



Application of Pogil Learning Model Integrated with Local Wisdom to Improve Students' Critical Thinking Skills

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This article aims to: 1) Know whether students who learn using the POGIL Learning Model integrated with local wisdom have better critical thinking skills than students who learn with conventional learning. 2) Knowing how much the improvement of students' critical thinking skills in the application of the POGIL Learning Model integrated with local wisdom. This article uses a quantitative approach. The method used is *Quasi Experiment Design*. This study used a *pretest-posttest control group design*. Data analysis techniques were carried out by analyzing preliminary tests of normality and homogeneity then hypothesis testing and N gain testing using the SPSS program. The results of this study showed the following: 1) The results of the first hypothesis test, namely the independent t test, obtained the results of the price of $t_{hit} > t_{tab}$, namely $2.156 > 1.671$ so that H_0 is rejected and H_a is accepted, it can be concluded that critical thinking skills are higher in the experimental class using the POGIL learning model integrated with local wisdom. 2) The second hypothesis test using the N-Gain test obtained the results of the experimental class the average value of the N-gain score for the experimental class (POGIL model) after and before being treated was 57.380 or 57.4% and had an N-gain criterion value of 0.4970 included in the medium criteria and was quite effective.

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INTRODUCTION

Education is the most important factor in a nation because education can encourage and determine the back-and-forth of a development process in various fields. This follows the purpose of education, which is to create educated and skilled human beings for the benefit of comprehensive development, both for the present and for the future [1].

Learning is essentially an effort to help students do learning activities. The purpose of learning itself is the realization of the efficiency and effectiveness of learning activities carried out by students. For an educator, it is expected to convey learning messages so that learning objectives are achieved, such as developing students' critical thinking skills.

Based on the results of research conducted by Maulina Wahyudi, et al on the analysis of students' critical thinking skills, namely that the average level of students' critical thinking skills in general is still in the low category. This shows that the learning process has not maximally involved activities such as analyzing, synthesizing, making considerations, creating, and applying new knowledge to real-world

situations. The low level of students' critical thinking skills is due to the learning methods applied in the classroom that have not familiarised students to develop their critical thinking skills [2].

The implementation of learning in Indonesia generally still places the teacher as the source of knowledge. In the learning process, the lecture method is still often used and is considered a learning option that can overcome the problems faced by each learner. The lecture/conventional method can indirectly make students easily bored so that they do not participate in the learning process. This is because learners only focus on listening, they tend to be passive and have a fairly low curiosity [3]. Without paying attention to their thinking skills, this can make students experience various difficulties when expressing ideas and opinions in the learning process so students are less able to conclude learning material using their own words. Therefore, critical thinking ability is a skill that must be developed to help learners in achieving optimal learning goals [4].

Various types of learning models can be used to improve students' critical thinking skills, one of which is the POGIL (*Process Oriented Guided Inquiry Learning*) learning model. POGIL is a learner-centered learning model, the teacher only acts as a facilitator. POGIL is an active learning model that uses team learning, guided inquiry activities to develop knowledge, questions to improve critical and analytical thinking skills, problem-solving, reporting, metacognition, and individual responsibility [5].

In addition to using the right model, linking learning materials with the diversity of each region also greatly affects student interest in learning materials, especially physical science. It is very important to instill the value of local wisdom in learning, especially physics learning. Science learning based on local wisdom is achieved by reorganizing the original IPA and translating the original IPA into scientific concepts. This initial science is obtained by observing the cultures that exist in society.

Wonosobo Regency is one of the governments in Central Java that has various types of local wisdom. Bundengan is a typical Wonosobo musical instrument made of bamboo fronds in the shape of a kowangan (tool for herding ducks), at first this musical instrument was a tool used to herd ducks [6]. Along with the times this instrument turned into a musical instrument that emits sounds similar to a whole gamelan. The basic technique of playing bundengan is plucked with the right hand playing four strings, while the left-hand plays rhythmically representing drum patterns in the form of proper [7]. Physically, bundengan musical instruments apply the concept of physics, namely sound and vibration. The sound is produced from vibrations that arise/are generated from the plucked strings to produce sounds that resemble gamelan strains. Every vibration must have a frequency and period as in the bundengan musical instrument. Frequency and period can be generated from the strings in the *kowangan* which are then plucked and produce a sound source.

Based on the description above, one of the efforts that can be made to improve student's critical thinking skills is through the POGIL learning model integrated with local wisdom. Using a learning model integrated with local wisdom can make students actively involved and rich in various knowledge and able to develop scientific attitudes, so that the creativity of students increases and students can solve problems systematically and logically because students are required to be critical by building their knowledge and looking for solutions they face, thus creating learning that is not only teacher-centered but also learner-centered.

RESEARCH METHODS

This research uses a quantitative approach. The method used is *Quasi Experiment Design*. There is one control group and one experimental group. This research uses a *pretest-posttest control group design*. In this design the groups were randomly selected, then given a pretest to determine the initial state between the experimental group and the control group.

The population of this study were all VIII classes of Mts Takhasus Al-Qur'an Wonosobo which consisted of four classes. In this study, the sample was all members of class VIII B and VIII D Mts Takhasus Al-Qur'an Wonosobo. The sampling technique used is Probability Sampling, namely, sampling is done randomly and provides equal opportunities for each element of the population.

The data collection techniques used in this research are observation, tests, and documentation. The observation technique is an observation method that is carried out when the researcher has entered the field. The observation technique that will be used in this study is the controlled observation technique. This observation focuses on observations made by researchers without the

need to make emotional contact with the observed object or informant. Test is a data collection technique using questions to determine the level of critical thinking skills of class VIII students of Mts Takhasus Al-Qur'an Wonosobo. The types of tests used in this study are *pretest* and *posttest*. The documentation technique is used to collect various things related to student data and photos in the learning process.

Data analysis techniques were carried out by analyzing preliminary tests of normality and homogeneity then hypothesis testing and N gain testing using the SPSS program. Before conducting preliminary and hypothesis analyses, validity, reliability, differentiation, and test difficulty were analyzed to determine the accuracy of the test questions to be used in the study using the SPSS program.

RESULTS AND DISCUSSION

Based on research that has been conducted at Mts Takhasus Al-Qur'an Wonosobo in the 2022/2023 academic year by applying the POGIL learning model integrated with local wisdom in class VIII D to determine the improvement of students' critical thinking skills on vibration material, sound waves, the research data obtained in the form of quantitative data. The data used in this test is in the form of post-test scores. This posttest value is used to determine cognitive learning outcomes and improvement in critical thinking skills after following the learning process. The research data is presented in the form of descriptions and tables. Based on the results of the research implementation, the following data were obtained:

Table 1. Analysis of Posttest Score Results

Class	Posttest Results		
	Average	Highest Score	Lowest Score
Experiment	77,6	89	67
Control	73,8	85	64

Based on the table above, it can be interpreted that the average posttest score for the experimental class is greater than the control class, namely the experimental class gets an average score of 77.6 while the control class gets an average score of 73.8.

1.1 Preliminary analysis

a. Normality test

The normality test of initial ability using the *Liliefors* test with a significance level of 5%, the *Liliefors* test was analyzed with SPSS on the *Kolmogorov-Smirnov* technique. The results of the calculation analysis in each group can be seen in the table.

Table 2. Normality test of experimental and control class students

Class	Kolmogorov-Smirnova		
	Statistic	df	Sig.
Experiment	.109	25	.200*
Control	.157	25	.114

In the *Kolmogorov-Smirnov* technique, if the significance number is more than 0.05, it means that the data comes from a normally distributed population, otherwise, if the significance number is less than 0.05, it means that the data is not normally distributed. From the table above, in the experimental class, the significance number obtained is 0.200 while the control class is 0.114. Based on the significance level set at 5%, both data have a significance number of more than 0.05, which means that the sample comes from a normally distributed population.

b. Homogeneity test

The homogeneity test was conducted in two classes, namely class 8D (experimental) and class 8B (control). The homogeneity test used is the *Fisher* test. The homogeneity test is used to determine whether the sample comes from a homogeneous population or not so that it is easier to determine the research sample.

Table 3. Homogeneity test

		F	Sig.
Critical Thinking Skills	Equal variances assumed	.000	1.000

From the results of calculations using SPSS, it can be obtained that the magnitude of the F test is 0.000, which is smaller than the F table value of 3.44. So it can be concluded that the data comes from a homogeneous population. With the results obtained that both samples are normally distributed and the population is homogeneously distributed, it can be tested using parametric statistics.

1.2 Hypothesis Analysis

a. T-test

After the normality test and homogeneity test are met, statistical analysis can be continued with hypothesis testing using the t-test. The t-test is used to determine the high and low critical thinking skills possessed by students after and after being treated. In this study, the hypothesis test uses an independent sample t-test with the test criteria, namely if $t_{count} \leq t_{tabel}$, then H_0 is accepted and $t_{count} > t_{tabel}$ then H_a is accepted. These results can be seen in the following table:

Table 4. T-test Result Data

Class	N	t	df	Conclusion
Experiment	25	2.156	48	Higher experimental class
Control	25	2.156	47.912	

Based on the results of the T-test calculation, the count is 2.156 while the price of t_{tabel} with a significance level of 5% and 24 degrees of freedom is obtained at 1.671. So the price of $t_{hit} > t_{tab}$ is $2.156 > 1.671$, so H_0 is rejected and H_a is accepted, it can be concluded that critical thinking skills are higher in the experimental class using the POGIL learning model with the control class using the conventional learning model.

b. Gain test

The N-Gain test was conducted to determine how much the students' critical thinking skills had improved. The calculation results can be seen in the table.

Table 5. N- Gain test calculation results

No.	Experiment Class N-Gain score (%)	No.	Experiment Class N-Gain score
1	58.33	1	0.58
2	46.30	2	0.46
3	62.07	3	0.62
4	66.67	4	0.67
5	62.07	5	0.62
6	38.89	6	0.39
7	55.38	7	0.55
8	43.14	8	0.43

No.	Experiment Class N-Gain score (%)	No.	Experiment Class N-Gain score
9	58.33	9	0.58
10	61.70	10	0.62
11	62.07	11	0.62
12	66.67	12	0.67
13	68.09	13	0.68
14	61.54	14	0.62
15	52.17	15	0.52
16	52.46	16	0.52
17	61.70	17	0.62
18	58.57	18	0.59
19	45.00	19	0.45
20	58.33	20	0.58
21	53.19	21	0.53
22	55.00	22	0.55
23	46.81	23	0.47
24	69.44	24	0.69
25	70.59	25	0.71
Average	57.380	Average	0.4970
Minimal	38.89	Minimal	0.31
Maximum	70.59	Maximum	0.71

Based on the results of the N-gain score test calculation, it shows that the average value of the N-gain score for the experimental class (POGIL model) is 57.380 or 57.4% and has an N-gain criterion value of 0.4970 included in the medium criteria and is quite effective. With a minimum N-gain score of 38.9% and a maximum score of 70.6%. According to the data from the N-gain calculation, it can be concluded that the POGIL learning model integrated with local wisdom has moderate criteria and is quite effective for improving students' critical thinking skills.

Based on the results of the analysis that has been done, the POGIL learning model integrated with local wisdom can improve students' critical thinking skills. This is because some learning activities in the POGIL learning model can trigger students to continue to train their critical thinking skills.

The stages in POGIL learning can foster the critical thinking skills of each learner. The first stage of POGIL learning is orientation, which functions to arouse the curiosity of students then students are required to present illustrations that can be observed by students [8]. The orientation stage is in line with the indicators of critical thinking skills. Each learner must be able to formulate each main problem that is being presented. In the POGIL learning stage that is by the second critical thinking indicator is exploration. At this stage, students are given assignments or activities that aim to find and explore appropriate sources of information [9]. The exploration stage follows the critical thinking indicator, namely being able to provide reasons to produce correct arguments. The third stage that follows the indicators of critical thinking skills is concept formation and application. At this stage, students are directed to be able to find and form concepts based on the information that has been obtained. Following the indicators of critical thinking skills, namely concluding clearly and logically

from the results of the investigation. The last stage of POGIL learning which is following critical thinking indicators is closing. In the closing stage, students reflect on the concepts that have been obtained to find out their perspective on the material they are learning.

CONCLUSIONS

The POGIL learning model integrated with local wisdom is one of the learner-centered learning approach models, students work in small or large groups with the teacher acting as a facilitator. In the learning process, the POGIL model is associated with local wisdom in the Wonosobo district. The use of the POGIL learning model integrated with local wisdom aims to improve the critical thinking skills possessed by each student. Related to this, in the first hypothesis test, namely the independent t-test, the results of the price of $t_{hit} > t_{tab}$ are $2.156 > 1.671$ so that H_0 is rejected and H_a is accepted, it can be concluded that critical thinking skills are higher in experimental classes using the POGIL learning model integrated with local wisdom with control classes using conventional learning models.

There was a significant increase in critical thinking skills in the experimental class before and after treatment. The second hypothesis test using the N-Gain test obtained the results of the experimental class the average value of the N-gain score for the experimental class (POGIL model) after and before being treated was 57.380 or 57.4% and had an N-gain criterion value of 0.4970 included in the medium criteria and was quite effective. With a minimum N-gain score of 38.9% and a maximum score of 70.6%. So it can be concluded that the POGIL learning model integrated with local wisdom is effective enough to improve students' critical thinking skills.

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