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Students' mathematical communication skills viewed from mathematical resilience in probing-prompting learning with performance assessment

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Abstract: By evaluating students' performance in their mathematical communication skills and characterizing those skills in terms of their mathematical resilience, this study seeks to determine the efficacy of probing-prompting learning. A mixed method by using a sequential explanatory research design is employed. The study was conducted in two phases: first, quantitative data was collected and analyzed, then based on the findings of the quantitative data, qualitative data was collected and analyzed. The results of the research show that (1) the probing-prompting model with performance assessment is effective to improve students' mathematical communication skills and mathematical resilience and (2) based on the analysis of mathematical communication skills regarding students' mathematical resilience, it shows that students who have low stage of mathematical resilience are only able to express one indicator of mathematical communication skills, while students who have moderate and high stages of mathematical resilience are able to express five indicators of mathematical communication ability. The conclusion is probing-prompting learning with performance assessment can be used to improve students' mathematical communication skills and based on students' mathematical resilience, students also have different levels of mathematical communication skills.

Keywords: Mathematical Communication Skill, Mathematical Resilience, Performance Assessment, Probing-Prompting

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INTRODUCTION

NCTM (National Council of Teacher Mathematics) states that mathematical problem solving, mathematical communication, mathematical reasoning, mathematical connections, and mathematical representation are the five skills in mathematics learning (NCTM, 2000). It is evident that these five competences include mathematical communication skills. Apart from that, the Ministry of National Education's definition of the purpose of learning mathematics is that students must have skills of generating generalizations by applying pattern-based reasoning and the nature of performing mathematical operations, gathering evidence, and elucidating mathematical concepts and assertions, communicating ideas and thoughts through tables, diagrams, and other forms of objects in clarifying situations and realizing the value of mathematics in daily life, which includes being curious and interested in learning the subject, having a persistent mindset, and feeling confident when tackling challenges (Depdiknas, 2006). As a result, one of the most crucial mathematical skills that students should possess is

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mathematical communication skills. However, in fact, students' mathematical communication skills are comparatively poor (Hendriana & Kadarisma, 2019), both verbal and written (Hikmawati et al., 2019). Research conducted by Rahmayani and Effendi (2019) suggests that 15% of students have low mathematical communication skills, apart from that, other related research conducted by Angelina and Effendi (2021) suggests that percentage of students that have low mathematical communication skills is 17%. In this regard, the same problem also occurred at the school where the research was carried out. Considering the outcomes of the research sit's math instructors' interview, students had difficulty writing down what they knew and asked because they were still unable to understand or interpret the questions well. Apart from that, students were still not able to do calculations correctly so that the conclusions produced are still not correct, hence it may be concluded that students' communication skills in mathematics are still lacking. Attached below is information on students' initial ability test scores for the prerequisite material for social arithmetic, namely algebraic operations, which is displayed in Table 1.

Table 1. Information on Students' Initial Ability Test Scores

Class	Number of students	Number of students who passed score 75	Average
VII A	32	11	64.25
VII B	32	10	60.625
VII C	32	15	70.56
VII D	32	14	67.03

The factor causing low mathematical communication skills is students' lack of skill to communicate mathematical ideas in mathematics learning (Kusuma, 2019). This is due to the students' lack of confidence regarding skills they have, which in this case are affective skills (Hendriana & Kadarisma, 2019), one of which is mathematical resilience. When learning mathematics, mathematical resilience is a positive mindset that encompasses the following traits: a willingness to discuss, reflect, and conduct research; endurance in the face of adversity; and confidence in one's ability to succeed through hard work (Rahmatiya & Miatun, 2020). Mathematical resilience is important for students because by having mathematical resilience, self-confidence will grow so that students will get good results (Azizah & Abadi, 2022). Thus, mathematical resilience has an influence on mathematical skills, one of which is mathematical communication skills. In accordance with research conducted by Suparni et al. (2021) which reveals mathematical resilience has an effect of 11.9% on mathematical communication skills.

Another factor causing why students has low mathematical communication skills is because the use of learning models that are still traditional and tend to be monotonous (Putri & Sundayana, 2021). When putting the learning process to develop mathematical communication skills into practice, teachers need to think carefully about which learning model to use. The PBL paradigm is now the learning model utilized in classrooms. It does not seem like using this learning paradigm has helped students become better communicators of mathematics. Teachers only apply learning models that have been widely used in the past, according to the findings of interviews with mathematics educators. This is because teachers still feel confused and feel that the process of preparing materials to implement these learning models is not practical. Probing-prompting model is used in this study. One of the reasons for using the probing-prompting model in this research is that the probing-prompting model in mathematics learning is very possible for teachers to use, even in learning other subjects (Sartika & Yulita, 2019). This model has steps that include indicators of mathematical communication skills. Probing-prompting learning steps can help students analyze the information obtained and interpret the results of the analysis to make decisions. This corresponds with one of the measures of mathematical communication skills offered by Parinata and Puspaningtyas (2022)s, namely interpreting the solutions obtained or use comprehensive representations to express mathematical concepts and solutions.

Because of the probing-prompting learning stage is appropriate for the indicators of mathematical communication skills utilized in this research, the probing prompting model was used. Indicators used is the indicators presented by Parinata and Puspaningtyas (2022). The initial stage of probing-prompting learning is that in the first phase, namely knowing the students' initial abilities, the teacher quizzes the students on previously taught content that relates to the material they would be studying. Next, the second stage is situation recognition. In this stage, by giving them photos, formulas, or other scenarios with issues, teachers can introduce their students to new scenarios and have them analyze the material presented. This stage is associated with the first indicator of mathematical communication skills, which is noting the questions and what is known in a problem, and also the second indicator, namely writing down calculation operations according to the purpose of the problem.

The third phase is the presentation of knowledge. Students hold discussions with friends to carry out analysis to answer the questions asked. The fourth phase is providing feedback. After the student representative answered the question, other students also responded to the feedback given by the teacher. The fifth step, known as strengthening understanding, involves the students coming to a consensus on the subject that has been taught. This occurs when the teacher poses closing questions to various pupils, highlighting that all students have a true understanding of the learning objectives. The third and fourth phases include the third and fourth indicators of mathematical communication skills, namely interpreting the solutions obtained or using comprehensive representations to express mathematical concepts and solutions, (4) using tables, pictures, models and so on to convey explanations. The fifth phase of probing-prompting learning is related to the last indicator of mathematical communication skills, which is explaining the conclusions obtained.

Previous researches that have been carried out show that by using the probing-prompting learning approach leads to an improvement in mathematics communication skills, which conducted by Sari and Saputri (2018), Aisyah et al. (2022), and Keswari (2023). However, these studies have not used performance assessment as a companion assessment during learning. Therefore, in this research, performance assessment is integrated into probing-prompting learning as a form of learning innovation. Arhin (2015) states that performance assessment is a kind of evaluation where students must demonstrate through an activity that they have mastered particular skills and competencies and what they are capable of. The reason this performance assessment is used is that it encourages students to learn by emphasizing progress and achievement over failure and defeat, which boosts their self-confidence and involves them directly and deeply in their own learning process (Wisnuwardani & Masrukan, 2021). The assignments given by teachers at schools, especially at schools where research is conducted, are still just written assignments with the aim of getting students to practice working on questions related to the material that has been taught in class. The hope is that using this performance assessment will not only improve students' mathematical communication skills, but also students' affective attitudes towards mathematics. Thus, the purpose of this study is to evaluate the efficacy of probing-prompting learning with performance assessment to mathematical communication skills and mathematical communication skills in relation to students' mathematical resilience.

METHOD

This research uses mixed research methods, namely a research approach that combines qualitative research with quantitative research. The research design used was an explanatory sequential design, which includes quantitative data collection, quantitative data analysis, and use of the results to inform further qualitative data collection (Creswell & Clark, 2018). This research was carried out in two stages, the first stage was collecting and analyzing quantitative data, then continued with collecting and analyzing qualitative data depending on the quantitative data result.

The quantitative data in this research is in the form of students' mathematical resilience scale scores, pretest and posttest scores, then determining the result of implementing the probing-prompting model, and the results of mathematical communication skill tests which are scored according to the assessment rubric. Meanwhile qualitative data obtained from analysis of data from pretest and posttest results, and the outcome of interviews done with selected subjects. The research design at this stage was carried out using Pretest-Posttest Control Group Design, with a design as in Table 2.

Table 2. Pretest-Posttest Control Group Design

Class	Pretest	Treatment	Posttest
Experimental	O_1	X	O_2
Control	O_3	Y	O_4

The experimental class was given pretest called O_1, after that the treatment X was given experimental class, that is learning by using a probing-prompting model with performance assessment. After applying treatment X, students in the experimental class were given a post-test called O_2. Meanwhile for the control class was given pretest called O_3, after that control class was given the treatment Y, that is learning by using PBL model. Then after being given treatment Y, students in the control class were given a post-test called O_2.

The 282 students, split into 8 classes; in class VII of one of Tangerang City's junior high schools during the 2022/2023 academic year made up the study's population. When choosing the control and experimental classes, the researcher urged the teacher to take the students' classical communication skills into account. The goal of this is to facilitate the analysis of the subject's mathematical communication skills by researchers. Class VII A was found to be the control class and class VII C be the experimental class in this study. The sample was carried out using the normality, homogeneity, and similarity of averages test. The results show that the two pretest data from class VII A and class VII C are normally distributed, have the same variance, and have the same average. So, in this study the samples used were class VII A and class VII C. Next, when choosing the control class and the experimental class, the researcher requested that the teacher's consideration. This aims to make it easier for researchers to analyze the subject's mathematical communication abilities. So, in this research, class VII A is determined as the control class and class VII C is the experimental class.

Next, subjects are selected based on certain criteria in order to fulfill the required information, namely subjects with low, moderate and high stages of mathematical resilience. Of the 32 students, 2 students were selected, each representing low, moderate and high stages of mathematical resilience to become interview subjects. Purposive sampling was the method used to choose research samples in this study. This sampling is one kind of sampling that is based on certain criteria. The findings of students' mathematical resilience questionnaires, their test scores on mathematical communication skills, and their level of activity during the learning process are the factors that are being discussed here.

Tests, questionnaires, and interviews were the methods utilized to collect data. The test instrument used was a mathematical communication skill test to test students' skills after being given treatment for the experimental class and control class. The treatment probing-prompting learning model with performance assessment was applied to the experimental class, while the treatment PBL model was applied to the control class. The mathematical resilience scale instrument used in this research has been tested for validity and reliability. Interviews were conducted to collect data on the mathematical communication skills of experimental class students regarding the stage of mathematical resilience based on mathematical communication skills after applying the probing-prompting learning model with performance assessment. The instrument used was an interview guide. Interviews are conducted with reference to indicators of mathematical communication skills but are not standard, meaning that the questions can change according to the conditions of the research subject, in this case the answers written by the subject. This study used learning tools which consisted of lesson plans for the experimental and control classes, worksheets for all meetings, student assignment sheets, textbooks provided by the school, and presentation slides for linear equation lesson material. The learning instruments and tools were validated by two validators who are lecturers in the Mathematics Education study program at Semarang State University.

The quantitative data analysis technique in this study is to test the effectiveness of learning by testing three hypotheses, namely (1) test of learning completeness, (2) test of average differences in mathematical communication skills, and (3) test of improvement in mathematical communication skills. Before testing the hypothesis, the researcher first carried out prerequisite tests, there are the normality and homogeneity test. On the other hand, the qualitative data analysis methods employed in this study include collecting, reducing, presenting, and making conclusions through data analysis (Creswell & Clark, 2018).

RESULTS AND DISCUSSION

Result

The study findings offered in this study are separated into two sections: the learning effectiveness section and the description of students' mathematical communication skills section, which is divided into three stages, namely low, moderate and high mathematical resilience.

Learning Effectiveness

In this research, learning is said to be effective if: (1) the proportion of students' skills of mathematical communication using the probing-prompting learning with performance assessment reaches the limit of learning completeness, namely 75%, (2) the skills of students' mathematical communication using the probing-prompting model with performance assessment higher than students who use PBL (Problem Based Learning), and (3) there is an increasement in students' mathematical communication skills in the experimental class.

The first hypothesis test is a learning completeness test to determine the proportion of students whose mathematical communication skills are more than the KKM in mathematics learning using the probing-prompting model with a performance assessment of more than or equal to 75%. The hypothesis tested is as follows.

$H_0 : \pi \leq 0{,}75$ (The proportion of students whose score is ≥ 75 has not yet reached 75%).

$H_1 : \pi > 0{,}75$ (The proportion of students whose score is ≥ 75 has reached 75%).

With the test criteria, reject H_0 if $z_{count} \geq z_{0.5-\alpha}$ where $z_{0.5-\alpha}$ is obtained from a standard normal distribution with probability $(0.5 - \alpha)$. Based on the test results using the z formula, it was found that the $z_{count} = 1.994$, with $\alpha = 0.05$ from the standard normal list giving a value $z_{0.45} = 1.64$ which shows that $z_{count} > z_{0.5-\alpha}$ so that H_0 rejected. This means that the completeness percentage of students' mathematical communication skill test results in probing-prompting model mathematics learning with performance assessment is more than or equal to 75%.

In order to determine if the group of students using the probing-prompting learning model with performance assessment has a higher average mathematical communication skill than the group of students using PBL model, the second hypothesis test is the average difference test. This is the hypothesis that is being tested.

$H_0 : \mu_1 \leq \mu_2$ (The average mathematical communication skill of students using the probing-prompting learning model with performance assessment is not higher or the same as students who receive PBL).

$H_1 : \mu_1 > \mu_2$ (The average mathematical communication skill of students using the probing-prompting learning model with performance assessment is higher than students who receive PBL).

The significance stage used is $\alpha = 0.05, dk = (n_1 + n_2 - 1)$ and the test criteria is to accept H_0 if the value of $t_{count} < t_{1-\alpha}$. Based on the results of calculations using the t test formula, the $t_{count} = 3.73$. Because the value of $t_{count} > t_{1-\alpha}$ where $t_{1-\alpha} = 1.67$, then H_0 is rejected and H_1 is accepted. So, it can be stated that the average mathematical communication skills of students using the probing-prompting model with performance assessment is better than PBL.

Finding out whether there is a difference between the average mathematical communication skills of student groups before and after utilizing the probing-prompting learning model with performance evaluation is the goal of the third hypothesis test, which measures increasement of mathematical communication skills. This is the hypothesis that is being tested.

H_0 : $\mu_B \leq 0$ (There is no difference in average between pretest and post-test in the experimental class).

H_1 : $\mu_B > 0$ (The average difference between pretest and post-test in the experimental class is higher than 0).

Test criteria reject H_0 if $t_{count} \geq t_{1-\alpha}$. The degrees of freedom for the t distribution list are $(n - 1)$ with probability $(1 - \alpha)$. The calculations by using the t formula showed that the result of $t_{count} = 11.09$. Because the value of $t_{count} \geq t_{1-\alpha}$ where $t_{1-\alpha} = 1.70$, then H_0 is rejected and H_1 is accepted. Therefore, it can be said that the average students' mathematical communication skills were different before and after probing-prompting learning model with performance assessment was put into practice. An n-Gain test was conducted prior to statistical testing in order to gauge the degree of progress in mathematics communication skills. With an overall average N-Gain of 0.62, the growth in mathematical communication skills falls into the moderate range. Table 3 displays the N-Gain test finding in particular.

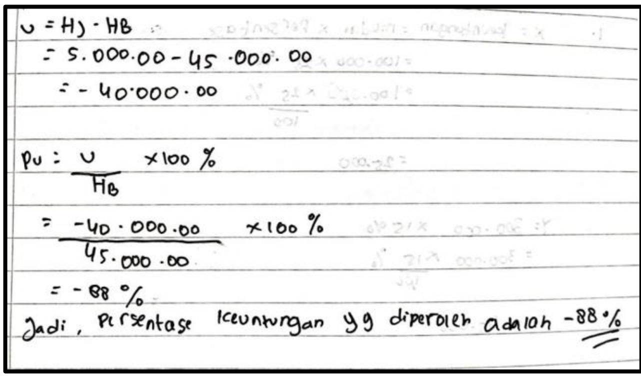
Table 3. The Results of N-Gain Test

Category	Number of Students	Percentage
High	24	75%
Moderate	7	21.875%
Low	1	3.125%

The results of the N-Gain test defined that 24 people or 75% of students experienced an increase in mathematical communication skills in the high category, 7 people or 21.875% of students experienced an increase in the moderate category, and 1 person or 3.125% of students experienced an increase in the low category. The N-Gain test' average result overall is 0.62 or the increasement of mathematical communication skills is in the moderate category.

Analysis of Students' Mathematical Communication Skills Viewed from the Stage of Mathematical Resilience

The examination of mathematical communication skills in relation to students' mathematical resilience follows, beginning with a low stage of mathematical resilience subject. Figure 1 display the outcome of the mathematical communication skill test from subject who has low stage of mathematical resilience. In the first indicator, a low stage of mathematical resilience student does not write down what they know and ask when solving problems. However, when interviewed, the subject was able to respond to the question with whatever information he had in the question. Next, the indicator writes down the calculation operation according to the purpose of the problem and the indicator interprets the solution obtained or uses a comprehensive representation to express the mathematical concept and solution. The subject did not write down the calculation operations correctly so that the solution obtained was not correct. When interviewed, the subject was still unsure about answering what formula to use in solving the questions. In the next two indicators, namely using tables, pictures, models, etc. to convey explanations and indicators explaining the conclusions obtained, the subject did not write the conclusions correctly because the subject was still mistaken in the process of solving the questions.



Trans:

$Profit = selling\ price - buying\ price$

$= 5.000.000 - 45.000.000$

$= -40.000.000$

$Profit\ percentage = \frac{profit}{buying\ price} \times 100\%$

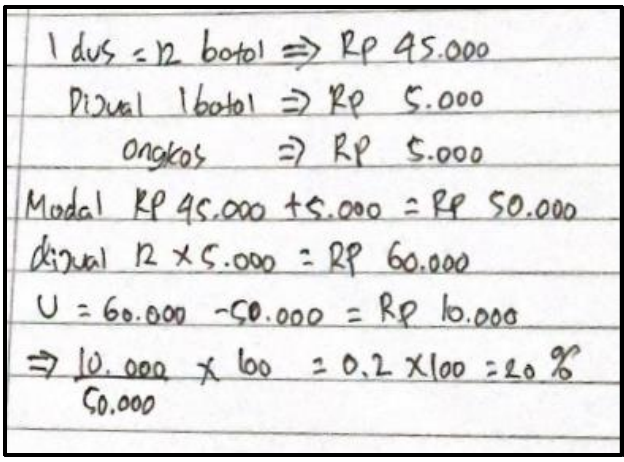
$= \frac{-40.000.000}{45.000.000} \times 100\%$

$= -88\%$

So, the percentage of profit obtained is -88%.

Figure 1. Subject Test Results with Low Mathematical Resilience Stage

Next is a description of mathematical communication skill of students who has moderate stage of mathematical resilience. Figure 2 display the result of the mathematical communication skill test of subject who has moderate stage of mathematical resilience.



Trans:

1 carton = 12 bottles => Rp45.000

Sold 1 bottle => Rp5.000

Fee => Rp5.000

Assets $Rp45.000 + Rp5.000 = Rp50.000$

Sold $12 \times 5.000 = Rp60.000$

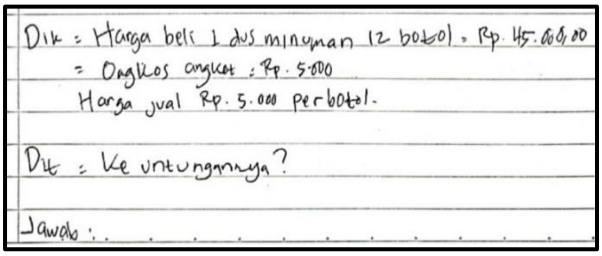
$Profit = Rp60.000 - Rp50.000 = Rp10.000$

$= \frac{10.000}{50.000} \times 100 = 0.2 \times 100 = 20\%$

Figure 2. Subject Test Results with Moderate Mathematical Resilience Stage

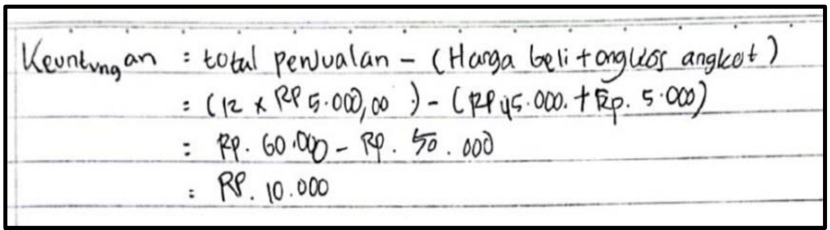
In the indicator of mathematical communication skill, writing down what is known and asked in solving problems, subjects with a moderate stage of mathematical resilience are able to write down existing information to solve problems. Subjects were also able to explain how to get the information needed to solve the questions presented. Next, the indicator writes down the calculation operations according to the purpose of the problem and the indicator interprets the solution obtained or express mathematical concepts and solutions by using a comprehensive representation. The subject is able to write and state what formula is needed to solve the problem. When confirmed again, the subject also understood the formula that should be used. Even when interviewed, the subject was able to explain the work steps correctly, so that in the next two indicators, namely using tables, pictures, models, etc. to convey explanations and indicators to explain the conclusions obtained, the subject was able to draw appropriate conclusions.

The examination of student's mathematical communication skills who has reached a high stage of mathematical resilience comes next. Figure 3 and Figure 4 display the outcomes of the mathematical communication skill test from subject who has a high stage of mathematical resilience.


Dik : Harga beli 1 dus minuman (12 botol) = Rp. 45.000,00
= Ongkos angkot : Rp. 5.000
Harga jual Rp. 5.000 per botol.
Dit : Keuntungannya?
Jawab :

Trans:
Known = Price for 1 carton of 12 bottles of drink = Rp45.000
= Public transportation costs = Rp5.000
Selling price Rp5.000 per bottle
Asked = Profit?
Answer =

Figure 3. Subject Test Results with High Mathematical Resilience Stage


Keuntungan : total penjualan – (Harga beli + ongkos angkot)
: (12 x Rp 5.000,00) – (Rp 45.000 + Rp. 5.000)
: Rp. 60.000 – Rp. 50.000
: Rp. 10.000

Trans:

Profit $= total\ sales - (buying\ price + public\ trans.costs)$

$= (12 \times Rp5.000) - (Rp45.000 + Rp5.000)$

$= Rp60.000 - Rp50.000$

$= Rp10.000$

Figure 4. Continued Subject Test Results with High Mathematical Resilience Stage

Similar to subjects who has moderate stage of mathematical resilience, on the indicator of mathematical communication skill, they write down what they know and ask in solving problems, subjects with a high stage of mathematical resilience are able to write and explain complete information based on the questions presented. In indicators, writing calculation operations according to the purpose of the problem and indicators interpreting the solutions obtained or using comprehensive representations to express mathematical concepts and solutions, high-stage mathematical resilience subjects are also able to use appropriate formulas and interpret solutions correctly. Apart from that, it can be stated that subjects with a high stage of mathematical resilience are more efficient and detailed in carrying out mathematical operations.

Furthermore, the next two indicators use tables, pictures, models, etc. to convey explanations and indicators explain the conclusions obtained. In this indicator, subjects with a high stage of mathematical resilience can make appropriate conclusions based on the work that has been done. Subjects were also able to explain again the reasons why the subject was able to conclude as they wrote on the answer sheet.

Discussion

Learning Effectiveness

The test of mathematical communication skills was given to 32 class VII C students on May 18 2023 for 60 minutes, consisting of 4 questions. After carrying out the proportion test, the result was that completeness percentage of the test results of experimental class students' mathematical communication skill in learning using the probing-prompting model with performance assessment was more than or equal to 75%. This suggests that learning with the probing-prompting model and performance assessment can help students' mathematical communication skills achieve the desired level of learning mastery, which can be used to enhance students' mathematical communication skills.

The results of calculations using the t-test formula demonstrate that there is difference of average in mathematical communication skills between students who use the PBL model and students who use the probing-prompting model with performance evaluation. Students in the experimental class used the probing-prompting model with performance evaluation to acquire an average of 80.47, whereas students in the control class used the PBL learning model to obtain an average of 75.22. Thus, it can be said that, in the comparison to PBL, students who employ the probing-prompting approach with performance assessment have stronger average mathematical communication skills. This is different with study conducted by Suwanti and Maryati (2021) which explained that classes that applied PBL had higher improvements than classes that received the probing-prompting learning model regarding mathematical representation skills. Apart from that, research conducted by Sari (2018) also stated that students using PBL approach and students using probing-prompting model did not differ in their problem solving abilities.

Students' mathematical communication skills improved both before and after the probing-prompting model with performance assessment was implanted, according to the t-test results, namely 0.61. Thus, it can be inferred that for students who employed the probing-prompting model with performance evaluation, there is a significant average difference between the pretest and posttest data, and that students' averages increased as a result of this difference. This obedient with study conducted by Wulandari et al. (2022) and Megariati (2022) that learning outcomes can be improved by using probing-prompting learning model. Apart from that, the probing-prompting model is also good to use to improve other mathematical skills, like skills of critical thinking (Susanti, 2017), skills of problem solving (Mustika & Buana, 2017), and skills of mathematical connection (Danaryanti & Tanaffasa, 2016).

Analysis of Students' Mathematical Communication Skills Viewed from the Stage of Mathematical Resilience

Mathematical communication skills are typically poor in subjects with low mathematical resilience. Distinct from individuals exhibiting moderate and high stages of mathematical resilience. While good mathematical communication skills are typically exhibited by subjects with moderate to high stages of mathematical resilience.

Subjects with low mathematical resilience were only able to express one indicator of mathematical communication skills, namely writing down what they knew and asking when solving problems. This is because subjects with low mathematical resilience tend to lack focus in the problem-solving process so that errors such as writing the final result can still occur. However, overall subjects with low mathematical resilience were able to write down the information needed to solve the problem. Apart from that, subjects with a low stage of mathematical resilience also tend to write answers directly on the answer sheet, without writing down the complete formula or solution flow. This results in subjects with a low stage of mathematical resilience being less able to reach the right conclusions. Thus, it may be said that students who have a low mathematical resilience often have incomplete problem-solving processes. Some problems are solved quite well, but some are not solved coherently. This is in line with study by Kurnia et al. (2018) that due to their lack of confidence and comprehension of the content they have studied, students with low stage mathematical resilience typically have inadequate mathematics communication skills, so that students experience difficulties when answering the questions given. When interviewed, subjects with low mathematical resilience also tend to be hesitant or silent in answering problems. This is also in line with study conducted by Nuraeni et al. (2018) who concluded that students who have weak fighting power in facing problems will produce less than optimal results, so that in the end they are unsure by the results they face. In this case, students with a low stage of mathematical resilience should try to use peer teaching methods and more often solve problems related to mathematical communication skills.

Subjects with moderate and high stages of mathematical resilience were able to express five mathematical communication skills' indicators, but there were still slight differences between subjects with moderate stages of mathematical resilience and subjects with high stages of mathematical resilience. High mathematical resilience subject is typically more thorough and efficient problem solver. The outcomes of the two subjects; interviews demonstrate this. Even though the information written by the subject was correct, the results of interviews with subjects who had a moderate stage of mathematical resilience showed that the subject was still a little hesitant in answering whatever information was known, so that subject immediately wrote down the what is known in the question without distinguishing whether the information was This is information that is known or asked about. Subjects with a high stage of mathematical resilience, on the other hand, are able to distinguish clearly between the knowledge already known and that which they need to learn.

Subjects with a moderate stage of mathematical resilience said that they already knew the formula that would be used to solve the problem, and subjects with a moderate stage of mathematical resilience also said that they knew the formula that would be used and were able to imagine what information would be used to solve the given problem. There is agreement with the opinion of Andayani and Amir (2019) that students who understand mathematical concepts will have high self-confidence in solving problems. Subjects with moderate and high stages of mathematical resilience were also able to solve problems in sequential steps. In this way, subjects with moderate and high stages of mathematical resilience are able to draw correct conclusions regarding the questions given. The results of this research are in line with research conducted by Kurnia et al. (2018), which concluded that students who have high mathematical resilience can complete mathematical communication skill test questions well, as well as students who have moderate stage of mathematical resilience can also complete mathematical communication skill tests well.

CONCLUSION

The conclusions acquired from this study are probing-prompting model with performance assessment is effective in improving students' mathematical communication skills. Apart from that, analysis regarding students' communication skills based on their stage of mathematical resilience can also be known by doing this research. Effectiveness of probing-prompting learning with performance assessment in experimental class is shown by; the proportion of students' skills of mathematical communication in experimental class was reaching the limit of learning completeness (75%), the skills of students' mathematical communication in experimental class are higher than control class, there is an improvement in students' mathematical communication skills of students in experimental class which shown by the results of the N-Gain test. It was discovered that 24 students, or 75% of students, reported improvements in mathematical communication skills (high category), 7 students, or 21.875% of students, reported improvements in moderate category, and 1 student, or 3.125% of students reported improvements in low category. This research also obtained that students' mathematical communication skills in terms of the stage of mathematical resilience show that students with low stages of mathematical resilience are only able to express one indicator of mathematical communication skills, while students with moderate and low stages of mathematical resilience are able to express five indicators of mathematical communication skills.

This research was only applied to students of grade VII and on certain subject only, so further research is needed regarding the implementation of probing-prompting model with performance assessment on other subjects. Apart from that, implementing the probing-prompting model requires quite a bit of time so that all students can contribute to the learning experiment in class. In this study, the time allocation was still insufficient so that not all students could participate actively during the learning process. It is hoped that time allocation would be adequately taken into account in subsequent studies to ensure that the probing-prompting paradigm is implemented as efficiently as possible and results in even better learning outcomes.

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DECLARATION

Author Contribution	:	CDC: Conceptualization, Writing - Original Draft, Editing and Visualization; WW: Validation and Supervision; BES: Validation and Supervision
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Conflict of Interest	:	The authors declare no conflict of interest.
Additional Information	:	Additional information is available for this paper.

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