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The Effectiveness of Chemical Bond Learning Tools Based on Meaning Learning Model for Training Students' Moral Sensitivity

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Abstract. This research is a continuation of the development research that aims to produce a chemical bond learning tools based on an effective means learning model to train students' moral sensitivity. The development of learning tools uses a 4D model and has been tested on state high school students in Gorontalo using the One Group Pretest Posttest Design. The data collection instruments consisted of observation sheets, student response questionnaires, and student moral sensitivity questionnaires. The data analysis technique used quantitative and qualitative descriptive analysis. The findings of the research showed that: (a) student responses to learning tools and learning activities show a positive response to all aspects of student statements by 90.18, and (b) an increase in moral sensitivity with a sensitive category of 81%. N-Gain score is 0.78 in the high category. The results of the study have shown that the chemical bonding learning tools based on the meaningful learning model was effective in training students' moral sensitivity.

INTRODUCTION

Education is the main aspect in developing human beings and as a bridge to increase knowledge. In an increasingly modern era with various facilities that make it easier to access knowledge, education system needs to adapt to the times, so it becomes more useful and appropriate. In the concept of Islam, education is the most basic thing in shaping human personality and character [1]. In education, religion has a very dominant role and function in general education [2].

The national policy for the character of the nation's development is drawn up as the implementation of the mandate of Law no. 17 of 2007 concerning the National Long-Term Development Plan for 2005-2025. The success of building the nation's character is marked by the realization of a nation's character that is tough, competitive, virtuous, moral, tolerant, working together, patriotic, dynamic, culture, and oriented to science and Technology-based on Pancasila and imbued with faith and piety to God Almighty [3]. Moral comes from the Latin word *mores* which skill ordinances in life, customs, or habits. The moral is essentially a set of values about a variety of sorts of behavior that ought to be obeyed [4]. Morals are norms and institutions that regulate individual behavior about social groups and society. The moral is a standard of good and that is determined for individuals with socio-cultural values in which individuals are social members [5]. Morality is an aspect of personality that is needed by a person about social life in a harmonious, fair, and balanced manner. Moral behavior is needed for the realization of a peaceful life full of order, order, and harmony [6].

The problem now is that students receiving knowledge at school only focus on general knowledge and spiritual values about Islamic culture are not obtained by them. Examples are truancy, leaving grades, coming late, smoking, taking friends' cellphones, interrupting lessons, without changing report cards, dating, getting pregnant out of wedlock, and taking pictures of friends who are wearing clothes in the bathroom at school [7]. To reach the "Golden Generation of Indonesia 2045" learning in schools is considered the best place to prepare agents of national change who will bring

prosperity to others. The teacher is no longer a place to transfer knowledge only, but also a place to shape attitudes, behavior, character, and leadership [8]. The which means studying mannequin is a studying model thru examples and examples of related events, signs and symptoms or phenomena that can doubtlessly be used as fashions in learning that goals to train effective attitudes, noble character, and character in addition to the educational factors [9]. Likewise, the learning tools used should be able to contain these directions so that they can help students learn independently and develop themselves, and can form good character and morals. Moral sensitivity is the ability to know the ethical problems that occur [10]. Moral sensitivity is defined as the ability to know that a situation has an ethical meaning when the situation is experienced by individuals [11], [12], namely the ability to know ethical issues. Moral sensitivity includes the perception and interpretation of events and relationships in a situation. Most basic aspects of sensitivity are indicative of elements of an ethical situation [13]. Moral judgment concerns the assessment of ethical actions as evidenced by the first component, namely moral sensitivity which is more morally justifiable (enough or only or morally right or good) [14]. Moral sensitivity can be described as an consciousness of how one's actions affect others [15]. According to Fraenkel sensitivity has different levels in each person which is divided into sensitive, egocentric, rational, and insensitive levels. The details for the four sensitivity levels are described as follows [16].

Regarding moral degradation and its relation to training as an effort to overcome it, noted that the effects of a survey carried out in faculties have two foremost problems that grow to be the principal issues related to this, namely (1) learning consequences which include fine attitudes, noble character, and manners and competencies to stay independently have not been taught "intentionally" (by design). Learning effects like this are usually carried out as an accompanying effect (nature effect), (2) the educating and studying technique has no longer been carried out as expected. Learning is nonetheless established on teachers and students as objects, is passive, and lacks motivation [17]. Regarding moral sensitivity, ethics educators argued that ethical sensitivity taught in the early time of expert improvement permit students to habituate it by means of practice during their school lifestyles [18], [19]. In a teaching and learning process, the ability of students to understand a concept is strongly influenced by the ability of the teacher, one of which is in preparing various learning tools. Varied learning tools are learning tools that can take advantage of learning resources available in the school environment and can be reached by teachers or students. One of the learning resources that can be compiled into one of the learning tools is moral values that are integrated with chemistry as a model for teaching positive attitudes, noble character, and character [20].

Chemistry is a branch of science or natural science that studies matter including the structure, composition, properties, and changes in matter and the energy that accompanies it [21]. So far, many scientists have studied the relationship or relationship between the Qur'an and science. This is evidenced by the many events or things from science that can be proven by the Qur'an. Learning with an Islamic teaching system has been able to improve the character of students, one of which is the research result of which can improve student discipline [22]. More broadly prove that learning based on Al-Quran values can improve students' mental health so that this is expected to trigger their achievement. Al-Quran as the main guideline for Muslims not only contains the rules of human life but also contains a lot of natural science information [23]. Chemistry learning in the Qur'an is not only evidence of the power of God but also includes learning good morals in everyday life such as its relation to the concepts of chemical bonds. Chemistry is one of the branches of Natural Sciences that explains very interesting phenomena and has the potential to be a model for students' moral attitudes. To teach moral attitudes requires examples and examples, of how moral attitudes are carried out. The concept of chemistry provides a model that can be imitated by students if the teacher helps students understand the concept. Internalization is carried out on certain symptoms/facts/concepts and relates them to the moral attitudes contained in the Qur'an. The results of the research application of the learning model of meaning in chemistry lessons for vocational students can develop the character of students who are honest, disciplined, and cooperative [24]. Another study conducted research in high school on biology subjects, obtaining the results that the meaning learning model can train students' moral attitudes and can instill character values in students [25].

METHOD

This research is development research that is developing a learning device for chemical bonding material based on a meaning learning model to train high school students' moral sensitivity. The development model used in this study is the 3D Model. The four stages used are Define, Design, and Development. The learning tools used are devices that have been tested for validity and practicality. The analysis of the effectiveness of learning tools is supported by the results of data analysis from (1) student activities, (2) student responses to learning tools, (3) students' moral sensitivity levels.

The data analysis of the attractiveness of learning devices in terms of student responses to the implementation of learning with the meaning learning model carried out the following steps: [26]

1. Counting the number of students who gave positive and negative responses to the implementation of learning.
2. Calculate the percentage of the number of students who gave positive and negative responses.
3. Describe the student's response to the implementation of the learning model of usage.

Aspects of students' moral sensitivity were measured by a moral sensitivity questionnaire. Each alternative answer has a different score and is then used to classify students into a certain level of moral sensitivity category [17]. The rating scale of student moral sensitivity score is shown in Table 1 [9].

TABLE 1. Student Moral Sensitivity Assessment Score

Score	Criteria	Indikator
1	Not sensitive	At this level, students do not have a sensitivity to the goodness behind the phenomena or concepts they experience (chemistry).
2	Rational	At this level, students believe that a phenomenon or concept is a rational and scientifically identifiable fact
3	Egocentric	At this level, students have sensitivity to the value of virtue in the phenomena or concepts they experience, but their goodness is still limited to their goodness
4	Sensitive	At this level, it is marked by the sensitivity of students to moral values that occur from a phenomenon or concept in the surrounding environment.

The percentage of students' moral knowledge can describe the moral sensitivity possessed by students and is indicated by the N-Gain score, namely the difference in scores on the posttest and pretest. Data analysis was obtained from the results of the assessment of students' answers to the moral sensitivity questionnaire. The calculation of the N-Gain score is carried out using the formula:

$$(g) = \frac{\% \text{ actual gain}}{\% \text{ potential gain}} \times 100 = \frac{\% \text{ posttest score} - \% \text{ pretest score}}{100 - \% \text{ pretest score}}$$

The N-Gain criteria are: (1) if gain > 0.7 high category, (2) if gain between 0.3 < gain 0.7 moderate category, (3) if gain 0.3 low category [27].

RESULTS AND DISCUSSION

Student Responses to Learning Tools

Student responses to learning tools based on the meaning learning model was collected by using questionnaire that composed of 20 questions. Questionnaire was given at the end of the study. This questionnaire consists of several question topics, which are related to interest, novelty, ease, and pleasure in using and clarity.

Student responses to this component focused on aspects of interest and novelty of learning devices in (1) learning materials, (2) student books, (3) LKPD, (4) classroom learning atmosphere, (5) teacher teaching methods, and (6) the meaning of chemical concepts. Student responses to this component focused on the ease of (1) listening to the teacher inform the concept, (2) answering the questions in the LKPD, (3) making presentations, (4) mentioning the meaning/moral message, and concluding it.

The result of the study showed that students feel happy during the learning process. About 100% percent of students reveal that they feel comfortable. Students are very interested in learning tools include six components that have been mentioned above (Fig. 1a). Several things that make students interested are the uniqueness and attractiveness of learning tools, the way of teachers deliver information that is very easy to understand, and the internalization of chemical concepts that relate to the moral lesson. Furthermore, the learning tools' characters are generally uncommon and up to date (Fig. 1b) because this is the first time for students to experience learning activity with the internalization model.

Most students state that they are at ease to take part in internalization learning model activities (Fig. 1c). Most students state that they are eager to take part in internalization learning model activities (Fig. 1c). Based on students' opinions the easiness is because of the interactive learning process and internalization of chemical concepts to moral value hence making students easy to understand and remember teaching material mainly chemical bonding concepts.

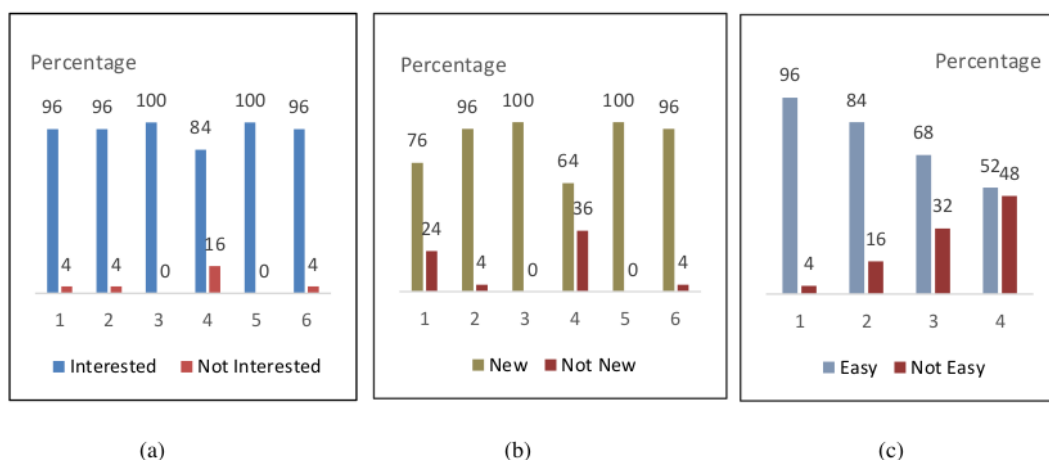


FIGURE 1. Percentage of response aspects including (a) Students' interest in learning tools, (b) The novelty of learning tools and (c) Easiness of LKPD

Student responses to this component are focused on aspects of students' feelings during learning activities. Based on the results of the analysis of the percentage of student responses that have been presented, on the aspect of students' feelings during learning activities, it shows that 100% of students answered happily and 0% of students answered not happy. Based on the students' answers, it was found that the feeling of pleasure in participating in the learning process was due to unique and interesting learning tools, besides the way the teacher taught made it easier for students to understand the concept of chemical bonds so that students felt enthusiastic in participating in the learning process.

Based on the results of the analysis of the percentage of student responses on the aspect of the clarity of the way the teacher teaches, showing the results of the percentage of student responses on the aspect of the clarity of the delivery of the concept of the material and the guidance of students by the teacher during learning activities, it shows that the two components have a percentage value of 100% of students answering clearly and 0% students who answered unclearly. According to students, this clarity is caused by the way the teacher is interactive and always involves students in responding to each question so that they can understand the material and arouse students' motivation to be actively involved in learning activities.

Student's Moral Sensitivity

Data of students' moral sensitivity in chemical bonding material was obtained by the questionnaire that consist of 12 questions. Moral sensitivity characters in this study are non-sensitive, rational, egocentric, and sensitive. The result showed that there is an increasing moral sensitivity of students before and after experiencing learning activities with the internalization model (Fig. 2).

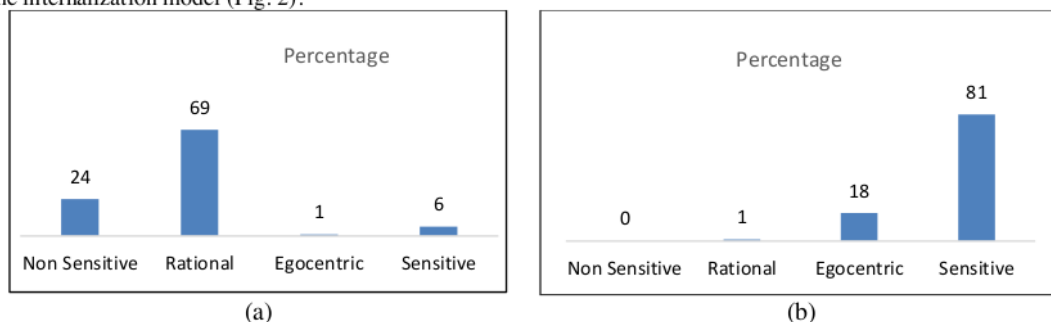


FIGURE 2. Students' Moral Sensitivity Before (a) and After (b) Experience Internalization Learning Model

Based on the study result sensitive category of students increase from 6% to 81%, with the internalization learning model. It means that students are more sensitive to the concepts of chemical bonding. Besides that, it indicates a change in moral values after students obtain internalization model

Further analysis was through by using the N-Gain score, the difference between the pretest and posttest scores calculated based on the Hake equation [27]. The results of the N-Gain analysis are briefly shown in Fig. 3.

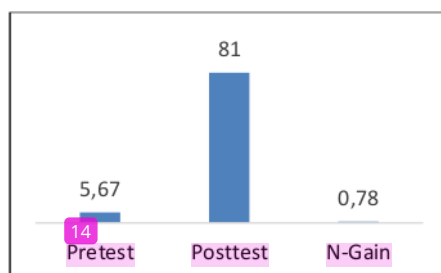


FIGURE 3. Graph of Average Percentage of Pretest, Posttest, N-Gain Results of Moral Sensitivity Questionnaire

The n-gain value is 0.78 which means it is in the high category. Thus, learning tools based on internalization models can develop students' moral sensitivity mainly in chemical bonding concepts.

This moral sensitivity is used to study which students are sensitive to moral values in the chemical bonding concept. Sensitivity character has different levels in each person which is divided into sensitive, egocentric, rational, and insensitive. The results of the data analysis described previously showed an increase in most students at the sensitive level from 5.67% to 81%. This indicates that there is a change in moral values after students get the meaning of concepts for chemical bonding material after learning activities are carried out. Theoretically, to bring up moral behavior continuously, there must be an integration process of moral values that exist in the cognitive structure into motivation and human feelings. Thus to be able to develop moral values in students, it is necessary to integrate moral values with teaching materials of educators in learning activities such as a study that has been carried out by researchers [28].

Moral sensitivity can change naturally, but it can also change intentionally through the educational process. Students who are already at a sensitive level, also need exercises or activities that can maintain their moral sensitivity as well as to increase them to the next stage of the psychological process. Students who are still in the egocentric level must be given guidance activities to interpret each concept or phenomenon as a habituation exercise. Beside that teacher must always provide training on the meaning of moral values for each learning activity. morals towards a concept of subject matter that they will get in learning activities [29].

CONCLUSION

According to the results of this study, the development of chemical bonding material learning tools based on meaning learning models is effective to develop students' moral sensitivity.

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