



Development of Interactive Multimedia Assisted with Powtoon Application on Global Climate Change Material to Facilitate Students' Knowledge and Technological Literacy Skills

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ABSTRACT

One of the most important skills in the era of industrial revolution 4.0 is technological literacy. This study aims to analyze the initial ability of knowledge aspects and technological literacy of students on global climate change material. The research method used was descriptive quantitative with a sample of 35 students of class X phase E at SMA N 2 Solok. Data processing was obtained from two categories, namely performance assessment instruments in the form of questions according to technological literacy indicators and teacher questionnaires. From the analysis of the performance assessment instrument, it was found that the indicator of knowing multimedia features in learning was 44% in the "low" achievement category. In addition, 45% of students are in the "low" achievement category on the aspect of knowing the various advantages of various technologies. A total of 41% of students are in the "low" achievement category on the aspect of using technology in learning. However, 43% of students were in the "low" achievement category in the aspect of selecting and utilizing technology in learning. The overall average in the category of achievement of students' technological literacy skills is 43% which is in the "low" category.

The results of the teacher questionnaire on the aspect of using the learning model by the teacher, 56%, are in the "sometimes" category, the aspect of using printed teaching materials and learning media that are not based on it, 70%, are in the "often" category, and the aspect of using facilities and infrastructure, 43%, are in the "sometimes" category. Based on these results, it can trigger students' low technological literacy skills.

Keywords: Interactive multimedia; knowledge aspects; students' technological literacy.



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I. INTRODUCTION

Education needs to keep up with technological developments and utilize information and communication technology as advanced equipment to facilitate the learning process. As stated in Article 1 Paragraph 2 of Law Number 20 of 2003, "National Education is education of religious values and national culture and "Education rooted in needs" responds to the times. According to [1] in the era of the Industrial Revolution 4.0, everyone must have knowledge and skills in digital literacy, information literacy, media literacy, and master information and communication technology, especially in the field of learning. One of the most important abilities in the era of the industrial revolution 4.0 is technological literacy [2]. Therefore, schools need to improve students' technological skills. This is because the role of literacy is needed in facing the challenges of the industrial revolution 4.0 so that students can compete globally and become a superior generation. One of the literacies that is suitable for answering the challenges of this era is new literacy [3].

Technological literacy is related to the ability to understand how machines work, technological applications work to produce technological products to get maximum results. The utilization of Information and Communication Technology (ICT) in the world of education is demanded in this era of the industrial revolution 4.0. The world of education that used to be completely manual has now been converted into a digital form that is more effective and efficient [4]. This is in line with Permendikbud No. 22 of 2016 which states that the principle of learning must utilize information and communication technology to improve the efficiency and effectiveness of learning.

Physics is one of the fields of science that requires a deep understanding because it involves many images, symbols and mathematical equations to increase deeper knowledge [5]. Therefore, the knowledge aspect is needed to improve understanding and application in everyday life. One of the physics materials included in the knowledge aspect is global climate change. Global climate change is one of the physics materials that requires understanding that makes students think critically in dealing with its application in everyday life, this triggers the low ability of students to connect the theory of global climate change to its application in everyday life [6]. This problem is certainly related to the level of students' knowledge aspect of global climate change material. Where the knowledge aspect itself is one of the important aspects in education, in addition to aspects of attitude and skills [23].

Analysis of low technological literacy on global climate change material is seen based on the results of the analysis of the performance assessment instrument [7]. Based on the results of this analysis, it is known that students' technological literacy is only 43%, this is supported by the results of the teacher questionnaire. That the teacher only uses familiar learning media such as PPT and LKPD which does not attract students' enthusiasm for learning so that it causes low student knowledge and technological literacy skills [8].

This is because students are less motivated because the learning provided is not in accordance with the needs and materials so that the learning process is not able to encourage deep understanding for students [19]. In addition, teaching media that are not conceptual and ICT-based but in use are not efficient, so that the learning process has not taken place properly [9]. Without sufficient interaction, students will have difficulty connecting the material taught with real phenomena. Therefore, it is important to make adjustments and evaluations to the models and teaching materials used by teachers to effectively improve students' knowledge and technological literacy aspects [20]. This study aims to analyze the knowledge and technological literacy aspects of students on global climate change material [10]. With this analysis, useful information can be obtained to improve the quality of education and find appropriate solutions. The results of this study are expected to be used as guidelines in an effort to improve students' knowledge and technological literacy aspects on global climate change material [11].

II. METHOD

This research includes R&D method research with the Hanaffin and Peck model. The Hanaffin and Peck model is a product-oriented learning design model [12]. The Hannafin and Peck model is a learning design model to produce a product such as learning media [13]. The Hanaffin and Peck development model consists of 3 stages, namely: (a) needs analysis; (b) design; and (c) develop and implementation.

At the needs analysis stage, researchers collected information about the implementation of learning at SMAN 2 Solok carried out by teachers and students, especially regarding global climate change. The preliminary research stage is by distributing questionnaires and performance assessment instruments. The questionnaires and performance assessment instruments were given to teachers and students. The questionnaire given to the teacher consisted of several questions related to several aspects, namely: (1) the use of learning models on global climate change material, (2) the use of learning media on global climate change material, (3) the use of supporting facilities and equipment. The performance assessment instrument given to students is related to the identification of technological literacy indicators with 5 answer categories in table 1 as follows.

Table 1. *Categories of Teacher and Student Questionnaire Answers*

Evaluation	Answer categories
1	Never do as stated (0%-20%)
2	Rarely do as mentioned (21%-40%)
3	Sometimes as mentioned (41%-60%)
4	Often do as stated 61%-80%
5	Always make statements (81%-100%)

III. RESULTS AND DISCUSSION

Results

Based on the analysis of the performance assessment instrument given to students at SMAN 2 Solok, the answers to the instrument given by students to see technological literacy can be seen in table 3 below:

Table. 2 Performance assessment instrument answers

Technology literacy indicators	Percentage of student answers
recognize the various advantages of various technologies	44%
knowing the features of multimedia in learning	45%
using technology during learning	41%
selecting and utilizing technology during learning	43%

Based on table. 2, it can be seen that the ability of technological literacy on global climate change material is 43% in the “low” achievement category among the four indicators of technological literacy, the highest result is the indicator of knowing the various advantages of various technologies at 45% in the “low” achievement category. In addition, 44% of students were in the “low” achievement category on the aspect of knowing multimedia features in learning. A total of 41% of students are in the “low” achievement category in the aspect of using technology in learning. However, 43% of students were in the “low” achievement category on the aspect of selecting and utilizing technology in learning.

Meanwhile, from the results of the teacher questionnaire data analysis to see the learning media used during the learning process. The analysis data is obtained from the answers given by the teacher in the questionnaire given as follows:

Table 3. Implementation of learning carried out by teachers (global climate change)

Aspect of the question	Evaluation	Answer categories
Utilization of innovative learning models	56%	Sometimes
Use of teaching materials and learning media	70%	Often
Use of supporting facilities and equipment	43%	Sometimes

Table 3 shows that teachers only occasionally use innovative learning models for global climate change material, even rarely. Teaching materials and digital learning media for global climate change materials are still conventional, such as textbooks and LKPD while the latest ones are only modules and handbooks and even then they are used only occasionally. The cause of students' low technological literacy results from this situation.

Discussion

The low level of technological literacy in students is caused by various factors, one of which is the unfamiliarity of students in using technology in the learning process[22]. This shows that during the learning process, teachers do not provide adequate services and guidance to students in using technology, so students are not accustomed to using technology literacy-based interactive multimedia features [14]. In addition, students' inability to choose and utilize technology during learning is another factor that causes students' low technological literacy. Observing the phenomena that occur in everyday life is the same as [15]. Thus, students do not have the literacy skills needed to solve problems in the real world [16].

Teachers play an important role in overcoming the lack of technological literacy in students by providing them with this knowledge. According to teachers have the power to provide methods and stimulation through the educational media and materials they use [17] However, in reality, educators only focus on improving student

learning outcomes without paying attention to the deeper aspects of knowledge. According to [18] they fail to prioritize the use of technology during learning that is relevant to the students' context. Due to the lack of reinforcement through problem-solving and real-world application, the concepts taught are easily forgotten and students' knowledge aspects are still superficial to the material provided [19].

Therefore, to improve the knowledge and technological literacy aspects of students, teachers must change the way they teach. Teachers should not only concentrate on improving students' learning outcomes, but also provide adequate guidance and assistance to solve physics problems [24]. Students must also critically look at events in their environment related to the knowledge aspect of physics, and must have enough technology literacy-based teaching media to encourage it [21]. Therefore, a teaching media design with a learning model that trains students' knowledge aspects and technological literacy skills is needed in the hope of improving students' knowledge aspects and technological literacy skills on the material of global climate change [25].

IV. CONCLUSION

Based on data analysis conducted at SMA N 2 Solok, the technology literacy indicator shows that the level of technological literacy of students is classified as the lowest. In the competency aspect, 25% of the indicators choose and utilize technology during learning with a "very low" category. Among the many factors that cause students to fail in understanding physics, including the model used and the teaching materials used, efforts need to be made to improve students' ability to understand and appreciate global climate change.

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