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SCIENCE LITERACY AND LEARNING OUTCOMES IN CELL MATERIAL: *GUIDED INQUIRY* IN CLASS XI SMA STUDENTS

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Abstract
21st century learning requires students to have science literacy skills and learning outcomes. Learning that is still conventional and has not led to the empowerment of science literacy skills and learning outcomes results in students not being active in the learning process. This condition is reinforced by the fact that when the teacher poses problems, some students are still passive in expressing their ideas and arguments. One of the learning models that is considered to develop science literacy skills and learning outcomes is the guided inquiry learning model. This study aims to determine the effect of guided inquiry learning model on science literacy skills and learning outcomes of grade XI high school students. This type of research is a quasi experiment with Pretest-Posttest Control Group Design. Instruments used to measure science literacy and cognitive learning outcomes in the form of essay tests, while affective learning outcomes using questionnaires and psychomotor learning outcomes of students using observation sheets. Data analysis techniques for science literacy and cognitive learning outcomes used ANOVA test while affective and psychomotor learning outcomes used descriptive analysis. The results showed that the guided inquiry learning model had a positive and significant effect on science literacy and student learning outcomes in terms of cognitive, affective, and psychomotor aspects.

Keywords: Inquiry Learning, Scientific Literacy, Learning Outcomes

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1. INTRODUCTION

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The success of student skills learning is contained in the 21st century education profile which includes knowledge, skills, and behavior as well as the process of measuring learning outcomes (Rayinda, 2019). 21st century learning requires each individual to have the ability to think critically, master information technology, and literacy skills in digital media including science literacy. The development of education in the 21st century also includes developments in information and communication technology which have an impact on various aspects of life, one of which is related to the educational aspect, namely science learning in high school (Wiyono, 2013).

The aspect of science learning has a very important component, namely the fulfillment of science literacy skills and the acquisition of student learning outcomes at school (Suryani 2017). Based on the data found, the science literacy skills and learning outcomes of high school students in science learning in Indonesia in 2018 reached a score of 396 points, which ranked 70 th out of 78 countries. (Oecd, 2003). The cause of the low science literacy skills and learning outcomes of high school students is none other than the application of conventional learning methods and ignoring the importance of science reading and writing skills as competencies that must be possessed by science students in high school (Norriss & Pillips, 2003). In addition, the ability in science literacy of high school students should also be included in the aspect of learning outcomes, the improvement of student learning outcomes, of course, cannot be separated from the selection and application of appropriate and effective learning models which will certainly support the improvement of students' ability to understand science literacy (Fatimah, et al, 2023).

Based on the data from the observation at school, it is known that the method used in the learning process is considered less inteiractive. This is evidenced by the data obtained, namely only 21 out of 32 students whose scores meet the KKM or only 60% of the total students in one class. Some of the obstacles underlying the emergence of these problems are the number of practical tools that do not match the number of students, the lack of facilities in learning, and the learning process that is still teacher centered or does not prioritize the active role of students in the learning process.

The low science literacy ability and science learning outcomes of students in high school certainly need to be improved, especially by building the concept of problem

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solving independently by students. The teacher acts as a facilitator who provides a stimulus related to the submission of problems according to the material and asks students to find solutions (Lestari et al, 2019). The teacher's job is to optimize the learning process and monitor students' abilities periodically to see students' balance effectively in order to improve their learning outcomes (Morwoto, 2009). The right learning model can be used as the right solution to improve science skills, train the ability to think critically and analytically, and to facilitate students in searching and finding answers to natural problems (Sanjaya, 2007).

Alternative solution that can be offered is that teachers must be more selective in applying effective learning models, one of which is the guided inquiry learning model. Guided inquiry is an inquiry-based learning model that is effectively used to improve science literacy skills and learning outcomes of high school students is guided inquiry (Fatimah, et al., 2023). Guided inquiry is a learning model that emphasizes the critical and analytical thinking process to seek and find answers to a problem (Sanjaya, 2007). The application of this learning model is considered important and is expected to create meaningful learning. Therefore, research on the application of this guided inquiry learning model needs to be done to improve the ability of science literacy and learning outcomes of biology class XI students in high school.

2. LITERATURE REVIEW

In this section researchers present some of the apparatus relevant to the research

3. METHODS (12PT)

This research utilizes a quantitative research approach. This type of research is a quasy eikspeiriimeint with Preiteist-Postteist Control Group Design. The research utilized two tests, namely the experimental and control tests. The research design can be seen in Table 1.

Table 1. Research Design

Design subject	**Pretest**	**Treatment**	**Posttest**
Experimental	P_1	X_1	P_2

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Control	P_2	X_2	P_2

Description:

P1: Preiteist on science literacy and learning outcomes.

P2: Post-test of science literacy and learning outcomes

X1: Inquisitive teaching and learning process

X2: Using the conventional method of lectures and assignments

This research was conducted in the odd semester of July - August 2023, located at SMAN 1 Kademangan. The study population was all students of class XI IPA SMAN 1 Kademangan. The research sample was 72 students with purposive sampling technique based on class equality test. In this research, test instruments were used to measure the variables of saiins literacy ability and cognitive learning outcomes in the form of essay tests, affective learning outcomes using questionnaires, and student psychomotor learning outcomes using observation sheets containing the syntax of guided inquiry learning models that will be carried out by teachers and students.

The instrument needs to be tested first before being used for data collection, which includes validity, reliability, difficulty level, and differentiation test. The data analysis technique used is to calculate how much influence the application of the guided inquiry learning model has using the ANOVA test complemented by the prerequisite analysis test in the form of normality and homogeneity tests. Descriptive test is used to calculate affective and psiikomotoriik learning outcomes. The criteria for hypothesis testing used as the basis for decision making are if sig. <0.005 then there is an influence, and if sig. > 0.005 then there is no effect of the treatment.

4. RESULTS

A. Science literacy

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Science literacy is a capacity that uses science knowledge to identify questions and draw conclusions based on observations and can make decisions in solving a problem. The test results of science literacy skills are seen from the pre-test and post-test results to see the initial and final knowledge of students on cell material. The experimental class pre-test results showed an average of 53.36, while the control class showed an average of 60.23. These results can be seen in Table 2

Table 2. Mean Results of Pretest and Posttest of Science Literacy of Control and Experiment Classes :

Class	Mean		Difference	Improvement (%)
	pretest	Posttest		
Experimental class	52,36	72,16	21,19	44,16
Control class	60,23	67,77	10,55	24,56

Source: SPSS Processed Results

In the experimental class, the treatment was established for 4 meetings using the guided inquiry learning model and the control class with direct learning. Based on table 1 above, the experimental class obtained an average post-test of 72.16, while the control class obtained an average of 67.77. Based on table 1 above, it is also obtained that learning in the experimental class can improve science literacy skills with a percentage of 44.16%, while in the control class can improve science literacy skills with a percentage of 24.56%. Based on these results, it can also be stated that the application of guided inquiry learning models to students' scientific literacy skills can provide a positive increase in learning outcomes. Discussion of the positive effect of the application of guided inquiry learning model on science literacy skills can be seen in Table 3.

Table 3. Hypothesis Test of the Effect of Guided Inquiry on Science Literacy

Uji Hipotesis Anacova Postest Literasi Sains					
Model	Sum of Squares	Df	Mean Square	F	Sig.

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eksperimen	Regression	1532.939	1	1532.939	16.080	.000[b]
	Residual	3241.366	34	95.334		
	Total	4774.306	35			

Source: SPSS Processed Results

Based on Table 3 above, it can be seen that the significance value in the experimental class is 0.00 <0.05, which shows that the application of the guided inquiry model has a significant effect on science literacy skills. The results of hypothesis testing in the experimental class above also show that there is an effect of guided inquiry learning on science literacy obtained by Fhitung of 16.080. The test results are supported by the results of research by Fanny, et al. (2023) that learning with the guided inquiry learning model students learn to solve problems independently and have critical thinking skills.

Other research results that also support the results of this study refer to the results of research by Tanjung (2023); and Tita Sonia (2023) which both state that the guided inquiry learning model is able to improve students' scientific literacy compared to using the lecture method. The application of guided inquiry in science literacy learning is also integrated. This is in line with Sanjaya's (2007) opinion that students' ability to express opinions, make predictions, and propose temporary answers to problems can appear and make students more active with the application of guided inquiry models. In addition, students' ability to propose temporary answers is not based on just any estimation but must have a solid foundation of thinking and be rational and logical.

B. Learning outcomes: in terms of cognitive, affective, and psychomotor abilities

Cognitive learning outcomes are the ability of students related to the knowledge of a meaningful experience in learning so that they are able to improve the knowledge of the

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previous knowledge. Affective learning outcomes are students' abilities related to attitudes and values that show concern for learning subjects, both in the form of discipline, having a high motivation, having high curiosity about a subject, and having respect for teachers and peers. Psychomotor learning outcomes are the ability of students related to skills or the ability to be able to act after a person receives the learning experience. Theoretically, the assessment of the psikomotor domain can be carried out through observation activities with an observation sheet. The test results of learning outcomes are seen from the pre-test and post-test results to see the students' initial and final knowledge related to cell material. The experimental class pre-test results showed an average of 46.38, while the control class showed an average of 59.02. These results can be seen in Table 4.

Table 4. Mean Results of Pretest and Posttest Learning Outcomes of Control and Experiment Classes :

Class	Average		Difference	Improvement
	Pretest	Posttest		
Experimental class	46,38	76,80	53,61	56,25
Control class	59,02	72,63	40,97	34,36

Source: SPSS Processed Results

In the experimental class, the treatment was given for 4 meetings using the guided inquiry learning model and the control class with direct learning. Based on Table 4 above, the experimental class obtained an average post-test with 76.80 while the control class obtained an average of 72.63. Based on table 1 above, it is also obtained that learning in the experimental class can improve science literacy skills with a percentage of 56.25%, while in the control class can improve science literacy skills with a percentage of 34.36%. Based on these results, it can also be stated that the application of the guided inquiry learning model to student learning outcomes can provide a positive and significant increase in results. Discussion of the positive effect of the application of guided inquiry learning model on learning outcomes can be seen in Table 5 below.

Table 5. Hypothesis Test of the Effect of Guided Inquiry on Learning Outcomes

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Uji Hipotesis Anacova Postest Hasil Belajar						
Model		Sum of Squares	df	Mean Square	F	Sig.
Eksperimen	Regression	2479.537	1	2479.537	56.165	.000[b]
	Residual	1501.019	34	44.148		
	Total	3980.556	35			

Source: SPSS Processed Results

Based on Table 5 above, it can be seen that the significance value in the experimental class is 0.00 <0.05, which shows that the application of the guided inquiry model has a significant effect on student learning outcomes. The results of the hypothetical test in the experimental class above also show that there is an effect of guided inquiry learning on learning outcomes which is identified by the F_{count} of 56.165. The test results are supported by the results of research by Amalina, et al. (2021) which in their research shows that guided inquiry improves the cognitive domain of students in experimental keilas. The results of the hypothesis test are also supported by the results of research by Elfiana, et al. (2023) in which the guided inquiry learning mode is able to increase the skill of the process of analysis processed through students' cognitive abilities and can make the learning process more effective, especially in improving learning outcomes in terms of students' cognitive abilities. This can be seen in the guided inquiry learning steps which direct students to be active and contribute fully to the process of finding problems, collecting data, and analyzing data which can then be justified (Riskiyanti, 2023; Lintang, et al., 2022).

In addition to students' cognitive abilities, the application of guided inquiry also significantly has a positive impact on students' affective abilities. This is evidenced by the observation that in meeting 1, students showed less curiosity about practicum activities related to cell material. At the time of data collection, the situation that occurred was almost the same as meeting 1, namely the lack of cooperation in the group. In meeting 2, the situation that occurred was that students had begun to realize that the learning that would be carried out had a positive and beneficial impact on their lives and environment. This is evidenced by the observation results which show that students' enthusiasm in

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participating in learning began to increase and have begun to show a level of self-confidence, being able to be disciplined, and being able to work together in groups.

In the 3rd and 4th meeting students have begun to be able to place themselves to pay attention to the stages when carrying out the practicum. At that time students also had a high curiosity and were able to be honest in collecting data, and had a good attitude of cooperation to carry out experiments and solve problems from the experiments carried out. The results of this study are supported by the results of other studies by Reisto, et al. (2021); Siti, et al. (2022); and Khana, et al. (2019) which state that the guided inquiry learning model has a positive effect on student learning outcomes in the affective domain. This is also in line with the diversity represented by the guided inquiry learning model which emphasizes every aspect of learning outcomes, one of which is the affective domain. Students' affective learning outcomes in each lesson also showed an increase. This can be seen when students are getting used to the guided inquiry learning mode and are able to appear confident, able to be productive, improve critical thinking skills, and be able to formulate results independently from a problem found (Hasna, et al., 2021).

The application of the guided inquiry learning model also affects student learning outcomes in the psychomotor aspect. Learning outcomes in the psychomotor domain were obtained from a sample of 36 students in the experimental class. The results in the realm of psychicomotor learning in the first study showed an average score of 55.83, in the second study showed an average score of 56.11, in the third study obtained an average score of 67.5, and in the fifth study experienced an increase in score to 70.27. These results are supported by the results of research by Juni, et al. (2019) and Hasna, et al. (2021) in which the students' psicomotory skills can increase with the application of the inquiry model. In addition, the application of the guided inquiry model is able to provide a significant improvement in psychomotor skills in the experiment and control classes as shown in Figure 1.

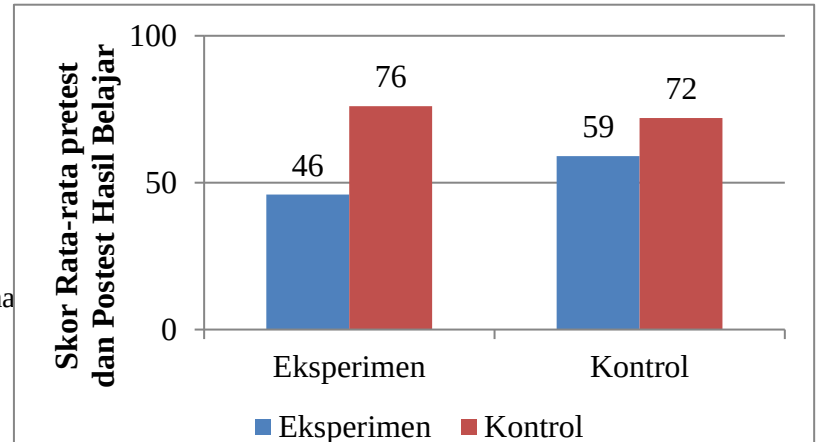

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Figure 1 : Improvement in psychomotor learning outcomes
Source : Processed from research results

5. CONCLUSION

Based on the analysis of the research results, it can be concluded that the guided inquiry learning model is able to improve science literacy skills and student learning outcomes (from cognitive, affective, and psychomotor aspects) significantly. The guided inquiry learning model is also considered effective as evidenced by the results of hypothesis testing with a value of 0.000 <0.005. The application of the guided inquiry learning model also has a positive influence because students can become more confident individuals, able to think critically, and able to find problems in learning and be able to suggest solutions.

REFERENCES

Amalina Artani, S. S. (2021). Pengaruh Pendekatan Chemo-Entrepreneurship pada Model Pembelajaran Inkuiri Terbimbing Berbantuan Kahoot Terhadap Hasil Belajar Kognitif dan Afektif Peserta Didik.

Elfiana Lubis, E. N. (2023). Pengaruh Model Pembelajaran Inkuiri Terbimbing Terhadap Keterampilan Proses Sains Dan Kemampuan Kognitif Siswa Pada Pelajaran Ipa Kelas V SD. *Jurnal Teknologi Pendidikan*.

Fanny Nella Nanlohy, V. I. (2023). Pengaruh Pendekatan Inkuiri Terbimbing Terhadap

ISSN: 2502-8521 (Print) / 2503-1155 (Online)
DOI: https://doi.org/10.35457/josar.v9i1.3538

Hasil Belajar Mahasiswa Pendidikan Biologi Semester Vi Pada Materi Kultur Jaringan Tanaman.

Fatimah, A. (2023). Pengaruh Model Pembelajaran Inkuiri Terbimbing Terhadap Hasil Belajar Peserta Didik Pada Materi Virus Kelas X Sman 2 Jeneponta. *Jurnal Pendidikan Biologi*.

Hasna Lailil Ma'rifah, M. S. (2021). Pengaruh model inkuiri terbimbing melalui pembelajaran praktikum terhadap kemampuan psikomotor peserta didik kelas xi mia man 10 jombang. *Jurnal Biologi dan Pembelajarannya*.

Juni Firman Karisma, B. S. (2019). Pengembangan Lkpd Berbasis Metode Pembelajaran Inkuiri Untuk Meningkatkan Psikomotorik Siswa Kelas V Sekolah Dasar.

Khana Fitri Pratiwia, N. (2019). Pengaruh Model Pembelajaran Inkuiri Terbimbing Berbasis Penilaian Autentik Terhadap Hasil Belajar Siswa. *Jurnal Inovasi Pendidikan Kimia*.

Lestari, S. N. (2019). Perbandingan hasil belajar siswa dalam matematika antara yang mendapat Pembelajaran Matematika Realistik (PMR) dengan pembelajaran konvensional. *Jurnal Pendidikan Matematika, 95-107.* .

Lintang Yunita, N. M. (2022). Pengaruh Model Pembelajaran Inkuiri Terbimbing Terhadap Kemampuan Pemecahan Masalah Dan Hasil Belajar Kognitif Siswa . *Jurnal Ilmiah Pendidikan Sains dan Terapan*.

Morwoto. (2009). Pengaruh Model Pembelajaran Inkuiri Terbimbing Terhadap Kemampuan Berpikir Kritis dan Hasil Belajar IPA Siswa Kelas VII SMP. . *Jurnal Pendidikan dan Pembelajaran.* .

Norris, P. (2003). Analisis Kemampuan Literasi Sains Pada Siswa Sekolah Dasar Ditinjau dari Aspek Konten, Proses, dan Konteks Sains. *Jurnal Pendidikan Sains Indonesia.* .

OECD. (2003). Memperkenalkan Literasi Sains Kepada Peserta Didik Perspektif Calon Guru Paud. *Jurnal Inovasi Pendidikan Guru Raudhatul Afhfal.*

Rayinda, D. P. (2019). Kecakapan Abad 21 : Kompetensi Digital Pendidikan Masa Depan. . *Jurnal Manajemen Pendidikan, 144-151.*

Resto Reswanto, H. Y. (2021). Penerapan Model Pembelajaran Inquiri Terbimbing Terhadap Hasil Belajar pada Materi Hukum Newton Kelas X. *Kappa Journal*.

ISSN: 2502-8521 (Print) / 2503-1155 (Online)
DOI: https://doi.org/10.35457/josar.v9i1.3538

Riskayanti, D. (2023). Pengaruh Model Pembelajaran Inkuiri Terbimbing Terhadap Kemampuan Pemecahan Masalah Dan Hasil Belajar Kognitif Siswa Biologi Kelas XI Sma. *Jurnal Kajian Biologi*.

Sanjaya. (2007). Inkuiri Sebuah Strategi Menuju Pembelajaran Bermakna. *Jurnal Al-Ta'dib.*

Siti Tsurayya Yaqutunnafis, ,. A. (2022). Pengaruh Lembar Kerja Berbasis Inkuiri Terbimbing (LKBIT) Terhadap Hasil Belajar Biologi Siswa Kelas X SMA Negeri 1 Lingsar. *Jurnal Ilmiah Profesi Pendidikan*.

Tanjung, I. F. (2023). Pengaruh Inkuiri Terbimbing Terintegrasi JAS (Jelajah Alam Sekitar) Pada Materi Keanekaragaman Hayati Untuk Meningkatkan Kemampuan Kognitif Siswa. *Journal Of Social Science Research*.

Tita Sonia, H. A. (2023). Pengaruh Model Pembelajaran Inkuiri Terbimbing Terhadap Keterampilan Berpikir Kritis Peserta Didik Pada Pembelajaran Biologi. *Jurnal Pendidikan*.

Wiyono. (2013). Pengembangan Model Pembelajaran Fisika Berbasis ICT Pada Implementasi Kurikulum 2013. *Jurnal Inovasi dan Pembelajaran Fisika*