



eISSN 3090-7012 & pISSN 3090-6822

JURNAL ILMIAH LITERASI INDONESIA

Vol. 2, No. 1, 2026

doi.org/10.63822/0h6k0h91

PP. 399-414

Homepage <https://ojs.indopublishing.or.id/index.php/jili>

Students' Critical Thinking Ability Through the Problem-Based Learning Model Assisted by Quizizz Reviewed from Learning

Salsabil Qoriroh^{1*}, Mulyono²

Mathematics Department, Universitas Negeri Semarang, Indonesia^{1,2}

Corresponding Author's Email: salsabilqoriroh@students.unnes.ac.id

Received: 10-07-2025 | Accepted: 20-07-2025 | Published: 22-05-2026

ABSTRACT

This research investigated the effectiveness of the Problem-Based Learning (PBL) model assisted by Quizizz in enhancing students' critical thinking skills and described critical thinking abilities across different learning styles (visual, auditory, kinesthetic). Employing a mixed-method approach with an explanatory sequential strategy, the study initially collected quantitative data through critical thinking tests, followed by qualitative data from learning style questionnaires and student interviews. The population comprised all seventh-grade students at SMP Negeri 23 Semarang in the /2025 academic year, with class VII C as the experimental group using PBL with Quizizz (32 students) and class VII A as the control group using Discovery Learning (32 students). Results show that the PBL-Quizizz model significantly improved critical thinking, with the experimental group achieving a higher average score (87.87) and classical completeness (93.75%) compared to the control group (77.46; 59.38%). All learning styles generally met critical thinking indicators, though some students struggled with problem comprehension.

Keywords: Critical Thinking Ability; Learning Styles; Problem Based Learning; Quizizz

How to Cite:

Qoriroh, S., & Mulyono, M. (2026). Students' Critical Thinking Ability Through the Problem-Based Learning Model Assisted by Quizizz Reviewed from Learning. *Jurnal Ilmiah Literasi Indonesia*, 2(1), 399-414. <https://doi.org/10.63822/0h6k0h91>



INTRODUCTION

Education is a process in which students can actively learn to realize their latent potential. In an effort to achieve this educational goal, Nadiem Makarim, as the Minister of Education and Culture, launched the Merdeka Learning program. This program emphasizes the importance of independent learning, where teachers and students have the freedom to achieve learning goals, choose methods, teaching materials, and assessments, as well as innovate, think critically, and develop their potential. Education is also defined as a change in attitudes and planned actions in an effort to mature humans through teaching. This process creates a learning atmosphere that allows students to actively develop their potential, including religious spiritual strength, personality, intelligence, noble morals, and skills necessary for themselves, society, nation, and country. Thus, education not only builds individual abilities and character, but also valuable national civilization. The goal is to develop individuals optimally, both physically and spiritually, so that they can improve the quality of life for themselves, families, and society.

Mathematics, as one of the main fields of science in education, has a crucial role in building logical and systematic thinking skills. As a component of the national curriculum, mathematics not only teaches basic concepts such as numbers, algebra, geometry, and statistics, but also encourages students to develop analytical thinking skills that can be applied in various aspects of life. According to Putri and Andriani (2022), learning mathematics provides a strong foundation for students to understand the relationships between concepts in depth. This interconnectedness strengthens students' ability to understand patterns, make generalizations, and solve complex problems. In the context of modern education, mathematics is also a means to train high-level thinking skills, such as critical and creative thinking, which are indispensable to face global challenges. In addition, mathematics is a universal science used to understand natural and social phenomena. A good understanding of mathematics helps students see order in daily life and provide rational solutions to the problems they face. Therefore, effective mathematics teaching is essential to shaping a generation capable of thinking logically, innovatively, and adaptively.

Facing the era of Society 5.0, it is not enough for students to just master basic skills such as reading, writing, and arithmetic; they must also have global competencies or 21st century skills. Society 5.0 is an era in which technology is centered on artificial intelligence and collaborating with humans to solve social problems, with integration between the real world and the virtual world. This era emphasizes efforts to place people at the center of innovation, using technological developments to improve quality of life, social responsibility, and sustainability. Competencies that students must master include: (1) *learning and innovative skills* (critical thinking, creativity, communication, and collaboration), (2) *knowledge, media, and technology skills*, and (3) *life and career skills*. One of the key competencies is the ability to think critically, which is a fundamental need in the 21st century. Critical thinking is a skill that requires a person to analyze an idea or idea in depth, evaluate the evidence, and make the right decisions. This ability involves mental processes such as focus, categorization, selection, and evaluation, which help students understand and process information effectively.

However, the results of international studies such as *the Programme for International Student Assessment (PISA)* show that the critical thinking skills of Indonesian students are still low. In the PISA 2022 results announced on December 5, Indonesia was ranked 69th out of 81 participating countries. Although this ranking is slightly better than PISA 2018, Indonesia's math score is 379, the same as PISA

2015. These results show that students' high-level thinking skills, especially in mathematics learning, still need to be improved. One of the causes is the low language and reasoning skills of students, which are influenced by internal factors (such as motivation and learning habits) and external factors (such as the learning methods used by teachers).

The researcher conducted an observation which was carried out in October 2024 at SMP Negeri 23 Semarang. The researcher observed teaching and learning activities in schools. Learning is still not active, this can be seen when the teacher delivers the material, the students' response to the teacher's questions when giving the material is still lacking. Students are also still reluctant to do assignments and study independently before the material is delivered. This is shown by the lack of readiness of students before learning begins. Students cannot answer questions about the prerequisite material presented by the teacher. Meanwhile, from the results of the teaching and learning activities that have been carried out, it can be concluded that the Minimum Completeness Criteria (KKM) in mathematics subjects is 75. From the questions given to 32 students, it shows that students' critical thinking skills are still low. The average obtained was 52.16 and classical completeness was 25%. The completeness criteria show the percentage of competency achievement so that it is stated with a maximum score of 100. The national completion target is expected to reach a minimum of 75.

The following is presented one of the preliminary study questions and student work results related to critical thinking skills.

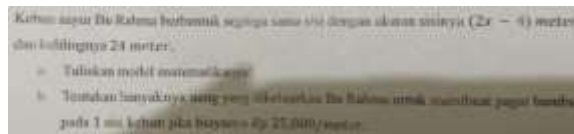


Figure 1 Preliminary study questions

One of the students' answers is shown in the following image.

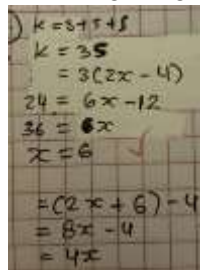


Figure 2 Student work results

Based on Figure 1 and Figure 2, it can be concluded that students cannot determine the information in the problem, students cannot solve it properly, and students cannot conclude the results of their work. Students only calculate x grades. This shows that the ability to think critically before research is still low. Based on the results of observations with mathematics teachers and the analysis of the results of students' daily tests, it shows that there are still many students who have difficulty doing problems that are different from practice questions. Thus, the critical thinking skills of SMP Negeri 23 Semarang students are still not optimal. To overcome this, innovative learning models are needed, one of which is Problem Based Learning



(PBL). PBL is a *student-centered learning model*, where students are confronted with real problems from the beginning of learning and encouraged to find solutions independently.

This model aims to develop students' critical thinking, problem-solving, and intellectual skills. The syntax of PBL includes: (1) orienting students to problems, (2) organizing students to learn, (3) guiding individual or group investigations, (4) developing and presenting results, and (5) analyzing and evaluating the problem-solving process. PBL can be combined with technology-based learning media, such as Quizizz, to increase learning effectiveness. Quizizz is a web-based platform that presents learning materials in the form of interactive games, thus making the learning process more interesting and fun. The features that Quizizz has, such as quizzes, short stories, and simulations, make it easier for teachers to convey material and evaluate students' understanding. The use of Quizizz can also be adjusted to students' learning styles, both visual, auditory, and kinesthetic, so that learning becomes more inclusive.

Learning style is an individual's preference in receiving, processing, and understanding information. There are three main types of learning styles, namely visual, auditory, and kinesthetic, each of which affects the effectiveness of learning. Janah et al.'s research shows that PBL combined with an understanding of learning styles can improve students' engagement and their critical thinking abilities. For example, visual students can be assisted with graphics-assisted materials, auditory students through group discussions, and kinesthetic students through hands-on practical activities. Based on the description above, the researcher designed PBL-assisted learning supported by Quizizz as a learning medium. This model is designed to contain content that is relevant to students' critical thinking skills, so that learning becomes active, real, and fun. Through this research, it is hoped that students can have a more meaningful learning experience and in accordance with real-world needs. Therefore, the researcher is interested in studying more deeply about "Students' Critical Thinking Ability Through the Quizizz-Assisted Problem Based Learning Model Reviewed from Learning Styles". The results of this study are expected to be a reference to improve students' critical thinking skills in mathematics learning.

METHODS

This research uses a combined qualitative and quantitative approach, known as the *mixed method*. *Mixed method* is a combination of quantitative research and qualitative research. The quantitative method was used to see the effectiveness of the *Problem Based Learning* model in obtaining students' critical thinking skills through critical thinking ability tests. As for qualitative research, it is used to analyze and describe students' critical thinking skills in the *Problem Based Learning* model for types of learning styles. In this study, the mixed method strategy used is *explanatory sequential* (a combination of the sequence model of findings). The initial stage of the research uses quantitative with the technique of collecting the results of the critical thinking ability test. Meanwhile, the next method uses a qualitative method with data collection techniques in the form of questionnaires and interviews with students. The description of the research design carried out can be seen in the table below.



Table 1 Pretest-posttest group design

O_1	X	O_2
O_3		O_4

Information:

O_1 = *Pre-test* (Before being treated) experimental class.

X = Treatment or Treatment given.

O_2 = *Post-test* (After being treated) experimental class.

O_3 = *Pre-test* (Before treatment) control class

O_4 = *Posttest* (After being treated) control class.

In the design of this study, there are two classes that are randomly selected. The first class was treated with the Quizizz-assisted Problem Based Learning model called the experimental class, while the next class was treated with the Discovery Learning model called the control class. Both classes were given a critical thinking ability test. The qualitative method uses questionnaires and interviews as a complement to primary data to describe students' learning styles and critical thinking skills.

This research was carried out at SMP Negeri 23 Semarang, Semarang City, Central Java. The population in this study is grade VII students of SMP Negeri 23 Semarang for the 2024/2025 school year which consists of 8 classes, with each class totaling 32 students.

Sampling in this study used random sampling techniques. The sample in this study was students of class VII C as the experimental class and class VII A as the control class. The research subjects for the interview were selected using the purposive sampling technique based on the results of the critical thinking ability test and their learning style in the experimental class. This study selected 6 students in the experimental class as interview subjects, namely 2 visual learning style students, 2 auditorial students, and 2 kinesthetic students.

The data collection techniques used included tests, questionnaires, and interviews related to students' critical thinking skills and learning styles in mathematics learning using PBL assisted by Quizizz. The data analysis in this study is in the form of quantitative data analysis, namely pretest and posttest data analysis of students' critical thinking skills, as well as qualitative data analysis. The initial data analyzed was the pretest data on students' critical thinking skills. The initial analysis in this study included a normality test, a homogeneity test, and an average similarity test with the help of IBM SPSS Statistics 26 software. Furthermore, the analysis of posttest data is in the form of a hypothesis test to determine the effectiveness of the treatment. There are five hypotheses tested, namely: (1) The average final test results of the critical thinking ability of students who have been given Quizizz-assisted Problem Based Learning learning at least reach a score of 75, (2) The critical thinking ability of students who get a score of more than or equal to 75 in Quizizz-assisted Problem Based Learning learning reaches the classical completeness that has been set, which is 75%, (3) The average critical thinking ability of students who learn using the Quizizz-assisted Problem Based Learning (PBL) learning model is better than the average critical thinking ability of students who learn using the Discovery Learning (DL) learning model. (4) The proportion of students who achieved a critical thinking score of at least 75 in the Quizizz-assisted Problem Based Learning (PBL) learning model was higher than the proportion of students who used the Discovery Learning (DL) learning model.

*Students' Critical Thinking Ability Through the Problem-Based Learning Model Assisted
by Quizizz Reviewed from Learning
(Qoriroh, et al.)*



In addition, qualitative data analysis in this study was carried out through data reduction, data presentation, and conclusion drawn. The results of interviews regarding students' critical thinking skills are used to triangulate the results of quantitative tests so that students' critical thinking skills can be described based on their learning style.

RESULTS & DISCUSSIONS

This research was carried out at SMP Negeri 23 Semarang, which is located at Jl. Rm. Hadisoebeno Sosro Wardoyo, RT.01/RW.07, Wonolopo, Mijen District, Semarang City. The initial observation will be carried out in October 2024 with the aim of observing teaching and learning activities and identifying the level of students' initial critical thinking skills.

Based on the results of observations, it is known that learning in the classroom is still less active and students tend to be passive in responding to teachers. Students' critical thinking skills were also identified as still low, which was shown by the acquisition of an average score of 52.16 and classical completeness only reached 25%, where this figure was still below the Minimum Completeness Criteria (KKM) for mathematics subjects, which was 75. In addition, this initial research is also the basis for considering the diversity of student learning styles which include visual, auditory, and kinesthetic categories in designing learning interventions.

1. Data Analysis of Critical Thinking Ability Pretest

The initial data analysis in this study was carried out on the pretest score data of critical thinking ability of students in grades VII A and VII C. The analysis of this initial data included a normality test, a homogeneity test, and a two-average similarity test. The pretest for the experimental class (VII C) was held on Tuesday, February 11, 2025, and for the control class (VII A) on Wednesday, February 12, 2025.

The results of the pretest showed that in both classes, both the experimental class and the control class, none of the students obtained results to reach the set minimum completeness. The experimental class had an average of 42, with the highest score of 62 and the lowest score of 28. Meanwhile, the control class had an average of 40.81, with a high score of 62 and a low score of 24. List of experimental class and control class pretest scores.

After analyzing the pretest data, it was found that the data obtained for the experimental class (VII C) and the control class (VII A) were normally distributed, with significance values respectively and , both greater than the homogeneity test (Levene test) on the pretest data showed a significance value (based on average) greater than indicating that the two classes had the same variance. Furthermore, the similarity test of the two averages (Independent Samples T-Test) on the pretest data showed a Sig. value of , which is greater than , so it was concluded that there was no difference in the average initial ability between the two groups.

2. Posttest Data Analysis of Critical Thinking Ability

The final data analysis in this study was carried out on the posttest score data of the critical thinking ability of students in grades VII A and VII C to determine whether the data meets the hypothesis that has

been submitted. The posttest for the experimental class (VII C) was held on Wednesday, February 19, 2025, and for the control class (VII A) on Thursday, February 20, 2025.

The posttest results showed that the experimental class had an average of 87.87, with a high score of 100 and a low score of 70. As many as 30 out of 32 students in this class achieved the set minimum completeness. Meanwhile, the control class had an average of 77.46, with a high score of 88 and a low score of 68. A total of 19 of the 32 students in the control class achieved the set minimum completeness. List of Posttest scores of experimental class and control class.

After conducting normality tests (*Kolmogorov-Smirnov Test*) and homogeneity tests (*Levene's Test*) on the data posttest, it was found that the data obtained for the experimental class and the control class were normally distributed (for both classes). The homogeneity test shows a significance value (based on the average) greater than showing that the posttest value of the two classes has a homogeneous variance. *Sig.* 0.365 Furthermore, the results of the hypothesis test will be explained as follows.

a. Students' Critical Thinking Skills in the Quizizz-Assisted Problem-Based Learning Model Can Achieve Classical Completeness, Which Is More Than 75% with KKM 75

Based on the results of the critical thinking ability test that has been analyzed, students in the Quizizz-assisted *Problem Based Learning learning model* were able to achieve classical completeness, which is shown by the proportion of students achieving the minimum completeness criteria (KKM) of more than 75%. The average posttest score for the experimental class was 87.87, which is greater than the KKM 75. The t-test results of one sample show a *Sig.* value that is smaller than 0.05, so H_0 is rejected. This means that the average posttest score of students' critical thinking ability in *Quizizz-assisted Problem Based Learning* has reached a minimum completeness of more than 75.

This success is closely related to the implementation of *the Problem Based Learning* model which encourages students to be more active in the learning process by facing real-world problems and developing critical thinking through an active and reflective process. The use of Quizizz also creates a more interactive and engaging classroom atmosphere, allowing for *real-time* feedback and evaluation, which helps students understand their mistakes and improve their understanding. These findings are consistent with the research of Laila Ambarwani & Yunita Sari (2025) and Anna Fertika Zalukhu et al. who showed that *the Quizizz-assisted Problem Based Learning* model significantly improved students' critical thinking skills.

b. Average Students' Critical Thinking Ability in the Quizizz-Assisted Problem-Based Learning Model is Better than the Average Student's Critical Thinking Ability in the Discovery Learning Model

The average posttest score in the class with *Quizizz-assisted Problem Based Learning* (experimental class) is while the average posttest score in the class with 87,87, *Discovery Learning* (control class) is The results of the two-average difference test (*Independent Samples T-Test*) show a *Sig.* value of less than H_0 is rejected. This result is in accordance with the researcher's hypothesis which states that the average posttest score of students' critical thinking ability in *Quizizz-assisted 77,46.0,000,0,05, Problem Based Learning* learning is higher than the average posttest score of students in *Discovery Learning learning*.

The difference in learning media used in the experimental and control classes caused a difference in the average results of the critical thinking ability test. The PBL model with Quizizz encourages active problem-solving, analysis, and discussion, leading to deeper understanding and better critical thinking skills

compared to a more passive learning approach. This is in line with the findings of Fariha et al. and Alyadani et al. who stated that the use of *the Quizizz-assisted Problem Based Learning model had a significant influence on students' critical thinking skills, as seen from the higher average test scores in the experimental class using Quizizz compared to the control class.*

c. The Proportion of Completeness of Students' Critical Thinking Ability Test Results in the Quizizz Assisted Learning Problem Based Learning Model is Higher than the Proportion of Completeness of Students' Critical Thinking Ability Test Results in the Discovery Learning Model

Based on the results of the critical thinking ability posttest, it was found that 30 out of 32 students (93.75%) in the *Quizizz-assisted Problem Based Learning* group achieved classical completeness, while only 19 out of 32 students (59.38%) in the *Discovery Learning* group completed it. Based on the results of the two-proportion difference test (z-test), a value of $z_{hitung}=3.25$ was obtained, which is greater than , so that H_0 is rejected. This result is in accordance with the researcher's hypothesis which states that the proportion of students' critical thinking ability completeness in $z_{0,5-\alpha} = 1,96$ *Quizizz-assisted Problem Based Learning* learning is higher than the proportion of student completeness in *Discovery Learning* learning.

This difference in proportions shows that learning with the Quizizz-assisted PBL model has a significant influence on the completeness of student learning outcomes, especially in the aspect of mathematical critical thinking skills. The learning process in the experimental classroom provides a greater space for students to be active in solving problems through group discussions, concept exploration, and the use of interactive media such as Quizizz which can increase engagement and motivation to learn. This is consistent with the research of Ikhwan et al. which also showed that PBL with interactive media results in higher learning completeness and improves critical thinking skills.

3. Description of Students' Critical Thinking Skills Reviewed from Learning Styles in the Quizizz Assisted Learning Problem Based Learning Model

The analysis of critical thinking skills reviewed from learning styles was carried out based on data from the results of the posttest of critical thinking skills and the results of the subject interviews. The student critical thinking ability test consists of questions adjusted to 5 indicators of critical thinking ability according to Ennis (2011): (1) Basic Clarification, (2) Basics for Decisions, (3) Inference, (4) Advanced Clarification, and (5) Strategies and Tactics. Six students from the experimental class were selected as research subjects, two from each learning style category: visual (C-13, C-01), auditory (C-02, C-32), and kinesthetic (C-15, C-23).

a. Critical thinking skills reviewed from visual learning styles

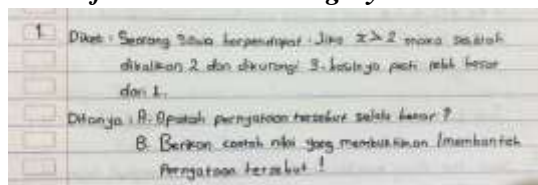


Figure 3 Understanding Question Information (Subject C-13)

Students with visual learning styles (subjects C-01 and C-13) generally show good critical thinking skills on most indicators.

- a. **Basic Clarification:** Both subjects are able to understand and write down the known information and identify the core questions in the question in a complete and concise manner. Subject C-13 focuses on "numbers and key sentences" while reading, while C-01 "imagines the process in the head".

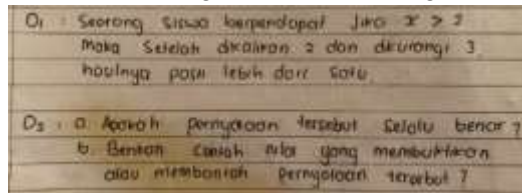


Figure 4 Understanding Question Information (Subject C-01)

- b. **Fundamentals for Decisions:** Visual learners demonstrate a good ability to do spelling for variables. Subject C-13 identifies concepts such as "no more than 64 meters" and the relevant rectangular circumference formula. However, the subject of C-01 does not explicitly list the formula used in the written test or during the interview.

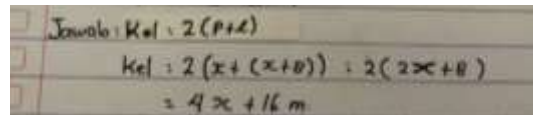


Figure 5 Variable Question Typing (Subject C-13)

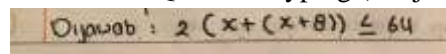


Figure 4 Question Variable Equation (Subject C-01)

- c. **Conclusion:** Both subjects were consistently able to write down the steps to solve the problem in a concise and correct manner, as well as make relevant conclusions.

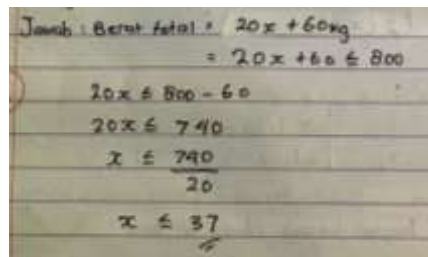


Figure 6 Problem Solving Steps (Subject C-13)

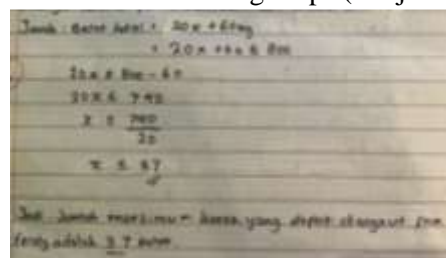
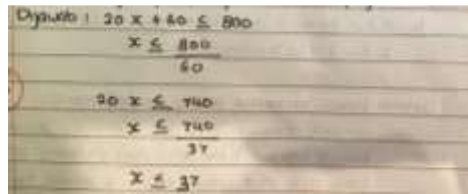


Figure 7 Relevant Conclusions of the Question (Subject C-13)



$$\begin{aligned}
 \text{Dijawab: } & 20x + 40 \leq 800 \\
 & x \leq \frac{800}{20} \\
 & x \leq 40 \\
 & 20x \leq 740 \\
 & x \leq \frac{740}{20} \\
 & x \leq 37
 \end{aligned}$$

Figure 8 Question Solving Steps (Subject C-01)

- d. **Advanced Clarification:** Visual learners can analyze the information of the question in depth and reformulate the core question in a more targeted way.

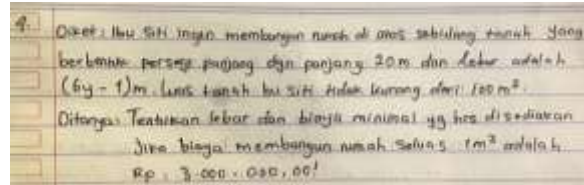
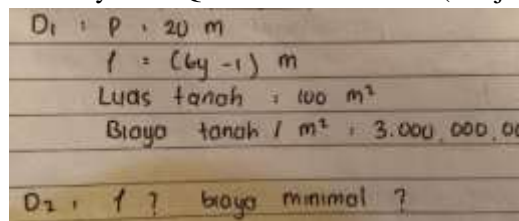


Figure 9 Analysis of Question Information (Subject C-13)



$$\begin{aligned}
 D_1: & p = 20 \text{ m} \\
 & l = (6y - 1) \text{ m} \\
 & \text{Luas tanah} = 100 \text{ m}^2 \\
 & \text{Biaya tanah / m}^2 = 3.000.000,00 \\
 D_2: & l? \text{ biaya minimal?}
 \end{aligned}$$

Figure 10 Analysis of Question Information (Subject C-01)

- e. **Strategies and Tactics:** Visual students are able to formulate and explain problem-solving strategies in a coherent and correct manner. Subject C-13 explains a systematic approach to story problems and even applies them in everyday life scenarios.

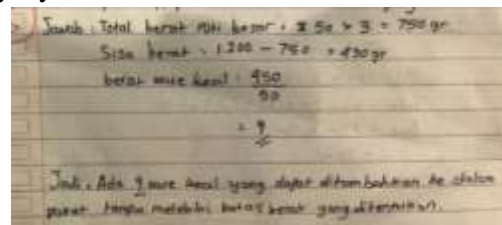
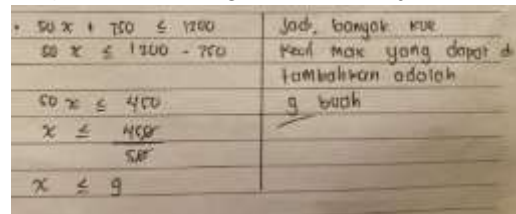


Figure 11 Solving Puzzles (Subject C-13)



$$\begin{aligned}
 & 50x + 750 \leq 1200 && \text{Jadi, banyak kue} \\
 & 50x \leq 1200 - 750 && \text{kecil max yang dapat d} \\
 & && \text{itambahkan adalah} \\
 & 50x \leq 450 && \text{9 buah} \\
 & x \leq \frac{450}{50} \\
 & x \leq 9
 \end{aligned}$$

Figure 12 Solving Collapse Problems (Subject C-01)

b Critical thinking skills reviewed from auditory learning styles

Students with auditory learning styles (subjects C-02 and C-32) were able to meet all five indicators of critical thinking ability.

- a. **Basic Clarification:** Both subjects consistently understand and write down known information and identify the core questions in complete and concise. They emphasize listening carefully ("listen carefully" for C-02, "often repeat this in your head to understand" for C-32) to process information.

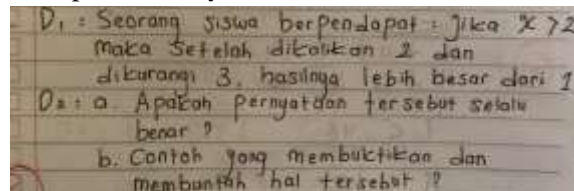


Figure 13 Understanding Question Information (Subject C-02)

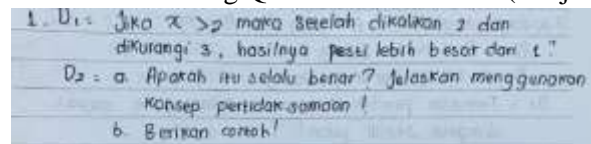
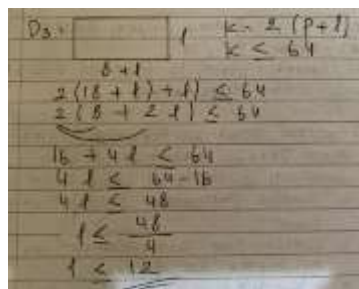


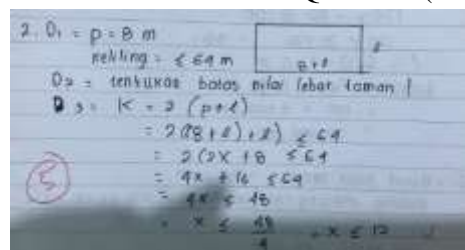
Figure 14 Understanding Question Information (Subject C-32)

- b. **Fundamentals for Decision:** Both subjects were able to accurately spell variables, name relevant formulas, and assess the relevance of the concept of inequality. C-02 recalls the formula of the "teacher's explanation".



D₃: $k = \frac{2}{3}(p+1)$
 $k \leq 64$
 $\frac{2}{3}(8+1) + 1 \leq 64$
 $\frac{2}{3}(8+1) + 1 \leq 64$
 $16 + 4 \leq 64$
 $4 \leq 64 - 16$
 $4 \leq 48$
 $1 \leq \frac{48}{4}$
 $1 \leq 12$

Figure 15 Variable Translation of Questions (Subject C-02)



2. D₁ = $p = 8m$
keliling = ≤ 64 m
D₂ = tentukan batas nilai lebar taman!
D₃ = $k = \frac{2}{3}(p+1)$
 $= \frac{2}{3}(8+1) + 1 \leq 64$
 $= \frac{2}{3}(8+1) + 1 \leq 64$
 $= 4x + 16 \leq 64$
 $= 4x \leq 48$
 $= x \leq \frac{48}{4} \Rightarrow x \leq 12$

Figure 16 Question Variable Equation (Subject C-32)

- c. **Conclusion:** Both subjects are able to write down the steps to solve the problem in a concise and correct manner, as well as make relevant conclusions.

Figure 17 Question Solving Steps (Subject C-02)

Figure 18 Problem Solving Steps (Subject C-32)

- d. **Advanced Clarification:** Auditory students can analyze the information provided in the question in more depth and reformulate the core question in a directed manner.

Figure 19 Analysis of Question Information (Subject C-02)

Figure 20 Analysis of Question Information (Subject C-32)

- e. **Strategies and Tactics:** Auditory students are able to formulate and explain problem-solving strategies in a systematic and correct manner. They explain common strategies for capacity limitation issues.

Figure 21 Solving Collapse Problems (Subject C-02)

Figure 22 Solving Problems (Subject C-32)

3.3.3 Critical thinking skills reviewed from kinesthetic learning styles

Students with kinesthetic learning styles (subjects C-15 and C-23) were able to meet all five indicators of critical thinking ability.

- a. **Basic Clarification:** Both subjects consistently understand and write down known information and identify the core questions in complete and concise. They mention physical actions such as "like to move my hands when reading questions so that they can enter more" (C-15) and "I have to move in my brain to understand" (C-23) to help with understanding.

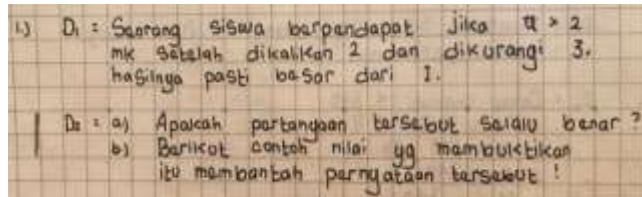


Figure 23 Understanding Question Information (Subject C-15)

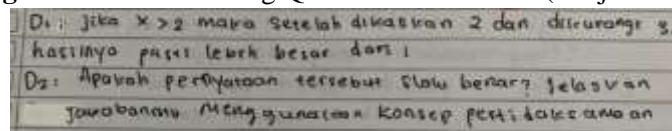


Figure 24 Understanding Question Information (Subject C-23)

- b. **Fundamentals for Decision:** Both subjects accurately performed variable reasoning, mentioned relevant formulas, and assessed the relevance of the concept of inequality. C-15 and C-23 both recall the formulas of "lessons" and "I write often". C-15 prefers "direct practice".

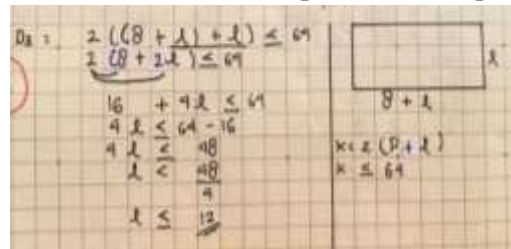


Figure 25 Variable Question Solvation (Subject C-15)

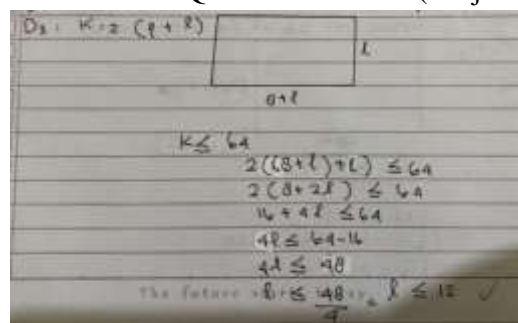


Figure 26 Variable Question Analysis (Subject C-23)

- c. **Conclusion:** Both subjects are able to write down the steps to solve the problem in a concise and correct manner, as well as make relevant conclusions. Their explanations are brief but capture the essence of the solution, often referring to practical outcomes such as "so as not to be overloaded".

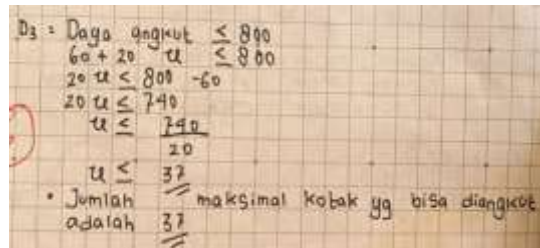


Figure 27 Question Solving Steps (Subject C-15)

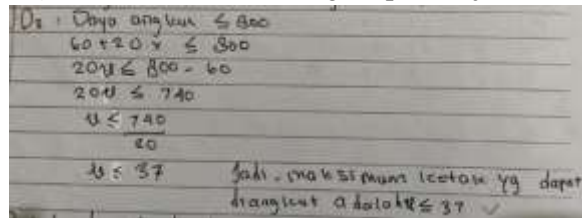


Figure 28 Question Solving Steps (Subject C-23)

- d. **Advanced Clarification:** Kinesthetic students can analyze the information provided in the question in more depth and reformulate the core questions in a targeted manner.

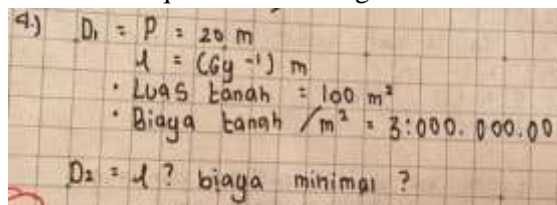


Figure 29 Analysis of Question Information (Subject C-15)

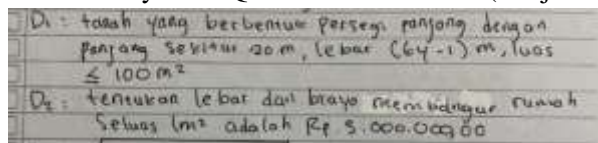


Figure 30 Analysis of Question Information (Subject C-23)

- e. **Strategies and Tactics:** Kinesthetic students are able to formulate and explain problem-solving strategies in a coherent and correct manner. They describe the common strategies applied to the issue of capacity limitations.

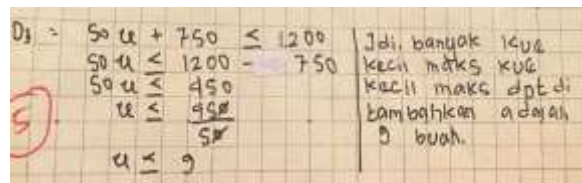
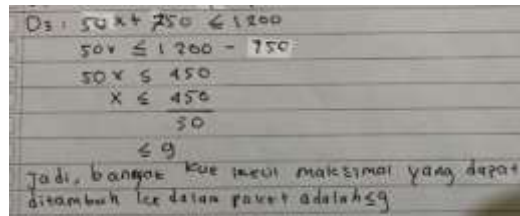


Figure 31 Solving Puzzles (Subject C-15)



Dik: $50x + 250 \leq 1200$
 $50x \leq 1200 - 250$
 $50x \leq 950$
 $x \leq \frac{950}{50}$
 $x \leq 19$
Jadi, banyak kue yang maksimal yang dapat ditambah ke dalam paket adalah 19

Figure 32 Solving Runtut Problems (Subject C-23)

Overall, these findings suggest that students in all learning styles can achieve critical thinking skills when taught using the Quiziz-assisted *Problem Based Learning* model. However, it should be noted that some students, regardless of their learning style, still have difficulty understanding math problems carefully and digesting the information of the problem perfectly, leading to a lack of detail in their solutions or reasoning. Some subjects often state "just instinct ma'am" when asked to explain the reason behind their move. This indicates that even if they can reach the correct solution, their ability to articulate the underlying thought process or mathematical concepts still needs to be honed. This suggests that there are other factors, such as early concept comprehension and accuracy, that also play an important role in students' critical thinking abilities.

CONCLUSION

Based on the results of the study, the following conclusions were obtained: (1) The Quizizz-assisted Problem Based Learning learning model was effective on the critical thinking skills of grade VII students in the One Variable Linear Inequality material at SMP Negeri 23 Semarang, this is evidenced by meeting the following criteria: (a) The average critical thinking ability of students in the class who received treatment with the Quizizz-assisted Problem Based Learning model was higher than the Criteria Minimum Completeness (KKM); (b) The critical thinking skills of students in the class who received treatment with the Quizizz-assisted Problem Based Learning model achieved classical completeness; (c) The average critical thinking ability of students in the class treated with the Quizizz-assisted Problem Based Learning model is better than the average critical thinking ability of students in the class treated with the Discovery Learning model; (d) The proportion of students who achieved learning completeness in the class treated with the Quizizz-assisted Problem Based Learning model was better than the proportion of students in the class who received treatment with the Discovery Learning model.

The description of students' critical thinking skills in the Quizizz-assisted Problem Based Learning model reviewed based on learning styles is as follows: (1) Students with visual learning styles are able to meet the indicators of critical thinking skills including Basic Clarification, Conclusion, Advanced Clarification, and Strategy and Tactics, but the Fundamentals for Decision indicators have not been met; (2) Students with auditory learning styles are able to meet the five indicators of critical thinking ability, namely Basic Clarification, Basics for Decisions, Conclusions, Advanced Clarification, and Strategies and Tactics; (3) Students with kinesthetic learning styles are also able to meet the five indicators of critical thinking ability, namely Basic Clarification, Basics for Decisions, Conclusion, Advanced Clarification, and Strategy and Tactics.



REFERENCES

- Alyadani, S., Sofyan, D., & Nurlaela, E. (2024). The application of the Problem Based Learning learning model assisted by Quizizz media to improve the critical thinking skills of grade V elementary school students. *Didactic: PGSD Scientific Journal of STKIP Subang*, 10(1), 2191–2204. <https://doi.org/10.36989/didaktik.v10i1.2760>
- Ennis, R. H. (2011). The nature of critical thinking: An outline of critical thinking dispositions and abilities. In *Sixth International Conference on Thinking* (pp. 1-8).
- Fariha, N. I., & Andrijati, N. (2024). The Problem-Based Learning model assisted by Quizizz Papermode improves critical thinking ability in mathematics learning. *Journal of Education Research and Evaluation*, 8(3). <https://doi.org/10.23887/jere.v8i3.77204>
- Ikhwan, M., Pidarta, I. M., & Suma, K. (2021). The effect of the Problem Based Learning model assisted by interactive media on the learning outcomes of science class V SD Cluster I, Selat District. *Scientific Journal of Basic Education*, 8(2), 92–100. <https://doi.org/10.31004/basicedu.v8i2.1237>
- Janah, M. C., et al. (2023). The Effect of the Problem Based Learning Model on Mathematical Learning Outcomes. *Journal of Educational Innovation*, 12(1), 45-56.
- Putri, M., & Andriani, S. (2022). Strengthening the basic concepts of mathematics in improving students' critical thinking skills. *Journal of Mathematics Education Innovation*, 10(1), 34-45.