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DEVELOPMENT OF VIDEO MULTIMEDIA "LET'S LEARN THE MEASUREMENT OF TIME, WEIGHT AND LENGTH" IN ELEMENTARY SCHOOL

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Abstract

The development of instructional media is essential for educators to convey abstract learning content effectively. Multimedia offers a concrete visualization of abstract concepts. This study aims to create an efficient and practical multimedia-based instructional media. The research subjects were third-grade elementary school students. Employing a modified Research and Development (R&D) design, the study utilized questionnaires and interviews for data collection. The research encompassed phases of problem analysis, data collection, product design, design validation, design revision, and product testing. Multimedia was validated by media experts, subject matter experts, and language experts. The obtained scores from media experts were 85.57%, subject matter experts scored 83%, and language experts scored 93.27%. This research contributes to the creation of effective and practical multimedia-based instructional media.

Keywords: *Development, Instructional Media, Multimedia*

1. INTRODUCTION

Education is the effort of families, communities, and governments to prepare learners to fulfill their roles effectively in the future through guidance, lessons, or training activities. However, in reality, these activities do not always proceed as expected. Students are often positioned as passive recipients of various information, as the communication between teachers and students tends to be one-sided, with information flowing only from the teacher to the student. Moreover, limitations in the media used by teachers during the learning process result in difficulties for students to comprehend the conveyed information. Consequently, students' creativity and engagement in the learning process tend to decline.

Quality education should be supported by instructional media that enhance students' motivation and learning outcomes. The chosen media should assist teachers in conveying abstract concepts that may not be easily explained verbally. Thus, abstract learning material should be visualized using instructional media. Media is defined as a tool that can be manipulated, seen, heard, read, or discussed, effectively employed in teaching and learning activities. Media is also acknowledged to influence the effectiveness of instructional programs (Usman & Asnawir, 2002).

According to Azhar, instructional media is a tool used both within and outside the classroom to stimulate students' learning process. Further, it is highlighted that instructional media consists of instructional material that effectively stimulates students' engagement in learning (Arsyad, 2011). Gerlach & Ely have remarked that instructional

media encompasses a wide range of sources, including humans, materials, or studies that contribute to creating an environment enabling learners to acquire knowledge, skills, or attitudes. The scope of instructional media encompasses all necessary resources for communication in education, including hardware such as computers, TVs, projectors, as well as software used within those hardware (Asyhar, 2021). In essence, instructional media is an entity that assists in stimulating students to more easily receive conveyed information or messages.

Sudrajat, as cited in Agustina (2011), outlines the diverse roles of instructional media in education. These roles include overcoming experiential limitations, extending learning beyond the classroom, enabling direct interaction with the environment, ensuring consistent observations, conveying accurate concepts, enhancing motivation, and guiding the transition from concrete to abstract experiences. Instructional media serve as powerful tools that facilitate comprehensive and engaging learning journeys for students.

In accordance with this perspective, Nana Sudjana and Rifai (Arsyad, 2013) emphasize the multiple advantages offered by instructional media, which encompass: Firstly, the cultivation of students' motivation to learn by rendering the educational process more captivating and stimulating. Secondly, the improvement of students' comprehension of the subject matter, thus facilitating the accomplishment of learning objectives. Thirdly, the broadening of teaching techniques, surpassing traditional verbal communication. Utilizing instructional media enables the alignment of instructional approaches with the content being conveyed. Lastly, the encouragement of active participation, as students are not solely passive listeners, but also engaged observers, demonstrators, or performers.

Multimedia, on the other hand, consists of two words: "multi" in Latin, meaning multiple, varied, or diverse, while "medium" in Latin denotes an intermediary. According to (Vaughan, 2011), multimedia is a combination of text, images, animations, sound, and video manipulated by electronic devices. Nowadays, multimedia is utilized not only for entertainment but also for various purposes. Multimedia applications require dynamic handling, comprising a fusion of text, images, audio, and animation. Fax, image documents, photo images, system maps, geographic information, voice commands, audio messages, video messages, and live videos are some elements classified under the definition of multimedia (Sutopo, 2012).

Hofsteder considers multimedia as the utilization of electronic tools or technology. Crafting multimedia entails employing computers to create or combine various elements such as text, graphics, audio, images, and animations, along with links and tools that enable users to navigate, interact, and communicate. Therefore, electronic tool support in multimedia creation is pivotal for the development of innovative, interactive, technology-based learning models (Darmawan, 2019).

Robin and Linda state that multimedia functions as a tool that enhances presentations by making them dynamic and interactive, combining text, graphics, animation, audio, and images (Darmawan, 2019). Generally, the benefits gained from using multimedia in education include making the learning process more engaging, interactive, and reducing the reliance on conventional teaching methods. Students become more motivated, learning can occur anytime and anywhere, and students' focus and attention can be directed toward ongoing activities.

According to (Ariani & Haryanto, 2010), the aforementioned benefits find realization through the merits of multimedia learning approaches, which encompass the

following aspects: Firstly, multimedia has the capacity to enlarge minuscule entities or those imperceptible to the naked eye, such as germs and bacteria, without requiring additional aids. Additionally, it can shrink enormously large objects that are impractical to bring into the classroom or school environment, including elephants, mountains, and towers. Furthermore, multimedia facilitates the presentation of historical events or incidents, as well as those transpiring at distant locations. Moreover, it enables the depiction of hazardous objects or occurrences. Lastly, multimedia contributes to intensifying students' curiosity and focus throughout the learning journey.

In this research, the multimedia that will be utilized is instructional videos. The selection of multimedia as a learning source must consider other components' characteristics, such as the intended objectives, strategies used, and learning evaluation. According to Sucipto (2010: 2-3), the characteristics of multimedia learning are Incorporating, Interactive and Independent.

Mathematics originates from the Greek word "mathein" or "manthenein," which means learning (Subarinah, 2006). Mustafa (Wijayanti, 2011)states that mathematics is the science of quantity, shape, arrangement, and size. The fundamental aspect of mathematics is the method and process of finding answers according to accurate concepts and consistent symbols, properties, and relationships between quantities and sizes, either in an abstract or concrete manner, in pure mathematics or applied mathematics.

Meanwhile, Ebbut and Straker (Marsigit, 2016) define school mathematics as part of students' activities to identify patterns, conduct investigations, solve problems, and communicate their findings, making the nature of mathematics more concrete. Similarly, according to Hans Freudenthal, mathematics is a human activity closely related to reality.

The researcher chose mathematics for third-grade elementary school students, focusing on the topic of measuring time, weight, and length. This topic is not sufficiently understood through textbook explanations or traditional teaching methods. Students often encounter difficulties in comprehending the material presented by the teacher using conventional teaching approaches. They struggle to identify objects relevant to time, weight, and length measurements. This issue arises due to limitations in learning resources within the school. This challenge can be addressed through the use of instructional videos, as videos can showcase examples through images or animations.

The primary objective of this research is to develop effective and practical instructional materials using multimedia-based videos to enhance the learning experience for students in comprehending the concepts of time, weight, and length measurements in mathematics. The success of video instructional media can be gauged by students' engagement with the presented learning content. The development of multimedia-based learning media is expected to assist students in both learning and understanding the subject matter effectively. Additionally, instructional videos are anticipated to aid teachers in delivering lesson materials to students, thereby achieving effective and practical learning activities.

2. RESEARCH METHODS

This type of research is development research (Research and Development). This research refers to the research and development strategy according to Borg and Gall in (Sugiyono, 2014) with the following stages:

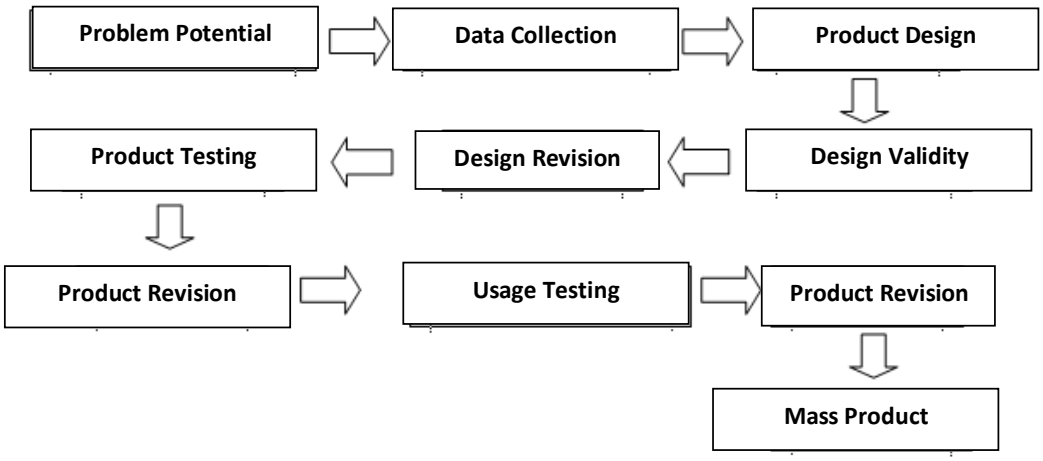

Figure 1. Stages of Development Research

In the early stages, namely potential and problems, researchers sought data about the problems that arose and the potential developed in learning activities. Data collection was carried out through interviews with class teachers and third grade students at SDN Plosorejo 01 and SDN Rejotangan 02. From the data collection, researchers will obtain data on the problems to be solved and the potential to be developed.

The data collection instruments used in this study were questionnaires and validation sheets. Questionnaires are used to measure student readability while validation sheets are used to measure the validity of the media created by researchers. The validity of the media was validated by 3 validators, namely material experts, media experts and linguists. A media can be said to meet the indicators, where the validator states that the learning media can be used with little or no revision.

3. RESULTS AND DISCUSSION

3.1. Results

3.1.1. Problem Analysis Results

The results of observations and interviews conducted at SDN Plosorejo 01 and SDN Rejotangan 02 obtained the problem that students' attention to learning materials decreased. This is due to the lack of learning resources and development of available learning media.

3.1.2. Product Design Results

The results of the video learning media design let's learn the measurement of time, weight and length are as follows:

a. The hardware used in making media is an android phone.
b. Kine Master application
c. Adobe Flash application

d. Learning tools in the form of a syllabus that contains competency standards and basic competencies.
e. DVD
f. Art paper
g. Scissors
h. Glue

3.1.3. Development Result

The following is the print screen of the learning video "*Mari Kita Belajar Pengukuran Waktu, Berat dan Panjang*":

Figure 2. Print Screen of the Learning Video

The video explains material about measuring weight, time and length along with supporting images so that students can easily understand the material being taught. The video is embedded on a DVD which is accompanied by a user manual.

The results of the validity test by material experts in the first stage obtained an average score of 37.65, the average maximum score of 60. Obtained a large percentage of 62.75% with the description "Valid with revision". The criticisms and suggestions from material validators are as follows:

Table 1. Results of Validity Test by Material Experts

Name of Validator	Criticism and Suggestions
Validator 1	For practice questions, it should be a description of the material, give students 1 or 2 problems to solve in discussion (referring to validation items). After that, practice questions are arranged in a structured manner starting from easy, medium difficult and problem solving.
Validator 2	Improve KD, learning objectives. The lesson plan is made thematic not per subject because it is for grade 3.
Validator 3	Enough

The results of the validity test by the first stage media experts obtained an average score of 54.28, an average maximum score of 70 and obtained a percentage of 77.54% with the description "Valid with revision" for use. The criticisms and suggestions from the media expert validators are as follows:

Table 2. Results of Validity Test by Media Experts

Name of Validator	Criticism and Suggestions
Validator 1	Introduction to learning is more focused on impressions that relate to the material. The learning process is good.
Validator 2	The media is better not to be too long in duration, divided by parts only, revisions can be made after the thesis exam.
Validator 3	Valid with revision

The results of the validity test by the first stage of language get an average score of 47.96, the average maximum score is 55. Obtained a percentage of 87.2% with the description "Valid with revision" to be used. The criticisms and suggestions from the linguist validators are as follows:

Table 3. Results of Validity Test by Linguist

Name of Validator	Criticism and Suggestions
Validator 1	In general, it is good but there are some things that need to be improved, namely spelling and suffixes.
Validator 2	Valid with revision
Validator 3	Valid with revision

The results of the validity test by the second stage material expert obtained an average score of 49.8, the average maximum score of 60. Obtained a large percentage of 83% with the description "Valid without revision". The criticisms and suggestions from material validators are as follows:

Table 4. Results of Validity Test by Material Experts

Name of Validator	Criticism and Suggestions
Validator 1	Can be continued
Validator 2	Synchronize with learning activities
Validator 3	Valid without revision

The results of the validity test by the second stage media expert obtained an average score of 59.9, the average maximum score of 70. Obtained a large percentage of 85.57% with the description "Valid without revision". The criticisms and suggestions from media validators are as follows:

Table 5. Results of Validity Test by Media Experts

Name of Validator	Criticism and Suggestions
Validator 1	Valid without revision
Validator 2	Valid without revision
Validator 3	Valid without revision

The results of the validity test by linguists in the second stage obtained an average score of 51.3, the average maximum score of 55. Obtained a large percentage of 93.27% with the description "Valid without revision". The criticisms and suggestions from language validators are as follows:

Table 6. Results of Validity Test by Linguist

Name of Validator	Criticism and Suggestions
Validator 1	Valid without revision
Validator 2	Valid without revision
Validator 3	Valid without revision

3.2. Discussion

This research on multimedia-based instructional media employs the Research and Development (R&D) methodology, referring to the research and development strategy by Borg and Gall as outlined in (Sugiyono, 2014). This strategy consists of 10 stages: problem analysis, data collection, product design, product testing, design revision, design validation, product revision, usage testing, product revision, and mass production.

3.2.1. Potential & Problem

The early investigation is carried out to gather information about the difficulties students encounter during the learning process. The findings from this investigation serve as a reference for designing instructional media that can act as a learning resource. From the analysis, the researcher identified several challenges: the perception of mathematics

being difficult, low student achievement in measurement topics, and a lack of multimedia-based instructional media used by teachers.

Gerlach & Ely state that instructional media has a broad scope, including humans, materials, or studies that create a condition enabling learners to acquire knowledge, skills, or attitudes. Instructional media encompasses all necessary resources for communication in learning, thus taking the form of hardware like computers, TVs, projectors, and software used within these hardware components (Asyhar, 2021). Instructional media is an inseparable component of the learning process; without it, effective learning cannot occur.

3.2.2. Data Collection

Observations were conducted on teachers and third-grade students at SDN Plosorejo 01 and SDN Rejotangan 02. The researcher employed interview techniques conducted face-to-face with the participants. In addition to interviews, questionnaires were distributed to third-grade students at the mentioned schools. The interview and questionnaire results revealed that students encountered difficulties in understanding mathematics lessons on measuring time, weight, and length.

3.2.3. Product Design

This stage's activities are focused on the outcomes of problem analysis and data collection. The researcher used *Adobe Flash* and *KineMaster* applications for video designing. The created video was stored on a DVD for use by teachers on laptops. The media design was crafted to be as appealing and engaging as possible, aiming to enhance students' interest in participating in classroom learning activities.

3.2.4. Design Validation

This stage involves testing the developed multimedia-based media. Validation testing is conducted by 9 validators, including 3 media experts, 3 subject matter experts, and 3 language experts, each of whom is competent in their respective fields. During this stage, the researcher receives feedback and scores from the validators for further revision or improvement.

3.2.5. Design Revision

Following design validation, the researcher improves the media based on the feedback from the validators. The media is divided into three segments with durations of 20 minutes, 21 minutes, and 26 minutes, respectively, to avoid excessive length. Additionally, the researcher creates introductory content more relevant to the discussed material.

3.2.6. Product Testing

Product testing is limited to readability tests conducted with teachers and students. Readability testing for teachers involves 3 elementary school teachers, while 5 third-grade students participate. Readability testing is conducted through observation and questionnaire completion by teachers and students after using the multimedia media.

The teacher's observations are as follows:

a. The video media "*Mari Kita Belajar Pengukuran Waktu, Berat dan Panjang*" is suitable for use in the learning process.
b. The addition of images to the instructional video helps students better comprehend the learning material.
c. The language used is clear and easily understandable.
d. The video is comprehensive as it includes questions at the end.

Furthermore, the results from the teacher's readability test questionnaire are:

Table 7. Teacher Readability Test Questionnaire Results

Respondent	Statement									Total score
	1	2	3	4	5	6	7	8	9	
1	4	4	3	3	4	4	4	3	4	33
2	3	3	3	4	4	3	3	3	3	29
3	4	4	4	3	3	3	3	3	3	30
Average	3,66	3,66	3,33	3,33	3,66	3,33	3,33	3	3,33	3,4

Based on the teacher's readability assessment of multimedia, the average score is 3.4. This value is included in the sufficient criteria.
Meanwhile, the results of student observations concluded that students had no difficulty in understanding the presentation of the material. The students argue that the learning video multimedia can be read and understood clearly and interestingly. Because there are clear illustrations.

The student readability test obtained an average score of 3.34 which is included in the sufficient criteria. The following below are the detailed results in the table:

Table 8. Students Readability Test Questionnaire Results

Respondent	Statement							Total score
	1	2	3	4	5	6	7	
1	3	3	3	3	4	3	3	22
2	3	4	3	4	3	3	3	23
3	3	3	3	3	4	3	4	23
4	4	4	3	3	4	4	3	25
5	3	4	4	4	3	3	3	24
Average	3,2	3,6	3,2	3,4	3,6	3,2	3,2	3,34

3.2.7. Product Revision

Revisions or improvements are made according to the results of the questionnaire obtained from the teacher and student readability trials in order to create a good product before finally being published.

3.2.8. Publication

Products or media that have passed several stages of validation and trials are published so that they can become one of the media sources that help both teachers and students in a higher quality teaching and learning process.

4. CONCLUSION

the development of multimedia-based instructional media, as exemplified by the creation of the "*Mari Kita Belajar Pengukuran Waktu, Panjang, dan Berat*" video, showcases the significance of innovative approaches in education. The utilization of *Adobe Flash* and *KineMaster* applications has enabled the crafting of a 29-minute learning tool that effectively bridges the gap between abstract concepts and concrete understanding. The evaluations conducted by media, subject matter, and language experts further validate the quality and suitability of the media for educational purposes. The collective efforts of this research and development endeavor have yielded a multimedia resource that holds the potential to engage students and enhance their comprehension of the subject matter.

In a broader context, this study underscores the pivotal role of multimedia in overcoming traditional learning limitations. By integrating visual, auditory, and interactive elements, the instructional experience becomes more captivating and conducive to effective learning. However, the successful adoption of this media within the classroom should be complemented by real-world testing and ongoing refinement based on the feedback received from educators and students. As technology continues to shape the educational landscape, the seamless integration of multimedia in pedagogical practices can usher in a new era of dynamic, engaging, and accessible learning experiences, thereby contributing to the holistic development of learners in today's rapidly evolving world.

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