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Validity of Student Worksheet (LKPD) Based on Guided Inquiry with Microorganisms topic for Senior High School Students of Class X

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Abstract - Biology belongs to one field of natural science that provides a variety of learning experiences to understand the concept and process of science. One of the topics discussed in biology subjects in Class X of odd semester is microorganisms (viruses, bacteria, protists and fungi). Microorganism material (viruses, bacteria, protists and fungi) is difficult material because microorganisms are microscopic creatures that cannot be seen directly. Students used student worksheets that have only one sheet containing one subtopic containing a list of questions that tend to be textual, but the student worksheets does not train students to find concepts independently and not train critical thinking. Therefore, new innovations are needed in the learning process. This study aims to produce student worksheets (LKPD) based on guided inquiry on the topic of microorganisms for senior high school students class X and to know about the criteria of validity. This type of research is Research and Development with the development model of Plomp which consists of three stages, namely the preliminary research phase, development phase, and assessment phase. The validity of student worksheets based on guided inquiry was obtained from the results of validation that used validation sheet by 3 experts. The results showed that the didactic aspect scored 96.29% have criteria is very valid, the construction aspect scored 97.83% have criteria is very valid, the technical aspect scored 96.00% have criteria very valid, and the overall average of the three aspects scored 96.71% with a very valid category. Student worksheets (LKPD) based on guided inquiry have been developed that are expected to be innovative and good quality materials to help improve student learning competencies.

Keywords - ***Validity, Student Work Sheet, Guided Inquiry.***

I. INTRODUCTION

Education is an important aspect to improve human resources and the main factors to determine the quality of a nation. Education is a process that is done intentionally to increase knowledge, insight, and experience (Khasanah, 2017).Goals of National education that have been formulated in accordance with Law No. 20 of 2003, namely to develop the potential of students to become human beings who believe and fear God Almighty, have noble character, are healthy, knowledgeable, capable, creative, independent, and become democratic and responsible citizens (Sanjaya, 2010).

The government continues to improve the quality of education, one of which is to change a curriculum, the name is 2013 curriculum. This curriculum to carried out to meet the competency needs and demands of 21st century globalization. Learning that emphasizes to skills process and have a priority to scientific approach is a demand for curriculum development in 2013. Ministry of Education and Culture (2012) states that 2013 Curriculum is a curriculum that focuses on the learning process where students are initially told to be students who are looking for know, and also the standard process that was initially focused on exploration, elaboration, and confirmation is now equipped with a scientific approach. The scientific approach includes the process of observing, asking, collecting data, associating, and communicating (5 M). Understanding of students is not only obtained from teacher explanations but

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it can be obtained from books, learning media, and student worksheets (LKPD).

Biology is included in one of the fields of natural science to provides a variety of learning experiences to understand scientific concepts and processes (Wulan, 2010). Microorganisms (viruses, bacteria, protists and fungi) are one of the topics to discussed in biology class X grade in odd semester. This material interesting for students, but this material is a difficult material because microorganisms are microscopic creatures that cannot be seen directly, besides learning resources to improve students' understanding of microorganism material is still lacking so that students are still having difficulties to understand this material. This can be seen from the results of repetition of students who are not as expected. students who have not yet reached the KKM score range from 50% or almost half of the total number of students. Its means that students still found difficulties to understand the material on the topic of microorganisms that are delivered by teachers using existing textbooks and student worksheets.

Based on the interviews and observations with biology teacher class X SMAN 5 Pekanbaru, namely Mrs. Vina Pertama Sari S. Pd, some problems were found in the learning process at school. First, the teaching materials used by students are private published textbooks and student worksheets made by MGMP teachers that are include MGMP Biology for Senior High School in Pekanbaru. Based on the results of the analysis of researchers, the student worksheets made by the MGMP is good, the student worksheets has been prepared based on Basic Competence, but has not been able to achieve the overall demands of the 2013 Curriculum because the student worksheets is only one sheet containing a sub-topic that contains textual questions. Worksheets are given to students before practice.

Second, the student worksheets used is colorless, until 67% of the students stated that the student worksheets that they used was less attractive and the images displayed were unclear, and 33% of students stated that the teaching materials they used were interesting and the images displayed were clear. Less interesting teaching materials cause students to be less motivated to learn.

Third, the student worksheets used by students is not yet accordance with the demands of the 2013 curriculum, which is based on one learning model recommended in the 2013 curriculum and does not have a specific learning approach that causes students to be less active in learning so that student learning outcomes to be low especially on microorganism topics . Therefore, the existence of biological student worksheets in accordance with the 2013 curriculum is very much needed.

In the learning process of microorganism material, students used student worksheets which contains a summary of the material and several questions, but student worksheets do not train students to find concepts independently and not train critical thinking, because of that, skill process still low and have a impact to learning outcome that are not maximal.

This problems need to be solved to improve the teaching and learning process. Learning strategies that can be applied to solve these problems is to develop teaching materials such as student worksheets. Student worksheets are sheets containing assignments that will be done by students (Zahro, 2017). Student worksheets can facilitate students to interact with given learning materials through several exercises so that students' mastery of learning material can increase.

Student worksheets need to be supported by a model that encourages students to find concepts through an independent innovation process, so that it needs to be supported by learning material innovations. The guided inquiry model is the right model because it can encourage students to find concepts through innovation, such as in solving problems, drawing conclusions, and producing predictions that involve students active in the teaching and learning process through activities centered on students (Eren and Sedar, 2013).

Learning based on guided inquiry is needed in learning activities because in this model emphasizes the importance of understanding the structure or important ideas of a scientific discipline through the involvement of active students in the learning process. Learning with the discovery model prioritizes processes rather than learning outcomes (Mulyasa, 2011). So that teachers are also required to have adequate abilities (Majid, 2007).

Student worksheet (LKPD) is a learning innovation and supports the 2013 curriculum, however, the use of student worksheets guided inquiry in schools, and the availability of student worksheets guided inquiry in the market, especially in microorganism material still very minimal, so the development student worksheets based on guided inquiry on microorganism material needs to be done.

Based on this problem, the researcher developed student worksheets with the title "Development of Student Worksheets (LKPD) Based on Guided Inquiry on Topics of Microorganisms for Class X Senior High School Students". The purpose of this study is to produce worksheets based on

guided inquiry on the topic of microorganisms that are valid and can be used in learning process.

To know the student worksheet is good or not to develop, student worksheets guided inquiry must go through several stages of testing, one of which is the validity test. Validity test is determine the level of validity of the instruments used. An instrument is said to be valid if it is able to measure what is desired and can reveal data from variables that are examined appropriately. The test has high validity if the results match with criteria, its mea that they have parallels between the test and the criteria.

The other side of understanding validity is a measurement accuracy aspect. A valid measuring tool is not only capable of producing precise data but also should give a careful description of the data. According to Trianto (2010), valid have a maning that the assessment has provided accurate information about the teaching materials developed. Meticulous have a meaning that the measurement can give a picture of the smallest differences between one subject and another.

II. RESEARCH METHODS

This research is a research development. The aims of this study to produce student worksheets (LKPD) products based on guided inquiry that have been validated and can be used in conducting learning activities, and can improve student learning outcomes.

Development of student worksheets (LKPD) based on guided inquiry using the model of Plomp (2013). Plomp's development model consists of three stages, the stage of initial investigation(*Preliminary research*), development stage or prototype making (*Development or prototype phase*), stage of assessment (*Asessment phase*) .The validity was assessed by experts, practicality was assessed based on the questionnaire practicality for teachers and students. But the researchers discussed only the stage of validity. At the stage of the initial investigation, an analysis of problems and needs, analysis of student, analysis Students Worksheet (LKPD), and analysis of the curriculum, and then at the development or prototyping stage, some steps that must do taken prototype I, prototype II, prototype III, and prototype IV. At the assessment stage , testing the worksheet of students is carried out in the classroom with actual students. In the stage of developing and making a prototype, the worksheet of the students is guided by research instruments . Validity test on the prototype II was testing to several experts *(expert Riview).* The result validation was carried out by three expert. Then revisions are made based on suggestions and comments from experts so that the student worksheets can fill full user needed and can be applied in the actual classroom.

The validation instrument by expert it can be seen at this table.

VALIDATION OF WORK SHEETS OF STUDENTS BASED ON THE INQUIRY ON MICROORGANISM TOPICS (VIRUS, BACTERIA, PROTISTA AND FUNGUS)

A. Didactic Aspects

No.	Assessment Indicator	Score			
		1	2	3	4
		STS	TS	S	SS
1.	Teaching an learning activities based on guided inquiry facilitate to understanding concept.				
2.	Teaching and learning activities by using student worksheets based on guided inquiry give various stimulus through students activity				
3.	Teaching and learning activities by using student worksheets based on guided inquiry can develop the communicative, social, emotional, moril, and aesthetic abilities.				
Total					

B. Construction Aspects

No.	Assessment Indicator	Score			
		1	2	3	4
		STS	TS	S	SS
1.	Student worksheet				

	based on guided inquiry used the Indonesian standard language.				
2.	Student worksheet based on guided inquiry used a good sentence arrangement				
3.	Student worksheet based on guided inquiry used the right vocabularies				
4.	Student worksheet based on guided inquiry has material levels that can support teaching learning Activities.				
5.	Student worksheet based guided inquiry has regulation, user guide, and suitable with phases of guided inquiry				
Total					

C. Technical Aspects

No.	Assessment Indicator	Score			
		1	2	3	4
		STS	TS	S	SS
1.	**Layout**				
	a. Using cambria fonts type b. Using readable font size c. Compatibility of punctuation d. using appropriate and standard Indonesian sentences				
2.	**Images**				
	a. Images are suitable with the concept b. Image description is suitable with the image				
3.	**Graphic**				
	a. Compatibility of using colour composition in Student worksheet b. Display design of student work sheet is simple and attractive				
Total					

Validity analysis used student worksheet validity data obtained from the analysis of data collection instruments, such as questionnaire filled by some experts. Data Analysis was begun by determining scores for each items, The determining validation score based on the Likert scale according to Yusuf (2007):

Score	Category
4	Very agree (SS)
3	Agree (S)
2	Disagree (TS)
1	Very disagree (STS)

Then, scoring results were tabulated and percentage by using this formula.

$$\text{Percentage of Validity} = \frac{\text{obtained score}}{\text{maximum score}} \times 100\%$$

Based on validity score that was obtained, assessment criteria of validating student worksheets based on guided inquiry can use this student worksheets validity categories.

Validity Score (%)	Category
0-20	Not Valid
21-40	Less Valid

41-60	Valid Enough
61-80	Valid
81-100	Very Valid

Source: Riduwan (2009)

III. Result And Discussion

The validity of student worksheet based on guide inquiry is based on the instrument of item by expert that related with a step of role in student worksheet on the microorganism topic. Then, student worksheet was validated by several experts. According to Sari (2017) the validator is experts who are experts in the field of study in providing an assessment of the worksheets of students developed. The validity based on guided inquiry student worksheets includes didactic aspects, construction aspects, and technical aspects. The validator involved in this validation process is Dr. Darmansyah, ST, M.Pd as a technology expert, Dr. Abdurrahman, M.Pd as a linguist, Dr. Ir. Zulfarina, M.Si as a material expert.

This is the result of validity of student worksheet (LKPD) by validator:

Table 1. Result Of Validity Analysis Of Student Worksheet (Lkpd) Based Guided Inquiry

No.	Aspects	Indicator	Validator Assesment			Total	Validity Score	Category
			1	2	3			
1.	Didactic Aspects	1	3	3	3	9	**96,29%**	**Very Valid**
		2	3	3	2	8		
		3	3	3	3	9		
	Total		**9**	**9**	**8**	**26**		
2.	Construct Aspects	1	3	3	3	9	**97,83%**	**Very Valid**
		2	3	3	3	9		
		3	3	3	3	9		
		4	3	3	3	9		
		5	3	4	3	10		
	Total		**15**	**16**	**15**	**46**		
3.	Technical Aspects	1a	3	4	3	10	**96,00%**	**Very Valid**
		1b	3	4	4	11		
		1c	3	2	3	8		
		1d	3	3	4	10		
		2a	3	3	3	9		
		2b	3	3	3	9		
		3a	3	3	3	9		
		3b	3	3	3	9		
	Total		**24**	**25**	**26**	**75**		
Total amount of validity score							**290,12**	**Very Valid**
Average of validity score							**96,71**	

Based on the analysis of the validation results in table 1, it can be seen that overall the average of validity score of student worksheets is 96.71% with a very valid category. This shows that the student worksheets developed were in accordance with KI and KD in the 2013 curriculum, presenting clear a learning goals, complete topic details, and conformity between topics of student worksheets and evaluations, so that student worksheets could be used in learning activities.

The validity of the didactic aspect scored 96.29% with very valid criteria. In the didactic aspects there are 3 indicators, the lowest value is obtained from the indicator of learning activities guided with student worksheets based on guided inquiry providing stimuli through the activities of

students, obtaining a value is 2 and included in a very valid category. According to Suryosubroto (2009), one of the weakness of guided inquiry learning is that slow learning student may be confused in their efforts to develop their minds when faced with new things. The highest values obtained on indicators of guided inquiry-based learning activities facilitate the understanding of concepts and learning activities guided by guided inquiry-based student worksheets that can be develop students' social, emotional, moral, and aesthetic communication skills which are obtained by 3. Its mean that the student worksheet (LKPD) based on guided inquiry is in accordance with guided inquiry learning characteristics according to Carin (1993), guidance is given in coherent and directed questions, questions presented can stimulate students to build a concept, and students use abilities think to solve it.

The format of student worksheets used by researchers in developing student worksheet based on guided inquiry is the format of writing LKPD according to Prastowo (2011) which consists of covers, study instructions or use of LKPD, subject matter, material summary, student worksheet, evaluation sheet and assessment. The format is :

1. Instructions for using student worksheets

Instructions for using contain how to use student worksheets in the learning process, both for students and for teachers

2. Material Description

The material description is presented on each sub topic and contains material that can provide information and concepts that are directly related to the topic of learning.

3. Indicators of Competency Achievement and TP

Contains indicators of achievement of competencies and learning objectives to be achieved

4. Evaluation sheet

The evaluation sheet on the student worksheet contains the questions and tasks required in the existing KD. The aim is to see the achievement of competencies that have been formulated after learning with the worksheet of students.

5. Assessment Sheet

Student worksheets also provide assessment sheets conducted by teachers, this assessment aims to provide feedback for students.

The validity of the construction aspect received a value of 97.83% with very valid criteria indicating that the guided inquiry-based student worksheet (LKPD) developed had been arranged with good innovation, was able to motivate students, and was presented in accordance with guided inquiry stages. Arends (2012) describes several characteristics in the activities of student worksheets that are in accordance with guided inquiry syntax, they are:

a. Students' orientation
b. Formulating the problems
c. Formulating hypothesis
d. Testing hypothesis
e. Collecting and analyzing data
f. Drawing conclusion.

In the construct aspect there are 5 indicators. high scores on the worksheet indicators students is code of conduct, instructions for used, and accordance with the stages of inquiry to get 4 for a value. The lowest value is on the worksheet indicators of students using good and correct Indonesian rules, worksheets using a clear sentence arrangement, worksheets use the correct vocabulary, and worksheets have material that can support learning activities, obtain grades 3. According to Prastowo (2013) the instruction sentences that we give in the student worksheet must be clearly read by students, because they are as perfect whatever material we prepare if students are not able to read it clearly then the student worksheet does not provide maximum results.

The validity of the technical requirements scored 96.00% with very valid criteria stating that student worksheet (LKPD) based on guided inquiry had readable and clear types of letters and font sizes, no ambiguous words, images and captions that were presented in student worksheet (LKPD) based on guided inquiry according to the material, the composition of colors used in accordance with the material and the design of the display of student worksheet (LKPD) based on guided inquiry is simple and interesting.

Components of technical aspects have 3 indicators : Layouts, image, and graphics. In the layout indicator of the worksheet, the student who gets the lowest score is the conformity of punctuation that gets 2 for value from the validator. Its happens because there are many mistakes in writing punctuation on student worksheets. While the highest score is the indicator using the Cambrian type of writing, using readable letters, the use of sentences in the worksheet of students in accordance with the rules of good and correct Indonesian gets a value of 4 from the validator.

IV. CONCLUSION

Based on the results of research and discussion on the development of student worksheet (LKPD) based guided inquiry on the topic of microorganisms for Class X high school students, it can be concluded that the guided inquiry-based student worksheets developed have very valid validity in terms of didactic aspects, aspects construction, and technical aspects so that the development of a student worksheet (LKPD) based guided inquiry that has been developed can be used in learning activities. This validity is reviewed from the results of the study of education experts and biologists with a validity level of 96.71%.

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