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CAN THE ETHNOSCIENCE-BASED INQUIRY LEARNING MODEL IMPROVE STUDENTS' SCIENCE PROCESS SKILLS?

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ABSTRACT

This study aims to determine the increase in students' science process skills by applying an ethnoscience-based inquiry learning model to colloid system material from a public high school in West Seram. The type of research used is descriptive quantitative. The sample used in this research was 30 students of class XI IPA. Data collection techniques in this study were test techniques in the form of pre-test and post-test. The results showed that the application of the ethnoscience-based inquiry learning model succeeded in improving students' science process skills. An increased score calculated based on the results of the average value before learning was 26.29 and increased after learning with an average value of 80.50. The average value of N-gain is 0.74, indicating an increase in students' science process skills in the high category. Encouraging chemistry teachers to explore other ethnoscience to teach colloid systems is necessary.

Keywords: *Inquiry learning model, ethnoscience, science process skills, colloid system*

INTRODUCTION

Teachers in science learning must involve students actively and directly so as to create learning experiences. That can increase curiosity and stimulate students to think about how to design a scientific investigation process that leads them to find answers to related questions or problems with scientific phenomena in nature. Scientific investigation of scientific phenomena will train students' abilities to observe, analyze, convey hypotheses, and draw conclusions from these phenomena.

Teachers are required to be active in creating and innovating learning to improve students' science process skills in chemistry learning. One of them is choosing a learning model with local wisdom. In developing learning tools based on Permendikbud No. 22 of 2016 (Kementerian Pendidikan dan Kebudayaan, 2016) concerning Process Standards for Primary and Secondary Education, it must adapt to the individual characteristics of students, pay attention to the active participation of students, encourage enthusiasm, motivation, creativity, inspiration, initiative, and innovation. These things must be considered in designing the implementation of learning, choosing learning models, and designing or selecting learning media or teaching materials used.

The implementation of Curriculum 2013 (Kementerian Pendidikan dan Kebudayaan, 2013a) is expected to produce Indonesian people who are productive, creative, effective, and innovative through strengthening integrated attitudes, skills, and knowledge. This curriculum implements a change in the pattern of education from an orientation towards results and educational materials as a process, through an integrative thematic approach with Contextual Teaching and Learning (CTL) (Kementerian Pendidikan dan Kebudayaan, 2013b). Therefore, learning should involve students as

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much as possible. Based on Permendikbud No. 65 of 2013 concerning Process Standards (Kementerian Pendidikan dan Kebudayaan, 2013c), the preferred learning models in implementing the Curriculum 2013 are inquiry, discovery, PBL (project based learning), project-based, and problem-solving based (Kementerian Pendidikan dan Kebudayaan, 2013a). It is hoped that the application of this learning model can improve the skills and learning outcomes of students.

Process skills are related to fundamental abilities that must be possessed, mastered, and applied in a scientific activity to succeed in finding something (Arantika, 2018). So, the learning model used must contain student activities accompanied by student activity sheets which can be used as a guide for carrying out scientific investigation activities to solve given problems or problems found. Thus, the steps of the learning model used will help students to train and improve the intellectual skills and scientific attitudes possessed by students to find facts, build concepts, and theories based on the results of scientific investigations conducted.

Ethnoscience based chemistry learning is closely related to everyday life so it can help students understand chemistry subject matter (Arfianawati et al., 2016). The ethnoscience approach is effective for improving student learning outcomes and producing a generation that is literate in science, has innovative thinking skills, and a scientific attitude (Setiawan, 2013). Science learning with an ethnoscience approach links learning with culture by exploring students' original views on culture, then translating them into scientific knowledge (Sudarmin et al., 2017).

Chemistry learning with an ethnoscience approach is a strategy for creating a learning environment and designing a chemistry learning experience that integrates local culture (local wisdom) as part of the learning process. According to Gunstone (2014) school learning that is suitable for the 21st century is science learning with an ethnoscience approach that is able to break the isolation of scientific knowledge in schools with everyday life. Integrated ethnoscience in chemistry learning can help make learning meaningful.

Integrating ethnoscience in learning must pay attention to the suitability of teaching materials and local wisdom, and their able for students while studying. Building science through ethnoscience can help tudents to show depth of thinking, insight into the concepts or principles being studied, and creative imagination in expressing their understanding (Sumarni, 2018). The importance of integrating culture into learning science (ethnoscience) is in line with the theory of social constructivism initiated by Vygotsky (Mussana, 2012). Chemistry learning needs to integrate some local wisdom to become more relevant to students' lives (Saija et al., 2023)

One of the learning models in accordance with the 2013 curriculum is the inquiry learning model. The inquiry learning model is a series of learning activities that optimally involve all students' abilities to seek and investigate systematically, critically, logically, and analytically so that they can formulate their own findings with confidence (Gulo, 2008). According to Mulyasa (2006), the purpose of the inquiry learning model is to improve the ability to think, work and act scientifically, and communicate as an important aspect of life skills. Inquiry learning is more effective in promoting learning and assist students in learning content (Sadeh & Zion, 2012).

Some studies have previously focused on the application of the inquiry learning model as able to improve students' science process skills because the methode gives students the freedom to think critically and actively participate in class. The research of Dewi et al. (2013) shows that is able to improve students' scientific skills and learning outcomes. Then, Murningsih et al., (2016) show that the inquyri learning use is able to improve students' scientific attitudes to the subject matter of solubility and solubility. Hadi & Rasmawan (2016) say that the application of inquiry-based learning models can strengthen students' scientific work skills and understanding of students' concepts. The research results of Dijaya et al. (2018) show that student performance in the application of guided inquiry learning to the concept of electrolyte and non-electrolyte solutions has increased. The same result by Sunetri (2021) shows that the use of an inquiry learning model can increase the performance of students in class.

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However, these researchers have not adopted ethnoscience as a context base in their studies. Therefore, this study is excited to use ethnoscience as a context in inquiry learning that is supposed to support students and teachers in learning chemistry colloid topics. The role of teachers as facilitators in the active learning process is expected to be maximized because learning activities will become more focused, and students can construct their knowledge (Saija et., 2023). Based on the description above, the researcher's purpose is to know how can ethnoscience-based inquiry learning improve students' science process skills.

RESEARCH METHODS

This research uses the one-group pretest-posttest design (Creswell, 2014). To find out the value of students' science process skills, an analysis was carried out at the beginning and end of the learning activities using the inquiry learning model on the results of the students' pre-test and post-test. This research was conducted at Public Senior High School 1 Seram West the subject is all students in XI class (30 students), part and on the subject of the colloid system. The value of each student, both for the initial test and the final test after learning. Student scores obtained are then used for the analysis of increased scores (gain test). The increase score analysis was carried out with the aim of knowing the increase in students' science process skills in a quantitative description using the N-gain formula. The amount of gain can be analyzed using Hake's formula (1999):

$$Normalized\ Gain = \frac{Score\ (postest) - Score\ (pretest)}{Score\ (ideal) - Score\ (pretest)}$$

The results of the Normalized Gain (N-gain) calculations are then converted by taking into account the following criteria: 0,7 < N-Gain is High; 0,3 ≤ N-gain ≤ 0,70 is Middle; and N-Gain < 0,30 is Low (Hake, 1998)

RESULTS AND DISCUSSION

Improving science process skills through the application of inquiry learning models is done by first collecting data on pretest and posttest scores obtained by students and these scores are converted into pretest scores and posttest scores of students. The following are the results of the pretest and posttest of students' science process skills which are presented in **Figure 1.**

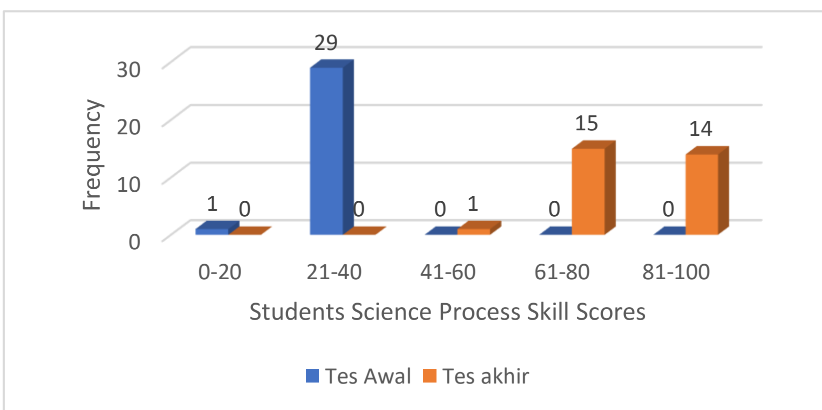

Figure 1. Student's Science Process Skill Score Pre-Post Test

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Figure 1 shows that in the pre-test before learning, students' understanding of science process skills in chemistry learning was very low where all 30 students scored below 40 from the interval 0-100. After learning by using the ethnoscience based inquiry learning model, students' science process skills increased where as many as 15 students scored between 61-80 and 14 students scored 81-100.

Based on the student's pretest and posttest scores, an analysis process of increasing scores was then carried out the N-gain formula. Based on the N-gain analysis, the increase in score is obtained and then the average value is calculated with the results in **Table 2.**

Table 2. Average Science Process Skills Test Results

Pretest	Posttest	N-gain average	N-gain interpretation
26,29	80.50	0.74	High

Based on **Table 2** above, the average score of students before learning was 26.29, then it increased after learning with an average value of 80.50. The results of the science process skills test obtained were then carried out by N-gain analysis to find out the increase in science process skills. The results of the N-gain analysis are presented in **Figure 2.**

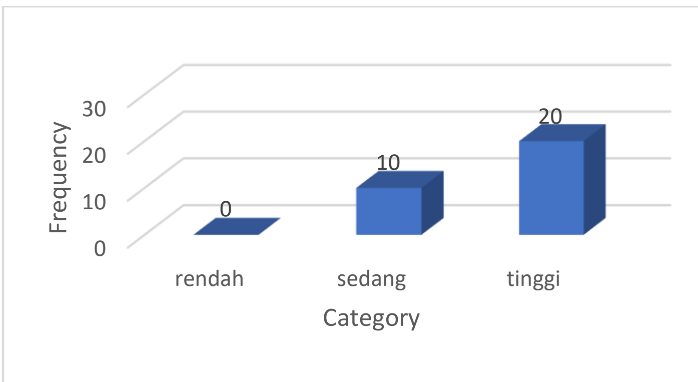

Figure 2. Students' N-gain Achievement

Figure 2 shows that the N-gain achievement of students is in the medium and high categories, where out of 30 students, 10 students are in the medium category and 20 students are in the high category and no students are in the low category.

One of the learning outcomes is a scientific process, sowe can say that in learning chemistry the ability to process science is emphasized to be able to gain a good understanding of chemistry. As revealed by Adnan (2008) process skills are intellectual skills and scientific attitudes possessed by students to find facts, build concepts, and theories. Furthermore, Yusmar et al. (2018) stated that science process skills are used to help students gain a more long-term understanding of material memory so that they are expected to be able to solve all kinds of problems in everyday life, especially in the face of global competition.

One of the benefitto application inquyri learning model is to provide students with a science process learning experience, where the steps of the inquiry learning model lead students to use science process skills. Aydin (2013) reveals that science process skills are thinking skills that are

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used to create knowledge, to reflect on problems and formulate results. This means that every student activity contained in the steps of the inquiry learning model fascinates and guiding students to act as scientists by applying the scientific method in order to find facts to build chemical concepts, principles and theories from their learning experiences.

The research results obtained in this study are in line with research conducted by Murningsih et al. (2016) that the application of the guided inquiry learning model can improve students' scientific attitudes on the subject matter of solubility and solubility product in Class XI MIPA 3 SMA Negeri 5 Surakarta. Hadi & Rasmawan (2016) that students' scientific work skills before and after learning with the inquiry model have increased in the highly skilled and skilled category. Sunetri (2021) that the use of an inquiry learning model can increase the learning activities of class XI MIPA 4 students at SMA Negeri 2 Mengwi. Dijaya et al. (2018) that student activity in the application of guided inquiry learning to the concept of electrolyte and non-electrolyte solutions has increased.

The application of the inquiry learning model in improving science process skills is evidenced from the results of research on class XI students of SMA Negeri 1 West Seram. Based on an analysis of the results of the pretest and posttest of class XI students of SMA Negeri 1 West Seram, the increase in score calculated based on the results of the average score of students before learning was 26.29, then it increased after learning using the ethnoscience based inquiry method with an average value of average 80.50. Then the normalized gain test was carried out with an average N-gain result is 0.74. The average N-gain value indicates that there is an increase in students' science process skills in the high category. Thus the results of the study show that the inquiry learning model used in learning is able to improve students' science process skills.

CONCLUSION

Based on the results of the study, it was concluded that the application of the ethnoscience-based inquiry learning model improved students' science process skills with an increase score calculated based on the results of the average score before learning was 26.29 then increased after learning with an average value of 80.50. The average value of N-gain is 0.74 which indicates that there is an increase in students' science process skills in the high category.

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