

Implementation of Discovery-Inquiry Methods with Work Sheet Illustrated Media to Improve Student's Critical Thinking Skills of Science Lessons in Indonesia's Border Elementary School

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ABSTRACT: This study aims to improve students' critical thinking skills (CTS) in disadvantaged, outermost and foremost areas, namely in Indonesia's border elementary schools which are full of limited educational facilities. This research was conducted on science subjects in grade VI SDN 29 IDAI on the balance of ecosystems. The method used for the research is the experimental method, which is Quasi Experiment because conditions do not allow for the control class to be held. The research design is one group pretest posttest design, where before the treatment is given, the sample is first given a pretest (initial test) and at the end of the learning sample is given a posttest (final test). CTS aspects developed in this study include identifying criteria for possible answers, mentioning examples, giving reasons, and drawing conclusions. Based on the results of data analysis in the form of the results of the pre-test and post-test, there was an increase in students' average critical thinking skills, starting from 32% (less) in the pre-test to 75% (good) in the post-test. The application of discovery-inquiry method with work sheet illustrated media is also able to increase student learning outcomes to an average value of 72.38 with a graduation rate. The minimum criteria for completeness in classical is 84.62%.

Keywords: Discovery-Inquiry, illustrated student worksheets, critical thinking skills

INTRODUCTION

Education is the main thing that must be considered in the development of a nation. With a high level of education, there will be better human resources available to fill development. But in Indonesia, there are many problems that often hinder the improvement of the quality of education, especially in the Foremost, Outermost, Disadvantaged areas. The problems of education in the Foremost, Outermost, Disadvantaged regions are actually very complex, such as the lack of educational infrastructure facilities, lack of teacher numbers, inadequate number and quality of books, limited budgets, high dropout rates, quality of human resources in managing education and performance and welfare teacher who is not optimal.

SDN 29 IDAI is one of the elementary schools located on the Indonesian border with Sarawak Malaysia precisely located in the hamlet of IDAI, IDAI village, Ketungau Hulu sub-district, Sintang District, West Kalimantan Province. To get to IDAI school, it takes around 9 hours by road from the city of Sintang district. Road infrastructure is still in the form of land with access that is not easy to pass. Educational facilities at SDN 29 IDAI are very far from adequate. Poor school buildings, lack of classrooms, lack of textbooks and other learning resources, lack of state electricity, and a lack of educators. The availability of textbooks and learning resources for students in SDN 29 IDAI which is inadequate causes the value of student learning outcomes and students' reading interest in subject matter is still low. The low reading interest also has an impact on the number of students who have not been able to read fluently, there are even some children who until they sit in the upper class are still reading haltingly. Learning also becomes constrained because the teacher becomes the only source of learning for students. The information they get is only limited to what is delivered by the teacher. Students also tend to learn only by hearing and memorizing what is conveyed by the teacher so that they tend to quickly forget about the material, especially material that is abstract in nature. According to Zaini et al[1] one of the factors that causes information to be quickly forgotten is the weakness of the human brain itself. Learning that only uses the sense of hearing has

several disadvantages, even though learning outcomes should be stored for a long time.

The various limitations of education in border areas with the learning system students who only listen and memorize, cause the level of intelligence of students to be lower when compared to students who are in the city. Learning material that is in accordance with the standards of the government is often not suitable with the level of ability of students so that the teacher must reduce the standard of subject matter so that it can be absorbed by students. But this causes more problems because on the one hand the teacher must reduce the standard material and on the other hand students must be able to prepare themselves to do the National Standard School Exams.

To overcome this problem, students should be required to have critical thinking skills on the subject matter they are learning so that their level of intelligence develops. Therefore, students must use the brain, study ideas, solve problems, and apply what they learn. According to Daryanto[2] to be able to learn something well, we need to hear, see, ask questions about it, and discuss it with others. In addition, students also need to describe something in their own way, show examples, try to practice skills, and do assignments that require knowledge that they have.

In an effort to create critical thinking students, the author tries to use a method in the form of a discovery-inquiry method, because the discovery-inquiry method can involve students actively using their mental processes to find some concepts and principles of the material being studied[3]. The advantages of the discovery-inquiry method also allow students to learn by utilizing various types of learning resources, and not only make teachers the only source of learning. Learning using the discovery-inquiry method involves active students and the teacher only functions as a facilitator and motivator.

The author applies the media in the form of illustrated Student Worksheets so that students in addition to being happy, interested, understanding and clear about the material, also have critical thinking skills in finding science concepts in the Ecosystem Balance material in class VI SDN 29 IDAI. Student Worksheets function as discovery sheets, where students express their findings in the form of new things that they have never known before, as a vehicle to train students to think more critically in teaching and learning activities, and increase students' interest in learning because the Student Worksheet is created more systematic, colorful, pictorial and attract students' attention.

METHOD

In this study using Quasi Experiment, which is research approaching a real experiment where it is impossible to control or manipulate all relevant variables. There must be a compromise in determining internal and external validity in accordance with existing restrictions[4]. The reason for using the Quasi Experiment method is because in reality the situation or situation does not allow the use of the control class in the study. Class VI at SDN 29 IDAI there is only one class with a limited number of students. That's why the author chose Quasi Experiment which only uses one class.

The research design used in this study was one group pretest posttest design. In this design before the treatment is given, first the sample is given a pretest (initial test) and at the end of the lesson the sample chapter is given a posttest (final test). This design is used in accordance with the objectives to be achieved, namely to find out how effective the use of learning videos to overcome the minimum availability of textbooks and to determine the effect of using learning video media on learning outcomes in class VI SDN 29 IDAI Academic Year 2018/2019. The following is a research Table design for one group pretest posttest design.

TABLE 1. Design Research One Group Pretest-Posttest Design

<i>Pretest</i>	<i>Treatment</i>	<i>Posttest</i>
O ₁	X	O ₂

Information:

O₁ = initial test before treatment is given

O₂ = final test after treatment is given

X = treatment of experimental subjects, namely by applying illustrated Student Worksheets.

The steps taken in this study are as follows:

1. Preparation Phase
 - a. Problem identification is analyzing the problems that occur in teaching and learning activities at SDN 29 IDAI which is a school on the Indonesian border with very minimal education facilities
 - b. Making learning devices
 - c. Prepare instruments that will be used for data collection

- d. Prepare the media in the form of illustrated Student Worksheets
2. Implementation Phase
 - a. Provide a pre-test before learning takes place to determine the students' initial abilities
 - b. Carry out teaching and learning activities by conducting treatment on learning
 - c. Hold a post-test to find out student learning outcomes

2. Final Stage

- a. Processing data from the pre-test and post-test results
- b. Analyze research data and discuss research findings
- c. Give conclusions based on the results of data processing
- d. Provide recommendations based on research results

The instruments used for data collection in this research include:

1. Picture Student Worksheet

The pictorial Student Worksheet used is an activity sheet for student discussion in groups. The multiple student worksheets are given to students at the beginning of the lesson so students can think actively and as discovery students in groups.

2. Written test

The test used in this study is a test given at the beginning and end of learning. This written test is given to determine the level of critical thinking skills of students. This test is also used to determine the mastery of students' concepts.

Data Analysis

The steps for data processing are:

1. Provide a raw score on each written test answer based on the criteria that have been made.
2. Change the written test score in the form of percent (%).

$$\text{Score} = \frac{\text{the right answer}}{\text{total score}} \times 100\%$$

3. Provide an assessment of student achievement on each CTS indicator based on the criteria proposed by Arikunto[5] listed in Table 2.

TABLE 2. Critical Thinking Skills Test Criteria[5]

Score (%)	Criteria
81 – 100	Very good
61 – 80	Good
41 – 60	Enough
21 – 40	Less
0 – 20	Very less

RESULT AND DISCUSSION

Teaching and learning activities begin with conducting apperception and question and answer with students, informing the material to be discussed, learning objectives, types of learning models to be conducted, and pre-test to find out the initial knowledge that students have. The author then assigns students to create study groups of 3-4 people. Then students are given illustrated Student Worksheets that are distributed in groups. Each student in the group must discuss the answers to the questions in the illustrated Student Worksheet by trying to think critically about the images presented on the pictorial Student Worksheet. Through these images will lead students to find answers to the problems raised in the questions on the illustrated Student Worksheet. After group discussions, students were also trained to conduct class discussions by presenting the work results of each group. At the end of the chapter material learning, a post-test was conducted to measure students' mastery of the material they had learned. The results of the pre-test and post-test are summarized in the following Table:

TABLE 3. Data on Pre-test and Post-test Results

No	Information	Pre-test	Post-test
1	Lowest value	20	53
2	Highest value	37	96
3	Average value	29.15	75.38
4	Total of failure	13	2

No	Information	Pre-test	Post-test
5	Total of Success	-	11
6	Successful Percentage	0%	84.62%

Based on these data, it can be seen that before being given treatment using illustrated Student Worksheets, the learning outcomes of class VI students were still low. After the class gets treatment with learning using illustrated worksheets, student learning outcomes increase. Seen from a total of 13 students, there were only 2 students who had not yet completed the Minimum Completion Criteria while most of them were completed from the Minimum Completion Criteria of 60. Thus, learning with this method could improve the learning outcomes of class VI SDN 29 IDAI in Science subjects. This increase in understanding is due to the involvement of students during the learning process. Through learning by discovering chemistry concepts by working on student worksheets illustrated in groups, the knowledge gained by students will be longer embedded in his memory and increase students' understanding of abstract material.

In addition to measuring student learning outcomes, written tests are also used to measure the achievement of students' critical thinking skills. The number of questions used for the written test are 10 multiple choice questions, 5 short questionnaires and 4 description questions with details of the aspects of critical thinking skills summarized in Table 4 and the achievement of students' critical thinking skills summarized in Table 5.

TABLE 4. Aspects of Critical Thinking Skills (CTS) in Each Item of the Problem

No	CTS Aspect	Test Number
CTS 1	Identify criteria for possible answers	Multiple choice: 6, 8, 10 Short essay: 2, 4, 5
CTS 2	Mention examples	Multiple choice: 1, 4, 5, 7, 9 description: 2, 3
CTS 3	Giving reason	Multiple choice: 3 Short essay: 3 description: 4
CTS 4	Draw a conclusion	Multiple choice: 2, 5 Short essay: 1 description: 1

TABLE 5. Achievement of Critical Thinking Skills (CTS)

	Score CTS 1	Score CTS 2	Score CTS 3	Score CTS 4
Pre-test	5, 3, 8, 13, 14, 6	6, 0, 10, 6, 4, 13, 10	4, 10, 11	7, 10, 8, 28
Total	49	49	25	53
Percentage	31% (less)	34% (less)	21% (less)	41% (less)
Post-test	8, 3, 11, 29, 30, 24	11, 3, 8, 8, 8, 29, 35	6, 35, 49	2, 8, 29, 65
Total	102	102	90	104
Percentage	65% (good)	71% (good)	77% (good)	80% (good)

Based on Table 5 above, it can be seen that students' critical thinking abilities have increased from the results of the pretest that has less criteria and after getting treatment, students' critical thinking skills improve to be good. The average achievement of improvement in students' Aspects of Critical Thinking Skills in this study can be seen briefly in Table 6.

TABLE 6. Average Achievement of Critical Thinking Skills

No	CTS Aspect	Pre-test	Post-test
CTS 1	Identify criteria for possible answers	31% (less)	65% (good)
CTS 2	Mention examples	34% (less)	71% (good)
CTS 3	Giving reason	21% (less)	77% (good)

CTS 4	Draw a conclusion	41% (less)	80% (good)
Average		32% (less)	73% (good)

The application of discovery-inquiry methods with media illustrated Student Worksheets is able to improve Critical Thinking Ability of class VI SDN 29 IDAI in Sciences subject, with an average increase of 32% (less) to 73% (good). Among the four aspects of Critical Thinking Ability developed in each item, the results show that the aspect of drawing conclusions is an aspect of Critical Thinking Ability that is best developed, namely 80%. Conclusion drawing skills are the implications of developing logical reasoning. The use of illustrated student worksheets has trained students to draw conclusions from a problem raised in the problem. The four Critical Thinking Abilities developed in this study all show Good results so that it can be said that none of the aspects of Critical Thinking Ability can be developed in the results of this study.

CONCLUSION

The application of the discovery-inquiry method using media illustrated student worksheets can improve students conceptual understanding by graduating in the classical 84.62% and an average score of 75.38. Application of discovery-inquiry method can improve students' critical thinking skills with an average percentage of achievement of 73% (Good). The achievement of critical thinking skills developed is in the aspect of identifying criteria for possible answers of 65% (Good), mentioning an example of 71% (Good), giving a reason of 77% (Good) and drawing conclusions at 80% (Good).

REFERENCES

1. H. Zaini, B. Muthe, S. A. Aryani, *Strategi Pembelajaran Aktif* (Pustaka Insan Madani, Yogyakarta, 2008)
2. Daryanto, *Penelitian Tindakan Kelas dan Penelitian Tindakan Sekolah* (Gava Media, Yogyakarta, 2011)
3. M. Amien, *Mengajarkan IPA dengan Menggunakan Metode Discovery-Inquiry* (Depdikbud, Jakarta, 1987)
4. M. Nazir, *Metode Penelitian* (Ghalia Indah, Bogor, 2005)
5. S. Arikunto, *Prosedur Penelitian* (Bumi Aksara, Jakarta, 2006)