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The Influence of the Guided Inquiry Learning Model on the Material of Work and Energy on Science Process Skills at MTsS Balimbing

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ABSTRACT

The purpose of this study was to see the effect of guided inquiry learning model on students' science process skills on work and energy. The type of research is Quasi Experimental research and the research design used is Posttest Only Control Group Design. The sample consists of 2 classes, the experimental class is class VIII 1 and the control class is class VIII 2 consisting of 37 students. The sampling technique used is simple random sampling. The instrument used in the study was a final test of 20 questions. The results of the science process skills data analysis showed an average score of science process skills test of 70.43%, while students in the control class obtained an average score of science process skills test of 60.53%. The results of the data test were analyzed using the t-test formula, which showed that t (count) > t (table) was 2.98 > 2.02. This shows that the use of guided inquiry learning model on work and energy material has an effect on the science process skills of class VIII students at MTsS Balimbing.

ABSTRAK

Tujuan penelitian ini adalah untuk melihat pengaruh model pembelajaran inkuiri terbimbing terhadap keterampilan proses sains siswa pada materi usaha dan energi. Jenis penelitian yang digunakan adalah penelitian Quasi Eksperimental dan desain penelitian yang digunakan adalah Posttest Only Control Group Design. Sampel terdiri dari 2 kelas, kelas eksperimen adalah kelas VIII 1 dan kelas kontrol adalah kelas VIII 2 yang terdiri dari 37 siswa. Teknik pengambilan sampel yang digunakan adalah simple random sampling. Instrumen yang digunakan dalam penelitian adalah tes akhir sebanyak 20 soal. Hasil analisis data keterampilan proses sains menunjukkan skor rata-rata tes keterampilan proses sains sebesar 70,43%, sedangkan siswa pada kelas kontrol memperoleh skor rata-rata tes keterampilan proses sains sebesar 60,53%. Hasil uji data dianalisis dengan menggunakan rumus uji-t, yang menunjukkan bahwa t (hitung) > t

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(tabel) yaitu 2,98 > 2,02. Hal ini menunjukkan bahwa penggunaan model pembelajaran inkuiri terbimbing pada materi usaha dan energi berpengaruh terhadap keterampilan proses sains siswa kelas VIII di MTsS Balimbing.

A. Introduction

Physics is a branch of natural science. Physics is a science that investigates natural phenomena in life. Investigation of natural phenomena is obtained through research. According to Trianto, physics is a science that studies how nature functions through various scientific processes whose results consist of concepts, principles, and general theories[1]. Several concepts are needed in learning physics to obtain good learning, namely physics as a product, process, and attitude. This physics product is a discovery result consisting of rules, laws, facts, and principles of physics, and is obtained through a process known as the scientific process. Observing, classifying, measuring, asking questions, formulating hypotheses, planning investigations, and interpreting information are some of the science process skills that can be learned in physics. These concepts are used to build science process abilities[2].

Science process skills are scientific skills used to discover a concept, principle, or theory, and to develop existing concepts[3]. According to Amalia et.al [4], science process skills are crucial for students because they encourage them to participate more actively in learning and develop a sense of responsibility for what they learn. These skills can also help them think and behave like scientists. Abungu, et.al [5] also explain that students need science process skills to solve scientific problems related to real-life events and the learning process.

Science process skills must be learned through hands-on experience with various materials and physical actions. According to Jack [6], developing science process skills helps students understand material more easily and retain it for the long term. Thus, students are expected to be able to solve various problems in everyday life, especially in global competition. Kadarwati & Ibadullah [7] stated that acquiring science process skills can help improve the attitudes and intellectual skills needed to better understand concepts.

From the three aspects above, physics learning can be achieved through teacher creativity in learning by using models that match the characteristics of the material being presented. A learning model is a framework of ideas that explains a systematic way to create learning experiences to achieve specific learning objectives. This framework also serves as a guideline for learning designers and teachers in planning and implementing learning activities [8]. According to Ongowo & Indoshi [9], a learning model is a design used as a guide in planning learning in the classroom or learning in tutorials. One learning model that can improve science process skills is the guided inquiry learning model.

Ongowo & Indoshi [9] stated that the inquiry learning model is a discovery-based learning approach that can be used to improve science process skills. The inquiry model is a student-focused teaching model that encourages students to investigate problems and find information. By asking questions and finding answers based on their own curiosity, the inquiry model can help students improve critical thinking skills and intellectual discipline. According to Purba et al. [10], the inquiry learning model is a learning model that fosters higher-order thinking. The inquiry learning model is a learning model that provides opportunities for students to think critically and analyze a number of facts or precise definitions of problems through their own discovery process.

To create creative, active students who can think logically and are skilled at conducting experiments, teacher guidance is needed. Through guidance and direction, students can understand what needs to be done. Over time, students are able to find out for themselves about the problems they face. As a result, the guided inquiry model is suitable for encouraging students to investigate problems with teacher assistance and find information on their own, so they can find learning ideas.

However, the reality that occurs in learning is that students usually only receive material from the teacher, resulting in a lack of student activity in responding to learning. Students only become listeners while the teacher is still the main actor in learning. This situation is in accordance with observations and the distribution of questionnaires that have been carried out at an MTsS in Balimbing to students and science teachers of grade VIII. The information obtained shows that teachers have used the inquiry learning model during the learning process, but students have not been able to actively participate in the learning process to discover the concepts and principles of the material being studied by themselves with teacher guidance.

According to a questionnaire distributed to students, 75% of students stated that the learning materials used did not enable them to learn independently. Furthermore, students' ability in science process skills was categorized as very low, at 12.5%. The indicators for science process skills include observing, classifying, interpreting, predicting, asking questions, forming hypotheses, planning experiments, using tools and materials, applying concepts, and communicating.

From the results of the observations and research above, it is clear that students' initial understanding of the basic concepts of science that have actually been taught is weak, so they are unable to reason well, and students' understanding is weak in applying the concepts. The lack of activity and creativity of students during learning results in students not being able to conduct experiments and observations.

Based on these facts, a study was conducted with the title The Influence of the Guided Inquiry Model on Work and Energy Material on Science Process Skills at MTsS Balimbing.

B. Research Methods

This study will use a quasi-experimental or quasi-experimental research type and use quantitative methods. The quasi-experimental design method is a method used to examine the effects of specific actions under controlled conditions [11]. By using a posttest-only control group design involving two classes, namely the experimental class and the control class. The experimental class is the class that applies learning with the application of the guided inquiry model, while the control class is the class that applies conventional learning. In both classes, a posttest will be conducted after students are given treatment to see the effect of the guided inquiry model on students' science process skills after learning.

The research presented is a final test of students' science process skills that looks at the application of the guided inquiry learning model in science learning. Researchers took samples before conducting the research by means of simple random sampling. The simple random sampling technique is a sample member is randomly selected from the population without looking at the population strata [12]. Where researchers collected students' daily test scores and conducted a normality test, after the normality test and obtained the results that both classes were normally distributed. Then the next stage was a homogeneity test, a homogeneity test was used to see whether the class was homogeneous or not. After the homogeneity test and both classes were homogeneous, then lotting was carried out to select the control class and the experimental class. In this study, it was found that the experimental class was in class VIII 1 and the control class was in class VIII 2.

The instruments used in this study were teaching modules and final test questions. The teaching modules consisted of an experimental class module and a control class module, differing in the learning model used. The final test questions focused on science process skills indicators, namely observing, classifying, predicting, interpreting, and applying concepts. The instruments were validated by two physics lecturers and two science teachers before use.

The test questions are in the form of objective questions (multiple choices) consisting of five indicators of students' science process skills, namely: observing, classifying, interpreting, predicting, and applying concepts. Before being distributed, the test questions were empirically tested to measure the level of discrimination, the level of difficulty, and the reliability of the questions. The results of the trial stated that the discrimination power was good, the level of difficulty was moderate, and the reliability was 0.72, which is included in the high category.

C. Results and Discussion

A total of 37 students took the test: 18 from the experimental class and 19 from the control class. To determine science process skills, a final test was administered, with questions containing indicators of science process skills, including observation, classification, interpretation, prediction, and application of concepts.

The research was conducted in 3 meetings. In the first meeting, students learned about work and its application in everyday life. Then, students were divided into 5 groups to discuss and create student discussion sheets that had been given. In the second meeting, students learned about energy and its application in everyday life. In this second meeting, students made a simple energy conversion tool, namely a water wheel. In the third meeting, students learned about kinetic energy and potential energy. In this meeting, students discussed and carried out practical work on potential energy with simple tools. In the next meeting, students worked on test questions to measure science process skills.

Based on the posttest conducted by the experimental class treated with the guided inquiry learning model and the control class treated with the conventional learning model, the results of students' science process skills were obtained as in Table 1.

Table 1 The results of the percentage of the posttest scores of the science process skills (SPS) of the experimental class and the control class

SPS Aspects	Control Class		Experiment Class	
	Percentage	Category	Percentage	Category
Observation	89.47	High	90.74	High
Clarification	78.95	High	86.11	High
Intepretation	39.47	Low	58.33	Middle
Prediction	36.84	Low	52.78	Middle
Implementation	57.89	Middle	64.20	Middle
Concep				
Average	60.53	Middle	70.43	Middle

Based on Table 1, the results of the posttest scores for science process skills of students in the experimental and control classes show a difference. Students in the experimental class achieved an average of 70.43%, while students in the control class achieved an average of 60.53%.

Several factors contribute to better science learning outcomes for students using the guided inquiry learning model, which focuses on science process skills, compared to those achieved through conventional learning. First, the implementation of the guided inquiry learning model facilitates students' understanding of the subject matter, which in turn improves student learning. This can be seen in the learning steps, where the teacher asks students to identify problems around them and allows them to solve them with guidance from the teacher. Students also engage in practical work, which fosters creativity in constructing tools and understanding how a problem can arise. This allows students to understand the learning process through the activities they undertake.

From the results of the data on the science process skills of class VIII students at MTsS Balimbing, as shown by the test results, they are included in the moderate

category. The KPS indicators in sequence from the indicators with the highest percentage in this study are the observation, classifying, applying concepts, interpretation and prediction indicators. Based on the results of data processing that have been carried out using t-test statistics, t_count > t_table is 2.98 > 2.02. By using the guided inquiry learning model, it can be concluded that the science process skills of class VIII students at MTsS Balimbing are influential.

The results of this study are in line with previous research conducted by Susanti [13] which stated that students' science process skills on the material on reaction rates guiding inquiry learning were accepted. The guided inquiry learning model is designed to develop intellectual thinking skills in students, so that they are expected to actively participate in the learning process. [14]. Guided inquiry is also an efficient and engaging learning model for students to improve their scientific literacy [15].

Based on this, the treatment of this learning model has shown a significant effect, where the class group that implemented the guided inquiry learning model obtained higher results when compared to the class group that implemented the conventional model. This statement is based on the results of the difference in the average final test scores of the experimental class and the control class. It is understood that this guided inquiry learning model influences students' science process skills.

D. Conclusion

Based on the results of the research conducted with the title of the influence of guided inquiry learning model on science process skills in science learning, it can be concluded with the results of the t test which shows that t_(count)> t_(table) where t_(count) is 2.98> from t_(table) 2.02. So H1 is accepted and Ho is rejected, where the use of guided inquiry learning model has an effect on science process skills at MTsS Balimbing.

References

[1] Trianto, *Mendesain Model Pembelajaran Inovatif-Progresif*. Jakarta: Kencana, 2010.

[2] M. Eka, "Hakikat Fisika dan Keterampilan Proses Sains," *J. Filsafat Indones.*, vol. 3, no. 3, pp. 72–80, 2020.

[3] D. Darmaji, D. A. Kurniawan, H. Parasdila, and I. Irdianti, "Deskripsi Keterampilan Proses Sains Mahasiswa pada Materi Termodinamika," *Berk. Ilm. Pendidik. Fis.*, vol. 6, no. 3, pp. 345–353, 2018, doi: 10.20527/bipf.v6i3.5290.

[4] Y. F. Amalia, Z. Zainuddin, and M. Misbah, "Pengembangan Bahan Ajar IPA Fisika Berorientasi Keterampilan Generik Sains Menggunakan Model Pembelajaran Inkuiri Terbimbing DI SMP Negeri 13 Banjarmasin," *Berk. Ilm. Pendidik. Fis.*, vol. 4, no. 3, pp. 183–191, 2016, doi: 10.20527/bipf.v4i3.1005.

[5] H. E. Abungu, M. I. O. Okere, and S. W. Wachanga, "The Effect of Science Process Skills Teaching Approach on Secondary School Students' Achievement in Chemistry in Nyando District, Kenya," *J. Educ. Soc. Res.*, vol. 4, no. 6, pp. 359–372, 2014, doi: 10.5901/jesr.2014.v4n6p359.

[6] G. U. Jack, "The Influence of Identified Student and School Variables on Students ' Science Process Skills Acquisition," *J. Educ. Pract.*, vol. 4, no. 5, pp. 16–23, 2013.
[7] A. Kadarwati and I. Malawi, *Pembelajaran Tematik (Konsep dan Aplikasi)*. Magetan: AE Media Grafika, 2017.
[8] Trianto and F. Yustianti, *Model Pembelajaran Terpadu: Konsep, Strategi dan Implementasinya dalam Kurikulum Tingkat Satuan Pendidikan (KTSP)*. Jakarta: Bumi Aksara, 2013.
[9] R. O. Ongowo and F. C. Indoshi, "Science Process Skills in the Kenya Certificate of Secondary Education Biology Practical Examinations," *Creat. Educ.*, vol. 04, no. 11, pp. 713–717, 2013, doi: 10.4236/ce.2013.411101.
[10] A. Purba *et al.*, *Strategi Pembelajaran (Suatu Pengantar)*. Medan: Yayasan Kita Menulis, 2022.
[11] Sugiyono, *Metode penelitian pendidikan*. Bandung: Alfabeta, 2011.
[12] Sugiyono, *Metode Penelitian Pendidikan*. Bandung: Alfabeta, 2019.
[13] W. Susanti, "Pengaruh Model Pembelajaran Inkuiri Terbimbing terhadap Keterampilan Proses Sains Siswa pada Materi Laju Reaksi (Kuasi Eksperimen di SMA Negeri 4 Kabupaten Tangerang)," UIN Syarif Hidayatullah Jakarta, 2014.
[14] S. Hidayatullah and R. Wulan, "Meta-analysis of the influence of 21st century high school students' skills in learning physics using a guided inquiry model," *J. Phys. Conf. Ser.*, vol. 2309, no. 1, p. 12057, 2022, doi: 10.1088/1742-6596/2309/1/012057.
[15] I. A. P. N. Warmadewi, "Penerapan Model Pembelajaran Inkuiri Terbimbing Berbasis Literasi Sains Dalam Pembelajaran IPA," *J. Pendidik. MIPA*, vol. 12, no. 2, pp. 325–331, 2022, doi: 10.37630/jpm.v12i2.600.