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The Effect of Guided Inquiry Model with Vee Diagrams to Students Scientific Literacy In The Junior High School 1 Pesawaran

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ABSTRACT

This study aims to determine the effect of the Guided Inquiry model with Vee Diagrams on students' scientific literacy abilities. The design in this study is the design of a pretest-posttest-equivalent control group. The research sample is 64 students that are selected through the Purposive Sampling technique. The instrument test used included the validity test with a significant level > 0.05, the reliability test with the level (a = 0.91), the level of difficult test with the level (0.31-0.70), and the different power test with a level (0,41-0.70). The average data of pretest, posttest, and N-Gain as a result of scientific literacy ability were analyzed by Independent Sample t-test with SPSS 18.0. The research results obtained the average value of N-Gain scientific literacy of students in the experimental class of (0.44 ± 0.14) (Medium) and control class (0.24 ± 0.12) (Low). The average results of the Vee Diagram component are 74.40% (Good). The results of the questionnaire responses of students have an average of 86.5% (Very Good). This research hypothesis test shows that there is a significant influence of the Guided Inquiry model with Vee Diagrams on the scientific literacy ability of students as evidenced by the value of Sig 0,000 < 0.05.

Keywords
Guided Inquiry, Vee Diagram, Literacy.

Introduction

By increasing the quality of education in Indonesia, it can improve the quality of human resources in Indonesia. Facing the 21st-century opposition, education must continue to develop dynamically and be able to organize competency-based education. In the 21st-century learning can be made as a 21st generation preparation facility. Where the learning process is demanded based on technology in order to be able to balance with technological and communication advances (TCA) that is developing rapidly, it is hoped that students can learn with 21st-century life skills. In line with this assistance Greenstein (2012) as cited in Surgiyarti (2018: 440) states that participant students who live in the 21st-century must master in science, have metacognitive skills, be able to think critically and creatively, and be able to communicate or collaborate effectively, but education situation right now has not reflected the expected education in the 21st century. Therefore, the government designs thee 21st century learning through a 2013 curriculum that is based on students.

The Ministry of Education and Culture has also launched a major program that is the School Literacy Movement as the efforts of the government to create education quality by enhancing literacy culture (reading and writing). The government has realized the importance of developing the character of students through a policy of reading for 15 minutes before the lesson starts (Surangga, 2016, p. 158). With Literacy can involve a the learning continuum in enabling individuals achieve their goals, can develop knowledge, potential, and so that individuals can participate fully in their environment and society at large (Rizqiani, D.A. 2017, p.27).

Science education is responsible for the scientific literacy of students, therefore the quality of science learning needs to be improved in order to achieve the level of sustainable development Nyoman (2015). One of the main keys to face the challenges of the 21st century is to apply scientific literacy UNEP (2012). Scientific literature covers certain key concepts that exist in science, and how science relates to mathematics, technology, and other human endeavours, scientific literature also encompasses understanding of the nature of

science, and inquiry skills such as designing experiments, collecting and analyzing data, and draw valid conclusions from the evidence (Ogunqola, B. 2013, p.266).

According to the Ministry of Education and Culture, the results of the National Examination (NE) in 2019 all around Indonesia have an average score on the natural science exam is 48.79. In Lampung, the average score of the National Examination (NE) is 47.3, and in Pesawaran District, the National Examination (NE) score is 40.73, while the competency standard set is 55. The results show that the value still below the average competency standard that has been set. Therefore the national education system, concepts and mindset of science education must be greatly improved.

Based on the result of PISA data in the year of 2018, Indonesia was ranked in sixth place from the bottom with the average science score of 396, meanwhile the average science PISA of OECD countries is 489 (Kemendikbud. 2019). One of the factors regarding the low ability of science literacy of students in Indonesia was caused by science teachers didn't fully understand well about the learning that can lead to the formation of science literacy, that one of which is the use of the teacher-centered lecture method, which causes students to be passive in learning.

The poor scientific literacy skills of Indonesian students are due to several things, that are learning that is centered on educators, the low positive attitude of students in learning science, there are several basic competencies that students do not like regarding content, processes, and Artarti contexts (2013) in Dwi ., et al., (2016, p.303).

Learning science as part of education, generally has an important role in improving the quality of education, especially in producing quality science students not only as mastery of a collection of knowledge in the form of facts, concepts or principles. only, but also a process of discovery (Astuti, 2009). Students who gain an understanding of science by memorizing tend to view science as a piece of science, they do not see the big picture of the learning unit (Disessa, 1988) these students do not accept a new concept into the concepts they already have into their long-term memory (Novak, 1993), and there are frequent misconceptions about the concepts and principles of science. Besides conceptual problems in science. The problem of tools used in the educational process must be considered, as proposed by Gabel 1987, students can produce correct answers to various types of problems, but in fact their understanding of the basic concepts of science is still low. In Gusri's research (2019) concluded that science learning still tends to be centered on educators explaining material and giving concepts to students, therefore in the science learning process at school does not explore scientific phenomena in the surrounding environment. Various empirical findings that have been presented indicate that science learning still tends to involve students a little, resulting in low understanding results in science learning. With this, there is an improvement in science learning.

Vee diagrams can be applied in the learning process by applying them to the learning model. The learning model has a strong relationship with learning objectives. This correlation can be seen from the description of the behavior and competencies that students must have during and after the learning process in a way that must be taken to achieve these goals. In addition, the learning model is considered to have an important role in improving scientific literacy skills, so that learning is needed that involves more students, adds to the concept of knowledge and is able to practice the process skills in it

From the facts and problems that have been described, and given the novelty of this research, the use of Vee Diagrams in the Guided Inquriy model can improve students' scientific literacy skills. So in this study the researcher aims to prove the effect of the learning model that is considered capable of improving students' scientific literacy skills by using the Guided Inquiry learning model with Vee Diagrams

Literature Review

Inquiry came from the word "to inquire" which means to participate or involved, in asking questions, finding information, or doing investigations (Suryandari, 2016, p.86). Inquiry is learning to include the application of knowledge to students, not only using the fact-keeping method but must include the application of knowledge Towndrow and Ling (2008) in Budhi (2018, p.109) Guided inquiry learning can direct

students to obtain information from observations that aim to solve or find answers to surrounding problems by using logical and critical thinking skills (Joyce & Weil, 2011).

The Vee Diagram was first proposed by Novak and Gowin (1984). It is called the Vee Diagram because it is in the shape of the letter "V". Vee Diagram is a tool that can be used to help solve problems or understand a procedure (Novak and Gowin, 1984). Vee diagrams were developed as a way to help students understand meaningful relationships between events, processes, or objects. It is a tool that helps one observe the interaction between what is known and what needs to be known or understood. With the Vee Diagram, it can link the development or discovery of knowledge from procedural activities carried out in the learning process and theoretical concepts and ideas that lead to scientific inquiry (Passmore. 1998)

Scientific literacy is the knowledge and scientific skills that a person has to identify questions, acquire new knowledge, explain scientific phenomena, and draw conclusions based on facts, understand the characteristics of science, awareness of how science and technology shape the natural, intellectual and cultural environment, and the willingness to be involved, and care about science-related issues (OECD. 2016).

Methods

This research was conducted to analyze the scientific literacy ability of VII grade at Junior High School 1 Pesawaran. This study's aims are to determine the influence of the Guided Inquiry model with Vee Diagrams on students scientific literacy abilities. The sample of this study was 64 students that consist of two classes, VII A and VII B. Class VIII B as an experimental class that was treated using a Guided Inquiry learning model with Vee diagrams. While for class VII A as a control class was treated using learning with discussion methods. Samples were taken from the population using the purposive sampling technique.

Analyzing of Data

This study uses a research quasi-experimental design with a control group pretest-posttest Non-equivalent. Where for the control group non-equivalent design, two groups have been chosen as research subjects, the first group has received a treatment in the form of Guided Inquiry Learning models with Vee diagram while the other group become a control group or a comparison group(non-equivalent).With each group given a pretest and a posttest with different treatments.

Before collecting data from the class that will be studied, the researcher will conduct an Instrument test. The purpose of conducting the trial is to obtain information about the quality of the instruments that have or have not met the requirements used. The instrument test used included the validity test with a significant level > 0.05, the reliability test with the level (a = 0.91), the difficulty level test with the level (0.31-0.70), and the difference power test with a level (0,41-0.70).

To see the increase in the aspects of students' scientific literacy. Then the results of the data were analyzed using a gain score, with the prerequisite test for normality, homogeneity, and hypothesis testing with the Independent sample t-test.

Result

The analysis results of students' scientific literacy skill in experimental and control class data are in the form of pretest, posttest, and N-Gain. The final data analysis comes from pre-test and post-test data that are generated from a multiple-choice test with twenty questions in it.

Table 1. Statistical test results for pretest, posttest, and N-Gain

Value	Value	$\bar{X}$ ± Sd	Normality Test	Homogeneity Test	Independent Test Sample t-test
Pretest	Experiment	54,14± 4.56	Sig. 0,121> 0,05	Sig. 0,916> 0,05	Sig.(2-tailed) 0.000 < 0,005
	Control	48,00± 4.96	Sig. 0,213 > 0,05		
Posttest	Experiment	74.84± 6,17	Sig. 0,09> 0,05	Sig. 0,97> 0,05	
	Control	61,05± 5,65	Sig. 0,213> 0,05		
N-Gain	Experiment	0,44± 0,14 (Medium)	Sig. 0,67> 0,05	Sig. 0,67> 0,05	
	Control	0,24± 0,12 (Low)	Sig. 0,67> 0,05		

Based on Table 1, it can be seen that the results of the independent sample t-test show that the sig. (2-*tailed*) 0,00 < 0,05 H_1 is accepted, and H_0 is rejected, from that result, it could be figured that there's a significant increase in students' scientific literacy skill between the experimental class along with control class. Also generated is the result of students' scientific literacy skill N-Gain in experimental class which is (0,44± 0,14) with the medium criteria and control class which is (0,24± 0,12) with the low criteria, so the decision obtained is to accept H1 which means that the average N-gain of the experimental class is higher than the average N-gain of the control class.

The increase in students' scientific literacy skills in the experimental class is caused by the Guided Inquiry model with the Vee Diagram. The Guided Inquiry model makes students as a learning center where an educator guides students to plan and make an investigation procedure to draw conclusions. Thus, in the learning process, students understand the steps that must be taken to solve a problem and be able to explain or justify a way to solve science problems. This is in line with (Puspitasari's, 2015, p.3).

The Guided Inquiry model is suitable for improving the literacy skills of students, where students can understand the influence of science and its implications for life. Because in the process of learning students are involved in research or experimentation using various sources of learning that can stimulate the ability of scientific literacy of students starting from the ability to identify phenomena, analyze phenomena, to draw conclusions from the phenomena found.

The application of Vee Diagrams in this study could help students in meaningful learning which cannot be separated from solving a problem where with the Vee Diagrams, students can represent the theory of constructivism in the acquisition of knowledge at the end of learning on the subject matter of environmental pollution.

Furthermore, the existence of Vee diagrams can determine the extent to which students understand the materials that they have taught. This is in line with research conducted by (Hapsari, 2012, p.24). Meaningful learning in this research occurs during the process of drawing conclusions using the Vee Diagram technique. Meaningful learning can be seen when the information received by students is able to communicate it in the form of findings, in addition to being able to communicate, students are also able to connect the information received during the learning process with their knowledge (in the form of concepts) that they already have. Students will connect new concepts obtained during the learning process with the cognitive structure that they have at the time of making the Vee Diagram. This is also in line with the opinion of Ling, Chua Yee., et.al (2019) that the Vee diagram serves as a knowledge guide about a meaningful relationship between the situation or object with shows what is known and what needs to be known or understood.

Table 2. Recapitulation of the Average N-Gain Saintific

Category	Experiment	Control
KI	0.39 (Medium)	0.24 (Low)
K2	0.33 (Medium)	0.18 (Low)
K3	0.41 (Medium)	0.26 (Low)
K4	0.44 (Medium)	0.25 (Low)
Average	0,39 (Medium)	0,23 (Low)

Table 3. Recapitulation of the Average N-Gain Saintific

Category	Experiment	Control
P1	0.44 (Medium)	0.23 (Low)
P2	0.49 (Medium)	0.27 (Low)
P3	0.49 (Medium)	0.15 (Low)
Average	0,47 (Medium)	0,21 (Low)

Based on table 2 and 3, the average N-gain of scientific literacy in the aspect of content in the experimental class is higher than in the control class. The average in the experimental class is (0.39) with "Medium" criteria, while the average in the control class is
(0.23) with the "Low" criteria. And the average N-gain of scientific literacy in the aspects of the process in the experimental class has an average (0.46) with "Medium" criteria, whereas in the control class has an average (0.21) with a "Low" criterion.

The achievement of scientific literacy in the aspects of content in table 2 is due to the moment when learning students use LKPD that adjusts to scientific literacy and pretest-posttest questions in a content in the form of discourse taken from everyday life so that trained students can identify scientific problems, namely, students can answer questions based on the discourse provided, classify things contained in the material based on literature, understand natural phenomena based on concepts that have been received, and identify keywords for scientific information needed to solve problems in the questions that have been given. This is in line with (Hapsari, 2012, p.17-25). Learning with the Guided Inquiry model combined with diagram V (Vee) actively involves students and also emphasizes science process skills.

The lack of scientific literacy in the aspects of the process in table 3 is due to the development of students' thinking abilities in the case of analytical thinking. Students of experimental class through the implementation of scientific-literacy-based Guided Inquiry learning model are trained to think analytically in solving a problem in every meeting on the subject regarding environmental pollution starting from some scientific problems, and followed by formulating temporary answers and investigating process to solve the problems through literature and laboratory activities, then, the understanding gained from the solving process of the problem will be used to make a decision in daily life. Vee diagram also has the role in the achievement of scientific-literacy indicators on the second process aspect, which is students can build their knowledge structure more by connecting concepts that they already had with new concepts that they get during the learning process. This is in line with the opinion of Polancos (2012) which states that vee diagrams can help students develop their knowledge with their learning concepts and strategies. Vee diagrams can also stimulate students to build relationships or links from the concepts being learned.

Table 4. Students Vee Diagram Ability

Vee Diagram	Average of Vee Diagram Components				
	Focus Question	Object	Theory	Transformation	Claim
	88,23	79,40	62,13	71,69	70,58

Students Vee Diagram Ability shows that the average at table 4 of all Vee Diagram components is 74,40%. The highest average value of Vee Diagram components appeared in focus question component with the average of 88,23%, meanwhile the lowest value of Vee diagram

components appeared in theory or concept component with the average of 62,12%. This shows that students are capable enough to create and direct their knowledge that's poured into Vee Diagram. It also shows that Vee Diagram is useful in the scaffolding process of students' thinking or reasoning to illustrate their understanding of the relationship between theories, and the application in problem-solving.

The use of Guided Inquiry model combined with Vee diagram has proven to be able to increase the scientific literacy of the students. According to Gowin&Alvares (2005), Vee Diagram is capable of helping the students to get the concept in the learning. This is because someone's knowledge structure in a scientific discipline is characterized by questions that become the focus of study, key-concept, and conceptual system construction. The understanding of the students regarding the production of knowledge claim will be reflected in the eonstruction of diagram V. Diagram v help students to connect concepts by acting as a metacognitive tool (Polancos. 2012, p.25).

In implementing using Vee Diagrams, not all students are able to understand the concepts how to use Vee Diagrams. That's way there are still some students who use wrong concepts when they apply for Vee Diagram. That's because of Vee Diagram is a learning strategy that they're just getting to know and students experienced of making a change in the form of normal learning toward Vee Diagram's application.

To solve this problem, what researchers do is guide and provide examples factual and procedural at the time of making the Vee Diagram because conceptual material sometimes doesn't can be immediately understood by students. Educate. This is in line with Kirschener.2006, p.76 opinion which states that with the guidance of an educator during the learning process it can lead students to improve learning outcomes and and provide opportunities for students to solve a problem they face by building solutions from their learning experiences. So that educators need to provide guidance because basically the abilities of students are not the same, by accepting a learning strategy using this Vee Diagram it motivates learning to increase and in turn can improve student learning outcomes.

Table 5. Questionnaire Responses of Student

No	Indicators	Class Experiment	
		Percentage	Category
1	Shows the interest in science learning with Guided Inquiry learning model.	86,75	Very good
2	Shows the usefulness of following science learning with Guided Inquiry model with Vee Diagram.	83,3	Very good
3	Shows the ability in following science learning with Guided Inquiry model.	89,5	Very good
AVERAGE		86,5	Very good

Based on the results of student questionnaire data analysis of Guided Inquiry model with Vee Diagram at table 5. the value indicator that obtained the highest value is the ability to follow science learning with Guided inquiry model with the percentage of 89,5. Based on the calculation

result of the average percentage of students questionnaire responses obtained 86,5 with the very of of good criteria.

The results of students responses on the experimental class show that learning using Guided Inquiry model with Vee Diagram in the environmental pollution subject that has been implemented by other researcher has been effective and get positive responses from the students that show very good criteria in the experimental class. This can be proven that in the learning process of experimental class, the students were very enthusiast during the learning, for example when the teacher asked the students were very enthusiast to answer, all students did experiments in accordance with the given LKPD. The students also have full enthusiast to recite their conceptions in the term of writing the focus question, writing theory and principles, writing focus question concept list, writing the phenomenon and object, writing notes, writing data and transformation, writing knowledge claim and value claim into Vee Diagram charts, and students felt happy and challenged when being given interesting problems and related to their environment.

Conclusion

Based on the research results it can be concluded that that Guided Inquiry model with Vee Diagram affects significantly on the literacy ability of 8th-grade students in Junior High School 1 Pesawaran in science learning

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