

**VALIDITY OF STUDENT WORKSHEET BASED GUIDED DISCOVERY ON ECOSYSTEM
MATERIAL TO TRAIN STUDENT SCIENCE LITERACY FOR
SENIOR HIGH SCHOOL GRADE 10th**

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Abstract

Science literacy is the ability to understand science, communicate science and apply scientific knowledge in daily life. One topic that suitable to train science literacy is ecosystem, because its related to the environment. In the ecosystem learning process, students worksheet based guided discovery can guide students to find concepts independently and apply concept in daily life. The aim of this research was to describe student worksheet based guided discovery on the topic of ecosystem to train student science literacy for senior high school grade 10th. This research referred to 4D development model, consist of define, design, develop, and disseminate, exclude the stage of disseminate. The instrument which used in this research was a validation sheet. It was used to determine the assessment of student worksheet in terms of appearance aspect, content aspect, language aspect, relevant with guided discovery models and science literacy. Based on the results of the validation, the score of all aspects was 3.88 with percentage of 97.22%, which indicated that the students worksheet was included in the valid category, so that it could be used in the learning process.

Keyword : student worksheet, guided discovery, ecosystem, science literacy, valid.

INTRODUCTION

The 21st century capability is consist of four main domains, namely digital era literacy, inventive thinking, high productivity and effective communication. One of the capabilities that needed in digital era literacy is science literacy. Science literacy is related to the ability of students to know about science and apply their science knowledge to overcome global challenges (Turiman, et.al., 2012). According to Program for International Student Assessment (PISA) (2010) science literacy is multidimensional assessment which consisting of three aspects, namely science content, science process, and science context. The study of science literacy was conducted by PISA 2015 shows that the level of science literacy in Indonesia tends to low category. One of the factors that influences the less science literacy of the students was the learning process has not been able to train science literacy. Therefore, its need an innovation in learning process to improve science literacy of students.

According to Setiawati (2013), the learning process would be appropriate if using guided discovery

learning models. It is one of the learning methods of constructivism that makes students easy to learn and build concepts by themselves. The stage of the guided discovery model are stimulation, problem identification, data collection, data processing, verification, and conclusion (Carin, 1993). The guided discovery learning model is one of the appropriate model to practice science literacy. Because it can help teachers to related learning material with the problems that occur in their environment and encouraged students to apply their knowledge in daily life. In this case students must be literate about science. This is accordance with the 2013 curriculum, which emphasizes that learning should be carried out using discovery /inquiry-based scientific approaches (Kemendikbud, 2016).

One of the biology subject matter that can train science literacy is ecosystem topic. This topic was studied by class X senior high school on basic competence 3.10 and basic skill competence 4.10. Based on the basic competency, students are expected to analyze the component and interaction that exist in

the ecosystem by examining various literature. This topic requires students to understand the environment well and solve the problems that related to the ecosystem environment. Therefore, the students should be able to developed their science literacy skills. According to Toharudin et al. (2011), the characteristics of learning materials that can train science literacy, namely natural resources, health, environment, danger and technological development.

The basic competency can be achieved if the learning process involves the participation of students to finding the concept. The guided discovery model can guide students to find concepts independently, because its emphasizes the importance of understanding structure or important ideas for a scientific discipline (Hosnan, 2014). The guided discovery learning model needs to be supported by learning resources which is suitable with the competence in ecosystem material and the applicable curriculum (Rustiningsih, 2015). The learning resources that can support biology learning activities is student worksheet. Student worksheet contains of instructions and steps that can help students in completing tasks and improving learning outcomes (Depdiknas, 2004).

Based on the description, it is necessary to develop student worksheet on the topic of ecosystem to train science literacy which is appropriate for grade 10th senior high school. One of the feasibility of student worksheet was seen by the results of validation. The purpose of the research was to describe the validity of student worksheet that consisted of appearance aspect, language aspect, content aspect, relevan with the guided discovery model and science literacy.

METHOD

The research that has been done includes the type of development research. The developmental research used Four D (4-D) consist of define, design, develop, and disseminate, exlcude the stage of disseminate was not done. This research was carried out in September 2018-February 2019 and then the validation was conducted in March 2019. The subject of this research was student worksheet based guided discovery on the topic of ecosystem to train science literacy for senior high school grade 10th.

The research instrument used a validation sheet. The validation sheet was filled by a material expert, an education expert and a biology teacher. The data was collected by employing validation method. Then, it was analyzed based on quantitative and qualitative description. The validation of student worksheet were analyzed using the following formula:

$$\text{Score of validation} = \frac{\text{Total score of each aspect}}{\text{Total of validator}}$$

Based on the result of data analysis, student worksheets are said valid if they get a score of 2.51 with a valid category. Then, the score was interpereted by using interpretation of validity score criteria in Table 1.

Table 1. Interpretation of Validity Score

Validity Score	Category
1.00 – 1.75	Less Valid
1.76 – 2.50	Quite Valid
2.51 – 3.25	Valid
3.26 – 4.00	Very Valid

(Adapted from Widoyoko, 2014)

RESULT AND DISCUSSION

The validation of student worksheet was obtained from five main aspects namely appearance aspect, content aspect, language aspect, relevan with guided discovery model and relevan to train science literacy. The result of the validation is given in Table 2.

Table 2. Validation Result of The Student Worksheet

No	Criteria	Score	Percentage (%)	Interpretation
1	Aspect of appearance	3.77	94.45	Very valid
2	Aspect of content	4.00	100	Very valid
3	Aspect of language	3.67	91.67	Very valid
4	Relevan with guided discovery model	4.00	100	Very valid
5	Relevan to train science literacy	4.00	100	Very valid
	Average of overall score	3.88	97.22	Very valid

Information :

Interpretation score :

1.00 – 1.5 = Less Valid

1.76 – 2.50 = Quite Valid

2.51 – 3.25 = Valid

3.26 – 4.00 = Very Valid

The results of the overall validation analysis got score of 3.88 (97.22%) with very valid categories. It can be inferred that the student worksheet was feasible to be used in learning process. The validity of the student worksheet has 5 aspects of assessment, namely appearance aspect, content aspects, language aspect, relevant with guided discovery models and relevant to train science literacy. The results of the validation was seen by the appearance aspect got score of 3.77 (94.45%) included in the very valid category (Widoyoko, 2014). There are nine criteria for evaluating the appearance aspects namely title, time allocation, learning objectives, instructions, references & cover.

The appearance aspect got the lowest score on the criteria instructions and cover. The instructions criteria got an average score of 3.67 with a percentage of 91.67%. It was based on the results of the validation which shows that one of the instructions was unclear so that it will make the student confused. The instructions for using student worksheet compiled with a good persuasive sentences can lead students to actively participate in learning process (Annafi, 2015). Furthermore, the lowest value on the appearance aspect was the suitability cover with the topic. Based on the results of the validation, the average score was obtained of 3.33 with a percentage of 83.33%. It because the cover on student worksheet 1 considered to be inappropriate to describe the practicum activities. The cover used in student worksheet 1 was an unreal image. The appearance of cover is a very important part because of the initial attraction for students to learn it (Sani, 2015). In line with the opinion of Prastowo (2013) revealed that the characteristics of student worksheet are attractive presentation in terms of the appearance, proportion of images, concept layout, and cover.

The content aspect got an average score of 4 with a percentage of 100% which included in the very valid category (Widoyoko, 2014). There are two criteria was assessed on the content aspect, namely the conformity of the material with the concepts and discussions. The material, which used in the student worksheets were ecosystem topic. The material of student worksheet 1 was related to the interactions in the ecosystem by conducting practicum on the effect of water pollution by detergents on the survival of fish. It indicated that there was an interaction between abiotic components and biotic components. The material of student worksheet 2 was related to the flow of energy that exists in the school environment by conducting practicum on exploring the school environment. The exploration activities was aim to determine the

existence of energy flows and interactions between biotic components in a ecosystem.

Moreover, the material of student worksheet 3 was related to the biogeochemical cycle by conducting practicum the effect of the aquatic plants on the oxygen produced. This practicum activity was to know the concept of carbon cycle in a simple way. Prastowo (2013) revealed that one of the good characteristics of student worksheet are not only contains the latest and correct concepts but also the substance of the material related with the concept that student needed and the current curriculum. And then, the content aspect on criteria discussion and images also got an average score of 4 with a percentage of 100% included in a very valid category. The discussion and images that were presented are in accordance with the learning objectives and supporting students to find the material concepts.

The language aspects got an average score of 3.67 with a percentage of 91.67% which included in the very valid category (Widoyoko, 2014). There are two criteria were assessed in language aspects, namely the language in accordance with PUEBI and the sentences. Based on the result of validation, shows that the language and the sentence were in accordance with the rules of writing. Amri, et al. (2010) revealed that the good and correct language will make all messages and information in books or texts conveyed appropriately. The criteria of a good student worksheet are related to the ease of sentences, the relationship between sentences, the vocabulary of sentence and the length of the sentence (Depdiknas, 2008).

The aspect of relevant with the guided discovery model got an average score of 4 with a percentage of 100% included in the very valid category (Widoyoko, 2014). It because the student worksheet has contained the stages of guided discovery model and guided students to carry out learning activities. These stages are include stimulation, problem identification, data collection, data processing, verification and conclusions (Djamarah, 2010).

The stimulation stage are carried out by observing images and reading article that will guide students to find the concept. The student worksheet presented an article and image about the phenomena in the ecosystem. Based on these stimulations, the students are required to identify problems by making questions that enable to experimental activities. Furthermore, students will conduct experimental activities in order to collecting data and finding their own concepts about ecosystem. The results of data collection will be processed in the form of tables and then it will be analysed by answering the question.

Based on the results of data processing students will be directed to verification the hypothesis that has been made. The verification stage are carried out by answering questions as an evaluation. Then, at the last stage of guided discovery model made a conclusion based on the result of the experiment.

The last aspect of relevant to train science literacy got an average score of 4 with a percentage of 100% included in the very valid category (Widoyoko, 2014). The student worksheet has contained three aspects of science literacy namely science content, science process and science contexts. At each stage of guided discovery learning model has been included aspects of science literacy that was trained. At the stimulation stage, students carry out observing and reading activities. Through observing and reading activities, it can train science literacy on the aspect of science content. The aspect of science content related with the ability of students to understand material concepts. Fang & Wei (2010) stated that reading and observing activities will encourage someone to understand the science content. So it will support science literacy of the student.

At the stage of problem identification students are directed to make a problem statement and hypothesis that allow to experimental activities. The problem identification stage can facilitate science literacy on the science process aspect on criteria identifying scientific questions. After that, the students collect the data to prove the hypothesis and find the concept. The data collection activities was a series of scientific process activities. Furthermore, at the data processing stage students presented the data and analyzed the data by answering the question. At this stage the scientific literacy on aspect of science process with criteria explaining scientific phenomena can be trained. Next, the students verification the hypothesis and make conclusions based on the results of the experiment. At this stage the aspect of science process with criteria using scientific facts can be trained (Wang et al., 2019).

At the end of the student worksheet was completed with advanced activities by answering the questions. The activity of answering questions aims to evaluated and applied the knowledge that has been obtained. So that aspect of scientific literacy on criteria of science context can be trained.

CONCLUSION

Based on the results, it can be concluded that the students worksheet based guided discovery in ecosystem material to train science literacy were very valid. It based on the result of validation from five

aspect namely appearance aspect, content aspect, language aspect, relevant with guided discovery model and relevant to train science literacy that got average score of 3.88 with percentage of 97.22%.

ACKNOWLEDGEMENTS

The researcher would like to say thank to Prof. Dr. Endang Susantini, M.Pd., Dr. Sunu Kunjtoro, M.Si., and Elizabeth Dwi Irawati, S.Si, M.Pd., as validator and also the students of X IPA 1 SMAN 1 Plemahan.

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