



## THE EFFECTIVENESS OF DISCOVERY LEARNING MODEL TO IMPROVE ELEMENTARY STUDENTS' CRITICAL THINKING SKILLS AND SELF- EFFICACY

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### KEEFEKTIFAN MODEL *DISCOVERY LEARNING* UNTUK MENINGKATKAN KEMAMPUAN BERPIKIR KRITIS DAN *SELF-EFFICACY* SISWA SEKOLAH DASAR

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#### ABSTRACT

**Abstract:** The learning model is a means used to implement plans for achieving the learning objectives, one of which is social science learning subjects. In the 21st century, students are required to have critical thinking skills. Critical thinking is a way of thinking to analyze problems. In increasing critical thinking skills, the students must learn independently through discovery learning and based on self-efficacy. Through the discovery learning model, the student's critical thinking skills and self-efficacy will increase. The purpose of the research is to determine the effectiveness of the discovery learning model to improve students' critical thinking skills and self-efficacy. The research uses quasi-experimental. In total, 48 students participated in the research with 26 participating in the experimental class and 22 participating in the control class. Data collection methods include tests, non-tests questionnaires, and note-taking. Data analysis using descriptive analysis, prerequisite tests, and hypothesis testing (including the *N-Gain* and mean difference tests) were to check the data. The *N-Gain* *TKBK* values are 1.7903 for the experimental group and the control group. The experimental group's *N-Gain* self-efficacy score are compared to the control group, and the *N-Gain* value is 1.4253. Through a higher effectiveness value than 1, it is clear that the discovery learning model is effective to increase students' critical thinking skills and self-efficacy.

**Keywords:** critical thinking skills, discovery learning, self-efficacy

**Abstrak:** Model pembelajaran merupakan cara yang digunakan untuk mengimplementasikan rencana untuk mencapai tujuan pembelajaran, salah satunya pembelajaran IPS. Pada abad ke 21, siswa dituntut untuk memiliki kemampuan berpikir kritis. Berpikir kritis merupakan cara berpikir untuk menganalisis permasalahan. Dalam melatih kemampuan berpikir kritis, siswa harus belajar secara mandiri melalui belajar penemuan yang harus dilandasi dengan sikap keyakinan diri (*self-efficacy*). Adanya model *discovery learning*, kemampuan berpikir kritis dan *self efficacy* siswa akan meningkat. Tujuan penelitian untuk mengetahui keefektifan model *discovery learning* untuk meningkatkan kemampuan berpikir kritis dan *self-efficacy* siswa. Studi tersebut menggunakan kuasi-eksperimental. Secara total, 48 siswa berpartisipasi dalam penelitian ini, dengan 26 berpartisipasi dalam kelas eksperimen dan 22 berpartisipasi dalam kelas kontrol. Metode pengumpulan data meliputi tes, nontes dalam bentuk kuesioner, dan pencatatan. Analisis data menggunakan analisis deskriptif, uji prasyarat, dan uji hipotesis (termasuk *N-Gain* dan uji beda rata-rata) digunakan untuk memeriksa data. Diperoleh nilai *N-Gain* *TKBK* kelompok eksperimen dan kelompok kontrol sebesar 1,7903. Skor *self-efficacy N-Gain* kelompok eksperimen dibandingkan dengan kelompok kontrol, nilai *N-Gain* sebesar 1,4253. Dengan nilai keefektifan lebih besar dari 1, jelas bahwa pembelajaran model *discovery learning* efektif meningkatkan kemampuan berpikir kritis dan *self efficacy* siswa.

**Kata Kunci:** kemampuan berpikir kritis, model discovery learning, self-efficacy

#### CITATION

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## INTRODUCTION

In accordance with Pancasila and the 1945 Constitution, the main aim of education is to equip students with the skills necessary to make a positive contribution to the growth and prosperity of their society. The goal of education is not just to equip students with facts and techniques, but to shape them into something better than the next generation becomes productive and contributing members of society. Domingueza (2023) that the interaction between educators and their students, or between the students themselves, is an inherent part of the educational process. Student-initiated activities will lead to the development of knowledge and skills that will enhance academic achievement. According to Pertiwi (2017) higher order thinking skills (HOTS), are critical thinking skills that have been very important as a contributor to literacy problems in the twenty-first century.

Critical thinking, as defined by Walfajiri (2019) is the ability to identify knowledge and solve problems from a problem by asking oneself questions about situations to uncover relevant information. According to Changwong (2018) that teaching students to think critically is important because it helps them understand complex problems, encourages them to find new solutions, and encourages them to take the initiative to solve problems.

Independence in learning is a very important skill for any learning activity. Many aspects such as modeling and self-efficacy (self-reliance) encourage the growth of independence in learning, as stated by Kurniawati (2016). According to Agcam (2016) that students' belief in their own skills to deal with obstacles in the learning process is a key aspect in fostering active learning. This is because students who are confident in their own talents are more likely to take initiative when faced with challenges.

According to Viberg (2023) innovation in education is critical to increasing student engagement and achievement levels in the classroom. Monica (2023) teachers must also be experts in identifying and selecting effective learning models. Svanes (2023) that teachers use this model to plan lessons that can really be followed and benefit students. The discovery learning model is the learning approach used. According to Slavin (dalam Aziz, 2015), by drawing parallels Through the discovery learning process, students are inspired to play an active role in their own education by drawing connections between the information they already know and what they have just obtained.

In most classrooms, students are expected to memorize and regurgitate information presented by their teachers in social studies class. Because not all elementary school children can follow this learning style, social studies teachers incorporate strategies beyond rote memorization into their lessons. Setyasto & Bayu (2017) state that low understanding of the various subjects discussed and emphasis placed on memory characterizes social science programs. According to their worldview, this makes sense. Feriady (2012) argues that social studies is not attractive to students, and they try to avoid it. IPS is an important foundational science in basic education.

Students generally consider this field of study less attractive to students. According to Sanjaya (2019) difficulty understanding the social studies curriculum due to students' lack of motivation to read and their excessive dependence on their teacher is the main cause of their social studies learning difficulties. As a result of the uninteresting content and the repetitive nature of the lessons, students often become disinterested in social studies subjects.

The Public Elementary School in the Kayen sub-district was the site for the initial documentation conducted by researcher Kayen

Pati, who revealed that student achievement in the odd semester evaluation for the 2022/2023 school year was still low. Seventy-0.21 percent of students do not meet the benchmark minimum mastery criteria (KKM). Preliminary observation data revealed a number of causes of substandard student learning outcomes. These include students' lack of engagement in class, teacher's use of less innovative learning models, students' lack of critical thinking skills, their lack of confidence in their own abilities, and their failure to meet school KKM benchmarks.

Azizah (2018) conducted research on the critical thinking skills of elementary school children. HOTS is a high-order thinking skill that is synonymous with critical thinking, which can be developed. According to Nunez (2023) the metacognitive level of critical thinking requires students to plan ahead, make intelligent guesses, and evaluate the effectiveness of their research. In this regard, research of Tiana (2015) argues that children can develop their critical thinking skills by engaging in activities such as asking, observing, and experimenting which are based on real-world evidence and are designed to awaken their natural curiosity. Students become more engaged and enthusiastic about their studies.

Students need critical thinking skills and self-efficacy to succeed academically. The discovery learning model is one of the unique approaches that can help children develop their critical thinking and self-awareness in the classroom. The findings of Aryani & Wasitohadi (2020) reinforce this assumption, showing that the discovery learning paradigm can foster more critical thinking skills among students. According to the findings of Utari & Syamsul (2018) students' self-efficacy affects

their academic achievement. Students' level of self-efficacy predicts how they approach and solve common difficulties. Kurniawati (2016) argues that student self-efficacy can encourage greater independence in the classroom.

Based on the description above, research is needed on "The effectiveness of the discovery learning model to improve critical thinking skills and self-efficacy of elementary school students." The formulation of the problem in this study is how the effectiveness of the discovery learning model to improve critical thinking skills and self-efficacy of fifth grade elementary school students. The aim of this study was to determine the effectiveness of the discovery learning model to improve critical thinking skills and self-efficacy for fifth grade elementary school students.

## **METHODS**

Experimental research like this exists. This study used a quasi-experimental design with an in-control group structure that included non-equivalent pre and post-test measurements. People were randomly assigned to either an "experimental" or a "control" group. Twenty-six fifth graders and twenty-two non-study students from a public elementary school located in Kayen District, Pati Regency during the 2022/2023 free and open school year participated in this study.

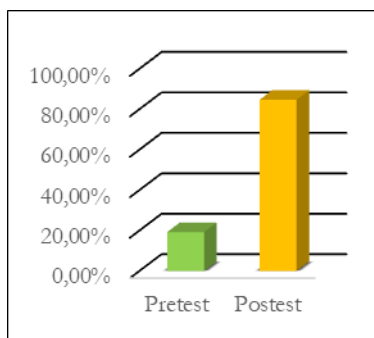
The research subject is said to be a variable, as stated by Arikunto (2013). Critical thinking skills and self-efficacy towards one's own abilities are used as the dependent variable in this study, with the discovery learning paradigm as the independent variable. Information collection methods for a study include tests, non-tests in the form of a scaled questionnaire (Likert), and notes.

**Table 1. Experiment Class Critical Thinking Ability Test Results**

Mark	Frequency		Percentage	
	<i>Pretest</i>	<i>Posttest</i>	<i>Pretest</i>	<i>Posttest</i>
Mark < 75	21	4	80,77%	15,38%
Mark ≥ 75	5	22	19,23%	84,62%

Based on table 1, there were 26 students in the experimental group, only 19.23% who scored above the KKM (score 75) on the pretest; However, after being exposed to the discovery learning model, 84.62% of them achieved this goal. As a result, the

experimental group experienced a score increase of 62.39 percentage points between before and after the test. The following conclusions can be drawn from the comparison of TKBK values:



**Figure 1. Experiment Class Critical Thinking Ability Test Results**

### Description of Critical Thinking Ability of Experimental Class Students

The control group was similar to the experimental group except that they did not receive any learning interventions. Social

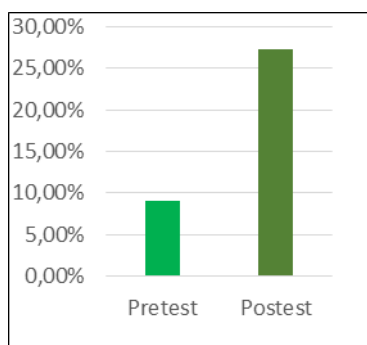
studies courses which include discussion of economic activities are taught using an expository approach to the control group. Table 2 displays the scores before and after the critical thinking skills test.

**Table 2. Control Class Critical Thinking Ability Test Results**

Mark	Frequency		Percentage	
	<i>Pretest</i>	<i>Posttest</i>	<i>Pretest</i>	<i>Posttest</i>
Mark < 75	20	16	90,91%	72,73%
Mark ≥ 75	2	6	9,09%	27,27%

Table 2 shows that out of a total of 22 students in the control group, 9.09% achieved a score of 75 or more on the pretest; after receiving expository learning, this figure increased to 27.27%. Therefore compared to

their pre-treatment scores, the control group's post-treatment scores increased by 18.18%. The results of the control class' critical thinking skills test can be interpreted as follows:



**Figure 2. Control Class Critical Thinking Ability Test Results**

### **Preliminary Research Data Analysis**

It was first determined whether the samples in this investigation all started in the same place. Before introducing the new teaching method to the two representative classes, a preliminary analysis was carried out. Results from pre-tests on measures of critical thinking ability were aggregated from either A/B Testing, or comparison and control.

### **Initial Research Data Normality Test**

The initial data was tested for normality through the normality test. The chi-square test was used to check for normality in this investigation. At a significance level of 5%, the  $H_0$  test criteria are approved if the calculated  $X^2$  value is less than what is shown in table X2.  $X^2 = 21.023$ , which corresponds to the value from the table = 37.652 using the original data normality test on the results of the experimental group. Because the value of  $X^2$  matches those in table (21,203, 37,652), then  $H_0$  is accepted. This indicates that initially there was a normal distribution of the experimental class data.

The estimated  $X^2$  value for the initial data normality test was 3.311, while the table  $X^2$  value was 32.671 for the control group.  $X^2 = 3.311$  32.671 which is the same as the value in the table, then  $H_0$  is allowed. Therefore, the baseline information for the control group follows a normal distribution.

### **Initial Research Data Homogeneity Test**

The samples included in the study were tested for homogeneity to see if they all came from the same environment. To perform a homogeneity test, the researcher first checks how similar the variances are between the two samples. In this study, homogeneity was determined using the F test. If the calculated F value is less than the table F value, then the null hypothesis ( $H_0$ ) is accepted at the 5% confidence level. The homogeneity test resulted in an estimate of the initial data F value of 0.784, but the F table value was 2.01.  $F = 0.784$  2.01 is the same as the F value in the table, then  $H_0$  is approved. Therefore, the basic information of this research is consistent.

### **Final Research Data Analysis**

After carrying out the necessary pre-analysis tests, in the final stages of this research, tests such as the normality test and homogeneity test can be used to assess the effectiveness of the discovery learning model.

### **Final Research Data Normality Test**

If you want to ensure your data set is regularly distributed, you can run a normality test. The Chi-Square analyzer was used to check for normalcy in this investigation. At a significance level of 5%, the  $H_0$  test criteria are approved if the calculated  $X^2$  value is less than the  $X^2$  table value. The estimated  $X^2$  value for the final data normality test in the experimental class is 3.888, and the  $X^2$  table



value is 37.652.  $H_0$  is accepted because the calculated  $X^2$  value = 3.888 37.652 which is the same as the value in the table. Therefore, the results of the experimental group follow a normal distribution.

The estimated  $X^2$  value for the final data normality test was 0.994, while the  $X^2$  table value was 32.671 for the control group. Because the estimated value of  $X^2$  is the same as the value of  $X^2$  in the table,  $H_0$  is approved. Therefore, the aggregate results of the control group are normally distributed.

### Final Research Data Homogeneity Test

To carry out a homogeneity test, the researcher first checked whether the two samples showed the same level of variance. The F test was used to test for consistency during this investigation. At the 5% confidence level, the null hypothesis ( $H_0$ ) is accepted if the calculated F value is less than the table F value. The value of  $F = 0.682$  and the value of F table = 2.01 were obtained from the results of the final data homogeneity test.  $F = 0.682$  2.01 is the same as the F value in the table, then  $H_0$  is approved. Therefore, the aggregate results of these investigations are consistent.

### Test The Difference in Average Data at The End of The Study

The purpose of the difference test of two means is to determine whether the sample groups have the same means. In this study, we compared means using the t test, discarding  $H_0$  if there was a difference of more than 5% of the total sample size. The average comparison uses the t test at a significance level of 5% Value = 10.287 from one, and Value = 1.684 from the other.  $H_0$  is wrong because = 10.287 > 1.684 =. The average critical thinking ability of students in the experimental group outperformed students in the control group.

### Results of The Effectiveness Analysis of The Discovery Learning Model Results of the Effectiveness Analysis of the Discovery Learning Model to Improve Students' Critical Thinking Ability

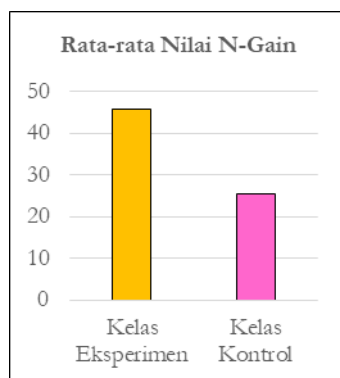
The discovery learning model was analyzed using the N-Gain test. Critical thinking skills before and after treatment of students were measured using the normalized gain test (N-Gain). The average N-Gain TKBK score for representative classes is shown in the following table.

**Table 3. TKBK Students' Average N-Gain Score**

Class	The Number of Students	Average N-Gain Value
Experiment	26	45,738
Control	22	25,548

Taking the N-Gain value in the experimental group and dividing it by the N-Gain value in the control group produces an efficiency value of 1.7903. The value of the effectiveness of discovery learning is greater

than 1, indicating that this learning is more effective than expository learning in cultivating students' critical thinking. The information in table 3 can be used to make the following diagram.



**Figure 3. The Average N-Gain Value in The Research Sample Class**

### **Results of the Effectiveness Analysis of the Discovery Learning Model to Improve Student Self-Efficacy**

The effectiveness of the discovery learning model is measured by the N-Gain metric. The purpose of this study was to test

whether students' confidence in their talents changed or not after implementing discovery learning strategies. The average value of the N-Gain test determined from the student self-efficacy questionnaire is shown in table 4 below:

**Table 4. The Average Value of Student Self-Efficacy Questionnaire N-Gain**

Class	The Number of Students	Average N-Gain Value
Experiment	26	35,478
Control	22	24,891

By comparing the N-Gain values of the test group and the control group, we can conclude that the efficiency of the test group is 1.4253. When compared to expository learning, exploratory learning is more successful in arousing students' sense of competence because its value is greater than 1.

### **Discussion**

To what extent does the discovery learning approach help students develop their critical thinking and sense of agency, this research sets out to answer that question. Students from Kayen District, Pati Regency, class V (grade five) of SDN were divided into two groups for three meetings, namely two groups: control and test. The economics-related content of fifth grade social studies texts is the focus of this analysis. Before any instructions were carried out, a pre-test was administered to the experimental and control

groups. Change in mean of experimental group from pre-test to post-test, and control compared. Studies in both control and experimental groups occurred on separate occasions. Researchers observed class teachers and students' reactions to the lessons. The teacher is responsible for conveying the content of the lesson.

### **Critical Thinking Ability of Class V Public Elementary Schools in Kayen District, Pati Regency**

This study set out to examine the differences between how students in discovery-based and expository-based classes developed their critical thinking skills. The students' pre-test and post-test scores in the intervention group and the control group were analyzed using the N-Gain approach to see how much their critical thinking had increased. Students' critical thinking is more valuable

both before and after they use the discovery learning paradigm in the experimental class.

Students who use a discovery learning approach to education develop their abilities to think analytically and critically. In addition, this methodology teaches students to critically evaluate the validity of their own conclusions based on their own experiences. This is in accordance with research findings by Azizah (2018) dan Tiana (2015) who found that critical thinking skills can encourage the growth of H.O.T.S. Students' natural curiosity can be sparked through a variety of question-based activities. As a result, students become more engaged and enthusiastic about their learning.

With exploratory learning methodology, schoolwork can actually be fun. Students' interest in learning is piqued through collaborative projects. Students' ability to understand concepts presented in class is strengthened by the social bonds they form and the anecdotes they hear from their peers during group discussions. This is in accordance with the research findings of Aryani & Wasitohadi, (2020); Kristin & Dwi, (2016); dan Yasmanto & Tatang (2017), all of whom found that the discovery learning approach teaches students to ask questions, provide evidence, and make conclusions based on their findings. The use of discovery learning models in social studies learning can help students actively develop their learning techniques through exploration and discovery activities, thus leading to deeper and meaningful understanding.

#### **Self Efficacy Class V Elementary School Students in Kayen District, Pati Regency**

The purpose of this study was to measure the increase in students' perceptions of their own abilities in the experimental class. The study of questionnaire responses from the experimental class provided information about the magnitude of the increase in students' perceptions of their own abilities. Students' self-confidence in their own abilities increases after applying the discovery learning

paradigm. Students' belief in their own skills will give them the confidence they need to set and pursue challenging goals, as well as the resilience to persevere through setbacks along the way. The ability of students to believe in their own abilities can be an asset in completing class assignments.

This is in accordance with the research findings of Kurniawati (2016); dan Utari & Syamsul, (2018) who concluded that students who believe in their own abilities are more likely to take the initiative to plan and carry out the steps needed to achieve their goals. Students' sense of self-efficacy can increase their initiative and interest in school, leading to deeper learning. Positive results or answers were obtained from students when the discovery learning approach was applied, as evidenced by observation sheets or observations made by observers during learning. Students may feel more comfortable taking risks when using the discovery learning paradigm to address problems or raise concerns in class. In addition, learning can produce an energetic, supportive, and fun classroom environment. Therefore, students can be motivated to learn, grow in their ability to solve problems, and complete class work when the discovery learning paradigm is used.

When students' confidence in their own skills is high, a discovery learning approach helps them reach their full academic potential. Students will gain confidence in their own capacity to face challenges once they develop self-efficacy.

#### **Social Studies Learning for Class V Elementary School Students in Kayen District, Pati Regency Using Expository Learning**

The control group of this study was subjected to an explanatory research strategy. Before starting teaching, students take an initial exam called a "pretest". The control group did more expository IPS learning with economic activity content. The first step in an expository lesson plan involves the instructor



sharing their pedagogical goals, their perspective on the topic being discussed, and any questions or concerns students may have. After that, the lesson was delivered by the instructor. Lecture techniques are used together with teacher guides, student guides, and student activity sheets (LKS) to carry out activities.

While discussing lesson topics and answering student questions, the instructor shows visual aids. Students do nothing but listen to the teacher and take notes as they impart knowledge. Teachers also encourage students to ask questions about concepts they do not fully understand. The instructor then responds to student questions and clarifies the information previously provided. In addition, the class as a whole draws conclusions about the content being studied. The next step is the instructor distributes homework. The instructor then said goodbye to the class.

### **Social Studies Learning for Class V Public Elementary Schools in Kayen District, Pati Regency Using the Discovery Learning Model**

In this study social studies learning with the discovery learning model was applied to the experimental class. Students are encouraged to acquire concepts and principles through their own exploration and application in the discovery learning paradigm. The instructor emphasizes using real-world examples and hands-on experiments to help students come to their own conclusions. The first step in the discovery learning paradigm is to share the desired outcomes, student perspectives, intrinsic motivation, and frequently asked questions (FAQ) about economic activities that will be discussed in class. The instructor played clips showing the many economic roles played by Indonesians. Students must pay attention during the video and think critically about what they see. The film continues with a series of questions from the teacher to the class. The teacher does this to measure the basic skill level of students. The

next step is for the children to get into groups of four or five people. Once the class is set up, the instructor distributes books and Member Worksheets. After that, they discussed LKS questions in groups. The teacher's role during these discussions is that of a facilitator, providing assistance to students as needed.

Students are guided through a critical, skilled, and independent learning process through a discovery learning approach. The instructor allots a certain amount of time for class discussion. Then, after group time is up, a representative comes forward to share what was discussed, and the other groups take notes and provide comments. At the end of the learning activity, the instructor provides comments and confirms student understanding. Next, the class discusses the overall impression of the course material. Over the course of three meetings, this task was completed. At the end of the third session, we administered a posttest using Discovery-based learning strategies to measure how well students had internalized information about the interactions between the economy and society.

Student engagement and motivation can be increased through exploratory learning models in class discussions. Students' ability to understand concepts presented in class is strengthened by the social bonds they form and the anecdotes they hear from their peers during group discussions. Naturally, this changed the time students spent on post-meeting evaluation questions.

### **CONCLUSION**

The results of the study found that when the discovery learning model was applied in classrooms, fifth grade students at Kayen Public Elementary School, Pati Regency showed a fairly good increase in critical thinking before and after the test. Apart from that, students' self-efficacy also increases when using this learning approach.

## RECOMMENDATION

The suggestion in this study is that the discovery learning model is effective for increasing students' critical thinking skills and self-efficacy in learning. So it is advisable for teachers to develop their ability to innovate in learning by attending seminars or training to increase knowledge and develop abilities. For further fields, this research can provide a development reference for further researchers.

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