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DEVELOPMENT OF TEACHING MATERIALS ABOUT CHANGES IN AROUND US BASED IN INQUIRY BASED TO INCREASE SKILLS OF SCIENCE PROCESSES AND LEARNING OUTCOMES

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Abstract:
Students have difficulty doing practice so that many students who do not engage themselves actively in learning use teaching materials in grade VII SMP science students book the subject matter of changes in objects around us. The teaching materials have not maximally described guided inquiry. The purpose of the study was to produce a prototype of the subject matter material for the change of objects around us based on guided inquiry that is valid, practical and effective to improve science process skills and student learning outcomes. The development research method refers to the Borg and Gall Research and Development (R & D) development model but only reaches the final product improvement stage. The research subjects of seventh grade of SMP 2 Daha Utara were 23 people (12 males, 11 females), seventh grade in SMP 1 Daha Selatan as many as 24 people (13 males, 12 females) and seventh grade students in SMP 5 Daha Selatan as many as 20 people (11 men; 9 women). Students of Daha Utara 2 Public High School and Daha Selatan 1 Junior High School in the experimental class were given treatment with guided inquiry-based teaching material while the control class of Daha Selatan Middle School 5 was treated with student book teaching materials. Before the treatment each class was given a pretest. During the treatment of teachers and students observed 2 observers equipped with observation sheets. After the treatment was given

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posttest. The results of the study found 87.75% validity (very valid) and readability of 95.83% (very good). The practicality of the experimental class is better than the control class. Guided inquiry-based teaching materials are valid, practical and descriptively effective for improving science process skills and student learning outcomes but inferentially are not effective for improving science process skills and student learning outcomes.

Keywords: teaching materials, guided inquiry, science process skills, learning outcomes

1. Introduction

Curriculum 2013 is designed to prepare students who are able to contribute to the life of society, nation and state and world civilization (Warso, 2014: 16). Student contributions to world civilization with their ability to compete at the international level, especially in the field of science. The scientific ability of Indonesian students at the international level is still relatively low. The results of the 2015 PISA test and evaluation Indonesia ranked 61 out of 69 countries evaluated (Gurria, 2016: 7). Indonesia's ranking is far behind compared to Singapore, Vietnam and Thailand.

The low ability of students demands a dynamic improvement of education. Improvement of education refers to eight National Education Standards (SNP). Among the SNPs that need to be improved on Facilities and Infrastructure Standards and Process Standards. Improvement of Facilities and Infrastructure Standards by the Ministry of Education and Culture in the 2013 curriculum by providing teacher books and student books. The teacher's book is designed to simplify and clarify the use of books for students. While the student book describes the minimum effort students must make to achieve the expected competencies. This student book is expected to improve science process skills consisting of basic skills and integrated process skills. Improvement of Process Standards by teachers related to the learning process. Improvement of the learning process can be done by compiling innovative and creative teaching materials according to the development of student needs (Prastowo, 2014: 6).

Hendra (2017: 153) provides suggestions for the implementation of the development of material analysis. The material analysis in the seventh semester grade VII student books in Natural Sciences (IPA) is based on science as a product and science as a process. Analysis of material based on science as a product is carried out in the form of facts, concepts, principles, laws or theories (Bundu, 2006: 11-12). Science as a product in the third Core Competence (KI.3) The 2013 curriculum on knowledge requires factual, conceptual and procedural existence. Analysis of science material as a process is carried out in the form of observation, classification, inference, formulating hypotheses and conducting experiments (Bundu, 2006: 12).

The results of the material analysis found that in the subject matter of Changes in the Objects Around Us science as a product is in factual, conceptual and procedural terms. While science as a process there is observation, classification, inference and

conducting experiments. Thus, the subject matter of Changing Objects Around Us is suitable for improving students' science process skills.

The teacher reviews the subject matter of Changes in the Objects Around Us especially in the student worksheet (LKS) section. The results of the study found that the subject matter of the Changes in the Objects Around Us contained 6 titles of LKS which included (1) looking for properties that remained in a substance, (2) changes in physics and chemical changes, (3) applying the filtration separation method, (4) apply the distillation method (distillation), (5) apply the chromatography method and (6) apply the sublimation method. The six LKS have not maximally described guided inquiry so that there is a lack of learning activities for both teachers and students and ineffective learning.

Sadiqin (2016: 123) provides suggestions for implementation that the need for preliminary observations in order to produce observations is more accurate. Observations were made for preliminary studies when 2013 curriculum assistance to science teachers at North Daha 2 Junior High School and Daha Selatan 1 Junior High School. The instruments used by companion teachers for science subjects consist of observing lesson plan instruments, implementing learning and assessment.

Based on the results of observations, it was found that all of the meanings were below 66 or had not reached a good predicate. The low results of observations of the three instruments are evidenced by (1) tools/materials/media/learning sources still adopting which are printed on student books without innovating, (2) many students have difficulty doing the practice according to the procedures printed on student books so that many students do not actively involve themselves in learning and (3) classically many students value their skills and knowledge have not achieved minimal learning completeness (KBM) set by the teacher 60 for the related basic competencies (KD). This shows the weakness of student process skills, especially science process skills and the low student learning outcomes.

Weak science process skills and low student learning outcomes should not continue. Weak science process skills make the learning process not work as it should and student learning outcomes are always under the KBM. As a result teachers are forced to remedial students who are under KBM. With the frequent implementation of remedial teachers the impact on the learning process is stalled and it is difficult to meet curriculum targets so that at the end of the school year there are many students who do not meet the CBM Science and not even go up to class.

The problem of weak science process skills and the low student learning outcomes is overcome by the development of teaching materials. Development of teaching materials needs to be done with the reasons (1) the availability of materials according to curriculum demands, (2) target characteristics, (3) demands for learning problems (Warso, 2014: 124).

Teaching materials developed can be in the form of printed teaching materials, listening teaching materials, listening material and interactive teaching materials (Prastowo, 2014: 40). The researcher chose the teaching material developed in the form of printed teaching materials. Print teaching materials can be in the form of handouts,

textbooks, modules, worksheets, brochures, leaflets, wallcharts, photos (pictures) and mockups.

Researchers choose printed teaching materials in the form of student worksheets (LKS) because LKS provides alternative learning strategies that are innovative, constructive and student-centered by focusing on achieving expected competencies (Setiawan, 2013: 90). LKS developed based on guided inquiry because students learn to find and find on their own but are still guided by the teacher. Baroody et al. (2015: 102) suggest that teacher-guided learning is more effective than without teacher guidance. Learning outcomes with guided inquiry learning are easier to memorize and remember, easily transferred to solve problems (Fathurrahrohman, 2010: 31).

The results of the research have concluded that guided inquiry-based teaching materials can develop cognitive, psychomotor and affective abilities in students lives (Restuwati et al., 2014: 71). Lee (2012: 58) describes inquiry learning centered on students. Gemaydha et al. (2014: 8) concluded that the guided inquiry learning model assisted with teaching materials provided more optimal learning outcomes than using conventional learning. Vlassi & Karaliota (2013: 497) explained that guided inquiry learning students are more active than traditional learning. Bayram et al (2013: 994) recommend inquiry learning makes students more active.

2. Methods

Product development in this study is in the form of developing teaching materials. Research on the development of teaching materials refers to the development model of Borg and Gall's Research and Development because of the development of teaching materials including product development. Borg (2009: 775) describes the 10 stages of development of the Borg and Gall models as follows. Sukmadinata (2010: 184) modifies the steps of research and development of Borg and Gall which consist of (1) preliminary studies, (2) development and (3) testing. The design of the guided inquiry-based teaching material used in this study is a form of Quasi Experimental Design. The product trial of guided inquiry-based teaching material development is done through three stages, namely: (1) validation, (2) initial field trials, and (3) limited field trials. Subjects in this study were seventh grade students of SMP 2 Daha Utara as many as 23 people (12 men, 11 women), seventh grade in SMP 1 Daha Selatan as many as 24 people (13 men, 12 women) and seventh grade students in SMP 5 Daha Selatan as many as 20 people (11 men; 9 women).

3. Results and Discussion

3.1 Results of Science Process Skills Analysis

The science process skills were analyzed using the normality test and influence test. The results of the normality test pretest of science process skills of the control class students and the experimental class with Shapiro Wilk Test are presented in Table 1.

Table 1: Recapitulation of Pretest Normality Test Results of Science Process Skills

Group	Statistic	Df	Significance
Control	0,865	20	0,010
Experiment	0,904	47	0,001

Table 1 shows that the significance of the control class is 0.010 when compared with the significant level of 0.05 (5%) then 0.010 < 0.05 then it is abnormally distributed and the significance of the experimental class is 0.001 when compared to the significant level of 0.05 (5%) then 0.001 < 0.05 means abnormal distribution.

The results of the posttest normality test of science process skills of the control class students and the experimental class with the Shapiro Wilk Test are presented in Table 2.

Table 2: Recapitulation of Post-test Normality Test Results of Science Process Skills

Group	Statistic	Df	Significance
Control	0,842	20	0,004
Experiment	0,830	47	0,000

Table 2 shows that the significance of the control class is 0.004 when compared with the significant level of 0.05 (5%) then 0.004 < 0.05, then it is abnormally distributed and the significance of the experimental class is 0,000 when compared to the significant level of 0.05 (5%) then 0,000 < 0.05 means abnormal distribution.

The results of the analysis of normality pretest of science process skills were obtained not normally distributed then using the Mann Whitney Test. The Mann Whitney Test results obtained a significance of 0.042 when compared with a significant level of 0.05 (5%) then 0.042 < 0.05 means significant.

The results of posttest normality of science process skills were found to be abnormal but homogeneous, so the analysis used the Mann Whitney Test. The Mann Whitney Test results obtained significance of 0.398 when compared with the significant level of 0.05 (5%) then 0.398 > 0.05 means that it is not significant.

Based on the results of the Mann Whitney Test analysis the pretest of science process skills students obtained a significance of 0.042 when compared with a significant level of 0.05 (5%) then 0.042 < 0.05 means significant. The significance of the pretest of science process skills students shows the spread of the initial ability of students' science process skills between the experimental class and the control class differently.

Based on the results of the Mann Whitney Test analysis posttest science proposes skills obtained a significance of 0.398 when compared with a significant level of 0.05 (5%) then 0.398 > 0.05 means not significant. No significant posttest of science process skills of students showed differences in the ability of science process skills of students between the experimental class and the control class did not differ significantly. This means that inferential learning using guided inquiry-based teaching materials is no more effective than learning using student book teaching materials to improve students' science process skills.

3.2 Results of Analysis of Learning Outcome Test

The results of the pretest normality test results of learning science knowledge of the control class students and the experimental class using the Test of Shapiro Wilk are presented in Table 3.

Table 3: Recapitulation of Pretest Normality Test Results Learning Outcomes

Group	Statistic	Df	Significance
Control	0,951	20	0,390
Experiment	0,927	47	0,006

Table 3 shows that the significance of the control class is 0.390 when compared with the significant level of 0.05 (5%), then 0.390 > 0.05, then it is normally distributed and the significance of the experimental class is 0.006 when compared with the significant level of 0.05 (5%), 0.006 > 0, 05 means normal distribution.

The results of the posttest normality test on the learning outcomes of the control class students (Daha Selatan Junior High School) and the experimental class (Daha Utara Junior High School 2 combined with Daha Selatan 1 Junior High School) with Shapiro Wilk Test are presented in Table 4.

Table 4: Recapitulation of Post-test Normality Test Results Learning Outcomes

Group	Statistic	Df	Significance
Control	0,794	20	0,001
Experiment	0,745	47	0,000

Table 4 shows that the significance of the control class is 0.001 when compared to the significant level of 0.05 (5%) then 0.001 < 0.05 then the distribution is not normal and the significance of the experimental class is 0,000 when compared with a significant level of 0.05 (5%) then 0,000 < 0.05 means abnormal distribution.

The results of the posttest normality and homogenises analysis of knowledge learning outcomes were found to be abnormal and homogeneous then using the Mann Whitney Test. The Mann Whitney Test results obtained significance of 0.813 when compared with the significant level of 0.01 (1%), then 0.813 > 0.01 means not significant. Based on the results of the Mann Whitney Test pretest learning knowledge results obtained significance of 0.762 when compared with the significant level of 0.05 (5%) then 0.762 > 0.05 means not significant. No significance of the pretest of student learning outcomes shows the spread of the initial ability of science process skills of students between the experimental class and the same control class.

Based on the results of the Mann Whitney test analysis the posttest knowledge learning results obtained a significance of 0.813 when compared with the significant level of 0.05 (5%) then 0.813 > 0.05 means that it is not significant. No significance of posttest student learning outcomes showed differences in the ability of science process skills students between the experimental class and the control class did not differ significantly. This means that inferential learning using guided inquiry-based teaching

materials is no more effective than learning using student book teaching materials to improve student learning outcomes.

4. Conclusion

Guided inquiry-based instructional materials are classified as ineffective in improving science process skills and student learning outcomes. This is due to the fact that many upper class students do not experience improvement which means that teaching materials only fit students to the lower classes.

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