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Object Balance: Smartphone-based Media Development

Winda Setya*, Kamal Abdullah, Tazki Amalia Subia Putri

Universitas Islam Negeri Sunan Gunung Djati, Bandung, West Java, Indonesia

ORCID
Winda Setya: https://orcid.org/0000-0003-2878-1497

Abstract.
The current transformation of technology and information is very fast, making it easier to create media. Physics concepts that are known to be very abstract and difficult can be easily understood by providing a visual representation using a Smartphone so that they can be studied anywhere and anytime. This study aims to determine the feasibility and student responses for the development of physics media on the material of rigid body equilibrium using APP Inventor. The research and development (R&D) method was used. The results of this study were in the form of learning media based on Android (.apk), which contains materials, videos, simulations, examples of problem-solving, and evaluations designed in a way as to attract students' interest in learning scales and making it easier to understand the concept of rigid bodies.

Keywords: object balance, smartphone, media development

Corresponding Author: Winda Setya; email: suratwindasetya@uinsgd.ac.id

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1. INTRODUCTION

Education has a strategic role in the realization of quality human resources [1]. The higher achievement of the quality of human resources shows a good correlation of education [2]. Physics is one of the important fields of science to be mastered, but the assumption that the difficulty of studying physics remains a terrible scourge for most students. Weak understanding of concepts, the difficulty of supporting science of mathematics and the lack of interactive media material for students becomes a pile of cliché problems [3–5].

The transformation of Technology and Information today is very fast. There is no choice for students to participate in transformation following the development of Technology and Information. One of them is the use of smart phones. Digital marketing research institute Remarketer estimates that by 2018 the number of active Smartphone usage in Indonesia will reach more than 100 million people, with that number Indonesia will become the country with the fourth largest active Smartphone user in the world

after China, India and America [6]. With these opportunities, IT integration in the field of science becomes a necessity, including the field of physics [7].

Smartphone as one of the IT media that is widely used by students to play games, and social media where both of these are more disruptive to their learning [8]. Responding to this, learning also needs to be transformed in a Smartphone one of them as a medium of learning. Various software is available to make learning media. This software support can make learning media more interesting and can be easily produced [9].

The more students who own and use mobile devices, the greater the opportunity for the use of technological devices in the world of education. Learning media that utilize Smartphone technology are called mobile learning [10, 11]. Mobile learning is an alternative development of learning media that gives students the opportunity to learn less mastered material anywhere and anytime [12]. Seeing this potential, the development of learning media by utilizing the Adroid Operating System was transformed into a system that is most widely used on smart phones [13].

Based on previous research and development, this research develops learning media with updates in the form of developing physics learning media with material on rigid body equilibrium by utilizing the MIT 2 App Inventor application program. Media development besides using interactive buttons that function to connect the current slide will display the media results, there will also be some videos, virtual practicum simulations so that they can be used as a reference for motivating students to study the expected material stimulate students' way of thinking.

2. RESEARCH METHOD

This study raises the physics material in it regarding the equilibrium of rigid bodies. Research development (R&D) consists of 7 stages, namely data and information collection, planning, initial product development, initial trials, main product revisions, main product trials, product revisions, product trials, and final product revisions. The study begins with the stage of solution formulation and analysis of needs found in the planning stage. The next step is making the media layout that will be tested on a small scale. The results of the small scale revision and subsequent development will be carried out on a large scale test phase. Evaluations provided by respondents at the large-scale stage will be revised until the results can be used as research products.

The sampling technique uses a purposive technique example. Data in the form of interviews and questionnaires. Instrument data collection using a feasibility questionnaire sheet and student responses to development of physics learning media with

material on rigid body equilibrium using application programs MIT 2 App Inventor. Data analysis technique namely quantitative descriptive to process the assessment data by validator and student responses, as well as qualitative descriptive to describe comments on suggestions for improvement from the validator. Learning media will be reviewed by material experts and media experts to get the final results. This expert validation includes six aspects consisting of four aspects, namely relevance aspect, material organizing aspect, evaluation/practice aspect, and language aspect and two aspects for media expert assessment, namely effect aspect for learning strategy and visual appearance aspect. In the assessment of experts in the form of quantitative data from the results of the assessment and qualitative data from criticism and suggestions from experts. Feasibility assessment and student responses using a Likert scale with a rating scale of 1- 5. Rating using Rating scale model with very good, good, enough, bad, very bad interpretation. The data obtained from the questionnaire results were then calculated for the percentage.

3. RESULTS AND DISCUSSION

Based on the stages of analyzing student needs contained in the planning stage, a design of rigid body equilibrium learning media was made. Previous research and development carried out only moved the material into learning media accompanied by buttons that function to connect layer one with the layer desired by the user so that they can see the appearance of the results of the learning media. On This development will be connected with several PHeT virtual practicum animations and simulations as well as learning videos about the balance of rigid bodies so that it can be used as a reference as a motivational stimulus for students to learn the material and given so that it is expected to stimulate students' way of thinking. The product development design is shown in Figure 1. The development of learning media uses the MIT App-Inventor platform which is easy to use for beginners even those who don't know it. programming language.

Expert validation assessment includes an assessment of the relevance aspect consisting of suitability of material with core competencies (KI) and basic competencies (KD), clarity of formulation of learning objectives, suitability of material with indicators, suitability of material with learning objectives, correctness of the concept of the material in terms of scientific aspects. Assessment of aspects of organizing material consists of clarity of material delivery, systematic delivery of material, attractiveness of material

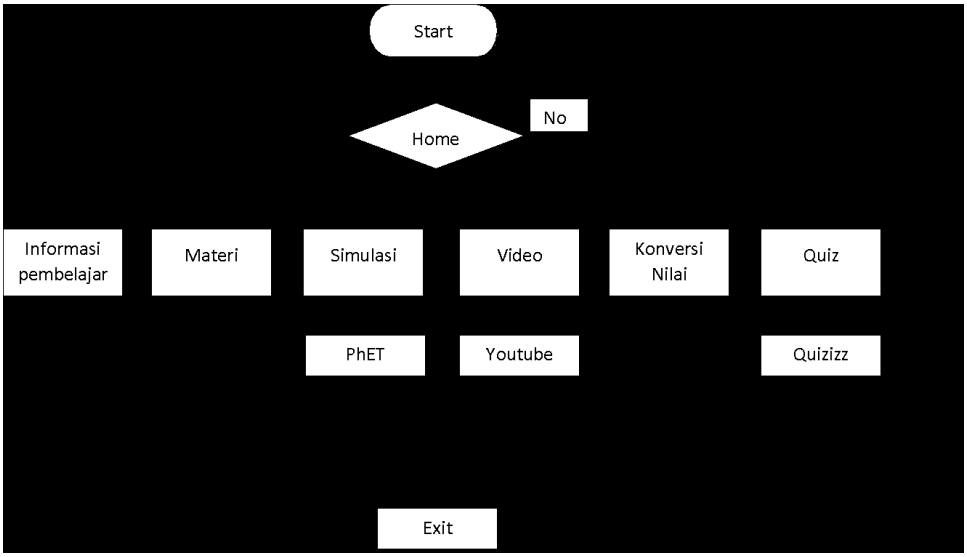


Figure 1: Flow chart media.

delivery, completeness of material, actualization of material, suitability of level of difficulty and abstractness of concepts with cognitive development of students, and clarity of examples given. Assessment of the evaluation/practice aspects includes the suitability of the evaluation with the material and learning objectives and the correctness of the concept of the questions. Assessment of language aspects includes the accuracy of the use of terms and the ease of understanding the flow of material through the use of language. Assessment of effect specs for learning strategies includes ease of use, media support for independent learning of students, the ability of the media to add knowledge, the ability of the media to increase student understanding, and the ability of the media to add motivation in learning. Assessment of aspects of visual appearance includes the suitability of display color selection, suitability for selecting fonts, suitability for selecting font sizes, accuracy and consistency of button placement based on pattern layout, and design attractiveness. The expert validation data for this learning media is declared feasible as shown in Figure 2.

This interactive test also tested the responses of students totaling 25 people using a response questionnaire to find out responses and improvements to learning media. The response questionnaire uses a Likert scale with five choices for each indicator. The percentage of the three aspects can be seen in Table 1.

Based on Table 1 it can be seen that the use of application-based learning media is very helpful in activities. The results of using the application that were tried on students to determine the effectiveness of using the application are shown in Figure 3.

The results of the test response questionnaire for interactive learning media based on APP Inventor in Figure 3 show that this learning media is interesting to use in the

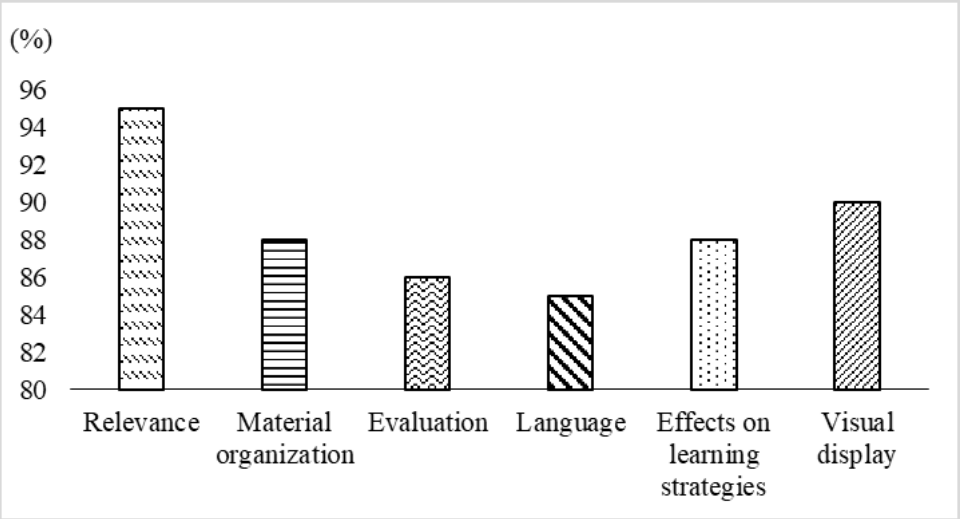


Figure 2: Expert assessment of learning media.

TABLE 1: Assessment submitted to students.

No	Indicator	Assessment (Student)				
		1	2	3	4	5
1	The efficiency of the application as a medium of independent learning	0	0	4	13	8
2	The effectiveness of the application as a medium of independent learning	0	0	5	12	8
3	Packaging applications in the .apk format make it easy for users	0	0	5	11	9
4	Application file is not large	0	0	5	8	12
5	Ease of application installation	0	0	3	11	12
6	Conformity between material with IC and BC 2013 curriculum	0	0	4	12	9
7	The suitability of the illustrations with the material	0	0	1	14	10
8	The suitability of the use of language according to students' understanding	0	0	5	7	13
9	Consistency to use terms and symbols	0	0	5	10	10
10	Linkages between chapters / sections	0	0	3	13	9
11	Conformity between questions and material	0	0	0	13	12
12	The accuracy of the discussion	0	0	5	13	7
13	Variation of questions	0	0	5	16	4
14	Interesting learning media	0	0	4	15	6

learning process by students. This interactive learning media is effectively applied to physics subjects because it can increase students' learning interest so that student learning outcomes also increase [2, 14]. The results of the responses to this trial will be the basis for evaluation of interactive learning media based on APP Inventor. The use of smart phones can be optimized as a tool or media in learning by students so that students feel comfortable in learning [15]. Android based learning media is developed

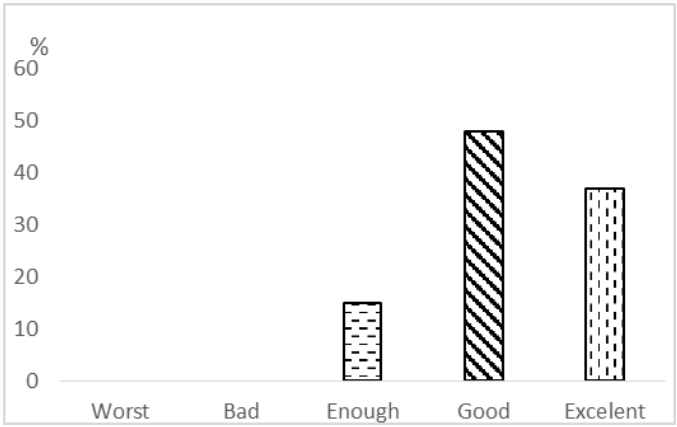
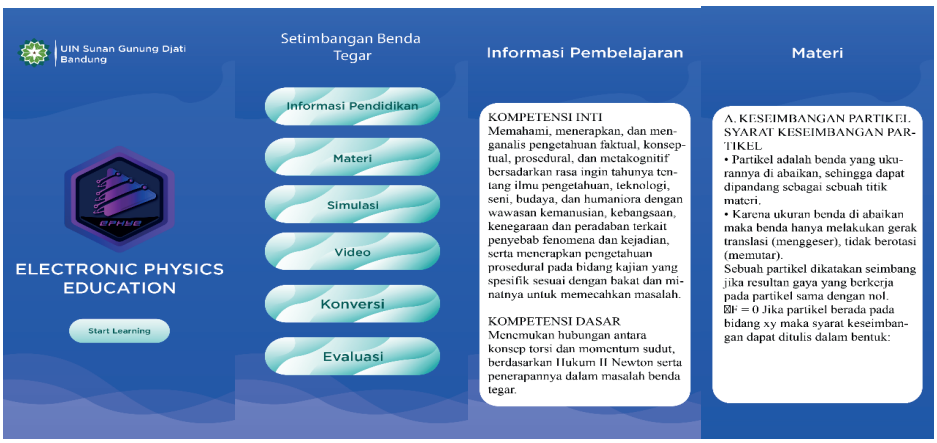


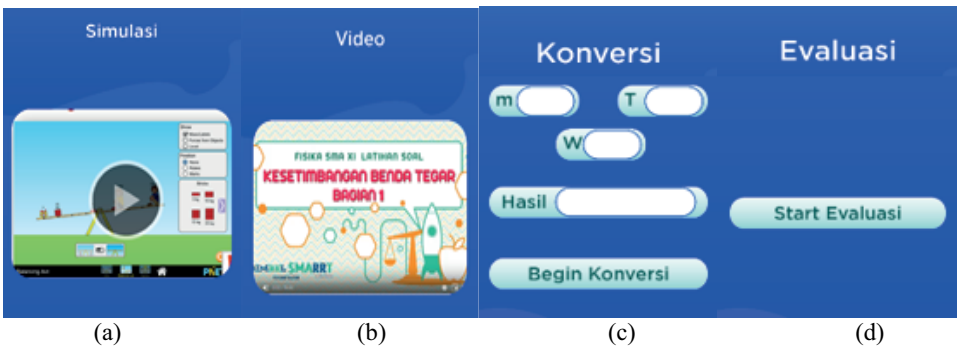
Figure 3: Display the results of using the application.

using the Mit 2 Inventor app platform which can be accessed http://appinventor.mit.edu/. The results of the development of learning media can be seen in Figure 3 and 4.



(a) (b) (c) (d)

Figure 4: (a) Main display, (b) Home menu display, (c) Learning information display (KD, IPK), and (d) Display material.



(a) (b) (c) (d)

Figure 5: (a) Simulation display, (b) Vedio display, (c) Conversion view, and (d) Evaluation display.

The presence of interactive material designs and learning videos about rigid body equilibrium, makes students more interested and less bored and can increase student

concentration. Virtual simulation can give students an idea of the material being taught and can present a real picture of practice in everyday life. The flexibility of using media that can be accessed anywhere and anytime and this interactive media can increase the knowledge, understanding and skills of students because of its attractive appearance.

4. CONCLUSION

We have succeeded in developing interactive learning media based on App Inventor that can attract students' interest in learning. The validation from media experts and material experts was declared feasible with an average yield of 89%. Students' responses to physics learning media on the material for rigid body equilibrium based on APP Inventor are very easy to use and increase students' learning interest with attractive media ratings of 48%, very interesting 37% and quite interesting 15%. The research produces data that can be concluded that the learning media tested to students is very helpful in learning activities. This learning media is categorized as good and suitable for use in learning activities.

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