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# THE EFFECTIVENESS OF THE PROBLEM BASED LEARNING AND SOCIAL SKILLS LEARNING MODEL ON THE CRITICAL THINKING ABILITY OF GRADE V STUDENTS OF SDN 101901 LUBUK PAKAM

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***ABSTRACT***
This study aims to analyze the effectiveness of the Problem Based Learning (PBL) learning model and social skills on the critical thinking skills of grade V students of SDN 101901 Lubuk Pakam in Mathematics subjects. The research method used was a quasi-experiment with a 2x2 factorial design, involving 44 students who were divided into an experimental group (using PBL) and a control group (using an expository model). Data was collected through critical thinking ability tests and social skills observations, then analyzed using the two-path ANOVA test. The results of the study showed that: (1) The PBL model was effective in improving the critical thinking skills of students, both those who had high and low social skills, with the highest average score in the PBL group and high social skills (83.00). (2) The expository model is also influential, but it is more effective in students with high social skills (80.50) than in low (68.93). (3) There is a significant interaction between learning models and social skills in influencing critical thinking skills ($p < 0.05$). The implications of this study emphasize the importance of applying the PBL model to develop critical thinking skills, especially when supported by adequate social skills. Teachers are advised to design collaborative learning that not only focuses on problem-solving, but also trains students' social skills. These findings contribute to the development of Mathematics learning strategies in primary schools, especially in the face of the demands of 21st century skills.



## INTRODUCTIONS

The development of science cannot be separated from Mathematics. For this reason, the mastery of Mathematics must be carried out from an early age so that students can keep up with the development of the times and technology in this century. Mathematics is also the basis for the development of technology in modern times and is one of the sciences that is widely used in daily life. Based on this, Mathematics needs to get serious attention in schools. (Zakiah, 2019)

Mathematics is a subject that helps students to solve problems in their daily lives. In mathematics learning, students are required to think logically, carefully, and fully calculating so as to train students to think critically. According to Cockroft (Reviva, 2020: 1) states that the reasons why Mathematics needs to be taught to students are: 1) used in daily life, 2) other learning requires mathematical skills, 3) short, strong and clear means of communication,

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4) Improves logical thinking skills, 5) Used to communicate in various ways, 6) Provides students with the ability to solve various challenging problems. (Wulandari et al., 2022)

However, the reality is that in school there are still many students who do not like mathematics lessons and are even afraid to solve math problems, especially story problems. This is because the teacher explains the mathematics lesson with the lecture method so that learning is teacher-centered. (Kusumawati et al., 2022)

Teachers as educators must improve their ability to understand and practice educational innovation. Teachers' learning methods must also be changed and adjusted to the times. Relying on the lecture method in explaining the subject matter will make learning boring. Teachers must use learning methods that make students active so that students are not bored and enthusiastic about participating in mathematics learning. ( Puspita & Goddess , 2021)

In addition to learning methods, the learning media used must also be adjusted to the development of students. This is in accordance with the statement that the difficulty of mathematics learning is caused because mathematics learning contains the concept of number science, and operational steps in solving numbers. In addition, mathematics learning requires the right way of teaching so that it can produce students' abilities. Nasution et al. (2024)

The low critical thinking ability in mathematics lessons is supported by research stating that the results of the critical thinking ability test at SDN 3 Brobawan showed that 12 out of 16 students obtained a percentage of < 50% with a relatively weak category. This is caused by 2 things, namely external and internal factors. External factors include the use of learning methods by teachers, the implementation of learning in the classroom and teacher habituation carried out to students. Internal factors include reading ability, learning motivation, students' writing ability, and students' habits. Hayati et al. (2023)

In addition, in the research of Puspita and Parma, D (2021: 86) stated that the critical thinking skills of students at SDN 10 Sungai Sapih in mathematics subjects are still low. This is characterized by the low ability of students to focus on solving mathematical problems, determining strategies for solving mathematical problems faced and choosing the right arguments in solving the mathematical problems. The study was conducted with a population of 140 students and a sample of 68 students. Based on initial observations, the average score obtained by students is below 50%. Teaching using traditional methods in mathematics lessons has many drawbacks so that students are less active in the learning process, causing students to be less able to build their own knowledge.

Research in other places, such as according to state that the critical thinking ability of students in the VA class of SDN 09 Sintang in mathematics lessons is still relatively low. This is evidenced by the 29 students, only 8 or 27.58% are able to think critically, while 21 people or 72.42% are not able to think critically. This is caused by several factors, both from the teacher and the students themselves. Factors from students include: students are still passive in the learning process, students prefer to record and memorize learning rather than understand well so that learning activities become unpleasant, most students do not understand the concept of learning, this is characterized by the ability of students to solve story problems that are not in accordance with the purpose of the question, and also students must be encouraged by the teacher to ask questions about material taught. Yudianto et al. (2025)

In the study, it was stated that the low critical thinking ability of grade 4 MI Miftahul Ulum Kralton in mathematics lessons was caused by the teacher's lack of creativity and innovation in simulating mathematics learning materials so that the teaching and learning process became boring and unpleasant. And also the lack of enthusiasm of students in following lessons and solving math problems. Education has so far only concerned with providing subject matter to students and putting aside the development of skills in thinking. Syamsudin (2020)

Meanwhile, it stated that the low critical thinking ability of grade V students of SDN 1 Metro Barat was marked by low midterm exam results. The low critical thinking ability is influenced by online learning. The methods used by teachers in online learning are less effective and efficient for students. The adaptation of online learning due to covid-19 has caused many changes to the learning process as well. For this reason, teachers must find learning methods that suit the character and development of students. The results of private universities obtained during the implementation of online learning show the low critical thinking skills of students. Riyanto et al. (2024)

This is also relevant at SDN 101901 Lubuk Pakam. Based on the results of observations that have been made, in the learning process at SDN 101901 Lubuk Pakam in class Va with 24 students and class Vb with 20 students, there

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are several problems faced by students. After the researcher made initial observations by giving 5 questions about fractions, several problems were found, including, students who were able to mention the properties of fractions according to the learning concept were only 31.8% (14 people), students who were able to mention examples of real objects related to fractions according to the learning concept were only 31.8% (14 people), students who were able to draw examples of fractions according to the learning concept were only 34.9% (15 people), Students who are able to visualize the image in question then operate fractions into formulas are only 22.7% (10 people) and students who can make props that concern fractions according to the learning concept 25% (11 people). And also low mathematics learning activities such as: 34.9% (15 people) asking questions, 29.5% (13 people) and 31.8% (14 people) asking questions.

The factors that affect the low critical thinking ability of students in mathematics lessons in this study are that students' willingness to participate in mathematics learning is still low due to the use of inappropriate learning methods. The learning method used by teachers is still conventional with a teacher-centered approach. This causes the learning process to be less active, making students bored. Students still have difficulty reading and mentioning the properties of fractions. This causes learning objectives not to be achieved.

In addition, in the learning process, children's will is also needed so that students can be active in participating in learning. However, not a few students also view learning as a boring and not very important activity such as students who are lazy, and feel reluctant to learn and do the assignments given by the teacher. Basically, with the willingness, the individual's encouragement to carry out learning activities will be carried out well. Learning will have a positive impact if the implementation of learning is carried out effectively and optimally so that it will produce useful achievements in the future.

In the learning process, one of the factors that affect the success of the learning process is the social skills of students. These social skills include building good communication with other learners, working together in a group to solve a problem well. Students are required to be active in the learning process through activities that build cooperation in solving problems, especially solving mathematical problems. This active student involvement will also provide meaningful learning for students so that they will be embedded in their memories well. Active learning will make students more likely to have a better critical thinking attitude. Critical thinking is a skill that must be possessed by 21st century students. (Twiningsih et al., 2022)

In accordance with the research, based on the regulation of the Minister of National Education Number 8 of 2024 concerning content standards, it is stated that mathematics lessons must be given equally to all students in accordance with the development of students and the times. So that students can foster awareness, self-esteem, trust and active participation and decision-making by students. This shows that mathematics learning in elementary school must make students able to keep up with the times.

Yusita et al. (2021) states that schools must prepare students to face the 21st century. Where it is expected to be full of uncertainty and limitations of natural resources. So, students must be able and competent, smart, think critically and creatively in solving problems. Based on this, learning mathematics is expected to train students' ability to solve problems, think critically and creatively. This shows that critical thinking is a very important competency to be developed in students.

Adrillian & Munahefi (2024) stating that each child's critical thinking skills are different, for that, this critical thinking ability must be trained. Critical thinking skills are the basis for analyzing arguments and developing a logical mindset. According to the statement, the mathematics score of students in Indonesia ranks 44th out of 49 countries with a score of 397. This shows the low level of critical thinking skills of students in Indonesia. S. S. Dewi et al. (2020)

The importance of critical thinking skills possessed by students is explained by: 1) the development of the times requires students to seek information to solve the problems they face, 2) students are required in the 21st century to be able to solve problems on their own, 3) students must be able to think critically in order to be able to solve the problems they face in their daily lives. Wulandari et al. (2022)

The goal of national education is not only about the academics of students but the science will be applied in the daily lives of both students individually and as community learning. As social beings, students cannot be separated

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as members of society. For this reason, good social skills are required. stating that social skills are starting to fade and are replaced by individualism along with the development of the times. According to social skills, a person is something that a person acquires by engaging in social interaction with other people, the environment to overcome various problems. Students who do not have good social skills will find it difficult to communicate and adapt in the community. Given the importance of social skills, they must be taught well in schools. Roseanne (2021) Rahmaini - Chandra (2024)

One of the strategies that can be done to overcome the various problems above is to use a learning model that involves students directly. By creating a learning innovation model, it is hoped that the learning atmosphere will be active, students will be creative, critical in dealing with problems and problems, and students will have good social skills. One of these learning models is Problem Based Learning (PBL). The focus of this learning is according to the problem so that students not only learn about concepts but also scientific methods to solve the problem. Using scientific methods to solve these problems will stimulate students' critical thinking skills. The interaction that occurs in solving these problems will create good social skills for students. Rahmadana et al. (2023)

This Problem Based Learning (PBL) model was chosen as a learning model that will overcome the various problems described above. The reason for choosing this learning model is because this model is student-centered so that learning will take place actively. PBL learning will encourage students to think critically in solving problems. According to stating that there is a difference in logical reasoning skills between students who learn using the PBL model and those who do not. With an average reasoning ability of the experimental class of 15.595% and the control class of 12.70%. According to the statement, learning using Problem Based Learning (PBL) can improve students' critical thinking skills in mathematics lessons. The success of PBL in improving students' critical thinking skills is inseparable from the advantages that PBL has. The advantage is that student-centered learning makes students active and meaningful learning occurs. Problems are solved cooperatively so that participants learn to listen to the opinions of other friends. The results of the discussion were presented to the front of the class. This helps students learn to speak in front of the class. Ramadhani (2024) Lestariningsih et al. (2024)

Based on the advantages of this PBL model, it can be seen that students' social skills also have an influence on the implementation of PBL. Such as by solving problems with discussions, listening to other friends' opinions and the process of interaction that occurs in the group. This is also in accordance with the opinion that in the PBL learning process, students will be formed in teams or groups so that each group will work together in solving problems. Working together in solving problems will lead students to actively engage in tasks, give opinions on problems, and participate in research to solve problems. Of course, this requires good social skills that students must possess in order to support the learning process using this Problem Based Learning (PBL) model. The better the social skills of students in PBL learning, the better the implementation of this PBl model in the classroom. This also supports students' critical thinking skills will increase in the learning process. Afifah et al. (2019)

Based on the background described, the researcher intends to conduct a study entitled "The Effectiveness of the Problem Based Learning (PBL) and Social Skills Learning Model on the Critical Thinking Ability of Class V Students of SDN 101901 Lubuk Pakam".

## METHOD

The type of research is *an experimental quasy research* (pseudo-experiment) with a 2 x 2 factorial design. According to the stated that *experimental quasy* is an experiment that measures impact, giving treatment and experimental units that do not use random assignments to perform comparisons in order to infer treatment-induced changes. This study is a study that uses mathematical analysis and objective measurements to analyze the data and to prove the hypothesis testing. (Asira et al., 2024)

This study is a quasi-experimental research *with* a 2 x 2 factorial design. The variable tied to this study is the critical thinking ability of class V students on fractional material. This critical thinking ability was obtained from the results of the test tested on students at the last meeting after treatment. The independent variables in this study are the problem-based learning model and the expository learning model and the moderate variable is social skills, these variables are differentiated into high and low social skills. The research design can be seen in the table below.

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**Table 3.1 Research Design**

| Social Skills | Learning Model (A) PBL | Expository |
|---|---|---|
| Height (B1 ) | A1B1 | A2B1 |
| Low (B2) | A1B2 | A2B2 |

A1B1 = The critical thinking skills of students who are taught with the PBL model and have high social skills.
A1B2 = The critical thinking skills of students who are taught with the PBL model and have low social skills.
A2B1 = The critical thinking skills of students are taught with an expository model and have high social skills.
A2B2 = The critical thinking skills of students are taught with an expository model and have low social skills.

In this study, the researcher carried out research operational activities, as follows:

a. The Problem Based Learning learning model is learning that requires students to actively and think critically to solve problems so that students can build their knowledge based on solving the problem.

b. Social skills are skills that children must have in order to be able to adapt to their environment and be well accepted so that they can develop a positive relationship with their environment. Social skills in this study are divided into two, namely low and high. To measure students' social skills, there are 6 indicators, namely: Peer Relations, Self-Management, Academic Ability, Compliance, Assertive Behavior and Self Management Conflict

c. Critical thinking is the ability of students to assess, make decisions, understand an event so as to increase understanding and solve problems well. In the research, which is meant by the ability to think critically in the ability of students to solve mathematical problems with fractional material.

Research variables are everything in the form of attributes, symbols, people, values, objects, or activities that have certain variations that are determined by the researcher to draw conclusions. The variables in this study are as follows: Independent variables (independent) of the problem-based learning model / Problem Based Learning (PBL). Dependent Variables (which are exerted) Critical Thinking and Social Skills moderator variables are differentiated on high social skills and low social skills.

The data analysis technique in this study uses inferential statistical techniques. The hypothesis was tested with a two-path variance analysis test (ANAVA) with a significant level of 0.05. Before this test is carried out, a normality test and a data homogeneity test are first carried out.

The normality requirement test can be performed with the Kolmogorf-Smirnov test with a significant level of 0.05. If the sig value > 0.05, it is said to be a normal distribution. On the other hand, if the sig value < 0.05 then it is said to be not normally distributed. The homogeneity test was carried out with the Levene test with a significant level of 0.05. If the value of sig > 0.05, it is said to be homogeneous. On the other hand, if the sig value < 0.05 then it is said to be non-homogeneous. After that, a two-track ANAVA test was carried out with SPSS.

The statistical model of this research experiment according to Syahputra (Safitri Reviva: 83) is as follows:

$$Yijk = \mu + \alpha i + \beta j + (\alpha\beta)_{Ij} + \varepsilon ijk$$ Where i = 1.2 j= 1.2 k = 1.2 ... 27

Information

| | | |
|---|---|---|
| Yijk | = | Critical thinking ability score of students who have social skills i, who get learning j |
| μ | = | Average score of actual critical thinking ability |
| αi | = | Additive influence of social skills i-i |
| βj | = | Additive influence of the learning model to j |
| $(\alpha\beta)_{Ij}$ | = | The effect of interaction of the ith skill and the j-learning model |
| εijk | = | The effect of experimental deviation from the kth student score, on the social skills taught with the j learning model |

## RESULT AND DISCUSSIONS

**Pretest of Critical Thinking Ability of Experimental Class Students**

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Before treating the experimental class, the researcher first conducted a pretest on the students' critical thinking skills. The goal is to see the students' critical thinking skills before treatment. The following is the data from the pretest results of students' critical thinking skills before treatment in the experimental class:

**Table 4.1 Pretest of Critical Thinking Ability of Experimental Class Students**

| Interval Classes | Frequency | Percentage |
|---|---|---|
| 65 – 70 | 1 | 4,55% |
| 71 -75 | 4 | 18,19% |
| 76 – 80 | 6 | 26,7% |
| 81 – 85 | 7 | 27,28% |
| 86 – 90 | 1 | 4,55% |
| 91 – 95 | 3 | 13,63% |
| **Sum** | **22** | **100%** |

Based on table 4.1 above, it was obtained that the lowest score obtained by students with the Interval Class 65 - 70 and the highest score with the Interval Class 91 - 95. The average score obtained is 80.64, the mode is with the Interval Class 81-85 class. The variant is 40.28 and the standard deviation is 6.35. Furthermore, the above frequency distribution data can be illustrated in the form of the following bar chart:

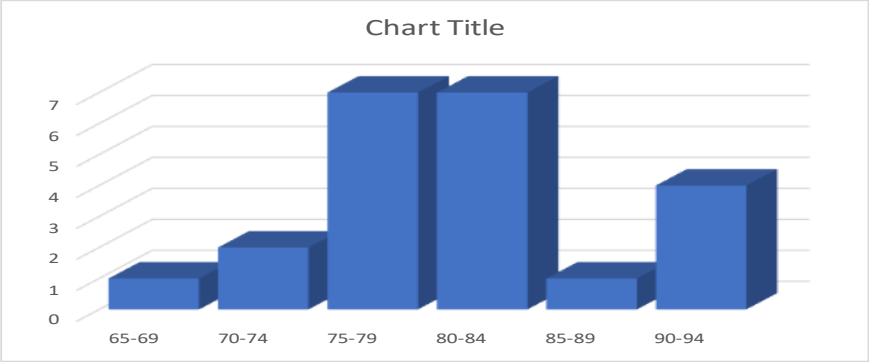


**Figure 4.1 Pretest Bar Diagram of Critical Thinking Ability of Experimental Class Students**

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Based on figure 4.1 above, it was obtained that the results of the pretest of students' critical thinking skills with the highest number of frequencies were found in the Interval Class 81 – 85 and the least frequency was found in the Interval Class 65 – 70 and 86 – 90 classes.

***Pretest* Critical Thinking Ability of Control Class Students**

Before controlling the control class, namely by applying the expository model, the researcher first conducted a pretest. The following is presented data on the results of the pretest of students' critical thinking skills in the control class.

**Table 4.2 *Pretest* Critical Thinking Ability of Control Class Students**

| Interval Classes | Frequency | Percentage |
|---|---|---|
| 56 – 60 | 2 | 9,09% |
| 61 – 65 | 4 | 18,18% |
| 66 – 70 | 5 | 22,73% |
| 71 – 75 | 5 | 22,73% |
| 76 – 80 | 3 | 13,64% |
| 81 – 85 | 2 | 9,09% |
| 86 - 90 | 0 | 0% |

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| | | |
|---|---|---|
| 91 - 95 | 1 | 4,54% |
| **Sum** | **22** | **100%** |

Based on table 4.2 above, it was obtained that the lowest score obtained by students with Interval Classes 65 - 70 was 56 and the highest score with Interval Classes 91 - 95 was 91. The average score obtained was 71. The variant is 126.002 and the standard deviation is 11.22. Furthermore, the frequency distribution data above can be illustrated in the form of the following bar chart;

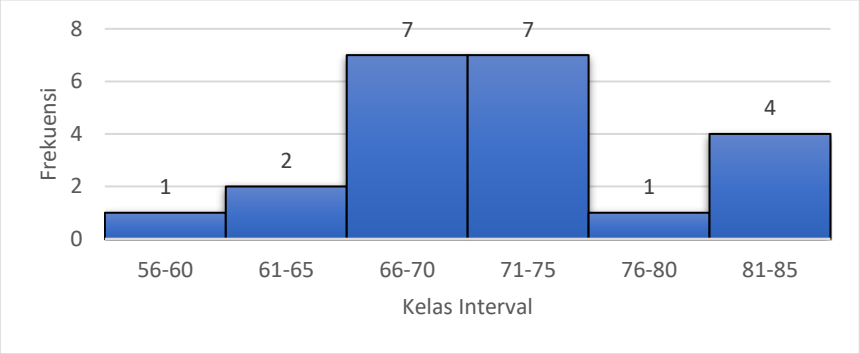


**Figure 4.2 Pretest bar chart of Critical Thinking Ability of Control Class Students**

Based on figure 4.2 above, it was obtained that the results of the pretest of students' critical thinking skills with the highest number of frequencies were found in the Interval Classes 66 - 70 and 71- 75 and also the least frequency were found in the Interval Classes 65 – 70 and 86 - 90 classes.

**Description of Social Skills of Experimental Class Students**

In addition to conducting a pretest before treatment, the researcher also saw that the students' social skills were further divided into 2 groups, namely high and low social skills. The following is the distribution of the frequency of students' social skills in the experimental class.

**Table 4.3 Frequency Distribution of Students' Social Skills in Experimental Classes**

| Low Interval Classes | Frequency | Percentage | Tall Interval Classes | Frequency | Percentage |
|---|---|---|---|---|---|
| 43 - 47 | 4 | 18,18% | 74 - 78 | 2 | 9,10% |
| 48 -52 | 5 | 22,72% | 79- 83 | 1 | 4,55% |
| 53 -57 | 2 | 9,10% | | | |
| 58 - 62 | 3 | 13,63% | | | |
| 63 - 68 | 3 | 13,63% | | | |
| 69 - 73 | 2 | 9,09% | | | |
| **Total** | **19** | **86,35%** | | **3** | **13,65%** |

Based on table 4.3, it can be seen that from 22 students in the experimental class, there were 19 students who had low social skills and 3 people who had high social skills. The frequency distribution of learners' social skills scores is visually shown in the bar chart image below:

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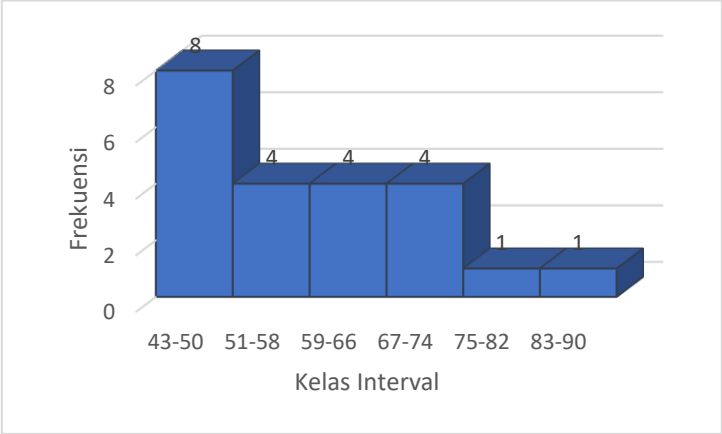


**Figure 4. 3 Experimental Class Social Skills bar chart**

Based on the picture above, it can be seen that the most frequent occurrence is the Interval Class 48 – 52 as many as 6 people.

**Description of Social Skills of Control Class Students**

Furthermore, below can be seen the distribution of frequencies of high social skills and low social skills in the control class. The following is the distribution of the frequency of students' social skills in the control class.

**Table 4.4 Distribution of Students' Social Skills Frequency in the Control Class**

| Low Interval Classes | Frequency | Percentage | Tall Interval Classes | Frequency | Percentage |
|---|---|---|---|---|---|
| 36 - 40 | 4 | 18,19% | 71 - 75 | 3 | 13,63% |
| 41 - 45 | 3 | 13,64% | 76 - 80 | 2 | 9,09% |
| 46 - 50 | 3 | 13,64% | 81 - 85 | 1 | 4,54% |
| 51 -55 | 1 | 4,54% | | | |
| 56 - 60 | 0 | 0% | | | |
| 61 - 65 | 1 | 4,54% | | | |
| 66 - 70 | 4 | 18,19% | | | |
| **Total** | **16** | **72,74%** | **Total** | **6** | **27,26%** |

Based on table 4.4, it can be seen that of the 22 students in the control class, there were 16 students who had low social skills and 7 students who had high social skills. The frequency distribution of learners' social skills scores is visually shown in the form of a bar chart below.

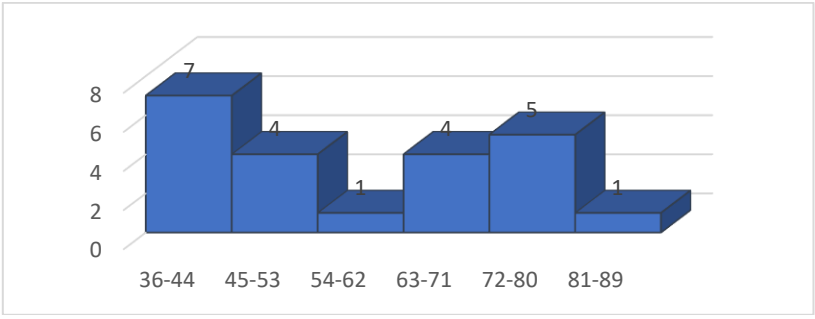


**Figure 4.4 Bar Diagram of Social Skills of Control Class Students.**

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Based on the bar chart above, we can see that the most frequencies are found in the Interval Class36 – 40 and Interval Class66 – 70.

***Postest* Critical Thinking Skills of Experimental Class Students**

Based on the data from the research results and the results of statistical calculations, it is known that the critical thinking skills of students who are taught with the model *Problem Based Learning (PBL)* got the lowest score of 72, the highest score of 87, with an average of 81.59, the variant of 11.29 and the standard deviation of 3.36. Frequency distribution of critical thinking score scores of participants who were taught using the model *Problem Based Learning (PBL)* presented in the following table.

**Table 4.5 *Postest* Students' Critical Thinking Skills in Experimental Classes**

| Interval Classes | Frequency | Percentage |
|---|---|---|
| 72 -76 | 1 | 4,55% |
| 77 - 81 | 12 | 54,54% |
| 82 – 86 | 7 | 31,81% |
| 87 – 91 | 2 | 9,10% |
| **Sum** | **22** | **100%** |

From table 4.5 above, it can be seen that students' abilities have increased compared to the pretest. The frequency distribution of critical thinking score scores of students taught with the PBL model is visually shown in the form of the following bar chart image.

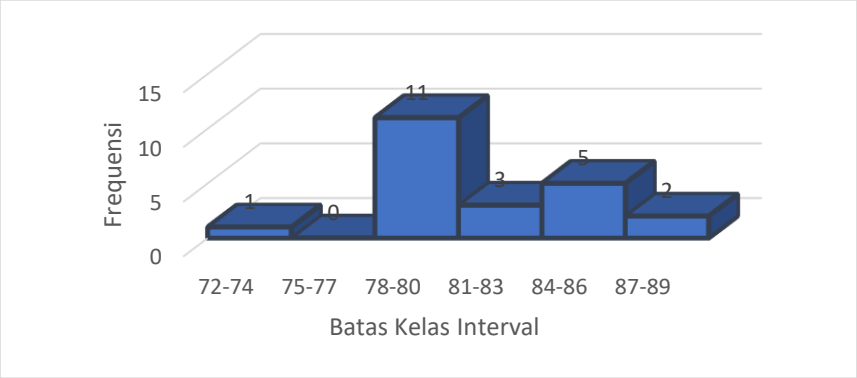


**Figure 4.5 Bar Chart of Students' Critical Thinking Skills in Experimental Classes**

***Postest* Critical Thinking Skills of Students in the Control Class.**

Based on research data and statistical calculation results, it is known that the critical thinking skills of students taught with the expository model got the lowest score of 61, the highest score of 90, with an average of 73.05, a variant of 42.50 and a standard deviation of 6.51. The frequency distribution of critical thinking ability scores of participants taught using an expository model is presented in the following table.

**Table 4.6 *Postest* Students' Critical Thinking Skills in the Control Class**

| Interval Classes | Frequency | Percentage |
|---|---|---|
| 61 – 65 | 2 | 9,10% |
| 66 – 70 | 4 | 18,18% |
| 71 – 75 | 5 | 27,73% |
| 76 – 80 | 5 | 27,73% |

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| | | |
|---|---|---|
| 81 – 85 | 3 | 13,64% |
| 86 – 90 | 2 | 9,10% |
| 91 – 95 | 0 | 4,54% |
| 96 – 100 | 1 | 13,64% |
| **Sum** | **22** | **100%** |

Based on table 4.6 above, it can be seen that the most frequencies are found in the Interval Class71 – 75 and 76 – 80 classes and the least are found in the Interval Class96 – 100 class. The frequency distribution of critical thinking skills scores of students taught with the Expository model is visually shown in the form of the following bar chart image.

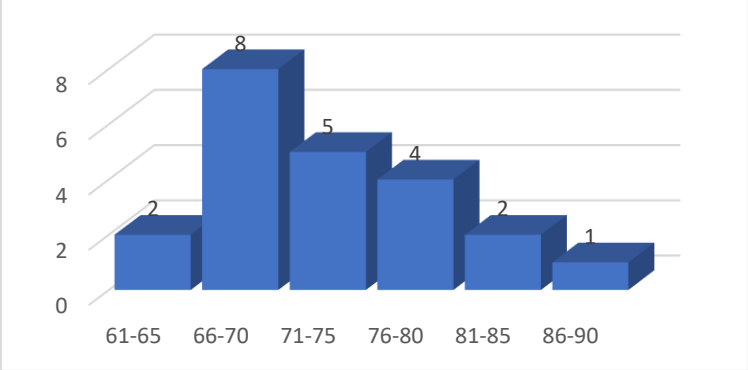


**Figure 4.6 Bar chart *Postest* Critical Thinking Skills in the Control Class.**

**Mathematical Critical Thinking Skills of Students Who Have High Social Skills**

From the data obtained and the results of statistical calculations, it is known that the mathematical critical thinking ability of students who have high social skills gets the lowest score of 62, and the highest score of 85, with an average of 75.6, a variant of 47.35 and a standard deviation of 6.88. The frequency distribution of the mathematical critical thinking ability of students who have high social skills is presented in the table below.

**Table 4.7 Frequency Distribution of Mathematical Critical Thinking Abilities of Students Who Have High Social Skills**

| Interval Classes | Frequency | Percentage (%) |
|---|---|---|
| 75 - 80 | 6 | 40% |
| 81 - 85 | 7 | 46,67% |
| 86 - 90 | 2 | 13,33% |
| **Sum** | **15** | **100%** |

From the table above, it can be seen that the highest score is found in the frequency of 81 - 85 with a percentage of 46.67%. The frequency distribution of critical thinking score scores of students who have high social skills is visually shown in the form of the following bar chart image:


**Figure 4.7 Bar Chart of Mathematical Critical Thinking Ability of Students Who Have High Social Skills.**

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From the picture, it is clear that the critical thinking skills of students who have high social skills with the lowest number of frequencies are found in the Interval 86-90 Class class with frequency 2.

**Critical Thinking Ability of Students Who Have Low Social Skills.**

Based on the data obtained in the research and the results of statistical calculations, it is known that the mathematical critical thinking ability of students who have low social skills gets the lowest score of 75, and the highest score of 98, with an average of 86.43, a variant of 140.33 and a standard deviation of 11.84. The frequency distribution of the mathematical critical thinking ability of students who have low social skills is presented in the table below.

**Table 4. 8 Frequency Distribution of Critical Thinking Ability of Students Who Have Low Social Skills**

| Interval Classes | Frequency | Percentage (%) |
|---|---|---|
| 61 – 65 | 2 | 6,90% |
| 66 – 70 | 8 | 27,58% |
| 71 – 75 | 5 | 17,24% |
| 76 – 80 | 10 | 34,49% |
| 81 – 85 | 1 | 3,45% |
| 86 – 90 | 3 | 10,34% |
| **Sum** | **29** | **17,39%** |

From the table above, it can be seen that the highest score is in the frequency of 76 – 80 with a percentage of 34.49%. The frequency distribution of critical thinking score scores of students who have high social skills is visually shown in the form of the following bar chart image:

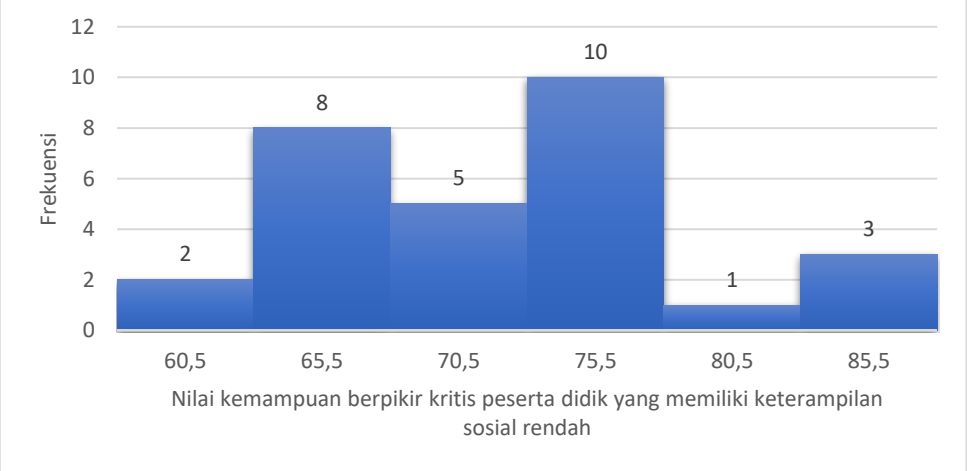


**Figure 4.8 Bar Chart of Mathematical Critical Thinking Ability of Students Who Have Low Social Skills**

From the picture, it is clear that the critical thinking skills of students who have low social skills with the lowest number of frequencies are found in the Interval Class 91 - 95 with frequency 1.

**Critical Thinking Skills of Students Taught with *the Problem Based Learning (PBL)* Model and Have High Social Skills.**

Based on the results of the study, data was obtained on the critical thinking ability of students who were taught with the PBL model and had high social skills, getting the lowest score of 80, the highest score of 86, with an average of 83, a variant of 11.89 and a standard deviation of 3.44. The frequency distribution of critical thinking skills of students taught with the *Problem Based Learning (PBL)* model has high social skills is presented in the table below.

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**Table 4. 9 Frequency Distribution of Critical Thinking Skills of Students Taught with the Model *Problem Based Learning (PBL)* and Have High Social Skills**

| Interval Classes | Frequency | Percentage (%) |
|---|---|---|
| 80 - 84 | 5 | 71,43% |
| 85 - 89 | 2 | 28,57% |
| **Sum** | **7** | **100%** |

From the table on the distribution of the frequency of critical thinking skills of students who are taught with *the Problem Based Learning (PBL)* Model and have high social skills, there are 71.43% of students who have a score of 80 - 84. The frequency distribution of critical thinking skills of students who are taught with the *Problem Based Learning (PBL)* model has high social skills is visually shown in the form of the following bar diagram:

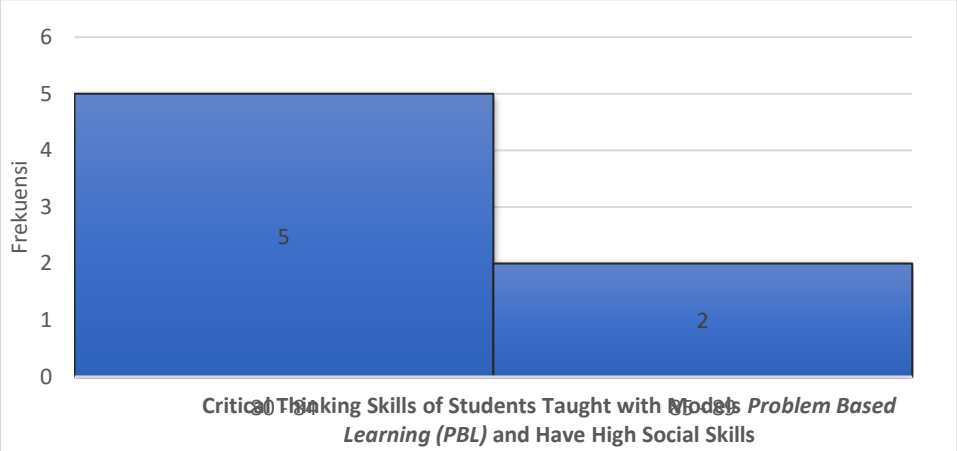


**Figure 4.9 Critical Thinking Skills of Students Taught with Models *Problem Based Learning (PBL)* and Have High Social Skills.**

Based on the figure above, the highest number of frequencies is in the Interval Class80 – 84 class with frequency 5 while the least frequency is in the Interval Class85 – 89 class with the number of frequencies 2.

**Students' Critical Thinking Skills through *Problem Based Learning (PBL)* Model and High Social Skills**

In facing the challenges of the 21st century, critical thinking skills are one of the main competencies that students must have. These abilities include the ability to analyze information, evaluate arguments, and make decisions logically and rationally. Therefore, an effective learning approach is needed to develop these abilities. One of the learning models that has proven effective is *Problem Based Learning (PBL).* In addition, another factor that also affects the success of critical thinking is the social skills that students have.

This is evidenced in table 4.20 of the critical thinking skills of students have the highest average on the use of the PBL model and high social skills with an average of 83,000. It was followed by the use of PBL models and low social skills with an average of 80,933. The average critical thinking ability of students using expository models and high social skills is 80,500 and the lowest average critical thinking ability is the use of expository models and low social skills with an average of 68,929.

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The PBL model is an approach that places students as the center of active learning. In this model, students are faced with a real problem that they have to solve independently or in groups. This process requires learners to explore relevant knowledge, develop hypotheses, and test possible solutions.

Wangid (2023) stated that learning using the PBL model begins with giving problems. This stimulates students to actively solve problems given by teachers. PBL is characterized by students collaborating with other learners in groups that bring motivation for ongoing engagement in complex tasks and enrich discussion opportunities. In discussions, students will listen and provide input on problem solving. So that the right solution to the problem is found. The higher the social skills of students, the better the communication that is established in solving problems so that solutions will be found faster. Based on this presentation, it can be concluded that the PBL learning model can be used to develop critical thinking skills.

The success of PBL implementation also depends heavily on the social skills of students. These skills include the ability to work together, communicate effectively, respect the opinions of others, and communicate ideas and solutions clearly.

Prastyo (2019) stating that students with good social skills are more effective at working in groups, presenting arguments, and considering different views. This process of social interaction strongly supports the development of critical thinking because it encourages students to express opinions with a strong foundation and is open to correction and input from peers.

The integration between the PBL model and high social skills creates a collaborative and interactive learning environment. In group discussions, learners are encouraged to defend their arguments logically, identify assumptions, evaluate evidence, and draw rational conclusions. All of these processes are an integral part of critical thinking.

Therefore, educators need not only to design challenging problem-based learning, but also create conditions that support the development of social skills through collaborative activities. This will encourage students to be active in learning, think deeper, and be able to make decisions wisely.

*The Problem Based Learning (PBL) model* has proven to be effective in improving students' critical thinking skills, especially if supported by high social skills. The combination of the two forms a learning environment that encourages deep interaction, exploration, and reflection. Thus, educators need to pay balanced attention between strengthening learning methods and developing social skills to produce students who think critically, collaboratively, and are ready to face future challenges. (Gillies et al., 2023)

**Students' Critical Thinking Skills through the Problem Based Learning (PBL) Model and Low Social Skills.**

The Problem Based Learning (PBL) **model** has proven to be one of the effective approaches to cultivate critical thinking skills. In this model, students are faced with problematic situations that require resolution through discussion, cooperation, and active exploration of information. Research by states that the use of the PBL model in integrated thematic learning in grade 5 elementary school brings great benefits, including the integration of various subjects, learning that is relevant to the real context, the improvement of critical thinking skills, more active student participation, and the development of collaborative, communicative, and creative skills. Haidir et al. (2024)

PBL provides opportunities for students to identify problems, formulate hypotheses, search for data, and evaluate the solutions obtained. This process trains students to not only passively receive information, but to develop deep reflective and analytical thinking skills.

Critical thinking is one of the main competencies in 21st century education, which needs to be developed so that students are able to face real-life challenges rationally and logically. states that critical thinking skills are related to the ability to recognize, solve, and analyze problems. Students need to have the ability to think critically, because this ability is one of the important skills that plays a big role in supporting academic and professional success in the future. Juandi (2021)

Social skills are an integral part of the success of the learning process, especially in collaborative learning models such as PBL. Stating strong social skills is an important part of a student's personal development, which not only supports their success in the school environment, but also plays a big role in their social life and future careers. Yudiana et al. (2024)

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However, there are still many students who have a low level of social skills. This is characterized by difficulty in interacting, lack of confidence when expressing opinions, and lack of ability to work together effectively. Collaborative learning has great potential in improving students' social skills, but its effectiveness can be hampered if there is an inequality of participation and problems with group dynamics. This shows that low social skills negatively impact the effectiveness of group-based learning, as it inhibits the process of discussion, collaboration, and completion of shared tasks. Labibah & Marsofiyati (2024)

Based on the results of the study, it was found that the critical thinking skills of students using PBL with low social skills had an average of 80,933. The average critical thinking ability is lower than the critical thinking ability of students using the PBL model and high social skills.

In the context of PBL, weak social skills can be a major obstacle because this learning demands active participation and interaction between learners. Therefore, the role of teachers is needed to provide social coaching, manage group dynamics well, and create a learning environment that supports the development of students' social skills.

Based on the above explanation, it can be concluded that the critical thinking ability of students using the PBL model and low social skills is lower than using the PBL model and high social skills. Social skills support the successful use of the PBL model so that it affects the average critical thinking ability of students.

**Students' Critical Thinking Skills through Expository Models and High Social Skills.**

The expository model is one of the learning approaches that emphasizes the delivery of material directly by teachers with a clear and systematic structure. Although often considered a traditional learning model, recent research shows that the expository model remains relevant and can support the development of students' critical thinking when applied with the right strategies, for example by combining the expository model with sparkling questions.

Thus, even though expository is *teacher-centered*, teachers can optimize it as a tool to instill a critical mindset through a structured and directed two-way communication process. In addition, in expository learning, teachers have a big role in facilitating the understanding of concepts through structured explanations. When accompanied by thinking stimuli such as case studies, contextual examples, and open-ended questions and answers, students are encouraged to conduct in-depth analysis and reasoning of the information conveyed. (S. Dewi et al., 2016)

However, the effectiveness of this model in building critical thinking relies heavily on the active participation of students during the learning process. When students only become recipients of information without engaging in the question and answer process or discussion, the development of critical thinking skills becomes limited.

High social skills have a great influence on the success of students in following the learning process, especially in the context of social interaction in the classroom. Students with good social skills are usually able to communicate effectively, show empathy, and be able to work together with peers and teachers. High social skills make students more confident in expressing opinions and being active in discussions, so that learning becomes more lively and meaningful.

In expository learning, high social skills will strengthen two-way interaction between teachers and students. Students who have good social skills are more likely to ask questions, answer, give opinions, and discuss new ideas that arise from the teacher's explanation. This indirectly encourages the growth of critical thinking skills because there is an exchange of ideas and a clarification process

The reality in the field using the expository model makes students bored and less active in participating in learning, thus affecting students' critical thinking skills. Based on the results of statistical calculations, the average critical thinking ability of students using the expository model and high social skills was 80,500. This average is lower than using the PBL model and high and low social skills.

Thus, it can be concluded that using the PBL model and high or low social skills are more effective in improving students' critical thinking skills in mathematics lessons with fractional material.

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**Students' Critical Thinking Skills through Expository Models and Low Social Skills**

Critical thinking skills are an important part of the learning process that aims to grow students who are not only able to receive information, but also able to evaluate, analyze, and draw logical conclusions. According to the statement, critical thinking is reflective reasoned thinking whose decision-making is based on clear indicators, references and interactions. Bonus (2007)

The expository model is a learning approach that focuses on the active role of teachers in conveying information systematically, with the hope that students can understand the material optimally. Although this model may seem one-way, with the right strategies, such as the insertion of reflective questions and the provision of contextual examples, expository learning can still stimulate students' critical thinking skills.

However, the success of this model in developing critical thinking skills is largely determined by how actively students play a role in the learning process. If students are only passive and simply receive information without engaging in discussion or question and answer activities, then the potential to practice critical thinking skills will be less than optimal.

Social skills are an important component of the learning process because they allow learners to interact, work together, and build positive relationships. However, not all students have good social skills. Students with low social skills tend to experience barriers to communication, lack confidence, are reluctant to engage in discussions, and have difficulty understanding the feelings of others. , stating low social skills can cause few students to actively respond or ask questions related to the material presented by the teacher. When doing assignments, students have difficulty communicating with their peers. They prefer to work individually rather than collaborate, so that cooperation between students in solving problems has not been built optimally. Pakpahan et al. (2025)

In the context of expository learning, low social skills can further worsen learning conditions as students become more dependent on teachers and unable to actively engage, even in question-and-answer sessions. This causes the opportunities to develop critical thinking skills to be very limited. Students who are not accustomed to expressing opinions or asking questions will have difficulty developing their critical reasoning.

Thus, low social skills are an obstacle in optimizing the potential of students' critical thinking, even in a relatively more structured expository learning model.

Based on the results of the study, the average critical thinking ability of students using the expository model and low social skills was 68,929. This average is the lowest average compared to the average critical thinking ability with the expository model and high social skills and also the average critical thinking ability with the PBL model and high and low social skills. So it can be concluded that the expository model does not support the improvement of students' critical thinking skills.

**The Interaction between Learning Models and Social Skills on Students' Critical Thinking Skills in Mathematics Lessons.**

Critical thinking skills are an important aspect of learning Mathematics because they help students analyze information, evaluate arguments, and solve problems logically and systematically. Mastery of mathematical concepts is not enough just through memorization, but must be developed through challenging and reflective thinking activities, which can be facilitated with the right learning approach.

The choice of learning model has a great influence on the development of students' critical thinking. Learning models such as *Problem Based Learning (PBL)* and expository, for example, have different impacts depending on the social characteristics of the student. Problem-based learning approaches tend to be more effective in practicing high-level thinking skills because they encourage students to explore problems, discuss, and make decisions based on reasoned reasoning. However, this approach will be optimal if it is supported by adequate social skills, such as the ability to communicate, work together, and express opinions. (Pradnyana, 2021)

In contrast, learners with low social skills tend to experience barriers in conveying ideas and participating in class discussions. This can have an impact on their lack of involvement in learning activities that are supposed to train critical thinking. mentioning that critical thinking skills are not only influenced by the type of learning, but also by the readiness of students to interact academically. Risandy et al. (2023)

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The interaction between learning models and social skills is an important key in determining the extent to which students' critical thinking skills can develop. For example, when a problem-based learning model is used on students with high social skills, the results are more significant than if applied to socially passive students. However, according to , teachers can still maximize students' critical thinking potential by adjusting learning strategies—such as using triggering questions, structured group work, or giving active roles—so that students with low social skills also have opportunities to develop. Meilani et al. (2024)

This is also supported by the results of hypothesis testing using two-path ANOVA for the fifth hypothesis, namely the interaction between learning models and social skills in influencing students' critical thinking skills, obtaining a value of Fcal = 14.361 and a significance value of 0.000 with $\alpha = 0.05$. So it can be seen that the value of sig. 0.000 < 0.005. So the hypothesis rejects Ho and accepts Ha. Thus, it can be concluded that learning models and social skills have an interactive relationship that affects critical thinking skills. Teachers need to consider a combination of the two to create adaptive and effective math learning.

## CONCLUSION

The results show that the Problem Based Learning (PBL) model has been proven to be effective in improving students' critical thinking skills, without being influenced by their social skill level. In contrast, the expository learning model only contributes to the improvement of critical thinking skills in students with high social skills, but its effectiveness is still lower than the use of the PBL model. The use of the expository model in students with low social skills has been shown to be ineffective in improving critical thinking skills. Based on the results of the two-track ANOVA test, it can be concluded that there is an interaction between learning models and social skills in influencing students' critical thinking skills, especially in mathematics learning in fractional materials.

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