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Development of Electronic Teaching Material Containing South Kalimantan's Traditional Game to Improving Students' Problem-Solving Ability

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Abstract
The low problem-solving skills of students and the lack of ability of students to apply the physics concepts they have learned in real life have encouraged researchers to develop electronic teaching materials containing traditional South Kalimantan games. This research is expected to be able to obtain valid, practical, and effective electronic teaching materials so that they are feasible and can be applied in training students' problem-solving skills. This study uses the ADDIE model and includes the type of research and development (RnD). The development was carried out in a field test at SMA N 6 Banjarmasin. Data collection is done using validation instruments, learning implementation sheets, and learning outcomes tests that are combined with problem-solving skills. The data were analyzed by quantitative descriptive analysis where the results obtained showed that: (1) electronic teaching materials containing traditional games obtained valid categories (2) electronic teaching materials including practical based on the assessment of the implementation of the lesson plan meet the practical category; and (3) the electronic teaching materials developed are also effective because n-gain of 0.78 is in the high category. Thus, electronic teaching materials containing traditional games developed are feasible to train students' solving skills in learning physics.

Keywords: *Electronic, Teaching materials, Feasibility, Problem-solving*

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1. Introduction

The life in 21st century has a lot of demands for mastering various skills; so that students can be successful people through good education and can prepare the students to master the needed skill. One of the skills that students should be able to master is known as problem-solving skills. The problem-solving skill becomes an important thing and needed to be mastered by students to solve the problem in the 21st century [1]. The problem-solving skills of students can give innovative problem-solving suggestions in solving the problem that they faced in daily life. Physics learning is closely related to problem-solving skills and related to natural phenomena in social life [2]. Thus, in the education purpose that expected by the Indonesian government is to prepare the students to have the 21st century support skill, especially in one of the skills which is the problem-solving skill.

The main purpose of curriculum 2013 is the students' skill and knowledge are developed and balanced. According to [3] the curriculum 2013 refers to three main educational references which are the 21st century skills, scientific approach, and authentic assessment including physic subject [4].

Physic subject is the lesson that can explain things that happen in the nature, so that in the daily environment, it can be found the problem that related to physic material [5]. Where the curriculum 2013 is the curriculum that focused on the character forming and the students' competence improvement, by integrating attitude, knowledge and skill that can reflect what students get as the sign of how much their understanding of the concept they learned [6].

The observation that the researchers do in XI class at SMA N 6 Banjarmasin with the question test found that the students are still quite weak in understanding physic learning material that has a lot of explanation about the physic concept. Some of the students or in the teaching material they have. The low students' understanding of the concept will affect the difficulty in problem-solving [7]. The Trends in International Mathematics and Science Study (TIMSS)'s research result in 2011 stated that there is a decrease in Indonesian students' learning achievement because, in Indonesia, memorization ability is still dominant to be used by the students in learning, that is the thing that caused Indonesia is ranked on the 38th of all the countries that have participated. The score point that becomes the reference in the test are knowledge, reasoning, and application in the questions that relate to the problem-solving are the assessed aspects [8]. In line with the research [9] where the students are still weak in their mastery to problem-solving skill.

Problem-solving stated by Polya in [10] means as the activity to find the solution or answer from the problem or obstacle, the problem-solving activity could also complete a purpose that want to be reached with the known or understood solution. According to Solso [11] explained specifically to solve a certain problem or thought is directed in finding a solution. Generally, the problem-solving can be interpreted as the activity to solve the given problem, while in Indonesian language, the term of problem-solving itself has a double meaning which are as the translation from *problem-solving* which means the process to solve the problem and as the translation from solution or *solusi* which means the result and effort to solve the problem [12]. The problem-solving step consist of several systematic steps through the activities that include students' cognitive ability, such as reading, problem understanding, planning, applying the problem-solving plan, getting an answer and checking it, which all these process will make the students be more understand than by only finding the final answer [13].

To solve the obstacle in the lack of problem-solving skill in the students, an interesting teaching material and the selection of the appropriate learning model are expected. The effort that can be done so the students are trained in doing a problem-solving is by a guiding from teacher which is adapted to the device in learning [14]. An electronic teaching material that becomes the development this time is one of the appropriate learning devices. The electronic teaching material is an unlimited digital learning source and can be accessed easily whenever by the students [15]. The use of electronic teaching material with using handphone or laptop can increase the students' spirit in learning [16]. Beside of that, with the technology that can be utilized will caused the need to access the information will not affected by the time and place anymore in the learning process, so that the used electronic teaching material becomes a strategy in the learning activity [17]. The electronic teaching material can be used individually by the students without the attending from the teacher which makes the students learning freely [18]. The lesson plan that is made should also appropriate with the using of media or the given electronic teaching material so the learning is still focused in the learning with or without the teacher who guides the students and still appropriate with the expected competence [19] [20].

The types of the delivered material, the sequence, and the treatment in selecting a learning material are the things that need to be considered in making the learning material [21]. The learning material need to be matched with the objectives that wanted to be reached from the learning so that can help the students in the learning. As for the developed learning material that is arranged is in accordance to the core competence and basic competence in curriculum 2013 that refers to an emergency curriculum (in a particular condition). Inherited from generation to generation related to the characteristic of a region is the cultural value that becomes the characteristic of that region [22] [23].

The local culture is created from the creativity in solving a problem or repetitive activities in utilizing the best potential from a certain region with its characteristic that always continued and repeated in the daily life [24] [25]. Physics learning that taught to the students will be more valuable and can be understood well by the students when the material is related to the activity or the nature symptom that close with the daily environment, the integration of the material will be deeper when it is related to the students' local culture, so the obtained things is not only the students' understanding to the material but also the understanding to the local culture in their residence area is getting bigger [26].

A traditional game is a game that can unite a lot of people thus besides it entertaining, it also can maintain social relationships and comfort in socializing which is also known as a folk game [27]. Indonesia is a unitary state that has its local culture in its regions, one of which is South Kalimantan. The local cultures in South Kalimantan include a traditional games such *balogo, kalikir, gasing* etc. *Balogo* (Figure 1) is the Banjarese's traditional game in South Kalimantan [28]. The name *balogo* is from the word *"logo"* which gets affixed *"ba"* which means a game that uses *a logo* as a tool. *A logo* which is the traditional game is usually made from a coconut shell. In order the *logo* to have a big mass, then on the surface of the coconut shell is added melted plastic that is put together with a mold. In this game, there is a tool needed called as penapak or *campa,* which is a batting rod with a length of about 40 cm and a wide of 2 cm that works to push *the logo* so it can slide and knock down the opponent's *logo* [29].

Figure 1. Balogo Game

The relevant research [30] showed that the electronic module based on the traditional games' local culture is feasible to be applied in the learning in class so the students can increase their learning achievement and train their skills. The result of the relevant research [14] showed that the direct teaching tools that were developed are included in the criteria of validity, practicality, and effectiveness. It is also supported by the research by [31] about the use of teaching material is obtained a percentage result at 78,78% & of students who get a score above 66%.

Based on the discussion above, it can explain how low the students' problem-solving is so that the researcher is interested to see the feasibility of the development of teaching material that developed containing a traditional game so that the students' problem-solving skills can be trained. The teaching material in which the local culture is inserted is the traditional game in South Kalimantan that can attract the students' interest to learn and solve a problem in the traditional game and also can preserve the traditional games in their environment. The feasibility of the development of the learning material is assessed from three aspects which are validity, practicality, and effectiveness.

2. Method

The research method is explained as a process of making, planning, researching, and testing a development that is done, whether the product is valid and can be used [32]. Research and Development (R&D) is a research method or strategy that is suitable for better practice. The steps to develop an existing product, which can be accountable is the definition of research and development. The product is not only physical or printed but it also can be in the form of a file or digital device program that can adjust to the students' requests or needs [33]. The steps in the ADDIE model consist of five steps, which are: (1) analysis, (2) design, (3) development, (4) implementation, and evaluation [32].

Emphasis criteria to develop a teaching material with good quality or feasible of the teaching material should fulfill the component of validity, practicality, and effectiveness [34]. Here is the explanation of validity, practicality, and effectiveness. Validity means valid or appropriate, the instrument that can measure an object precisely is called the valid instrument. So that the instrument validity can be interpreted that the suitability of the instrument used to measure what will be measured, the validity has two types which are logic validity that tested based on a clear instrument and follow an existing condition, and empiric validity based on an experience or has been tested for real [35]. Which is the validity assessment uses logic validity and measured using the validity assessment instrument and assessed by a validator the result will be adjusted to the Table 1 [36].

Table 1. The Category of Validation

No	Interval score	Category
1	$X > 3,4$	Very Good
2	$2,8 < X \leq 3,4$	Good
3	$2,2 < X \leq 2,8$	Good Enough
4	$1,6 < X \leq 2,2$	Poor
5	$X \leq 1,6$	Bad

as for the reliability criteria that used is as follows on Table 2 [37].

Table 2. The Reliability Level Criteria

No	Reliability coefficient (r_{11})	Category
1	$0,80 < r_{11} \leq 1,00$	Very High
2	$0,60 < r_{11} \leq 0,80$	High
3	$0,40 < r_{11} \leq 0,60$	Enough
4	$0,20 < r_{11} \leq 0,40$	Poor
5	$0,00 < r_{11} \leq 0,20$	Bad

Practicality means how easy a development is used in the learning or in the field in the preparation, using, data processing and data interpretation, or the administration [38]. With the assessment of the implementation of the learning process, it can be assessed the developed teaching material practicality, the teaching material is practical if it is easy to be applied in learning. Therefore, practicality is assessed from the implementation of learning activity in the lesson plan (RPP) [39].

Based on reference [40] [41] stated that effectiveness can be seen from the *N-gain* average which si the students' pre-test and post-test score comparison. As for the factor that can interfere the students' learning process are internal factor, external factor, and learning approach factor. The internal factor are physical and spiritual health or students' mental, the external factor is from the students' environment, and the learning approach factor is how the students learning and how the learning is delivered to the students [42]. Then, the level of the electronic teaching material and the improvement of students' cognitive learning result effectiveness is measured using *normalized gain (N-gain)* equation as follows in equation 1.

$$< g > = \frac{\%<S_f>-\%<S_i>}{100\%-\%<S_i>} \quad (1)$$

The effectiveness category according of learning effectiveness as high with interval score (< g >) > 0,7; medium 0,3 ≤ (< g >) ≤ 0,7; and low category (< g >) < 0,7. The students' problem-solving skill is tested using paired sample t-test by doing pre-test and post-test which aiming to know whether the developed electronic teaching material has a significant effect to the students' problem-solving skill [41]. Then, the improvement of the students' problem-solving skill can be seen by usig the equation 2.

$$N = \frac{S_{pd}}{S_m} x\ 100 \quad (2)$$

The assessment of the problem-solving skill is done from THB that the students have done. Problem-solving skill is assessed based on the rubric which has determined. The average score of problem-solving skill assessment is adjusted with the category in the Table 3 [36].

Table 3. Problem-Solving Skill Category

No	Interval score	Category
1	$\bar{X} > 80{,}00$	Very Good
2	$60{,}00 < \bar{X} \leq 80{,}00$	Good
3	$40{,}00 < \bar{X} \leq 60{,}00$	Good Enough
4	$20{,}00 < \bar{X} \leq 40{,}00$	Less Good
5	$\bar{X} \leq 20{,}00$	Not Good

3. Result and Discussion

Based on the teaching material development that had been done which consist of the lesson plan containing the traditional game, the students' worksheet (*Lembar Kerja Peserta Didik – LKPD)*, the teaching material that contain the traditional game, and the learning result test (*tes hasil belajar – THB).* After the research design step was done, the teaching material containing the traditional game result is obtained as follows Figure 2.

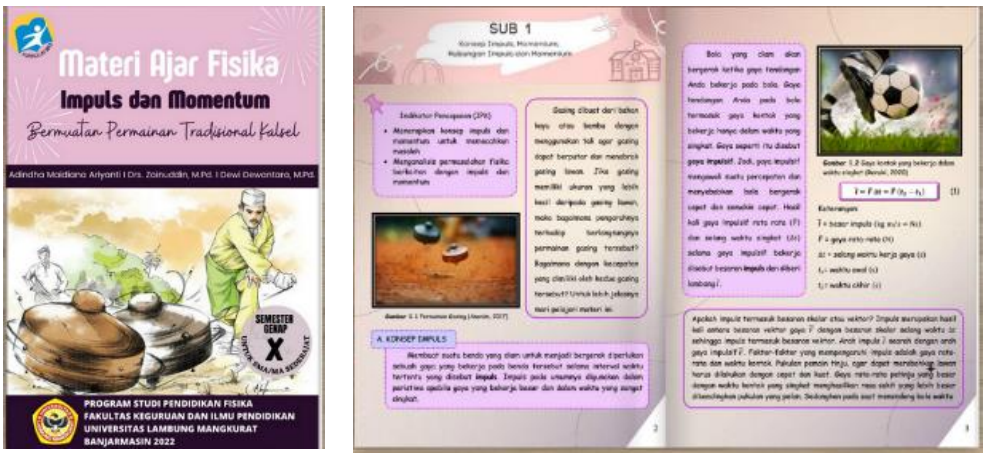

Figure 2. The Teaching Material Product

The developed teaching material was made as interesting as possible with giving the traditional game pictures that close with the students' environment was linked with the learning material in the class, then the students were given exercises and assignments which also related to the traditional game. By using the teaching material that had been combined with the traditional game would increase the students' understanding and love to their local culture and also can train the students' problem-solving skill through the pictures which are easy for the students to understand. With the local culture in the teaching material, it is assessed effective to increase the learning quality [43]. After finished the validity assessment from three people which are suitable with their competence, which are two academics, and one practitioner (the teacher), the teaching material validity consist of several assessment aspects, which are content aspect including (software engineering, organization, language), and display including (visual communication, format, attractiveness, font size form) is obtained a result as follows Table 4 and Table 5.

Table 4. The Result of Content Aspect Teaching Material Validity

Content Aspect	Validity		Reliability	
	Score	Category	r_{11}	Category
Software Engineering	3.19	Good	0.62	High
Organization	3.67	Very Good		
Language	3.50	Very Good		

Table 5. The Result of Display Aspect Teaching Material Validity

Display Aspect	Validity		Reliability	
	Score	Category	r11	Category
Visual communication	3.22	Good	0.63	High
Format	3.50	Very Good		
Attractiveness	3.33	Good		
Font size and form	3.00	Good		

Overall, the result of the developed teaching material is stated as very good category. The assessment result to the teaching material development is stated as already valid. The result of the reliability is at high category. It means, it is already appropriate with the good teaching material characteristics by [44]. In line with the opinion from [45] [46] that stated that the assessment of the validity of learning media in this category is the electronic teaching material need to consider how the

display will increase the students' learning motivation which will help to increase the learning quality, so that an interesting display and can describe a traditional game that close with the students' environment will be more motivated the students. The opinion from relavant research [47] a teaching material should be able to deliver the learning to the students in accordance to the problem that want to be solved, therefore, it needs to assess the validity, where the higher the validity assessment will be better the teaching material when it is used in the learning. Especially in the problem-solving, then the steps or the interesting activity of problem-solving and close with the students' daily environment need to be drawn in the teaching material.

The practicality of impulse and linear momentum teaching material that contain South Kalimantan traditional game to train the problem-solving skill is measured by the result of the lesson plan implementation which filled by three observers when the learning using the electronic teaching material which developed by the researcher is implemented. As for the practicality using a lesson plan implementation sheet that is done on the three meeting is obtained the assessment as preface on phase 1 with overall average 3.55, core activity on phase 2 is 3.37, phase 3 is 3.62, and phase 4 is 3.67. There are shown at Table 6.

Table 6. The Result of the Measure of the Teaching Practicality

Activity		Overall Average
Preface	Phase 1	3.55
Core Activity	Phase 2	3.37
	Phase 3	3.62
	Phase 4	3.67
Closing		3.64
Overall average		3.57
Category		Practical
Reliability		0.64
Category		High

Based on the implementation of the lesson plan in the amount of 3,57 with practical category and the reliability value of 0,64 with high category. This result showed that the overall steps in the lesson plan has been done well. The result of the lesson plan implementation observation can be a practicality component in the learning product. In line with the relavant research [48], that stated that the learning implementation showed how easy and suitable the learning is applied to solve the problem that want to be solved. The right teaching to learn the students' skill in solving a problem should be easy to apply or teach by the teacher so that the students will be more interested with the learning, also the problem given by the teacher is close with the students' environment [49]. The learning with a certain containing which close with the students will increase the students' learning interest, which in the end will be able to reach the wanted learning objectives, in thing is the learning will run smoothly to be able to train the students problem-solving with giving the problem based on the traditional game that close with the students [50][51]. The learning effectiveness can be seen from the students' problem-solving skill pre-test and post-test result. The result of the problem-solving skill analysis is showed in the Table 7.

Table 7. The Result of Pre-Test and Post-Test

KPM Indicator	Pre-Test		Post-Test	
	Average	Category	Average	Category
Problem Understanding	34.69	Less good	86.33	Very good
Problem Planning	23.06	Less good	78.69	Good
Problem Finishing	16.32	Not good	85.50	Very good
Re-Checking	0.00	Not good	86.25	Very good

Then, the pre-test and post-test result is used to measure *N-gain*. The measure result of *N-gain* is showed in the Table 8.

Table 8. Student Problem-Solving Achievement

Pre-test Average	Post-test Average	N-gain	Criteria
26.43	86.46	0.78	High

Based on the Table 8 the result of the students' pre-test average is 26,43. After the material was taught using the developed teaching material that contain South Kalimantan's traditional game, the learning result test (THB) was tested again and obtained the students' post-test result is 86,46; while the N-gain is 0,78 with high category. The electronic teaching material effectiveness which developed was measured to know the students' learning result achievement after using the developed electronic teaching result. The effectiveness is the assessment to how much is the effect of the increasing of the students' achievement or the students' learning result after implementing the developed product [52].

The effectiveness of the developed electronic teaching materials is assessed from the students' problem-solving tests, namely problem-solving questions using the Polya problem-solving stages contained in the student learning outcomes test. This is because the problem solving skills of students can be seen from the learning outcomes test, which focuses on the steps students use to solve each given problem. Learning outcomes test filled out by students; instructions for filling out the test, 6 essay questions and answers. The value of effectiveness is obtained from the acquisition of scores on the problem-solving questions contained in the learning outcome test. Aspects that are calculated in problem solving skills there are 4 aspects, namely: (1) Understanding the problem where students are able to write down known variables, be asked, and describe their physical situation. (2) Make a problem-solving plan where students are able to write standard formulas and formulations according to questions. (3) Implement the plan, namely the students perform mathematical calculations. (4) Overall re-checking, namely students check the completion procedure by checking each stage and writing conclusions.

To practice the understanding aspect of the problem, habituation is needed by frequently working on the available questions so that students are accustomed to identifying known variables and also unknown variables. To practice the aspects of making plans, implementing plans and checking back, many examples of explanations are needed and with practice so that students are accustomed to writing formulas correctly, doing calculations correctly and checking again. As shown in Table 7 in the pre-test, the aspects of understanding the problem and planning the problem have a poor category. Meanwhile, in the aspect of problems- solving and checking again, the category is not good. This shows that the problem solving skills of students are still low which is in accordance with the results of the study. Meanwhile, from the post-test learning outcomes test, the aspect of planning the problem was

categorized as good. While the aspects of understanding the problem, solving the problem, and re-evaluating get a very good category.

The increase in the problem solving skills of these students after training in problem solving skills of students by using electronic teaching materials in the form of flipbooks. Electronic teaching materials are equipped with sample questions whose solutions use problem-solving steps and can be easily accessed by students, either from the writing provided in the flipbook or via video. In addition, at each learning meeting, students are always trained in questions by using the stages of problem solving to solve them so that students are accustomed to using the stages of problem solving to solve problems. This is in line with that there is an increase in students' problem-solving scores because at each meeting they are always trained on the stages of problem-solving [53]. The repetition and exercises taught in learning have a high probability of an ability that can be achieved. retained in long-term memory[54]. shows that the developed teaching materials can be said to be effective for use in learning, especially to train students' problem-solving skills. The direct teaching model, an explanation of the impulse and momentum material as well as the stages of problem-solving abilities can be explained by the teacher to students in stages [55]. So that through learning that is taught with direct learning models can be used to train students' problem-solving skills.

4. Conclusion

The feasibility of the development product of the electronic teaching material containing a traditional game can be seen from several factors, which are the validity aspect which the obtained result is the average is in the good and very good category and for the reliability is in the high category both from the content aspect and display validity assessment with the score 0,62 and 0,63. The next feasibility aspect is the practical which assessed from the learning implementation sheet that obtain the score 3,57 with the practical and reliability category's score 0,64 at high category. While the last aspect is the effectiveness which obtain the N-gain socre is 0,78 with the high category and the average of the assessment for the problem-solving skill is in the very good category. So that the development of the electronic teaching material containing a traditional game can increase the students' problem-solving by how interesting the learning that close with the students and in the fun playing atmosphere.

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