

Development of Science Learning Based on Pemaknaan Learning Model to Train Moral Sensitivity of Senior High School Students in Genetic Substance.

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Abstract- Research was aimed to developed science learning with pemaknaan learning model on subject matter genetic substance through 4-D models to train moral sensitivity of Senior High School and tested on 15 students of SMAN 10 Samarinda with one group pretest-postest design. Analyzed by descriptive quantitative-qualitative and the result are: (1) Validity of *the syllabus, lesson plans, worksheets, BAS, and THB* very valid category (3,68); (2) practicality based on: a) Feasibility of instruction good category (88,89%), b) The response of students positively (98%); (3) Effectivness based on: a) The students' activities that stand out in the high category are paying attention to explanations, asking questions, holding discussions with groups to make sense, b) Moral sensitivity increase (N-Gain: quite-sensitive category). Conclusion of this research was science learning which developed based on pemaknaan learning model, feasible and can be used to train moral sensitivity of senior high school in genetic substance.

Index Terms- *Science learning, Pemaknaan model, Moral sensitivity, Genetic substance*

I. INTRODUCTION

The progress of information technology and globalization is causing rapid changes in human life. Progress in the field of education produces intelligent human beings as indicated by the rapid development of science and technology itself. But on the other hand there is a shift in values, attitudes and morals and national character. The influence of technology easily penetrates into the doors of the family which were originally built with modesty or into family rooms which were originally full of moral norms (Yuliana, 2010). Some negative phenomena that have surfaced today include student fights, drugs, corruption, plagiarism, cheating in examinations and various community upheavals (Kemendikbud, 2013; Oemar, 2013; Rachmawati, 2014). These symptoms are contrary to the ideals of national education in shaping Indonesian people who have personality and noble character.

Education is an effort to anticipate global change and the flow of information towards the negative influence of morals and national character. This is stated in Law number 20 of 2003 concerning the National Education System. According to the 2013 curriculum implementation, character education can be integrated in all learning in each field of study contained in the curriculum. (Mulyasa, 2013). Integration in question includes loading values into substance on all subjects and implementing learning activities in every activity inside and outside the classroom (Marshall and Caldwell, 2011).

Related to moral degradation and its relation to education as an effort to overcome it. Ibrahim (2014) mentions the results of a survey conducted in schools that there are two main issues which are the main issues related to this, namely (1) learning outcomes which include positive attitudes, noble attitudes, and character and skills to live independently have not been taught "deliberately "(by design). Learning outcomes such as this are generally only achieved as a concurrent effect (nutrans effect), (2) the teaching and learning process has not been carried out as expected. Learning is still centered on teachers and students as objects, is passive and lacks motivation.

In connection with the above, the idea arises that the teaching of a positive attitude, noble character, and character can be integrated with science. In this regard researchers are interested in developing learning devices. Learning that is used is not only oriented to academic intelligence alone, but can also be used to teach and develop the positive character of students. The learning tool in question is a Biology learning device model of meaning.

The meaningful learning model is a learning model through examples and examples of the relevance of events, symptoms or phenomena that have the potential to be used as models in learning that aim to teach positive attitudes, noble attitudes, and manners in addition to their academic aspects. Students use a scientific approach through observing a phenomenon to study a content or concept in Biology. Then

students ask questions or problems with the observed phenomena, then proceed with further experiments or observations to solve or find answers to these problems. The phenomenon or findings of students are used by teachers as behavioral models, character analogies or positive attitudes to touch students' hearts. The teacher shows the similarity in the process of meaning to the human model if it has the behavior that will be trained (Ibrahim, 2014).

The material chosen by researchers is genetic substance. In the material there are many concepts that can be interpreted, so that they can be models or examples of positive attitudes and noble character. For example in the concept of the phenotype of an organism it is controlled by genes that are inside the cell nucleus. One gene controls one different nature such as the shape of the face. This can be interpreted if God creates one organism with another that is not similar, different, and specific. The regularity of God's creation should always be admired and grateful as a proof of God's greatness and power.

Examples of these meanings show that Biological genetic substances can be used to develop learning designs that contain ethical values that are integrated in the lesson plan so that it has a companion effect for the development of positive character in students. The process of integrating moral values will occur through seriousness and awareness of the moral values taught. Internalization is the process of displaying the entry of moral values into students and creating moral behavior, which starts from a condition called moral sensitivity.

Moral sensitivity is a sensitivity to the moral impact on all phenomena around it. This is what is called moral sensitivity (Narvaezt and Rest, 1995; Lovett and Jordan, 2010). Someone who has a high sensitivity can feel the existence of certain moral values of each event they experience. But for someone with low sensitivity it will be difficult to experience this, he will be touched if the events that occur really great and occur in front of his own eyes, such as natural disasters and accidents. Moral sensitivity illustrates the tendency for someone to accept or recognize that some aspects of a problem have moral implications (Sadler, 2004). Hoffman in Myyry (2003) states that the important thing about moral sensitivity is sensitivity to the interests and rights of others, especially when there are conflicts with personal interests. Based on these considerations, a study was conducted that aimed to aimed to developed science learning with pemaknaan learning model of senior high school on subject matter genetic substance.

II. METHODS

This research is a developmental research of 4-D model to develop science learning covering Syllabus, Learning Implementation Plan (RPP), Student Textbook (BAS), Student Worksheet (LKS), and Moral Sensitivity Test. Target of the research was 15 senior high school students of class IX on academic year 2017-2018. Research, development and validation of instructional media is done at State University of Surabaya and implemented in SMAN 10 Samarinda, East Borneo, Indonesia.

The variables to be observed in this study are the validity of the science learning tools, practicality of science learning tools which include the implementation of learning and student activities, the effectiveness of the science learning tools which include student response and the ability to moral sensitivity. The data analysis technique uses descriptive quantitative-qualitative. The data obtained were analyzed with an average score of each aspect translated into categories.

III. RESULT AND DISCUSSION

Based on results of data research, application of science learning tools based on pemaknaan learning model to train moral sensitivity of senior high school students indicated that:

A. Validity of The Learning Tools/Devices

Learning tools that have been developed include Syllabus, Learning Implementation Plan (RPP), Student Textbook (BAS), Student Worksheet (LKS), and Moral Sensitivity Test (MST) were validated by three validators. The data analysis techniques of the validation of learning tools use qualitative descriptive. The data obtained were analyzed with an average score of each aspect. The results of the validation can be seen in *Table 1*. below:

Table 1. Validation Result of The Learning Tools/Devices

No.	Type of Learning Devices	Average Validation Results	Category
1.	RPP	3,53	Very Valid
2.	BAS	3,71	Very Valid
3.	LKS	3,62	Very Valid
4.	MST	3,86	Very Valid

Based on *Figure 1* above it can be seen that the learning tools developed has obtained very valid results which score 3,68 (Ratumanan & Laurens, 2006). This is because the preparation of learning tools is in accordance with the guidelines given by the government. Learning devices are arranged in a complete and systematic manner so that learning takes place interactively, inspiring, pleasing, challenging, and motivating students to actively participate and provide sufficient space for initiatives, creativity and independence according to the talents, interests and physical and psychological development of students (Narvaezt and Rest, 1995). Learning tools developed by researchers are compiled by studying various supporting literature, including examples of learning tools from several previous researchers and through consultations with counselors (Hergenhahn and Olson, 2010). RPP is designed based on a scientific approach by integrating it into a meaning model that is expected to be a learning that integrates aspects of spiritual attitudes, social

attitudes, aspects of knowledge and aspects of skills so that students have complete Biological competencies. The lesson plan developed by the researcher is adjusted to the steps in the meaningful learning model in which there is a characteristic that is the existence of a meaningful phase and adapted to the needs of the research to practice moral sensitivity. Furthermore, the stages in the RPP are adjusted to BAS, LKS and assessment instruments used.

B. Implementation of The Learning Tools/Devices

The implementation is carried out three times in the same class by using the previously validated Learning Implementation Plan (RPP). In the implementation process there are three observer teachers in three times who will provide an assessment during the learning process. The results of the implementation of the learning tools/devices can be seen in *Figure 1*. below:

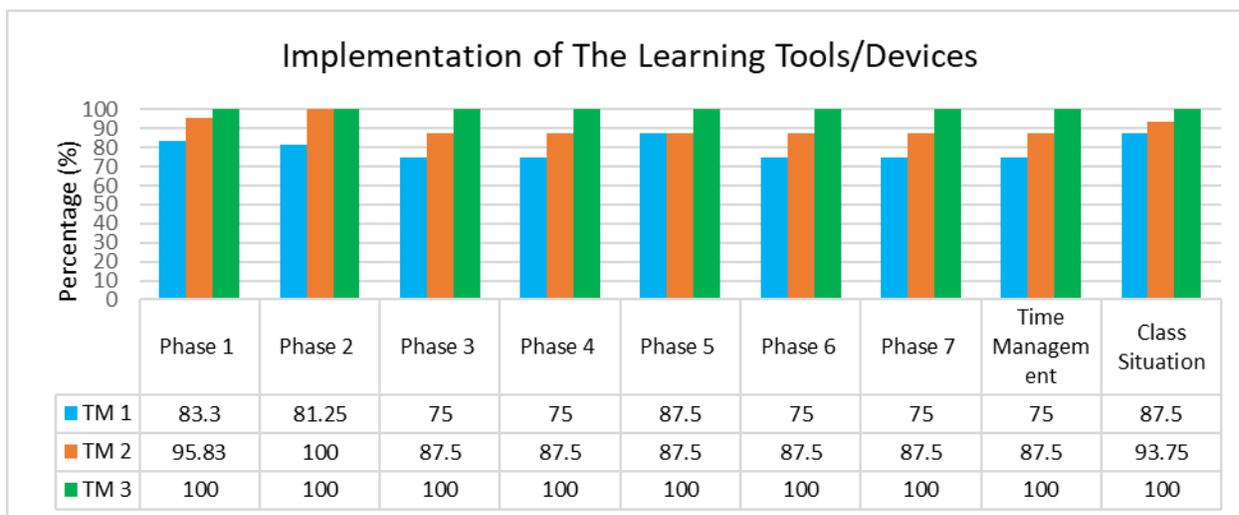


Figure 1. Implementation of The Learning Tools/Devices

The activities and steps listed in the RPP can be implemented in good category with percentage of RPP of 89,97%. This shows that in the implementation of RPP using pemaknaan learning models can be categorized as reliable, because the reliability value 96,67% so that it can be used in the learning process. The high average score and in the excellent category are due to all stages of learning being carried out and several other supporting factors, namely: *First*, in the preliminary activities; The teacher motivates students by orienting students to a problem or question. This is in accordance with the theory of learning discovery by Bruner suggesting that students should learn through active participation so that students gain experience (Slavin, 2009).

Secondly, in the core activities, the teacher gets a score with a very good category. This is because in the second and fifth phases students are asked by the teacher to work on the worksheets in discussion, then negotiations and confirmations are conducted. This aims to provide teacher feedback in the form of reinforcement, correction, or refinement of information presented by students as well as adding to less information. This principle is in line with the theory of learning behavior developed by Skinner (in Budayasa, 1998; Hergenhahn and Olson, 2010), which says that learning is a change in behavior.

Third, in the core activities, the teacher and students also make sense of the subject matter that has been delivered. The meaning is done based on the symptoms or events contained in the genetic substance that is associated with aspects of character, good norms, positive attitude. This is in line with the opinion of Narvaez and Rest (1995) which states that there are four internal psychological processes that must occur before producing moral behavior, namely moral sensitivity which involves the acceptance of receptors, moral considerations that involve the process of deciding moral actions, moral motivation involving intention to do, and implement.

Fourth, in the seventh phase the teacher can guide students to evaluate and reflect. The expected goal is for students to regulate learning outcomes by re-expressing the process of activities, revealing the results of activities. Meaning models can help students understand material, help construct students' understanding, and improve problem solving skills (Miranda, 2010; Martinez, 2006; Flavel, 1976).

Fifth, time management is implemented in the good category. This indicates a significant increase in the aspect of classroom atmosphere. Dewey describes learning as an active individual process, not something done for someone but rather something done by someone and considers that experience and inquiry are very important in meaningful learning (Martinez, 2006).

C. Student Activities

The implementation is carried out three times in the same class by using the previously validated Learning Implementation Plan (RPP),. Same as the implementation process, Student activities observed by three observer teachers in three times who will provide an assessment every 5 minutes during the learning process. The results of the implementation of the learning tools can be seen in *Figure*

2 below:

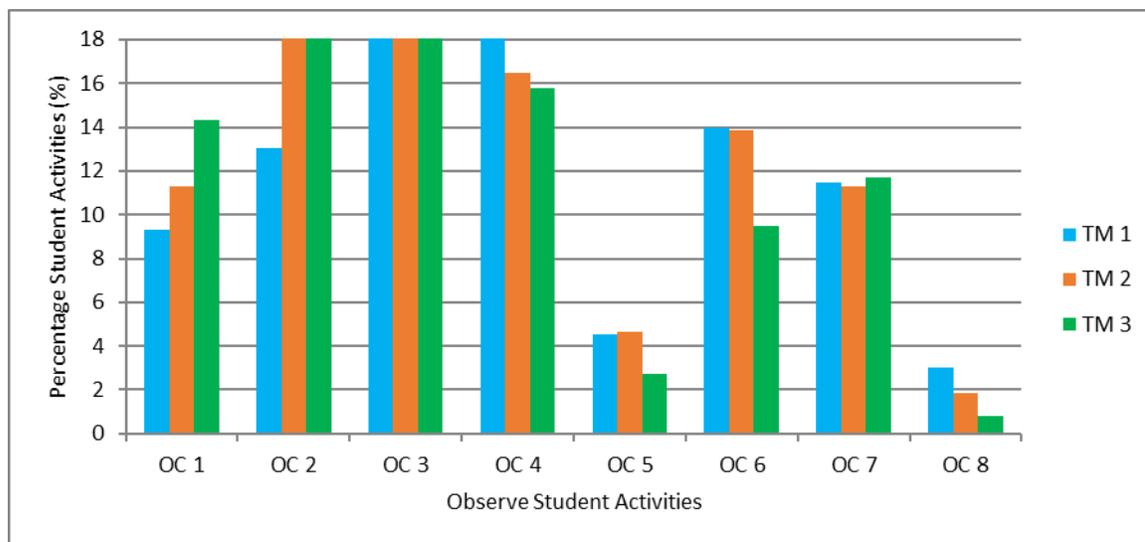


Figure 2. Student Activities

Student activities observed during the learning process which include: OC1) pay attention to the teacher’s explanation; OC2) asking questions/answering teacher questions verbally; OC3) conduct observations/discuss with groups; OC4) present observations/discussion; OC5) write down important things when the teacher gives feedback; OC6) discuss the meaning of the concepts that have been submitted; OC7) conclude learning; OC8) irrelevant behavior. The results of observing student activities in the trial can be seen that the activities pay attention to teacher explanations, ask questions / answer the teacher’s questions verbally, make observations / discussions with groups, and conclude that learning consistently increases with each meeting. Ibrahim (2000) and Priyono (2013) state that the meaning model used by the teacher can make students more active in learning activities.

Student activities using the model of meaning, there is an increase in three prominent activities, namely: 1) pay attention to the explanation; 2) ask; 3) conduct discussions with groups to make sense. In the core activities in discussion activities students make observations, record the relationship of observations with concepts / theories that already exist from several sources, ask questions about something, and summarize learning material. In the activity of discussing student assignments, they are conditioned to feel challenged to solve problems in worksheets so students do activities in worksheets with full motivation.

Biology learning which is characterized by a meaningful model is learning that studies the knowledge of living things, thinking skills, and enhances the skills to carry out scientific inquiry methods through the steps of the scientific method to grow and develop attitudes (Miranda, 2010). This is in accordance with Ausubel learning theory students must know the meaning of learning and use the knowledge and skills acquired to solve problems in life so that learning activities will lead to meaningful meaning.

Activities that are not relevant to learning from the first meeting to the third experience a significant decrease. The role of the teacher in this metacognitive learning becomes a facilitator and guides students who are still having difficulty in investigating and completing assignments. Taccasu Project (2008) and Ibrahim (2010) in teaching meaningful teacher as a facilitator in developing students’ thinking processes through learning activities, by: helping students in developing learning strategies, guiding students in developing good habits from the results of meaning.

D. Moral Sensitivity

Students’ moral sensitivity to science learning with a model of meaning in the material of genetic substances is known from the values obtained by students in answering tests of moral sensitivity and self-report moral feelings. Data on moral sensitivity test results in the form of moral sensitivity ratings with scores from 1 to 4 for each question. The percentage level of students’ moral sensitivity at the pretest and posttest can be seen in Table 2. below:

Table 2. Moral Sensitivity Results

Student	Pre Test		Post Test	
	Average Score	Range of Sensitivity Levels	Average Score	Range of Sensitivity Levels
B1	1	Less Sensitive	3,2	Quite Sensitive - Sensitive
B2	1,3	Less Sensitive	3,3	Quite Sensitive - Sensitive
B3	1,4	Less Sensitive	3,5	Quite Sensitive - Sensitive
B4	1,3	Less Sensitive	3,7	Quite Sensitive - Sensitive
B5	1,9	Less Sensitive	3,8	Quite Sensitive - Sensitive
B6	1,6	Less Sensitive	3,4	Quite Sensitive - Sensitive
B7	1,8	Less Sensitive	3,5	Quite Sensitive - Sensitive
B8	2,2	Less Sensitive – Quite Sensitive	3,6	Quite Sensitive - Sensitive
B9	1,6	Less Sensitive	3,5	Quite Sensitive - Sensitive
B10	1,4	Less Sensitive	3,5	Quite Sensitive - Sensitive
B11	1,3	Less Sensitive	3,3	Quite Sensitive - Sensitive
B12	1,5	Less Sensitive	3,5	Quite Sensitive - Sensitive
B13	1,4	Less Sensitive	3,6	Quite Sensitive - Sensitive
B14	1,7	Less Sensitive	3,5	Quite Sensitive - Sensitive
B15	1,2	Less Sensitive	3,2	Quite Sensitive - Sensitive
Rerata	1,50	Less Sensitive	3,47	Quite Sensitive - Sensitive

Description of Score:

- 1: Less Sensitive
- 2: less sensitive (rational level)
- 3: quite sensitive (egocentric level)
- 4: sensitive

The results of data analysis showed that there was an increase in the level of moral sensitivity of students. After being given a meaningful learning model, there was an increase in the sensitive level categories, which meant students were sensitive to the Biological phenomena taught. This indicates that there is a change in moral value after students get the meaning of the concept.

Further analysis on the average score of the pretest of the results of the moral sensitivity test was 1.50 (Less Sensitive) and after the learning process the average score increased to 3.47 (Quite Sensitive - Sensitive). Both of these scores are at the level between quite sensitive and sensitive. These results indicate that most students are already at a sensitive level. As with every other psychological aspect, moral sensitivity in a person is strongly influenced by the environment.

Moral sensitivity can experience natural changes, but can also experience change intentionally through the educational process. For groups of students who are already at a sensitive level, training or activities are needed that can maintain the moral sensitivity they have, while at the same time increasing it to the next stage of the psychological process. For students who are still in an egocentric stage, the thing that should be done is to provide guidance activities to students to interpret each phenomenon that they face as habituation training (Narvaezt and Rest, 1995).

The learning outcomes of moral knowledge tests are not enough as an indicator of the success of character education. Moral knowledge is the initial stage of character building for a person, therefore assessment is continued with moral feelings and moral actions. Assessment of students' moral feelings aims to find out the attitudes, feelings and self-commitment of students related to moral values from the results of meaning. The application of the results of the development of learning devices can train moral sensitivity as well with more than 86.32% of students declared complete. The increase was also shown by n-gain analysis which reached a high category.

The achievement of the test results of learning moral knowledge and self-reports of moral feelings cannot be separated from the use of the results of the development of a meaningful model of learning tools to train moral sensitivity. The validation result of the learning device is categorized as valid so that it is feasible to be used as a learning tool in an effort to practice moral sensitivity. Moral sensitivity includes moral knowledge trained to students with the meaning of concepts such as those found in BAS which are presented in special features, individual columns and presentation with attractive images and colors. Then students are trained to write down the meaning of the concepts they learned in BAS into the LKS.

The average pre-test score of indicators creative thinking (fluency, flexibility, originality and elaboration) obtained by students is quite low with the category of less creative. This condition occurs because students are not accustomed to giving ideas or

reactions in verbal form related to the questions given and the level of originality of ideas and students' elaboration abilities are still low. Students are not accustomed to thinking about things that are outside the general context and thinking in detail and in depth related to learning materials. Most students feel that the creative thinking ability test as tested is new and they have never done it before so that the results obtained are not optimal. The results of the post-test of the four indicators of creative thinking shows that students are included in the Creative category with moderate to high N-gain. These results indicate that the ability of students to think creatively develops after participating in learning by using learning tools that have been developed. The ability to think creatively or divergent thinking is obtained when students are given the opportunity to experiment and explore information and express their opinions.

E. Student Respons

The recapitulation of the results of 15 students' responses to learning activities and learning tools/devices developed with the pemaknaan learning model is presented in Figure 3 below:

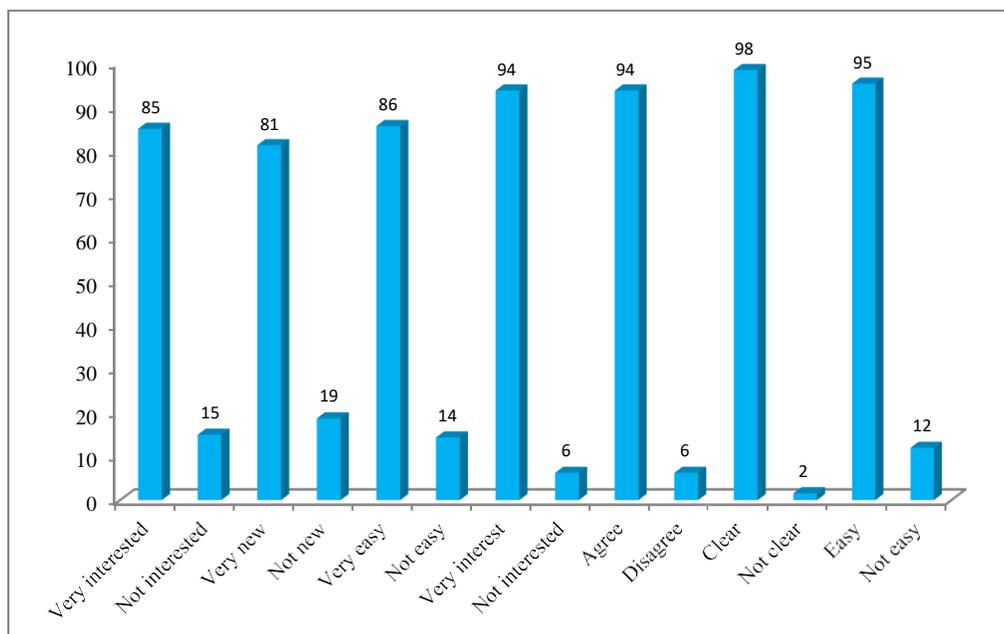


Figure 3. Student Responses

Student responses to the lesson plans that were developed also looked positive by 90% and students' negative responses were 10%. Student responses to the developed moral sensitivity assessment instrument looked positive at 94%. These results are in accordance with the conversion of student response questionnaire data using the Guttman scale ie the interval score of 80% -100% categorized as very strong (Riduwan, 2010).

IV. CONCLUSION

Conclusion of this research was science learning which developed based on pemaknaan learning model, feasible and can be used to train moral sensitivity of senior high school in genetic substance.

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