Student Worksheet Validity Based on Problem Based Learning (PBL) Equipped With Educational Games in Biological Science Materials for Junior High School Grade VIII

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ABSTRACT
The aim of this research is to develop student worksheet based on PBL which completed by educative games and know the validity criteria. The type of this research is Research and Development with the development model of Plomp which consists of three stages, namely the preliminary research phase, development of phase, and assessment phase. The validity of student worksheet based on PBL based which completed by educative game is achieved from validation of expert sheet by 3 experts. The result shows that the didactic term is scored 82,14% with very valid criteria, construction term is scored 80,56% with valid criteria, technical term is scored 76,39% with valid criteria, language term is scored 83,33% with very valid criteria and the average of all four conditions get 80,60% with valid criteria. The development of students worksheet based on PBL which complete educational games was successfully developed with valid of the validation criteria and is expected to be a guideline in the learning process that helps improve students' competencie in terms of knowledge, attitude, and skills.

Keywords: Validity, Student Worksheets, Problem based learning

1. INTRODUCTION

Education is one of the most important factor in improving overall human resources both as individuals and as members of society. To produce quality human resources, mastery in the field of science and technology is very necessary. Natural Sciences as a branch of science has an important role in the development of science and technology, whose mastery in the field of Natural Sciences is very necessary.

The science learning process that emphasizes the scientific learning process is expected to provide direct experience to students so that students can build their own knowledge so that knowledge competencies, attitudes and process skills of students can increase. The teacher is one of the main determinants of learning. For that we need a planned way or effort to make it happen. Developing teaching materials is one way that can be done by teachers to help students in learning. Teaching materials have an important role in learning. For that, we need a planned way or effort to make it happen. Developing a teaching material is one way that can be done by teachers to help students in learning. Teaching materials have an important role in learning [1].

Based on the experiences and observations of researchers in teaching science, students usually use the student worksheet that is already in the student textbook. This is reinforced by the results of interviews of researchers on teachers who taught in several schools, namely SMPN 4 Batang Anai, SMPN 1 Batang Anai, SMPN 20 Padang and SMPN 27 Padang. Data was obtained that the teacher used student worksheet in science learning at school, but more using student worksheet contained in textbooks of 2013 curriculum students. The student worksheet has used a scientific approach, but it has not been compiled in accordance with the learning model recommended in the 2013 curriculum which can direct students to think critically through solving problems related to themselves, the environment and daily life. The student worksheet also does not present questions that can train students to think critically and be actively involved in the learning process. The students who were interviewed by the researchers also stated the same language, namely using the 2013 curriculum students' textbooks that they considered to be less interesting, and lacking in complete presentation and not facilitating students in conducting discussions.

The success of the learning process cannot be separated from the teacher's ability to develop a learning model that is oriented to increase the intensity of student involvement effectively in the learning process[2]. one of the learning models that can increase the activeness and motivation of students in learning is a learning model that focuses on solving everyday problems is a problem based learning model[3].

Problem-based learning (PBL) is a learning model that is effective in helping students acquire skills and build student knowledge [4]. This model is characterized by the use of real-life problems as something students must learn to train and improve critical thinking and solving problems and get important knowledge and concepts. PBL aims to help learners increases intrinsic motivation, build thinking skills, develop knowledge to a higher level, and become learners who can work together and collaborate in groups[5].

In general, the syntax of the Problem Based Learning model as follow: (1) Orient students to problems, (2) Organizing students to learn, (3) Guiding individual or group investigations, (4) Develop and present the work, (5) Analyze and evaluate the problem solving process [6].

problem based learning has some advantages as follows: (a) represent technique is quite good for more understand fill in lesson learned, (b) obtained cpplenge ability students and give away satisfaction for find new knowledge for students, (c) improve students activity learning, (d) help students how transfer their knowledge for understand problem in real life, (e) help students for develop knowledge and take responsibility in their learning. Beside that, solving problem push for do self evaluation to the result, as well as the learning process, (f) develop students ability for critical thinking and their ability for adjust with new knowledge, (g) give chance on student to apply their knowledge in the real world, (h) develop students interest for continously learn even though learn on formal education has been is over[7].

Student worksheet is equipped with educational games, because with educational games it is expected that students will not feel bored so that the learning conditions are interesting and fun for students, this is in accordance with the opinion of that educational games are activities that are seducing and are educational means or tools that are educational and useful for improving language skills, thinking, developing personality, bringing relationships between teachers and students closer, channeling student activities and so on[8]. Game give away a positive impact to results learning students on aspect cognitive, affective and psychomotor[9].Educational games are a means to improve the quality of learning of students [10].

2. METHODOLOGY

The type of this research is research and the development. This research can produce new products that have been validated and can be used in conducting the learning process, and can improve student learning outcomes.

The development of student worksheet based on PBL is complemented by educational game using the Plomp model[11]. Plomp's development model consists of three stages, namely the stage of initial investigation (Preliminary research), the stage of development or making a prototype (Development or prototype phase), the assessment.

The validity was assessed by experts, practicality was assessed based on practicality for teachers and students.

But the researchers discussed only reaching the stage of validity. Validity is a criterion for the validity of the product produced. Validity is concerned with the accuracy of the assessment tools for the assessed concept so that it really assesses the things that should be assessed[12]. Validity refers to the accuracy, meaningfulness and usefulness of a conclusion stated by an expert[13].

At the initial investigation stage, an analysis of the problems and needs of students is carried out, analysis of students, curriculum analysis, and student worksheet analysis. at the stage of developing or making a prototype, there are several steps taken consisting of the prototype I, prototype II, prototype III, and prototype IV. At the assessment stage, student worksheet based on PBL equipped wtih educational games testing is tested with actual students. In the stage of developing and making prototypes, the student worksheet is guided by research instruments. Validity testing is done for prototype II by testing it to several experts. Validation of the results of the study was carried out by three expert experts. Then revisions are made based on suggestions and comments from experts so that the worksheet meets user needs and can be used to guide the learning process. Validity analysis uses student worksheet validity data obtained from data collection instruments based on questionnaires filled by expert experts.

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Data analysis started with specified scores for each item, validation score specifies based on scale Likert [14]:

Skor   Kategori
4   =   Strongly Agree (SS)
3   =   Agree (S)
2   =   Less Disagree (TS)
1   =   Disagree (STS)

Analysis of the validity assessment on student worksheet in the form of construction, didactic, technical, and language aspects based on the validity assessment sheet is carried out in the following steps:

a.   Score for the answer with criteria based on Likert modified[14] :
b.   Decided the highest score
     Highest score = validator total x indicator total x maximum score
c.   Decided total score with each validator with sum up all the scores that obtained by each indicators.
d.   Decided score which is obtained by sum up scores from each validator
e.   Validity score with this formula:

$$Validity\ Score = \frac{Total\ score\ obtained}{maximum\ total\ score} \times 100\% \quad (1)$$

f.   Validity score (Riduwan, 2009) with these criteria can be seen in table 1.

Table 1. Validity criteria.

Validity Score (%)	Category
81%-100%	Very Valid
61%-80%	Valid
41%-60%	Quite Valid
21%-40%	Less Valid
0%-20%	Not Valid

3. RESULTS AND DISCUSSION

Validation of student worksheet based on PBL equipped with educational games is based on the expert validation instrument items based on the steps of problem-based learning (PBL) based student worksheet, then a worksheet is produced student worksheet based on PBL are then validated by experts. Validators are only carried out by experts who are experts in their fields in providing an assessment of the developed student worksheet.

student worksheet is qualified should prepare some requirements that is terms construction, including terms use language , terms didactic and , technical conditions [15]. The validity of student worksheet based on PBL with educational games includes construction requirements, didactic requirements, technical requirements, and language requirements.

The validator who gave an assessment of this validation process was Mr. Dr. Darmansyah, ST, M.Pd as a technology expert, Dr. Abdurrahman, M.Pd as linguists, and Mr. Dr. Abdul Razak, M.Si as a biologist. The results of the validation of problem-based learning (PBL) based student worksheets (LKPD) with educational games are as follows:

Table 2. Construction Aspects.

No	Indicator	Validator Assessment			Total	Validation Score	Criteria
		1	2	3			
1	Student worksheet presents clear indicators and objectives.	3	3	3	9		
2	Activities in the Student worksheet are in accordance with the subject matter.	3	3	3	9		
3	Activities at Student worksheet are presented systematically based on the PBL phase.	3	4	3	10		
4	Learning activities in the Student worksheet have a phase of orienting students to problems, displaying a problem phenomenon that is in accordance with the topic.	3	3	3	9	80,56%	Valid
5	Learning activities in the Student worksheet have a phase of organizing students to learn, by giving orders for group learning.	3	4	3	10		
6	Learning activities in the Student worksheet have a phase guiding individual and group investigations. Students write a temporary answer to the problem or phenomenon that	4	3	3	10		

No	Indicator	1	2	3	Total		
	is given. As well as directing students to conduct experiments that will be carried out.						
7	Learning activities in the Student worksheet have a phase of developing and presenting the work, by directing students to write the results of the experiment and the command to answer the questions.	4	4	3	11		
8	Learning activities in the Student worksheet have a phase of analyzing and evaluating the problem solving process, by asking students to draw conclusions from the results of the activities carried out.	3	4	3	10		
9	Learning activities in Student worksheet have educational games by asking students to guess the images presented.	3	3	3	9		
	Total	29	31	27	87		

Table 3. Didactic Aspects.

No	Indicator	Validator Assessment			Total	Validation Score	Criteria
		1	2	3			
1	The material on the Student worksheet developed in accordance with KI, KD and	4	4	3	11	82,14 %	Very Valid

	Indicators						
2	Student worksheet lists questions related to material concepts.	4	4	3	11		
3	Activities at Student worksheet provide opportunities for students to work together.	3	3	3	9		
4	Activities at the Student worksheet develop students' social communication skills.	3	3	3	9		
5	Activities at the Student worksheet develop the ability of students to problems solve.	3	4	3	10		
6	The activities carried out in the Student worksheet have applications in daily life.	3	4	3	10		
7	The images presented can support the material.	3	3	3	9		
	Total	23	25	21	69		

Table 4. Technical Aspects.

No	Indicator	Validator Assessment			Total	Validation Score	Criteria
		1	2	3			
1	Pictures and writing on the cover reflect the contents.	3	3	3	9		
2	Images on the contents of the Student worksheet can convey messages effectively.	3	3	3	9	76,39 %	Valid
3	The caption is in	3	3	3	9		

		1	2	3			
	accordance with the picture presented at the Student worksheet.						
4	The colors used in the Student worksheet are quite contrasting.	3	4	3	10		
5	Image color fosters attraction for students.	3	3	3	9		
6	The type and size of letters used are appropriate.	3	3	3	9		
	Total	18	19	18	55		

Table 5. Language Aspects.

No	Indicator	Validator Assessment			Total	Validation Score	Criteria
		1	2	3			
1	Student worksheet uses the correct Indonesian language rules	4	4	3	11		
2	writing can be read well	4	3	3	10		
3	The language used is easy to understand.	3	4	3	10		
4	The language used is in accordance with the language level of junior high school class VII students.	3	3	3	9	83,33 %	Very Valid
5	Using a simple and clear sentence structure.	3	4	3	10		
	Total	17	18	15	50		

Validity obtained from the results of validation using the guideline sheet of experts validation includes construction aspects, didactic aspects, technical aspects, and language aspects. In the value of validity in the aspect of construction, the value of 80.56% criteria is valid. Showing that the student worksheet is presented according to the indicators, objectives, and learning material, the student worksheet activities have been integrated with the PBL model that is able to develop the scientific attitudes of students in the learning process.

In the value of didactic aspect validity the value is 82.14% with very valid criteria. Shows that the material presented at the student worksheet has been developed in accordance with KI, KD, and indicators. The developed student worksheet contains a list of questions related to material concepts, provides opportunities for cooperation, students' social communication skills, and the presented images can support the material. While the value of the technical aspect validity is 76.39% with valid criteria. Shows that the images and writing presented are in accordance with the needs of the students. And the validity of the language aspect of the 83.33% value criterion is very valid. Showing that the student worksheet uses the correct Indonesian language rules, the use of letters is easy to understand. The overall calculation of the value of validity gets an average value of 80.60% with valid criteria. So it can be concluded that student worksheet based on PBL equipped with educational games can be used as guidelines for students' worksheets that are able to encourage active students in conducting the learning process, making it easier for students to remember and understand the material with the problem learning model based learning and increasing student learning competencies from cognitive, affective, and psychomotor competencies.

4. CONCLUSIONS

Based on the results of the research and discussion it can be concluded that student worksheets based on PBL equipped with educational games that has been successfully created student worksheet based on PBL learning objectives. Student worksheet can be used as a reference as a learning process that is able to guide students in learning more active and can improve their learning outcomes.

Student worksheet based on PBL equipped with educational games are developed to have an average value of 80.60% with valid criteria validity in terms of construction aspects, didactic aspects, technical aspects, and language aspects so that the LKPD that has been developed can be used in the learning process activities to help participants students in carrying out the learning process, understanding the available problems and achieving basic competencies to improve student learning competencies.

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