Development of Measurement Learning Media Using App Inventor

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Abstract: The aim of this research is to develop learning media using App Inventor on Measurement material with a good category. The research method used is development research with the Research and Development (R&D) research model. The procedure used in the research and development of this learning media uses the ADD model with the stages of activity consisting of: Analysis, Design, Development. The learning media developed contains text, images and learning videos about Measurement material consisting of a cover page, login page, home page, specifications & instructions for use page, learning objectives page, material page, evaluation page, glossary page, bibliography page, and maker information page. The creation of this learning media utilizes App Inventor. The validation results obtained from experts in terms of material, media and language are very good so that the learning media is suitable for use.

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A. INTRODUCTION

The world of education continues to experience development and change. One example of a change in the world of education is a change in the curriculum. The curriculum in Indonesia has undergone several changes, historically some of these changes include the 1947, 1964, 1968, 1973, 1975, 1984, 1994, 1997, 2004, 2006, 2013 curriculum, emergency curriculum, prototype curriculum and merdeka curriculum (Santika et al., 2022). The change in curriculum has a strong foundation that underlies the change or replacement. Changes in the curriculum are in line with the development of the digital era which utilizes technology in its application.

The implementation of the curriculum changes and the development of the times is the development of digitalization which is one of the foundations in the implementation of the merdeka learning curriculum (Aulia et al., 2022). The merdeka learning curriculum basically implements independence in learning for students, so that students have the freedom to access knowledge through formal and non-formal education (Manalu et al., 2022). The implementation of an merdeka curriculum certainly requires an innovation that can support its success, the utilization of effective and efficient learning media is a form of innovation needed in learning. Students are expected to learn independently by using learning media, this is in accordance with what is expected in the merdeka curriculum. The merdeka curriculum is implemented in the 2021/2022 school year in driving schools and simultaneously implemented in almost all schools in the 2022/2023 school year, this is one of the factors that there are not many learning media available that can support the learning process in accordance with this curriculum is the implementation of an merdeka curriculum which is still in its early stages.

Physics is a branch of science that requires more understanding than theoretical memorization because physics is classified as a science that studies physical forms (Suparno,

2013). Physics studies the phenomena and properties of nature, so it can be said that learning prioritizes direct experience. One of the physics materials studied at the Senior High School (SMA) level in the Merdeka curriculum is Measurement and Scientific Work material. Measurement and Scientific Work is a physics subject matter that studies quantities, dimensions, measurements, significant figures and scientific notation. In the Merdeka curriculum, measurement and scientific work material for SMA / MA levels is obtained during class X odd semester.

Quoting the study of Ozgelen (2012), measurement is a type of basic science process skill that must be mastered by students, because the concepts contained in the measurement material will continue to be used for advanced measurement concepts. Meanwhile, research conducted by Sari (2013) stated that 68.35% of students experience misconceptions in the material on quantity symbols. Based on research by Annisa (2023) which was carried out in three classes in three schools, namely SMA Negeri 7 Surakarta, SMA Batik 1 Surakarta and SMA Batik 2 Surakarta as an initial stage, it was found that 75.8% of students had difficulties in the material on measurement and scientific work. So that in learning physics, a learning medium is needed to facilitate student discussion activities so that they can learn the physics material on measurement and scientific work.

Learning media is a material that is used to channel information from the sender to the recipient in learning a material so that it can attract attention, stimulate the mind, and interest in learning students (Tafonao, 2018). Learning media is a form of innovation from an educator (Hidayat, 2021). Learning media is a tool that has a function to increase effectiveness and efficiency in the learning process so that learning objectives can be achieved (Rozi & Kristari, 2020). We can see that the development of internet-based media or e-learning is very much needed as a solution to problems that arise in the learning process, with the right media and approach problems can be resolved and can even indirectly increase student learning independence. Innovation in learning media is in the form of mobile which is designed interactively by combining developing technology so that it can be used anytime and anywhere and fosters student interest in learning. Mobile learning is a smartphone technology among the community and children to be more useful in the field of education. The development of mobile learning in learning is considered necessary to foster student interest in learning (Dewi et al., 2019). One of the mobile learning development websites is appinventor.mit.edu where the website is effective and efficient to use. So that smartphone-based learning media can be an alternative that can facilitate the learning process.

One of the websites that supports the development of learning media is App Inventor. According to Zhu (2019:17), App Inventor is defined as an innovative web-based application that was initially released and developed by Google in 2010, then in 2011 it began to be managed by the Massachusetts Institute of Technology (MIT). App Inventor allows users to create a simple Android application using visual block programming, can design UI (User Interface) according to needs and desires, is free, can be run on a laptop or computer or smartphone, produces products in .apk format so that they can be installed directly on Android. In a study conducted by Yudanto and Wiyatmo (2017) on the development of mobile learning media on the Android platform based on App Inventor, the results obtained were in the very good category on average from media experts, material experts, and physics teachers, and were able to increase student scores by 0.54, so that the media created was suitable for use. According to Koroh's research (2024) on the implementation of interactive physics learning media based on android applications with MIT App Inventor, it states that the implementation and results of trials with students, the feasibility level of interactive physics learning applications based on android is 84.46% or worthy of being an alternative reference source for physics learning on GLB and GLBB topics. In addition, research from Rejeki (2024)

on the development of android-based learning media to improve mathematical problem-solving skills for elementary school geometry and measurement materials also shows that the media is feasible for use in improving mathematical problem-solving skills. In previous studies, no one has utilized App Inventor for physics learning on measurement materials in scientific work, this is what underlies the use of App Inventor in developing learning media on measurement materials in scientific work.

The results of previous research support the selection of the App Inventor website and this website is right to support this research. From the problems that have been described, it can be overcome by the type of Research and Development (R&D) research or learning media development research on the topic of measurement and scientific work. The development of this learning media is in the form of learning media consisting of learning objectives, materials, evaluations, glossaries, and bibliographies which media can be accessed via each student's smartphone in the form of .apk so that it is easy to access. Based on the description above, the author developed learning media on measurement and scientific work materials through research entitled "Development of Measurement Learning Media Using App Inventor".

B. METHOD

The type of research used in research is Research and Development (R&D). According to Sugiyono (2015) in (Rahmi et al., 2019), R&D research is a method designed to develop certain products and test the effectiveness of these products. The procedure used in this study is to use the ADDIE model which has been developed by Dick and Carry (1996), with the stages of activities consisting of: Analysis, Design, Development, Implementation and Evaluation. Judging from the research objectives, namely to determine the feasibility of the learning media developed, the stages of the ADDIE model are only carried out in the first three stages, namely: analysis, design and development.

C. RESULTS AND DISCUSSION

1. Analysis Stage

The analysis stage is to analyse related to the identification of learning problems, the needs of students and teachers, learning objectives, learning materials, and determine the things that need to be developed. Things that are analysed are the problems that exist at SMA Batik 2 Surakarta, which is used to conduct research. Based on the results of the needs analysis with the teacher, there are obstacles and difficulties during physics learning activities in the classroom with the limited textbooks used. Teachers also need the development of learning media to support the process of teaching and learning activities in the classroom. The results of the needs analysis with the students also show that many of the students feel that there are limitations of textbooks as a learning resource and also students feel the need for the development of learning media as a means for learning activities in the classroom. In addition, these students are interested in using learning media if there is an innovative development in learning media.

2. Design Stage

The design stage is the process of preparing a framework design for compiling learning media using App Inventor on Measurement material in Scientific Work. The design of learning media is adjusted to the Merdeka curriculum. The learning media section includes, cover page, login page, home page, specifications & instructions for use page, learning objectives page, material page, evaluation page, glossary page, bibliography page, and maker information

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page. Learning activities are organized based on the scientific approach, namely observing, questioning, gathering information, associating, and communicating.

3. Development Stage

The development stage is the process of applying the framework that has been prepared at the design stage and then validated by experts in terms of media, material and language. Validation of learning media products is carried out by two lecturers as expert validators. Based on the validation questionnaire that has been distributed to expert validators can determine the level of product assessment. The level of validity of a module in this study by classifying into five criteria as used by Azwar (2007) in Rozadi (2017).

Table 1. Scoring Criteria

Interval Score	Criteria
Mi + 1,5 Sbi < X	Very Good
Mi + 0,5 Sbi < X ≤ Mi + 1,5 Sbi	Good
Mi - 0,5 Sbi < X ≤ Mi + 0,5 Sbi	Fair
Mi - 1,5 Sbi < X ≤ Mi - 0,5 Sbi	Less
X ≤ Mi - 1,5 Sbi	Very Poor

Description:
X = Respondent's score
Mi = Ideal mean = 1/2 (ideal maximum value + ideal minimum value)
Sbi = Ideal standard deviation = 1/6 (ideal maximum value - ideal minimum value)

Table 2. Results of Learning Media Assessment

No	Aspect	Maximum Score	Score	Criteria
1	Media	65	56	Very Good
2	Materi	50	45	Very Good
3	Language	20	19	Very Good

Based on Table 2 the acquisition of scores and validation by experts, it is known that the overall App Inventor learning media product in terms of media has very good criteria, the material has very good criteria and the language has very good criteria.Thus the learning media product is declared valid with very good criteria with a score of 120 from the maximum score of 135.

D. CONCLUSIONS AND SUGGESTIONS

Based on the results of the research conducted, it can be concluded that the learning media using App Inventor on measurement material in scientific work is declared valid with very good criteria from the aspects of media, material and also language with a score of 120 from the maximum score of 135. So that this learning media can be used as a learning media on measurement material in scientific work. Researchers conducted research limited to only 3 stages of the procedure of the ADDIE model. Therefore, researchers hope that this research can be further developed up to 5 stages of the ADDIE model.

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