International Journal of Progressive Sciences and Technologies (IJPSAT)
ISSN: 2509-0119.

http://ijpsat.ijsht-journals.org
Vol. 6 No. 2 January 2018, pp. 274-278

Validity of Student Work Sheet Based Mind Map on Learning Materials of Matter Classifications and Organism Classifications for VII Grade SMPN Students

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***Abstract* – Education is a human right that must be fulfilled by everyone. Through education, people can be better in facing the challenges and problems in life. Educational quality can be improved by some strategies, like the choosing of the right learning approach in learning process and selecting learning materials suitable with learning objectives and students' characteristics. One strategy and learning materials that can support learning process in classroom is applying student work sheet based mind map. The research aimed at developing student work sheet based mind map to SMPN class VII students and knowing its validity criteria. It was a development research with Instructional Development Institute (IDI) model. The validity of the student work sheet bases mind map was obtained from validity result by using expert validity sheets done by 3 experts. The result of the research showed that score of didactic requirements is 81,25% with the criteria was valid; score of construct requirements was 83,33% with the criteria was valid; score of technical requirements was 86,45%, which mean it was valid; the score of language requirements was 85,41%, which mean it was valid; and the average score of all requirements is 84,11%, which mean it was valid. The student work sheet based mind map is successful to be developed with the validity criteria was valid. In addition, it is hoped that the student work sheet can be used as learning materials that help students improve their competence in cognitive, affective, and psychomotor.**

***Keywords* – Validity; Student Work Sheet; Mind Map.**

I. INTRODUCTION

Science learning actually consists of product, process, and attitude that demand students to do an innovation and problem solving. The science has a strategic function because it can be used to develop students' potentials and competences in cognitive, affective, and psychomotor (Mundilarto, 2005). Learning outcome is an objective of learning process. According to Anderson & Krathwol (2010), learning outcome includes three competences, they are cognitive, affective, and psychomotor.

One of science learning is Biology. The Biology is a part of sciences that studies various life concepts. Based on the fact, teachers should encourage students to study Biology by understanding the existing concepts. The concepts have strong relation with daily life so the learning process becomes more meaningful if those concepts are applied in real life, not only memorize it.

Teachers should have competence to create and develop learning materials. Sungkono (2003) asserts that one competence the teachers should have is they can develop learning materials. The development of learning materials are important in order to make learning process become more effective, efficient, and suitable with the competence that will be achieved. One of learning materials that can be developed by teachers is student work sheet.

Based on observation and interview done in SMPN 1 Canduang, it is found that students have difficulty in

understanding learning materials of matter classifications and organism classifications. It is known from the data obtained from the students' average score of test in matter classifications and organism classifications materials. The score of matter classifications was 64% and organism classifications was 55%, which mean the students do not achieve the minimum criteria of mastery learning (KKM).

The results of observation and interview with science teacher in SMPN 1 Canduang also show that there are some factors that influence students' outcomes. One of the factors is learning process applied in school. The learning process that involves students actively in the classroom is called active learning. So, the active learning is one solution to increase students' active role in learning process. According to teacher in SMPN 1 Canduang, the active learning model have been applied learning IPA but this model cannot activate all students in the classroom. Only the students who have good competence are active in learning process.

Book used in Biology learning in SMPN 1 Canduang only has few pictures. Besides that, learning materials are presented shortly and briefly. Then, components of work sheet used have not fulfilled the 2013 curriculum needs. Activities do not reflect the scientific approach that should be applied in learning process nowadays.

Related to the problems above, teachers should find a good strategy to overcome those problems. One strategy that can be used is to apply scientific approach in learning process to support educational quality improvement. Applying student work sheet could be a good strategy for teacher in the classroom because it can facilitate students with activities and exercises in form of work sheets.

The student work sheet is a printed learning materials that contains materials, summaries, directions to do tasks that refer to basic competence that must be achieved. The purpose of using student work sheet is to facilitate students to interact with the given materials, to increase students' mastery towards given materials, to train students' independence, and to facilitate teachers in giving tasks or exercises to students (Prastowo, 2011). Therefore, student work sheet is created by presenting the interesting materials for students by visualizing them in form of mind map.

The mind map is a creative and effective way in taking notes by mapping the ideas (Buzan, 2009). The students' notes form ideas pattern that is related each other, in which the main topic is in central and sub-topic and details become its branches. This technique is also known as Radian Thinking (Deporter dan Hernacki, 2011).

According to Ariana (2012), when students use mind map, they are not only active in learning, but also they can see the result of their efforts so that they feel learning is an interesting and meaningful activity. It is in line with the research done by Zampetakis, *et.al*., (2007) which showed that mind map technique gives a significant contribution to students' learning outcomes because this technique can help students to make mapping of their learning material so that they can understand it easily.

To know whether it is suitable or not, the developing student work sheet needs to pass some tests. One of the tests is validity test. The validity is a measurement standard that shows an instrument is accurate and valid. A test is called valid if it measures what is needed to be measured. The test has high validity if the result is suitable with determined criteria, which means the test is in line with the criteria.

Besides that, the validity is a measurement accuracy aspect. A valid instrument is not only able to produce precise data, but also give accurate image about the data. Accuracy means that the measurements can give image about difference between one subject with other subjects in detail.

The validity test is done to know the validity of instruments used. An instrument is valid when it can measure what is needed and reveal the data from variables accurately.

II. RESEARCH METHOD

This research was a development research. The research was done to produce a new product that has been validated so that it can be used in learning process and increase students' learning outcomes.

The development of student work sheet based mind map is developed by using IDI (Instructional Development Institute) model. The IDI model is developed by the university of Consortium for Instructional Development and Technology (UCIDT). IDI model development applies some phases, they are define, develop, and evaluate. (Yusnita dkk, 2011).

In the define phase, problems and needs analysis, curriculum analysis, and student work sheet analysis were done to get clear image of product that would be developed. Next, in develop phase, validity test was done by some experts. Last, in evaluate phase, testing of student work sheet is done in the classroom.

In the develop phase, the validity test was done to the student work sheet based mind map by testing it to the experts. The validity test of the student work sheet based mind map was done by 3 (three) experts. Then, the result is used to make revision so that the student work sheet based mind map has fulfilled the needs of users and been able to be applied in the real classroom.

The following is the expert validity instrument used in this research.

THE VALIDITY SHEET OF STUDENT WORK SHEET BASED MIND MAP ON LEARNING MATERIALS OF MATTER CLASSIFICATIONS AND ORGANISM CLASSIFICATIONS

A. DIDACTIC REQUIREMENTS

No	Assessment Indicators	Score			
		1	2	3	4
		STS	TS	S	SS
1	Learning activities are suitable with SK, KD, learning indicators and learning objectives that will be achieved				
2	Learning objectives are suitable with activities that will be done				
3	Activities of student work sheet based mind map facilitate the concept understanding				
4	Initial statement that is presented can be understood by students well				
Total					

B. CONSTRUCT REQUIREMENTS

No	Assessment Indicators	Score			
		1	2	3	4
		STS	TS	S	SS
1	It has regulation in the classroom				
2	Summary of learning materials in every presented topics is suitable with the mind map steps				
3	The developed student work sheet is based on mind map				
4	student work sheet presented is suitable with the mind map steps				
5	The materials in student work sheet support learning activities that will be done				
Total					

C. TECHNICAL REQUIREMENTS

No	Assessment Indicators	Score			
		1	2	3	4
		STS	TS	S	SS
1	**Layout**				
	a. Using clear fonts				
	b. Using readable font size				
	c. Compatibility of punctuation				
	d. using appropriate and standard Indonesian language				
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 work sheet				
	b. Display design of student work sheet is simple and interesting				
Total					

D. LANGUAGE REQUIREMENTS

No	Assessment Indicators	Score			
		1	2	3	4
		STS	TS	S	SS
1	The language used is communicative				
2	Using the standard Indonesian language				
3	Language used can develop students' cognitive competence				
4	Terms used are suitable with the concepts of the learning topic				
Total					

Validity analysis of student work sheet based mind map, like didactic, construct, technical and language requirements is based on validity sheet done by some steps. The are:

a. Giving score to the answers based on the likert scale, modified by Sugiyono (2007) as follow.

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

b. Determining the highest score
   The highest score = total of validators × total of indicators × maximum score
c. Determining total score from every validators by summing up all scores obtained by every indicators.
d. Determining scores obtained by summing up all scores from every validators.
e. Determining validity score by using the following formula:

$$\text{Validity Score} = \frac{\text{total obtained scores}}{\text{total the highest scores}} \times 100\%$$

f. Interpreting the validity score to the following criteria.

Validity Score (%)	Category
90% - 100%	Very Valid
80% - 89%	Valid
60% - 79%	Valid Enough
0% - 59%	Not Valid

III. Result And Discussion

The validity of student work sheet based mind map is based on expert validity instrument items which follow the steps of arrangement of student work sheet based mind map. After that, student work sheet based mind map on matters classifications and organism classifications learning materials were created. Next, the student work sheet based mind map was validated by experts. The validity of student work sheet based mind map includes didactic requirements, construct requirements, technical requirements, and language requirements. The validators involved in this validity process were Mr. Dr. Darmansyah, ST, M.Pd as a technology expert, Mr. Dr. Abdurrahman, M.Pd as a linguist, and Mrs. Dr. Violita, M.Si as a learning material expert.

The validity results of student work sheet based mind map are as follow:

VALIDITY ANALYSIS RESULTS OF STUDENT WORK SHEET BASED MIND MAP ON LEARNING MATERIALS OF MATTER CLASSIFICATIONS AND ORGANISM CLASSIFICATIONS

A. Didactic Requirements Validity

Indicator	Validator Assessment			Total	Validity Score	Criteria
	1	2	3			
1	4	4	3	11	**81,25%**	**Valid**
2	3	4	3	10		
3	3	3	3	9		
4	3	3	3	9		
Total	13	14	12	**39**		

B. Construct Requirements Validity

Indicator	Validator Assessment			Total	Validity Score	Criteria
	1	2	3			
1	3	4	4	11	**83,33%**	**Valid**
2	3	3	4	10		
3	3	3	3	9		
4	3	3	3	9		
5	3	4	4	11		
Total	15	17	18	**50**		

C. Technical Requirements Validity

Indicator	Validator Assessment			Total	Validity Score	Criteria
	1	2	3			
1a	3	3	4	10	**86,45%**	**Valid**
1b	4	4	4	12		
1c	3	4	4	11		
1d	3	4	3	10		
2a	3	3	3	9		
2b	3	3	3	9		
3a	3	4	4	11		
3b	3	4	4	11		
Total	25	29	29	**83**		

D. Language Requirements Validity

Indicator	Validator Assessment			Total	Validity Score	Criteria
	1	2	3			
1	3	4	4	11	**85,41%**	**Valid**
2	3	3	4	10		
3	3	3	3	9		
4	3	4	4	11		
Total	12	14	15	**41**		

The validity of student work sheet based mind map was obtained from the result of expert validity sheet includes didactic requirements, construct requirements, technical requirements, and language requirements. Validity score of didactic requirements is 81,25% with the criteria is 'valid', which shows that learning activity is suitable with core competence, basic competence, learning indicators, and learning objectives. Besides that, student work sheet based mind activities also facilitate the conceptual understanding.

Validity score of construct requirements is 83,33% with the criteria 'valid', which shows that student work sheet based mind map has regulation in the classroom, memiliki tata tertib dalam kelas, materials summary is suitable with the topic, and developed student work sheet has been arranged and presented by using the steps of mind map.

Learning activities in student work sheet have some mind map steps, explained by Yoga (2008). They are:

a. Determining central topic of the learning materials**.**
b. Determining Basic ordering Ideas-BOIs for the chosen central topic. Usually, BOIs are title of chapter or sub-chapter of a book.
c. Completing every BOIs with branches contained supporting data about related topic. This step is very important because, at this time, all data should be placed in every branches of BOIs associatively and use radian structures that is the specific characteristic of the mind map.
d. Completing every branches with image, like pictures, symbols, codes, lists, graphics, and linking lines when the BOIs are related each other.

The score of technical requirements validity is 86,45% with the criteria 'valid', which shows that student work sheet based mind map has readable and clear fonts and font size, ictures and picture descriptions presented in student work sheet are suitable with the learning materials, colour compositions are also suitable with the materials, and layout designs of student work sheet are simple and interesting.

The language requirement validity score is 85,41% with the criteria 'valid', which shows the language used is communicative, the dictions uses the standard language. Besides that, the language used can develop students' cognitive competence. Furthermore, the terms used are also suitable with the concepts of the learning materials.

The average of all validity scores is 84,11% with the criteria 'valid'. It means that student work sheet based mind map on matter classifications and organism classification learning materials can be used as the learning materials that can encourage students to be active in learning process and to facilitate the students to remember and understand the materials by using mind map method. Moreover, it can be used to increase students' cognitive, affective, and psychomotor competences.

IV. CONCLUSION

Based on the result and discussion above, it can be concluded that learning materials on matter classifications and organism classifications have been successfully created in form of student work sheet based mind map. The student work sheet based mind map can be used as additional learning materials in the classroom. The developed student work sheet based mind map has a valid validity if it is viewed from didactic requirements, construct requirements, technical requirements, and language requirements, so that it can be used in learning process to help students understand the learning materials and achieve basic competence to improve students' cognitive, affective, and psychomotor competences.

ACKNOWLRDGEMENT

Thanks to Mrs. Dr. Dwi Hilda Puteri, M.Biomed and Mr. Dr. Abdul Razak, M.Si as advisors and gave motivation to writer in writing this journal.

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