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Development of Guided Inquiry Based Learning Modules to Improve Environmental Attitude and Hight Order Thinking Skills

Inggrid Indrayanti[1][✉], Sri Ngabekti[2], Budi Astuti[2]

[1] SD Ummul Quro Gunungpati, Indonesia
[2] Pascasarjana, Universitas Negeri Semarang, Indonesia

Article Info	Abstract
	Education as the main foundation for individuals to develop their abilities. This research includes research and development (R&D). This Research aims to find out how the validity and effectiveness of guided inquiry-based learning modules to improve environmental attitudes and HOTS (Higher Order Thinking Skills) of students. This research used 32 students as sample. Data analysis in this study used descriptive qualitative analysis techniques. The implementation of this learning module shows an increase related to the attitude of caring for the environment and HOTS of students. The benefits of this research for educators are to provide a reference to learning models that are effective in increasing environmental attitudes of students and HOTS of students. The conclusions in this research are guided inquiry-based learning modules in environmental pollution lesson is valid and effectively used to increase environmental attitudes of students and HOTS of students.

✉ correspondence :
SD Ummul Quro Gunungpati, Indonesia
Jalan Sekar Gading Barat No.1A, Kelurahan Kalisegoro, Kecamatan
Gunungpati, Kalisegoro, Semarang, Jawa Tengah, Indonesia 50229
E-mail: inggridindrayanti25@yahoo.com

INTRODUCTION

The integration of the development of attitude values in learning materials can directly increase students' environmental care attitudes in the 21st century those are very urgent. Polluted environmental issues have been a global problem. Learners can take responsibility for environmental conditions that directly affect themselves and to get a personal approach to global environmental problems (Fauville et al., 2014).

Abun & Aguot (2017) said that an individual's attitude consists of two components, the emotional dimension involves feelings and cognitive aspects that refer to facts and beliefs of a person. The formation of Indonesian human attitudes as a basis for realizing the vision of national development is being prioritized by the government (Fadlilah & Ngabekti, 2018). Attitude is the result of interactions and life experiences that are gained. Attitudes are expressed as learning outcomes because attitudes can change. Information acquisition through education is one of the factors that influence attitude change. Education provides knowledge that is capable of changing one's values and beliefs which ends in positive attitude changes (Hebel et al., 2014).

According to Agboola & Tsai (2012) attitude is described as the way we express the values that are embedded in ourselves. Tannir & Al-Hroub (2013), argues that each individual has the desire to learn to respect oneself, respect others, be responsible, cooperate with other individuals, solve problems, and be honest and trustworthy. The importance of environmental care must be fostered early on. Love the environment is an expression of someone to preserve the environment. Students can realize the attitude that they will do, it needs support in thinking Hots (high-level thinking skills).

Kusuma et al. (2017) explained that high level thinking is understood as an ability that can connect phenomena with other elements that are taught to be associated. Yee et al. (2015) explained the ability to think is a sense of competence to carry out the thought process. The ability to think is closely related to the ability of humans to use cognitive and affective domains in solving a problem. The ability of thinking at a higher level requires students to be able to connect and

transform information that presents the novelty of their knowledge and experience into a novelty.

The results of interviews with science teachers in SMP (Junior Hight School) Kesatrian 2 Semarang explained that the ability of thinking at a higher level (HOTS) had not been maximally improved. Generally, students are given test questions using cognitive levels C1 and C2 (knowledge and understanding). This can be seen from the learning outcomes of students who are still under the standard that is 75. The attitude of caring for the environment needs to be cultivated in students themselves. This can be viewed from the affective results of students who need to be directed towards a better direction. One effort to cope with dynamic changes in the mindset and attitudes of students is the development of an appropriate science learning module. The learning module that will be developed is a Module with Environmental Pollution material oriented guided inquiry models to foster an attitude of caring for the environment and high-level thinking ability (HOTS) of students in SMP Kesatrian 2 Semarang expected to achieve the desired learning goals. The guided inquiry learning model allows full involvement of learners in learning activities. Students are faced with problems and explain the process of inquiry, collect data and verify investigation of problem situations, and experiment (Joyce & Emily, 2009).

METHODS

This research type is research and development by Borg & Gall (2003). The following are the stages of the research:
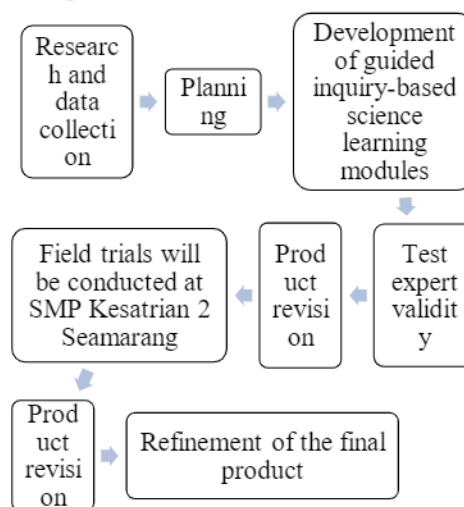

Figure 1. Module Development Stages

There are four main stages in this research, namely: 1) Research and data collection (research and collect information), which includes literature studies, small-scale research, and considerations in terms of value. This stage begins by observing the learning tools and teaching materials used at school. Reviewing the content standards conducted by mapping Basic Competencies and Core Competencies. 2) The second stage, namely planning, this stage is carried out making research instruments which are the evaluation criteria of learning modules developed. The research instrument used was a reasonable multiple choice test instruments, a validation sheet, an observation sheet on environmental attitudes and an interview guide. 3) Development of a product draft (develop preliminary form of product), which is the development of a science learning module on environmental pollution material. 4) Test validation by media experts and science teachers. The validation phase of the learning module is carried out so that the product developed can be known for its feasibility based on the assessment of media experts and science teachers who participated in using it. The research sample used 32 students of class VII B consisting of 20 male students and 12 female students.

RESULTS AND DISCUSSION

Module validation analysis

The validation analysis of the learning module by the media expert lecturer was carried out twice as validation. Improvements made are the addition of an invitation column about caring for the environment. Students are encouraged to be able to observe an image of pollution that occurs in the surrounding environment, then there is a response to overcome it.

Table 1. Recapitulation of media expert validation

Results	Step I	Step II	Average
Average	4.074	4.889	4.481
Category	Valid	Valid	Valid

Table 2. Recapitulation of science teacher validation

Results	Step I		Step II	Average
Average	3.740		4.740	4.240
Category	Quite Valid		Valid	Valid

The results showed the average assessment of media experts and science teachers as practitioners fulfilled the criteria of $4 \leq Va <5$, so that the learning modules developed could be said to be valid and appropriate to use. To strengthen the feasibility of this learning module, the students' questionnaire responses were spread. Questionnaire was given to 15 children, as many as 12 children answered with very decent criteria. The average obtained is 86% which is included in the criteria is very feasible to use.

Readability uses the mortar test

Overlaying procedures are applied to the reader in order to understand incomplete discourse (because certain parts of the discourse are deliberately omitted). The mortar test conducted on 15 students as many as 12 children can work and produce conclusions that can be understood by them. The level of understanding of discourse is 80%. This condition shows the readability of the learning module into the category of easy to learn by students independently. According to Rankin and Culhane (1969), the interpretation of the results of the cross-examination test of the reader is at an independent or free level, if the percentage of the cross-test test score obtained is above 60%.

The effectiveness of the module on environmental attitudes

Attitudes of students' environmental care were analyzed using observation data. There are two observers who assess the development of students' environmental care attitudes. The development of environmental care attitudes can be seen in Table 3 below:

Table 3. Development of Environmental Care Attitudes

Observer	Attitude to Care for the Environment Meeting to - (%)		
	1	2	3
Observer 1	83	89	86
Observer 2	82	87	85
Average	**83**	**88**	**85**
Category	entrenched	entrenched	entrenched

The attitude of environmental care observed by observer 1 at the first meeting showed 83%, while the second meeting experienced a significant increase of 89%. This is because students who are

enthusiastic in following the learning process using the modules that have been provided, students are increasingly interested in learning to use modules and implementing environmental conservation efforts around their schools. the third meeting had decreased, this is due to lack of motivation of students when participating in learning. Learning at the third meeting in the form of practical activities to observe the behavior of crickets. In the process of observing the cricket, students show an uncomfortable attitude because there are some children who do not dare to hold the cricket. During the learning process, students who are afraid of crickets become less enthusiastic about observing. According to Irfianti et al. (2016) students care about the environment to prevent damage to the natural environment and its surroundings is a responsibility to create a comfortable environment.

Based on the Indonesian Ministry of National Education (2010) categorizing the characters into four namely unseen, beginning to be seen, starting to develop and the third meeting of students' environmental care attitudes included in the category of culture. According to Erdogan (2015), the attitude of caring for the environment possessed by students has existed since he saw the surrounding environment. There is a sense of awareness to protect the environment in its own way. Based on the results of interviews with several students, on average in their daily lives they care about cleanliness in the surrounding environment for example: disposing of trash in its place, supporting environmental cleanliness both at home and at school. This is in line with the statement of Sellmann & Bogner (2013), students participate in protecting their environment because they have the knowledge to do something for hygiene.

Effectiveness on HOTS

Students' higher-order thinking skills were measured using pretest and posttest scores in the form of 15 reasonable multiple-choice questions. The N-gain test is carried out to find out the increase in student learning outcomes in environmental pollution material which can be seen in the following Table 3:

Table 3. Calculation of N-gain

Pretest	Posttest	N-gain	Category
66.25	88.33	0.36	Enough

Table 3 shows an increase in the pretest and posttest scores, the results obtained fall into the medium category. The questions used are from C4, C5, and C6 levels. On average there are still students who have difficulty in answering questions at the C6 level, so this is what causes the ability to think of high-level students has not been maximally developed. According to Hugerat & Kortam (2014), high-level thinking skills should be trained on students continuously and using effective methods, so students will get used to solving problems in their own way. Higher-order thinking skills are not only important in teaching and learning, but also have a positive impact on educational development (Heong et al., 2011).

CONCLUSION

Based on the results of the study it can be concluded that the guided inquiry-based learning module with environmental pollution material gets valid results and is suitable for use in learning. The effectiveness of learning using the module can be seen from the increasing attitude of caring for the environment and HOTS of students at each meeting. Attitudes of students caring about the environment for all meetings included in the criteria of culture, while the ability of HOTS students also increased as indicated by the value of the *pretest* and *posttest*.

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