The Effectiveness of Android-Based Physics Learning Media Assisted by Smart Apps Creator to Improve Learning Outcomes

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Abstract: The aim of the research is to develop physics-based learning media based on Android with the help of smart app creators on mechanical wave material. Tests were conducted to determine the effectiveness of the media to improve student learning outcomes. This study uses the Research and Development (R&D) development research method. The research subjects were 22 students of SMAN 1 Gunungsari class XI IPA1. The results obtained were an average pre-test score of 43.33 and a post-test score of 72.50, with an average N-gain of 0.52 which qualified in the medium category. This shows that the Android-based physics learning media assisted by smart app creators is effective in improving student learning outcomes in mechanical wave material.

Keywords: physics learning media, smart apps creator, learning outcomes

Introduction

Changing times lead to changes in technology. Technological changes affect all aspects of life, including affecting the world of education. The influence of technology has a big impact on education. Technology in education can be used as a means to achieve learning goals (Maritsa et al, 2021). According to Gunawan and Widiati (2019), almost all components of the education system are influenced by technological developments, both in terms of learning materials, learning resources, strategies, learning objectives, and learning media. Technology is the overall means of providing goods needed by humans (Waluyo & Suni, 2022). Advances in information and communication technology bring people into the digital era. In the digital era, humans can obtain various information very quickly. The digital age has revolutionized the way we learn. The use of digital technology in education makes the learning process easier for students (Amarulloh et al, 2019).

Smartphones have become an indispensable part of our lives, allowing us to access information easily and conveniently. This allows students to use their mobile phones for learning, such as reading online textbooks, using online lectures, and taking notes with apps. Smartphones can also be used to find relevant material quickly and easily. With the right apps, students can make the most of their study time by having all the necessary information at their fingertips. On smartphones, there are many applications that can be used as sources of information, but educational applications are still very minimal on smartphones, especially in physics lessons.

Physics is an important subject in education, but its application in learning media is often neglected. Physics is a science that studies natural phenomena (objects) both micro and macro and their interactions and tries to find relationships between these symptoms and the existing reality (Putri, 2021). To make it easier for students to understand physics lessons easily, students need good learning media. According to Ikhbal and Musril (2020) state that learning media is a means of channeling messages or learning information that the source of the message wants to convey to the target or recipient of the message. One of the media that is suitable for use by students in this digital era is Android-based media because it has a big impact on students' ability to learn and understand physics concepts. According to Safitri et al., (2020), each concept does not stand alone but is interconnected with other concepts. The development of android-based learning media can provide fresh air for education in Indonesia. The practical, flexible, and

personal nature of learning media can increase students' interest, motivation, and creative power in the learning process (Muyaroah & Fajartia, 2017). Physics lessons consist of many concepts and material that is abstract in nature, making it difficult for students to understand. With the right learning media, students can gain a better understanding of physics and apply it in everyday life. Unfortunately, many learning media are not designed to help students understand physics concepts, especially in mechanical wave material. Therefore, a teacher or prospective teacher must be good at developing learning media to motivate students' interest in learning.

The use of smartphones has become part of student's daily activities, enabling educators to take advantage of this situation to develop Android-based physics learning media. According to Surani (2019) in this era, teachers must upgrade their competencies to deal with the millennial generation who are no strangers to the digital world. Android-based media allows students to access educational content on their mobile phones. There are many Android-based learning support software applications available and one of them is the Smart Apps Creator (SAC). The Smart Apps Creator (SAC) application is the latest digital interactive media that builds multimedia content that can be installed on Android-based smartphones (Suhartini, 2021). Smart Apps Creator (SAC) as software has advantages including 1) does not require programming skills, so anyone can operate it, 2) The output of this application can be applied on various platforms and one of them is Android, 3) Easy to insert animation as desired and needs, 4) interactivity, 5) support for all types of storage media, 6) integrated web services so that applications are more functional (Budyastomo, 2020).

Research related to the development of Smart Apps Creator (SAC)-based media has been carried out, such as the development of Android-based Smart Apps Creator media that is effectively used in science learning on temperature and heat material for class V Elementary School (Elviana & Julianto, 2022). With the introduction of Android learning media, students find it easier to understand physics lessons interactively. This has a positive impact on the difficulty of physics lessons, making them more accessible and understandable for all types of learners. By providing interesting visual and audio content, Android learning media helps students better understand the material and stay focused on the task at hand. In this paper, we will discuss the effectiveness of Android-based learning media

assisted by Smart Apps Creator (SAC) to improve learning outcomes in mechanical wave material? Researchers hope that this Android-based physics learning media can help convey material properly and effectively so students can understand physics concepts well.

Methode

This study uses the Research and Development (R&D) development research method. Research and development Research and Development is a series of processes or steps in order to develop a new product or perfect an existing product so that it can be accounted for. This development research aims to produce Android-based physics learning media assisted by smart app creators which can be said to be effective for increasing understanding of the concept of mechanical wave material. This research intends to create a media product, namely Android-based learning media that can make it easier for students to receive lessons in the learning process. The subjects in this study were 22 students of SMAN 1 Gunungsari class XI IPA 1. The development model used in this study is the 4D model (Define, Design, Develop, and Disseminate) with 4 stages, namely:

First (define), the purpose of this stage is to define and define the learning conditions. This stage includes 5 main steps, namely initial analysis, student analysis, task analysis, concept analysis, and specification of learning objectives. After the initial analysis, student analysis, task analysis, concept analysis, and specification of learning objectives. A solution was found, namely the development of interactive learning media based on Android using the Smart Apps Creator (SAC) for physics subjects on mechanical wave material in KD 3.8 Analyzing the characteristics of mechanical waves and 4.8 Conducting experiments on one of the characteristics of mechanical waves.

Second (design), at this design stage it aims to prepare the structure of the learning device to be developed. The selection of media is carried out to facilitate optimal learning so that the objectives of learning and making media are achieved. Selection of media according to needs, concept analysis, and analysis of tasks that have been made. The selection of media that researchers use to replace experiments that cannot be carried out is by providing experiences in virtual form using a smartphone. Media created using the Smart App Creator software is packaged in an attractive way to become interactive learning media.

Third (develop), the development stage is the stage of developing a product that is in accordance with the design that will be used in learning. At this stage, the effectiveness of the media that has been made is tested. The results of the effectiveness of Android-based media can be obtained by increasing students' understanding of concepts seen from a comparison of the N-gain scores with the following equation:

$$< g > = \frac{pretest\ score - posttest\ score}{maximum\ score - pretest\ score}$$

The N-gain values obtained from each student are then categorized using the normalized gain index interpretation as shown in Table 1.

Table 1: Effectiveness Criteria

Value Range	Criteria
N-gain > 0,7	High
0,3≤ N-gain ≤ 0,7	Medium
N-gain< 0,3	Low

(Mahuda et al, 2021)

Fourth (Disseminate), The purpose of this stage is to disseminate Android-based physics learning media assisted by smart app creators on mechanical wave material that has been developed, after undergoing improvements and declared feasible for use. At this stage, the resulting learning media is disseminated to various physics teachers and students at SMAN 1 Gunungsari School as learning media.

Result and Discussion

The media developed is an android-based learning media on mechanical wave material. The results of the initial analysis revealed that most students already had their own smartphone devices and were used to using them. However, the utilization and use of learning activities have not been carried out optimally, students spend more time playing games, social media, YouTube, etc. Likewise with teachers, where teachers have not been optimal in utilizing and developing technology-based media in accordance with the needs and demands of the times. Activity analysis was carried out by reviewing the curriculum contained in class XI, then it was formulated into the GPA of the KD.

Based on the results of the field survey it is known that students have a very low learning level, students are too focused on smartphones so they are less focused on learning. Available learning media is also lacking. So it is necessary to hold a learning

media that can attract students' interest in learning. Learning media can be designed by making Android-based media. Android-based media can be designed in an interesting way so that it attracts students' learning interests. Students will also focus more on learning so that students understand the concept well. It takes the development of Android-based learning media. In this research, a product in the form of Android-based media was created with the help of a smart app creator. Smart apps creator is an application for creating Android applications that can be accessed easily with an easy-to-understand display and minimal memory usage (Prasetyo & Musril, 2021). By making this Android-based learning media the teaching and learning process becomes effective, interesting, and fun for students. The design of learning media that has been made is as follows.

Figure 1. Initial Display of Android-Based Media

Figure 1. is the initial display of Android-based media assisted by smart apps creators, this display is the opening video for learning media.

Figure 2. Home Menu Display

Figure 2. is the display of the home menu of learning media, the home menu consists of 6 menus namely instructions, KI and KD, material, phet simulation, Quiz, and Biodata. Students can choose what menu they want to display.

Figure 3. Display Instructions

Figure 3. is a display of instructions for using learning media so that students can easily use learning media.
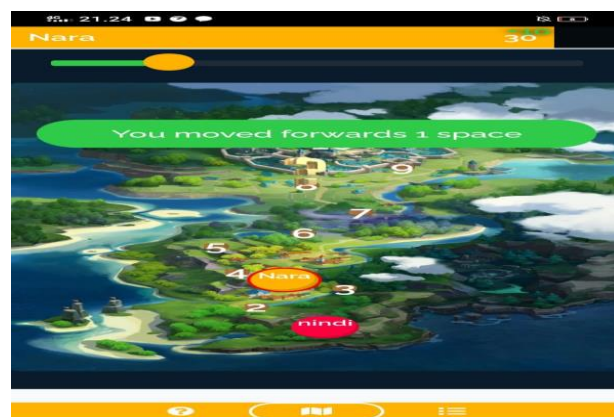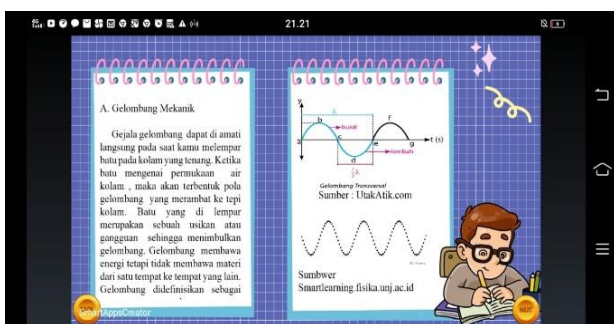

Figure 4. Display of Core Competencies and Basic Competencies

Figure 4. is a display of Core Competencies and Basic Competencies. Core competencies and basic competencies that must be achieved by students, after learning to use the learning media that have been studied.

**Figure 5.** Display of Mechanical Wave Material

Figure 5. is a display of material consisting of understanding mechanical waves, classification of mechanical waves, their magnitudes, and characteristics, besides that this material also consists of online videos which are directly linked directly to YouTube videos.

Figure 6. Material Phet Simulation

Figure 6. is a simulation that will be carried out by students. When they have finished studying the material, this simulation aims to provide students with virtual experimenting experiences. This simulation is a simulation of light wave interference.

Figure 7. Quiz Display

Figure 7. are pictures of quizzes available online that are designed using a quizzer, this quiz is designed like an educational game, this quiz consists of 3 types of questions, namely multiple choice, true and false, and numeric


Figure 8. Personal Biodata

Based on the results of the trial held at SMAN 1 Gunungsari on February 23, 2023, class XI IPA 1 by giving a multiple choice form test on mechanical

wave material. The test instrument consists of 25 multiple-choice test items with indicators: knowledge (C1), understanding (C2), application or application (C3), analysis (C4), evaluation (C5), and creation (C6). Data on the results of the pre-test and post-test scores can be seen in full in Figure 9. In the results obtained the ability of knowledge, understanding, and application obtains an average final score of 80, even for the ability of the application to obtain the highest score of 85. This is because, in the media that was created, there were many examples of questions on mechanical wave material along with how to discuss them. As for the ability to analyze (C4), evaluate (C5), and create (C6) get a score of less than 80. This means that the media can already measure low-level thinking skills, but to measure higher-order thinking skills it is necessary to improve in terms of the learning process.
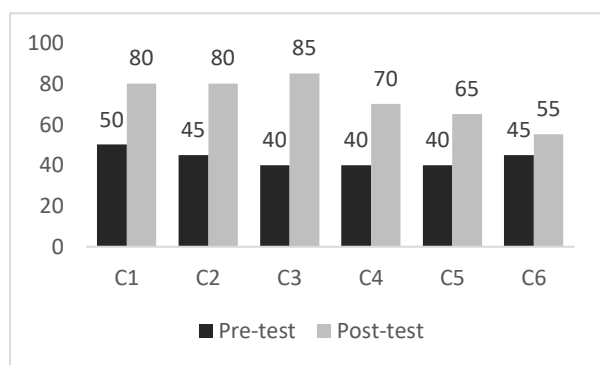
Figure 9. Graph of pre-test and post-test results of learning
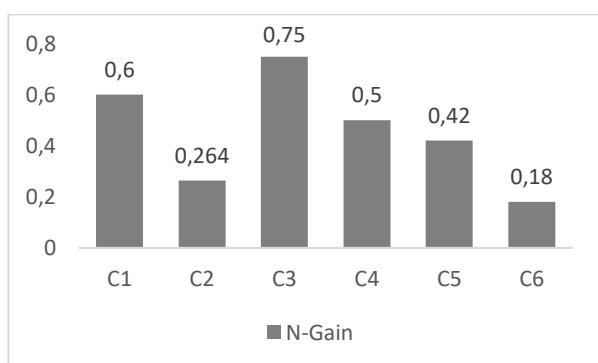
Figure 10. Graph of the value of N-gain learning outcomes

Meanwhile, measuring the effectiveness of a media is based on the N-gain value, not based on the final score. Based on the N-gain results in Figure 10, it produces an average pre-test score of 43.33 and an average post-test score of 72.50. By doing the calculations, an average N-gain of 0.52 is obtained in the medium category. For each of the indicators

that have been measured, the average N-gain of application capability has the highest average N-gain of 0.75, while the creating/creating indicator has the lowest N-gain of 0.18.

The value obtained indicates an increase in the ability to understand concepts as seen from the average value of student learning outcomes. The results obtained show that the Android-based physics learning media assisted by smart app creators is effective in improving student learning outcomes in mechanical wave material.

This is also supported by the results of research conducted by Wulandari (2020) stating that the development of Android-based learning media is appropriate to help students learn physics more effectively. In line with research conducted by Kumala & Widiatun (2022), the results of his research show that Android-based media helps the teaching and learning process and applications can be used as educational tools because they are fast, effective, and efficient. This media can be designed using smart app creator software. Smart apps creator is a desktop application for creating Android and IOS mobile applications without programming code and can produce HTML5 and exe formats (Suhartati, 2021). The same thing was done by Mahuda, et al., (2021) who stated that Android-based learning media assisted by smart app creators was effective in improving mathematical problem-solving. This result is reinforced by Budyastomo's statement (2020) that the Smart Apps Creator (SAC) has the advantage that it does not require programming skills, so anyone can create learning media according to the developer's creativity.

Conclusion

The results of the development of Android-based learning media assisted by smart apps creator on mechanical wave material are effective for increasing student learning outcomes with an N-gain value of 0.52 qualified in the medium category with the highest increase in N-gain on the applying indicator and the lowest on the creating indicator. create. Recommend that before using Android-based physics learning media assisted by smart app creators, all students are first trained to use the features contained in the media.

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