJAU DARI KEMANDIRIAN BELAJAR SISWA KELAS X MAN SINTANG. *Jurnal Pendidikan Matematika Dan IPA*, *9*(1), 87. https://doi.org/10.26418/jpmipa.v9i1.23702

Saregar, A. (2016). Pembelajaran Pengantar Fisika Kuantum dengan Memanfaatkan Media Phet Simulation dan LKM Melalui Pendekatan Saintifik: Dampak pada Minat dan Penguasaan Konsep Mahasiswa. *Jurnal Ilmiah Pendidikan Fisika Al-Biruni*, *5*(1), 53–60. https://doi.org/10.24042/jpifalbiruni.v5i1.105

Tetania, N., Siahaan, S. M., & Zulherman, Z. (2019). *Pengembangan Multimedia Interaktif Fisika Materi Listrik Dinamis Untuk Kelas*

Xii Sekolah Menengah Atas [Universitas Srwijaya]. https://repository.unsri.ac.id/2773/

Warditon, I., & Fitriyawany. (2019). Jurnal Pendidikan Fisika dan Fisika Terapan. *Jurnal Pendidikan Fisika Dan Fisika Terapan*, *1*(1), 1–8.

Feasibility of Android-Based Physics Learning Media on Dynamic Electricity

ORIGINALITY REPORT

9%	6%	4%	0%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	journal.iainbengkulu.ac.id Internet Source	4%
2	repository.iainpare.ac.id Internet Source	1%
3	Henry Suryo Bintoro, Ratri Rahayu, Alif Catur Murti. "DESIGN OF ETHNOMATHEMATICS MOBILE MODULE TO FACILITATE STUDENTS MATHEMATICAL THINKING ABILITY", AKSIOMA: Jurnal Program Studi Pendidikan Matematika, 2021 Publication	1%
4	E Afriani, A Asmar. "The development of device learning based on contextual teaching and learning improve mathematical communication skills class VII", Journal of Physics: Conference Series, 2020 Publication	1%
5	Nopriyanti, E D Kurniawan, H Fatihah. "Learning media-based android for technical	1%

drawing courses", Journal of Physics: Conference Series, 2020
Publication

6	ejurnal.budiutomomalang.ac.id Internet Source	1 %
7	jurnal.narotama.ac.id Internet Source	1 %
8	repository.unsri.ac.id Internet Source	1 %

Exclude quotes	On	Exclude matches	< 1%
Exclude bibliography	On		