

Development Module Oriented Science Technology Society Indue Science Literacy Assessment for 7th-Grade Junior High School Students in 2nd -Semester

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Abstract. The problem in the science learning process is the application of the scientific approach takes a long time in order to provide conceptual understanding to the students, there is no teaching materials that can measure students reasoning and thinking ability, and the assessment has not measured students reasoning and literacy skills. The effort can be done is to develop science technology society module induce science literacy assessment. The purpose of the research was to produce a module oriented society induce science science technology literacy assessment. The research is development research using Plomp model, consist of preliminary, prototyping, and assessment phase. Data collect by questionnaire and documantion. The result there is science technology society module induce science literacy assessment is very valid.

1. Introduction

Learning process in science using scientific approach. Implementation scientific approach is not optimal, because students take a long time to understanding of the concept. Teaching material to help students prepare for learning process is the module. Modules can make students study independently.

Module is used to give to the students understanding of the concept develop by the Science Technology Society approach. STS approach used to provide an understanding of science concept to students. STS can improve the ability to reason through problem-solving activities in the community.

The concept of science relevant to student's daily lives. STS according to Yager [1] a science learning in a human experience context, which emphasizes the importance of science and technology. STS approach suitable for use on materials related to the student environment. Learning material related to student environment is interaction of human organism and environment, environmental pollution and climate change.

NSTA has defined STS as the teaching and learning of science in the context of human experience. It emphasizes the importance of technology and science, noting that technology is understood better and accepted more readily as curriculum and course topics appropriate for all students even though it has not been a focus previously [2].



Reasoning ability of students can be seen by assessment. Assessment can be used to measure the ability to reasoning and high-level thinking is science literacy assessment. Science literacy assessment consists of the cognitive level of application, analyse, synthesis, and evaluation.

2. Methods

The development of the module is based on the stages of the Plomp model. This module was developed through three stages namely (1) preliminary research phase, (2) prototyping phase, and (3) assessment phase [3]. Fomative evaluation is done at every single stage in the form cycle of evaluation-revision. Implementation of this formative evaluation proposed by Tessmer (in Plomp [3]).

The trial subject is students in one class of 7th-grade of Junior High School numbers 12. Data consist of qualitative and quantitative data. The qualitative data obtained from observations and interviews in preliminary research phase and one to one evaluation in prototyping phase. The quantitative data obtained from the validity questionnaire.

Result of the research processed using the following equation.

$$\text{Value} = \frac{\text{Obtained score}}{\text{Maksimum score}} \times 100\% \quad (1)$$

This value is subsequently converted in accordance with validity criteria that can be seen in Table 1.

Table 1. Criteria level of validity

Percentase (%)	Level of validity
0 – 20	Invalid
21 – 40	Less Valid
41 – 60	Enough Valid
61 – 80	Valid
81 – 100	Very Valid

3. Results and Discussion

Module contains a description of the material that consist the science technology society component such as introduction, concept-forming, application of concepts, and consolidation of concepts. Module was developed through three stages of Plomp model. In preliminary research phase there are fourth process namely (1) problem analysis, (2) need analysis, (3) concept analysis, and (4) curriculum analysis. In prototyping phase there are process namely (1) self evaluation, (2) expert review, and (3) field tests. Validity doing by expert review. Validity of module includes aspect namely content egibility, linguistic, presentation, and graphic.

3.1. Results

Based on preliminary research analysis finds that problem in the form of non-optimal the application of scientific approach, there is no teaching materials that can measure students reasoning, and there is no scientific literacy assessment use in learning process. Student need a module that help students discover the concept itself. The module applied science technology society approach. Learning material related to environment is interaction of human organism and environment, environmental pollution and climate change.

Module contains a description of the material that consist the STS component such as introduction, concept-forming, application of concepts, and consolidation of concepts. Component of introduction contains the problem in accordance with the indicators of learning process. Students can link the problems encountered with the learning material through discourse. Component application of concepts contains a sample application of the concepts.

Scientific literacy assessment in the module found on the competency tests. Science literacy competency in module is using scientific evidence, identification scientific issue, and explaining phenomena scientifically. The competency test contains questions that evaluate the achievement of learning indicators in one learning activity that has been studied by the students. The literacy assessment of science is an assessment with high-order thinking skills. Science literacy assessment not only assesses content but also processes in the context of everyday life of students.

Module are develop tasted for validity. Results module validation by experts are presented in Table 2.

Table 2. Result of validation module

Aspect	Percentage (%)	Criteria
Content Egibility	93.83	Very Valid
Linguistic	93.75	Very Valid
Presentation	93.33	Very Valid
Graphic	91.67	Very Valid
Average	93.14	Very Valid

Based on Table 2 can be seen that the module are develop is very valid. During the validation, experts give some advice to fix the cover, text color, and language. Cognitive competencies measured using scientific literacy assessment. The science literacy content in interaction of human organism and environment is ecosystem and population. The science literacy content in environmental pollution is earth system exchange. The science literacy content in climate change is earth system energy. The context of the literature of science on assessment is a personal, social, and global context.

Before use assessment tasted for validity. Results scientific literacy validation by experts are presented in Table 3.

Table 3. Result of validation scientific literacy assessment

Aspect	Percentage (%)	Criteria
Content Egibility	81.33	Very Valid
Linguistic	75.00	Valid
Presentation	81.25	Very Valid
Graphic	81.25	Very Valid
Average	79.70	Valid

3.2. Discussion

The result of validity test showed that the STS module indue scientific literacy assessment develop is very valid. Module have suitable with basic competences. Module also accordance with the development of the child. Student in 7th-grade is 12-13 years old that has been able to analyze problems that are gives to him. This is in accordance with the opinion of Gredler [4] states that the child has begun to thinking linked to concrete objects are developed, and comes to understand that a given operation simultaneously and necessarily implies its inverse.

Module contains a description of the material that consist the science technology society component such as introduction, concept-forming, application of concepts, and consolidation of concepts. The STS components are made intact and directed in each learning activity. Directed learning will help students to learn by themselves. This is in accordance with the opinion of Eggen [5] that concept attainment could be used to help students understand the process of Inquiry and the scientific method. This is in accordance with the opinion of Rosario [6] stated that STS approach using varied strategies to allow student exposure to issues in the context of experience which would provide opportunities for the students' construction of knowledge

The introduction component relate to issues, events that students have known, or events contained in society with the material to be discussed. It is a discourse that contains issues relating to learning indicators. Students can relate problems encountered with learning materials through discourse. This is

in accordance with the opinion of Rosario [6] stated that important aspect of the approach is that activities can be derived from the local community to make the lessons more relevant.

The concept-forming component contains the materials that corresponds to the learning indicator. The materials is delivered in simple language in order to be understood by the students. This section comes with an appropriate image to support the delivery of the material. The process of the concept formation is done by discussion method. The process of forming this concept will make students find the correct concept. This is in accordance with the opinion of Dikmentepi [7] states that inclusion of the articles or books which tell about scientists' lives, documentaries about scientific and technological developments into the courses can help student to understand the nature of science and technology.

The concept application component contains examples of the application of concepts contained within the concept consolidation section. This is in accordance with the opinion of Yager [8] which states that STS focuses on the impact of science and technology to students.

Module include assessment of scientific literacy are developed with suitability indicators observed articles with material from the article in accordance with the material, derived from a newspaper article, and the article came from a magazine. Adjustments articles with incoming material on psychomotor level observed. This is in accordance with the opinion of Rosario [6] stated that familiarity with the environmental issues and problems of the community may make the experience more effective.

The concept consolidation component contains conclusions about the material. The concept of thinking is based on the material contained in the concept forming section. Stabilization of concepts is needed to fit the concept of the material that has been studied. This is in accordance with the opinion of Yager [8] states that the focus on student projects and real problems provides the way to illustrate the importance of the concepts and processes.

Students who already understand the material will be able to do reasoning on the matter and comment on the material provided. Module include scientific literacy assessment have explicit indicators and learning goals, complete materials and according to the indicators that have been made. The application of science literacy assessment can overcome the error that the assessment used is still the assessment of knowledge, understanding, and application. Science literacy assessment has difficulty ranging from understanding to synthesis. Science literacy assessment is an assessment capable of measuring high-order thinking skills. Science literacy assessment not only assesses knowledge but also assesses the ability of scientific thinking and uses it in the context of everyday life. This is in accordance with the opinion of Wright [9] states that the tests are concerned with the literacy related to problem solving in science.

4. Conclusion

The conclusion of the research that module oriented science technology society induce scientific literacy assessment are develop is very valid. Module was developed contains a description of the material that consist the science technology society component such as introduction, concept-forming, application of concepts, and consolidation of concepts. Validity of module includes aspect namely content egibility, linguistic, presentation, and graphic. Based on research that has been done, the author gives advice to test one-on-one, small group, and pitch in different grades, so that the products developed proven feasibility.

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