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Development of Rembang Regency Ethnoscience-Based Integrated Thematic Teaching Material to Improve Concept Mastery

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Abstract

School plays an important role in introducing local culture by integrating culture as ethnoscience learning material. This study aimed to determine the process of developing Rembang Regency ethnoscience-based integrated thematic book to improve students' concept mastery. This study applied the R&D method by using Borg & Gall design. Data were collected through observation, interview, test, and questionnaire, and the subjects of this study were fourth grader of elementary school consisting of two experimental classes. The data were analyzed by applying feasibility, effectiveness, and practicality test of learning tool. The result of this study indicated that each indicator of ethnoscience-based thematic learning material was in very valid criteria with an average score of 90.4 (scale 0-100). Ethnoscience-based thematic learning material was effective to improve students' mastery of concept, this was proved by the completeness which reached 100%, the enhancement result was in the moderate category, and students' response was in the very high category. The result of the study proved that students were pleased and motivated during the ethnoscience-based learning process so that their concept mastery increased. From data analysis, it could be concluded that the development of ethnoscience-based integrated-thematic teaching material could improve students' mastery of concept.

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INTRODUCTION

Thematic learning is a learning which is carried out in coherent context and holistic way and the concept or subject is contained within a particular theme (Muhardini, 2020). Learning is not only about transferring material from teacher to students, but it is more about students' understanding of the concept of the material itself. By learning how to deal directly with life, students will be more interested in activities in which they get new experiences (Akfirat & Kezer, 2016).

The concept mastery can be defined as students' cognitive ability of understanding and mastering scientific concepts through phenomena, events, objects, or activities related to the learning substance. Students can master the concept if they understand the meaning of the process of events, phenomena, and objects through the observation activity and teacher's explanation. The measurement of the concept mastery can be done through test, namely initial and final test (Tursinawati, 2016).

Based on the observation conducted in one of the Public Elementary School in Kaliiori District, it was revealed that students could not master the learning concept and this was shown by their low learning outcomes. The mastery of concept is an effort which must be accomplished by students in recording and transferring back several information from a certain learning subject to solve problems, analyze, and interpret the events (Silaban, 2014). Low mastery of concept can be overcome by various attempts, one of them is the use of teaching material that is innovatively made by adjusting students characteristics (Oktaviani, 2017). One of those effort is by engaging school to take an important role in introducing local culture to the students.

The knowledge of local culture can be conveyed by integrating culture as learning material as in the book. The local culture which is also known as indigenous science, is integrated with the learning process by turning it into ethnosience (Arfinawati, Sudarmin, & Sumarni, 2016). Ethnosience is authentic scientific knowledge in society then changed into

scientific knowledge (Rahayu & Sudarmin, 2015). Furthermore, according to Wahyu (2017) ethnosience learning is a strategy for creating a learning environment and designing learning experience that integrates culture as a part of the learning process in primary school. Ethnosience learning can be implemented by incorporating a developing culture in the community into thematic learning in elementary school.

The learning material of four grade in theme 2, namely "Selalu Berhemat Energi" (Always Save Energy) is very suitable to be developed and integrated with natural phenomena in Rembang Regency. The characteristic of innovative learning is the novelty of model and provision of alternative solutions to problems (Sarwi et al., 2018). Therefore, it is necessary for teacher to develop natural phenomena-based teaching material that involves students in the learning process (Widiyanto et al., 2015). Each region has different local culture based on their respective characteristics. One of the local cultures of Rembang Regency is salt production area.

It is crucial for students to recognize the local culture, especially in Rembang. To achieve this goal, the natural potential of the salt-making process in Rembang can be turned into ethnosience learning material for students. Ethnosience learning is almost the same as the usual teaching method, but the difference is in the learning activities and the addition information of local residents and culture which are connected to the concept of knowledge will be taught (Fasasi, 2017). In the primary school level there is a theme which is suitable to be applied in the local culture-based learning material, it is four grade semester 1 material on the book theme 2 "Selalu Berhemat Energi" (Always Save Energy) which is appropriate to be established and integrated with natural phenomena in Rembang Regency. Thus, the researcher will develop Rembang Regency ethnosience-based thematic teaching material "Selalu Berhemat Energi" (Always Save Energy).

The study about ethnosience approach and the substance of the ethnosience-based additive module, is effective to enhance student

learning outcomes and entrepreneurial characters (Sudarmin et al., 2017). In addition, developing a local wisdom-based electronic module, namely Ets-E module, can make students studying science phenomena related to the society (Nurkhalisa & Ummayah, 2017). On the other hand, local wisdom-based thematic teaching material can be used as teaching material which can increase students' knowledge of the lesson being studied (Tinja, 2017).

The innovation of this research optimizes the students' cognitive, affective, and psychomotor domains by utilizing thematic teaching material which is developed with an ethnoscience approach for four grade, where students' mastery of concepts can be expanded through direct observation in a salt-making factory. Considering the background of the encountered problems, this study aims to analyze the development of ethnoscience-based thematic teaching material to improve students' conceptual understanding.

METHOD

The method of this study was Research and Development (R&D) with Borg & Gall (1989) design. This study developed ethnoscience-based "Selalu Berhemat Energi" (Always Save Energy). theme integrated thematic learning material. The development model in this research consisted of research and information collection, planning, initial product design, design validation, design revision, limited trial, product revision, extensive testing, product revision, and dissemination.

The samples used in this study were 22 students of class IVA as the experimental class 1 and 22 students of class IVB as the experimental class 2 in one of the Public Elementary School in Kaliori District, Rembang Regency. The techniques of data collection were observation, interview, test, and questionnaire by following guidance of the instruments that were created and developed by the researcher.

The data analysis technique used was the analysis of the need of developing ethnoscience-based teaching material, feasibility analysis,

analysis of the effectiveness of learning tool, and analysis of the practicality of learning tool. The effectiveness analysis consisted of descriptive analysis of completeness of student learning outcomes, influence analysis of the application of learning tool on students' concept mastery, and analysis of improvement (N-gain), while the practicality of learning tool was measured through student response analysis.

RESULT AND DISCUSSION

Students always interact with the local environment and culture in their daily life. Without realizing it, that kind of activity can increase their potential for understanding the learning. According to Sarwi et al. (2018) & Sarwi et al. (2019), in learning activity, an interaction with real object and learning environment is needed, so that the gained experience is meaningful for students. Science learning can be enhanced from the perspective of local culture and organized local wisdom related to certain natural events (ethnoscience) (Yuliana, 2018). Ethnoscience learning which can combine environmental culture with scientific culture in school will be able to develop students' quality as the future next generation of the nation. Hence, in this study, school teaching material must be developed and integrated with local culture in Rembang.

The information of teaching material used in the school was obtained through interviews with school principal and fourth grade teachers of the Public Elementary School in Kaliori District, Rembang Regency, which had used the 2013 curriculum. The teaching material used was student books, teacher books, and worksheets. Teachers one of the Public Elementary School in Kaliori District had known the characteristics of the local area as a salt producer. However, they had never invited students to do the learning activity in salt-making place. The learning material which had been applied so far had not developed material with an ethnoscience approach.

The elaboration of need aspect of ethnoscience-based integrated thematic learning

material included: (1) content feasibility analysis, (2) presentation feasibility analysis, (3) language feasibility analysis, (4) ethnoscience component analysis, and (5) chart eligibility. In the student theme book 2 entitled "Selalu Berhemat Energi" (Always Save Energy), the material scope had included the found material with problem discovery and the application of the given examples had already been based on science and technology, but it had not provided an explanation of the theory/concept and had not described the material connecting ethnoscience and culture with the environment around Rembang.

Students had been encouraged to be active in their own discoveries. However, the instruction in the book did not yet explain whether those activities should be done individually or in groups. The language used in the 2017 revised "Selalu Berhemat Energi" (Always Save Energy) thematic book was effective and interesting, but there were still sentences or material that were difficult to understand. In the ethnoscience component, the presented 2017 revision "Selalu Berhemat Energi" (Always Save Energy) thematic book was not in accordance with KI, KD, and indicator. This was because the thematic book did not yet contain the material related to ethnoscience in Rembang. So, the indicator regarding reviews of teaching material developed with the ethnoscience of Rembang Regency was the salt-making process, while the information of science, culture, and the surrounding environment did not exist yet.

Illustrations and pictures had already been in accordance with the material, but the illustrations used in the book were cartoons. The cartoons were interesting, but it would be better if the illustrations were real or original pictures so that students would easily understand. The example of illustration used in the book shown in Figure 1.



Figure 1. The Illustrations Used In The Book

The presented illustration in Figure 1 was not clear enough for students. Moreover, it did not have an explanation. Textbook illustration had a function to explain the text or the description of events both scientific and part images. It could be the form of photograph, natural image, and even chart. The image selection should have taken into consideration because it would affect students' imagination.

The integrated-thematic learning material consisted of Pancasila and Civic Education, Indonesian, Science, Social, and Art, Culture, and Craft subject. At the end of every lesson, it was completed with evaluation questions. The given questions were adjusted to the material. The developing theme in the lesson was "Selalu Berhemat Energi" (Always Save Energy). There were three sub-themes in the book. Every sub-theme contained 6 lessons. So, the total learning developed in this teaching material was 18 lessons.

The salt-making process was chosen to be the main characteristic in the development of teaching material because Rembang Regency is one of the salt producing areas. The researcher conducted interviews with salt farmers and salt factory owners to find out the terms in the salt-making process written in the developing textbooks. In addition, several characteristics of Rembang Regency were also published in books such as fish catch, typical foods such as pepper vegetable, kawista syrup, dumbeg cake, lontong tuyuhan, Lasem batik, and beach tourism. The learning material emphasized on learning with

an inquiry approach that invited students to discovery activities.

Based on the need analysis and material adequacy analysis, ethnoscience-based teaching

material product was developed with the template shown in Figure 2 and Figure 3.



Figure 2. Book Cover



Figure 3. First Page Display Of Learning

After product development, the next step was the feasibility of teaching material or expert

validation. Teaching material before validated shown in Figure 4.

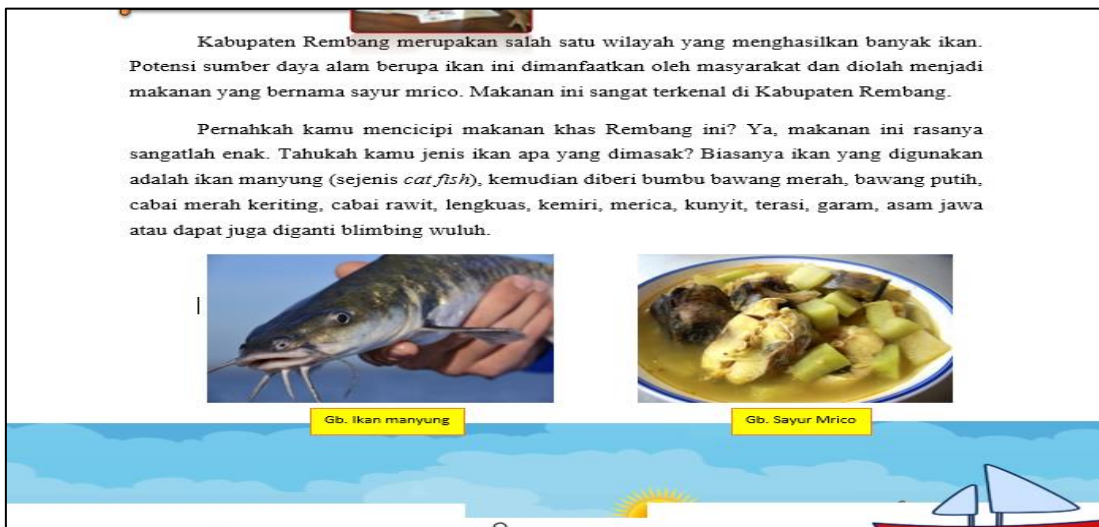


Figure 4. Teaching Material Before Validated

There were 4 validators in the feasibility test of ethnoscience-based thematic teaching material. The indicator of the teaching material test consisted of the feasibility of content, the feasibility of presentation, the feasibility of

language, the component of ethnoscience, and the feasibility of graph. The recapitulation of validity test done by validators presented in Table 1.

Table 1. Recapitulation of Teaching Material Validation.

Assessment Indicators	V1	V2	V3	V4	Scores	Criteria
The feasibility of the content	24	22	24	23	93.00	Very Valid
The feasibility of presentation	22	20	21	23	86.00	Very Valid
The feasibility of language	18	18	16	18	87.50	Very Valid
Ethnoscience components	11	12	12	12	97.92	Very Valid
The feasibility of graph	17	17	17	19	87.50	Very Valid

Table 1 showed the validation results of Rembang Regency ethnoscience-based integrated-thematic teaching material "Selalu Berhemat Energi" (Always Save Energy) by experts, school supervisors, and four grade teachers. The result outlined that ethnoscience-based teaching material in each assessment indicator was in very valid criteria with an average validation score of 90.40 so that the

teaching material was feasible to be applied. However, teaching material still need to be improved by considering validators' advice. The improvements included the quality of the front cover image, the addition of source images, the improvement of typing, and the addition of other characteristics of Rembang Regency. Improvement of teaching material after expert validity test shown in Figure 5.

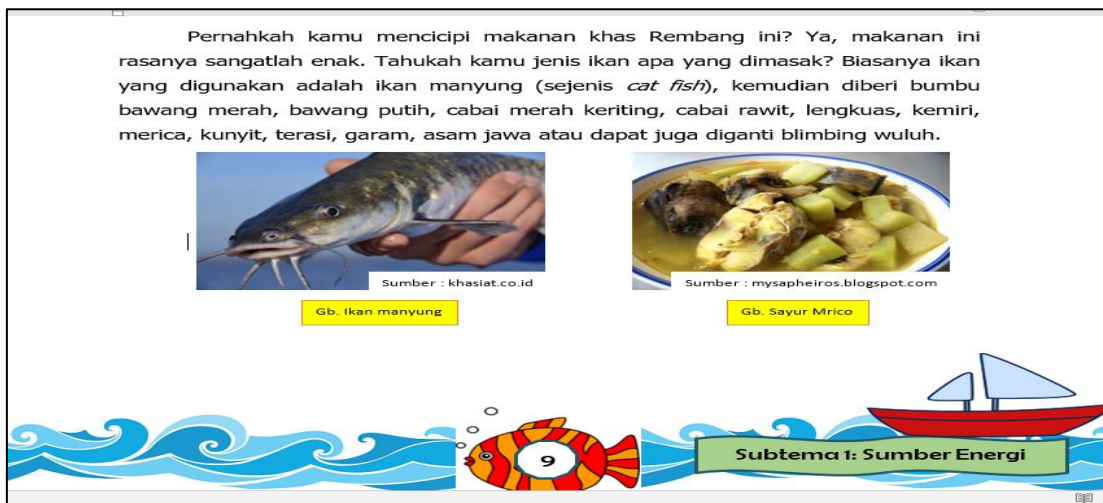


Figure 5. Teaching Material After Validated

The next step was implementation of the enhanced teaching material to the research sample to determine the level of effectiveness in improving students' concept mastery. The effectiveness level of ethnoscience-based teaching

material was measured by using completeness test, influence test, and improvement test. The completeness test of the experimental class 1 and experimental class 2 presented in Figure 6

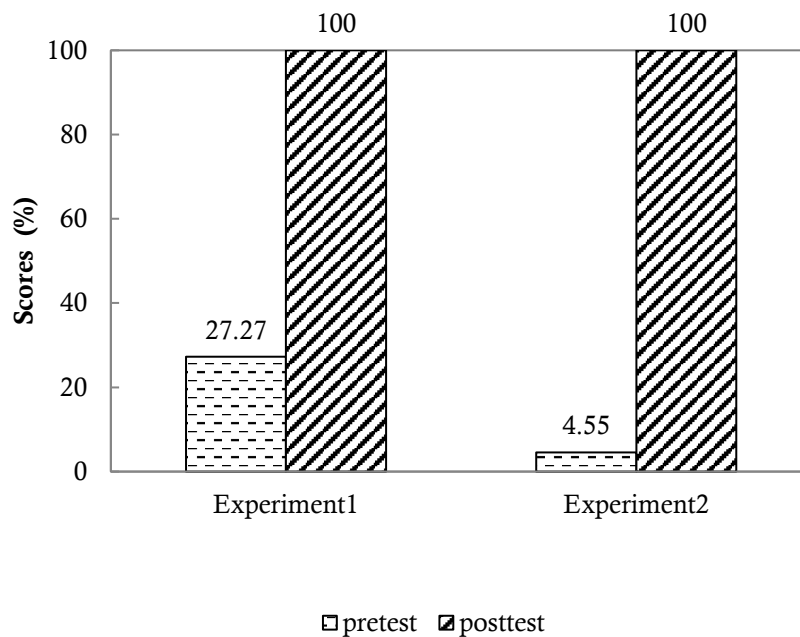


Figure 6. Graphic Of Learning Outcomes Completeness

Based on Figure 6, the pretest of the experimental class 1 showed that there were 6 students (27.27%) who reached the minimum completeness criteria (KKM), but after the implementation of new learning process, all students passed the minimum completeness criteria as shown in posttest data. Whereas in the pretest of experimental class 2 indicated that there was only one student (4.55%) who had completed the minimum completeness, but after the treatment, the posttest showed that all

students passed the minimum completeness criteria.

The influence test of the implementation of ethnosience-based thematic learning tool on student cognitive learning outcomes was carried out using Paired-Samples t-Test. The use of learning device would give an effect on cognitive learning outcomes if there were a significant difference between pretest and posttest. The results of the difference test presented in Table 2.

Table 2. The difference Test of Students' Pretest and posttest Cognitive Learning Outcomes

Data	t-value	Sig	Conclusion
pre-pos Experiment 1	-10.64	0.00	There was significant difference
pre-pos Experiment 2	-9.88	0.00	There was significant difference

Based on the Table 2, the significant value of experimental class 1 and 2 was 0.000 which was < 0.05, so H_0 was rejected. It indicated that there was difference in learning outcomes before and after being given learning devices, so it could

be concluded that there was a significant effect in providing ethnosience-based "Selalu Berhemat Energi" (Always Save Energy). Integrated thematic learning tool on student cognitive learning outcomes is presented in Figure 7.

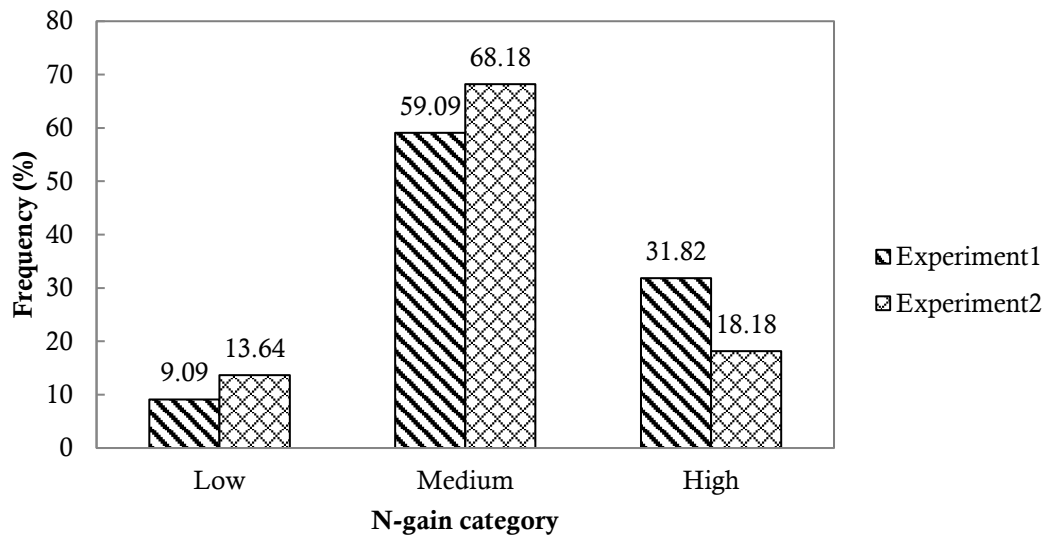


Figure 7. The graphic of N-Gain Category Student Cognitive Learning Outcomes

N-gain analysis was used to determine the improvement of student cognitive learning outcomes so that the effectiveness level of the application of ethnosience-based thematic learning tool on cognitive learning outcomes could be seen in Figure 7. The N-gain average of the students' cognitive learning outcomes both in the experimental class 1 and 2 was in the moderate category with a value of 0.58 and 0.55 so that it had an effective level of effectiveness.

The application of ethnosience-based thematic teaching material in the experimental class 1 and 2 effectively improved students' mastery of concept. This could be seen from the students' cognitive learning outcomes which had increased significantly, the increase was in the moderate category, and the posttest average of learning outcomes in experimental class 1 was 80.32 which was higher than pretest, which was 52.55. Not to mention the average of posttest learning outcomes in experimental class 2 was 52, higher than the pretest, which was 79.54. From the two classes, there was improvement in the average of learning outcomes by 27%.

These results were in line with the research of Fitriani & Setiawan (2017), with the application of ethnosience-based science modules, students' critical thinking learning outcomes was improved with a moderate improvement category. The development and

application of the ethnosience module was proved easy to use and very effective as a thematic teaching material on the theme of tobacco plant cultivation in Jember Regency (Nailiyah et al., 2016). Ethnosience-based learning material could effectively enhance cognitive learning outcomes in the moderate category of improvement (Ahmadi et al., 2019).

The conducted research by Rahayu & Sudarmin (2015) also showed a significant increase on learning outcomes after the implementation of an ethnosience-based integrated science module, this was because the ethnosience-based assignments and materials in the module encouraged students to actively search information and convert people's original science about energy theme in life to a science form. Moreover, with ethnosience learning, students' scientific literacy skills also increased so that they could apply their knowledge (Sarwi et al., 2019).

The integrated-thematic learning using an ethnosience approach made students felt more interested and enthusiastic in learning because they felt it was more fun than just sitting listening to the teacher delivering the material. The students' enthusiastic in the experimental class 1 and 2 was measured through practicality analysis, it was the measurement of students'

response during the application of ethnoscience-based integrated thematic science learning.

The analysis of students' response in experimental class 1 and 2 on each indicator shown in Figure 8.

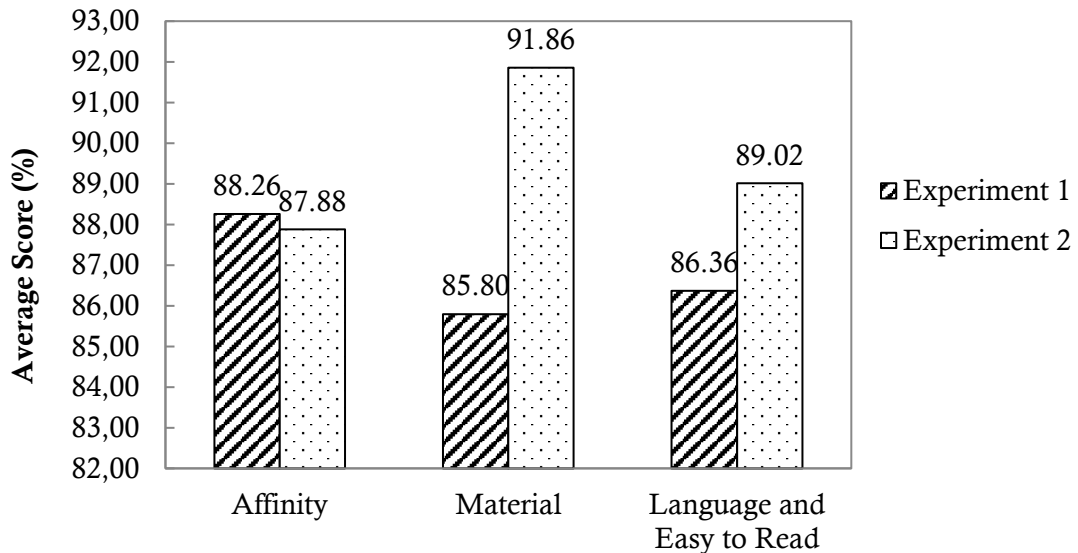


Figure 8. Students' Response in Experiment Class 1 and Experiment Class 2

In Figure 8, students' responses to the application of ethnoscience-based integrated thematic learning tool "*Selalu Berhemat Energi*" (Always Save Energy) both in the experimental class 1 and the experimental class 2 gave a positive response. This could be seen from the average of students' responses which were more than 85% and very high on each response indicator. In the experimental class 1, most students responded interested in the applied learning concept. Meanwhile, in the experimental class 2, most students liked the material presented during the learning process. The average of students' responses was in the very high category with an average of the experimental class 1 was 86.89% and in the experimental class 2 was 89.7%. Hence, the conclusion showed that ethnoscience-based integrated thematic teaching material was practical to be applied to attract students' interest during learning.

In the study conducted by Ariningtyas et al. (2017), the implementation of ethnoscience-based student worksheet (LKS) encouraged students to give positive response in good category with an average score of 77.67%.

Whereas the research conducted by Fitriani & Setiawan (2017) and Nailiyah et al. (2016) also outlined that students responded positively to ethnoscience learning and the average of response was in the very high category with an average score was 95%. This indicated that the use of ethnoscience approach led students to discover something new and unique which they had not yet encountered in the learning before, so they felt motivated to learn.

The high enthusiasm and interest in learning made students easily to absorb the transferred-material, thus it enhanced students' mastery of concepts. In accordance with Nurhalita (2020) findings, the application of ethnoscience learning was useful to help elementary school students to overcome the difficulties in absorbing abstract learning by providing learning experiences that involve students in a complex way based on the real world (contextual), and ethnoscience learning had a role as a special alternative in building nationalism character formation through the reinformation of regional local wisdom value by the implementation of ethnoscience.

CONCLUSION

Rembang Regency ethnoscience-based integrated-thematic teaching material "Selalu Berhemat Energi" (Always Save Energy) was declared very valid on each assessment indicator with an average validation score of 90.4. Ethnoscience-based integrated-thematic teaching material could significantly improve students' mastery concept, the increase was in the moderate category, and the average of learning outcomes improvement was 27%. Therefore, it had the conclusion that the application of ethnoscience-based integrated-thematic teaching material was effective to improve students' concept mastery.

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