

Remediation of Integer Operation Misconceptions for Seventh-Grade Students Through Role-Playing

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Abstract. Misconceptions in integer operations remain a common challenge among junior high school students, affecting their understanding of mathematical concepts and procedures. This study aimed to remediate these misconceptions through a role-playing approach that integrates physical and contextual learning experiences. The participants were five seventh-grade students from a junior high school in West Kalimantan, Indonesia, selected based on diagnostic test results and teacher recommendations. A descriptive qualitative design was employed, with data collected through tests, observations, interviews, and documentation. The remediation process was carried out in four systematic stages involving role simulation with physical number lines, group discussions, contextual problem-solving, and reflection. The findings revealed that students successfully overcame conceptual, procedural, and operational misconceptions, while representational misconceptions decreased considerably though still persisted in some students. Role-playing proved effective in fostering engagement and conceptual reconstruction, indicating its potential as an alternative strategy for misconception remediation. Further enhancement of visualization tools, such as number line media or digital supports, is recommended to optimize learning outcomes.

Keywords: Conceptual Understanding; Integer Operations; Misconceptions; Role-Playing; Remediation

Abstrak. Miskonsepsi dalam operasi bilangan bulat masih menjadi tantangan umum bagi siswa sekolah menengah pertama, yang berdampak pada pemahaman konsep dan prosedur matematika mereka. Penelitian ini bertujuan untuk meremediasi miskonsepsi tersebut melalui pendekatan role playing yang mengintegrasikan pengalaman belajar konkret dan kontekstual. Partisipan penelitian terdiri atas lima siswa kelas VII dari salah satu SMP di Kalimantan Barat, Indonesia, yang dipilih berdasarkan hasil tes diagnostik dan rekomendasi guru. Penelitian ini menggunakan pendekatan deskriptif kualitatif dengan teknik pengumpulan data berupa tes, observasi, wawancara, dan dokumentasi. Proses remediasi dilakukan dalam empat tahap sistematis, meliputi simulasi peran menggunakan garis bilangan konkret, diskusi kelompok, pemecahan masalah kontekstual, dan refleksi. Hasil penelitian menunjukkan bahwa siswa berhasil mengatasi miskonsepsi konseptual, prosedural, dan operasional, sementara miskonsepsi representasional menurun secara signifikan, meskipun masih dialami oleh sebagian siswa. Kegiatan role playing terbukti efektif dalam meningkatkan keterlibatan dan rekonstruksi konsep siswa, sehingga berpotensi menjadi strategi alternatif dalam remediasi miskonsepsi. Peningkatan penggunaan media visualisasi seperti garis bilangan atau dukungan digital disarankan untuk mengoptimalkan hasil belajar.

Kata kunci: Operasi Bilangan Bulat; Miskonsepsi; Pemahaman Konseptual; Role-Playing; Remediasi



INTRODUCTION

Integer operations are among the fundamental concepts in mathematics that must be well understood by junior high school students (Yanala et al., 2021). A solid understanding of integer operations, including addition, subtraction, multiplication, and division, as well as their properties such as commutative, associative, and distributive, is an important foundation for students' higher mathematics skills (Yanala et al., 2021). However, many studies have consistently reported that a significant number of junior high school students experience misconceptions about these operations, particularly in applying operational rules and interpreting number-line representations (Distari et al., 2018; Kurniati et al., 2018).

Misconceptions occur when students hold inaccurate or inaccurate understanding of the concept of integer operations (Distari et al., 2018; Kurniati et al., 2018; Manora et al., 2020). This can be caused by various factors, such as inadequate initial understanding, limited learning experience, or errors in applying concepts in integer operations (Manora et al., 2020). The existence of these factors is also reflected in the preliminary interviews conducted at a junior high school in Pontianak, which confirmed the persistence of these issues in classroom practice. Interviews with three seventh-grade students revealed that the learning that took place so far was only centered on the teacher's explanation without involving discussion or question and answer. The learning method that is too monotonous and focuses on lectures makes students feel bored and have difficulty understanding the material. Students stated that they could not receive the material well due to the lack of variety in delivery methods. This indicates weak student involvement in the learning process, which is also a contributing factor to misconceptions (Larkin, 2012).

Similar insights was also obtained from an interview with one of the seventh-grade mathematics teachers, who stated that some students are still experienced misconceptions in solving integer operation problems, especially in mixed operation problems and the use of number lines. Students often misunderstand the rules of operations such as the use of parentheses, the order of operations, and the results of adding or multiplying two negative numbers. In addition, it was found that students also had difficulty converting story problems into symbolic forms of mathematics. This information strengthens the assumption that the misconceptions experienced by students are not only caused by a weak understanding of concepts, but also by learning methods that instructional approaches that fail to promote active participation and conceptual construction (Pekel & Hasenekoğlu, 2020). Collectively, these findings reflect the existence of various factors that cause misconceptions, ranging from incomplete initial understanding, passive learning experiences, to errors in applying mathematical rules and symbols. This condition indicates the need for remediation efforts through learning strategies that can improve students' conceptual understanding.

Remediation is an effort to overcome misconceptions experienced by students (Manora et al., 2020). According to Murni et al. (2023), remediation is a form of teaching that aims to cure or correct students' misconceptions. In this study, the form of remediation used is through the role-playing approach, which is a learning method that actively involves students in playing roles related to integer operation. Through this method, students engage physically and cognitively in the learning process, allowing them to confront and revise their misconceptions. It aims to overcome the misconceptions experienced by students in understanding concepts in integer operation and improve learning outcomes that are less successful (Yen et al., 2022).

The choice of role-playing approach is motivated by the need to create active, contextual, and fun learning. In this activity, students will act as the main character, positive number, negative number, director, and recorder of the final result. This method can help students visualize abstract concepts, such as integer operations, through simulation and dramatization, enabling them to connect symbols with actions and meaning (Fadli, 2021; Watia et al., 2023). Thus, it is expected that students can build better conceptual understanding and reduce the occurrence of misconceptions.

Students who experience misconceptions about addition and subtraction of integers continuously will of course interfere with the process of understanding the next concept, namely multiplication and division of integers (Kurniati et al., 2018; Putri et al., 2021). This source of misconception will also cause difficulties in applying algebraic operations in solving mathematical problems in general. Therefore, systematic remediation efforts are necessary to rebuild accurate conceptual frameworks and ensure continuity in mathematical understanding (Hogan & Rutherford, 2020; Yazici & Şimsek, 2022). Based on these considerations, this study aims to identify the types of misconceptions experienced by students in integer operations and to describe how these misconceptions change after remediation using the role-playing approach.

METHOD

This employed a descriptive qualitative design aimed to understand the phenomena experienced by the subject, such as behavior and perceptions, through descriptions of words in a natural context (Creswell & Poth, 2018). The main characteristic of qualitative research is data collection in the form of words and pictures, not numbers. While the research subjects consisted of five seventh-grade students who had studied integer operations. The subjects were selected based on the results of the initial diagnostic test as well as the recommendation of their mathematics teacher, with the criteria of students who showed dominant misconceptions. Purposeful sampling is often used in qualitative research to select participants who can provide rich information relevant to the study focus (Patton, 2015).

Multiple instruments were used to collect, explore, and triangulate the data, namely diagnostic test and posttest, test questions and question validity, student worksheet, observation sheet, and interview guidelines. The diagnostic test and posttest consisted of questions related to the submaterial of addition and subtraction of integers (including the use of number lines), multiplication and division of integers, mixed operations of integers, and application of integer operations in simple contextual problems. The test were in descriptive form to allow students to write their thinking explicitly, making it easier to identify misconceptions. The number of diagnostic test and posttest questions were five items each. Before being used, the test questions were first tested on students outside the research subjects to see the level of difficulty, clarity of instructions, and variety of student answers. The validity of the questions was assessed through content validity by asking for an assessment from three experts (mathematics lecturers and teacher) regarding the suitability of the questions with the indicators and learning objectives.

The student worksheets were used in the action during the role-playing sessions and included several components: a role guide for each student, playing scenarios related to integer operations, practice questions related to the situation in the role-playing, and personal reflection space for students to record understanding before and after role-playing. Meanwhile, the observation sheets used to record student behavior, participation, and responses during the role-playing process, such as ability to explain roles and mathematical concepts in dialog, cooperation in the group, ability to correct misconceptions that arise during the simulation, and emotional reactions such as enthusiasm or confusion.

Interviews were conducted in two phases, namely before action (to find out the background of learning experience and students' perceptions of the material) and after role-playing (to explore changes in understanding, obstacles during activities, and students' evaluation of learning). The interview guidelines contained open-ended questions that are flexible and can be developed during the interview. In addition, documentation is done by taking photographs during the implementation of role-playing, archiving student work results (student worksheets, tests, reflection notes), and capturing important conversations during observations and interviews.

The analysis technique uses the interactive model of Akinyode & Khan (2018) through four stages. First, data collection through tests, observations, interviews, student worksheets, and documentation. Second, data reduction by sorting and selecting data that is relevant to the focus of the research. Third, data display by presenting findings in the form of descriptive narratives, tables, diagrams, and interview quotes. Lastly, conclusion drawing and verification by making temporary conclusions, then verifying them with the data collected to obtain a credible final conclusion. To ensure the validity of the data, researchers used triangulation techniques, namely comparing data

from various sources and methods (tests, interviews, observations, and documentation) to confirm the findings.

RESULTS AND DISCUSSION

Based on the diagnostic test results administered to 30 students, it was found that students demonstrated varying levels of understanding regarding integer operation. Four students showed very good understanding, 21 students showed good understanding, and five students exhibited persistent misconceptions (see Table 1). These five students (coded S1–S5) were selected for in-depth analysis and remediation, based on both test results and teacher recommendations, to ensure the focus remained on students who genuinely required conceptual support.

Table 1. List of Research Subjects

No.	Subject's Initials	Subject Code
1.	AH	S1
2.	AV	S2
3.	GB	S3
4.	KA	S4
5.	RS	S5

This selection was based on the recommendation of the mathematics teacher, ensuring a focus on students who really needed remediation. In-depth analysis of the diagnostic test answers and interviews revealed four main types of misconceptions: representational, procedural, conceptual, and operational as summarized in Table 2.

Table 2. Types of Misconceptions of Each Subject

Subject	Representational	Conceptual	Procedural	Operational
S1	✓		✓	
S2	✓	✓	✓	✓
S3	✓		✓	
S4	✓			✓
S5	✓		✓	

Representational Misconceptions

Problem 1. *On the number line, the initial position of an object is at -10. It first moves 3 units to the left, then 6 units to the right. Find the final position of the object!*

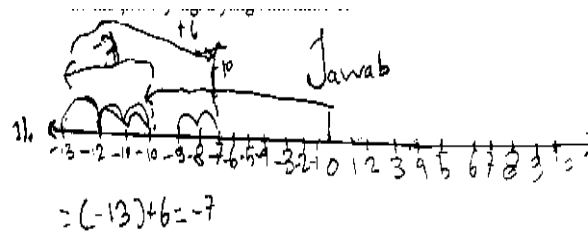


Figure 1. S1' Answer

Figure 1 shows a number line without indicating a starting point at -10. The arrows show the direction of motion but start from random numbers and the step length is inconsistent.

P : Hello S1, may I know how you depicted the result of Problem 1 on the number line?

S1 : I used a number line, but I was a bit confused about which number to start from. So, I just made a number line as I remembered.

P : Are you sure your drawing is correct?

S1 : I think so, but I'm not sure if it's right or wrong.

This indicates a misconception caused by insufficient understanding of the number line concept and limited practice in visualizing movement involving negative numbers.

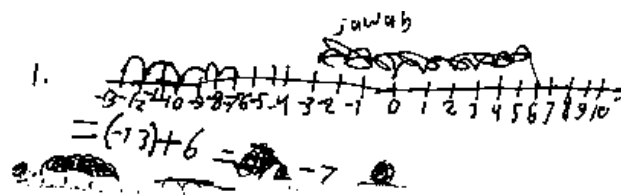


Figure 2. S3' Answer

Figure 2 shows that S3 did not determine the starting point at -10 and was confused about the steps in the number line. Figure 2 also shows a number line created without proper reference to the movement direction.

P : Hi S3, I'd like to ask how you worked on Problem 1?

S3 : I can if I directly subtract or add Miss. But, I was confused when told to draw it and I also didn't know what number to start with.

The misconception arose because S3 was unfamiliar with using visual models and lacked comprehension of how the number line represents integer operations.

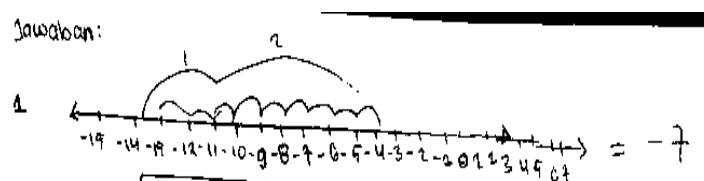


Figure 3. S4' Answer

S4 drew the number line with an unstructured sequence of numbers and inconsistent step lengths. Figure 3 shows that the direction of the arrows is inconsistent and S4 seems hesitant in determining the starting point.

P : S4, I'd like to know how you drew the number line for Problem 1?

S4 : I tried to draw a number line, but the result is a bit messy, Miss. I also forgot what number to start with.

The misconception resulted from inadequate experience using the number line as a problem-solving tool and prior learning that emphasized symbolic calculation rather than visualization. This finding supports the notion that visual representation plays a central role in students' conceptual understanding of integers (Stylianou, 2010).

Problem 2. Use a number line to solve this problem $-12 \div 3 = \dots$

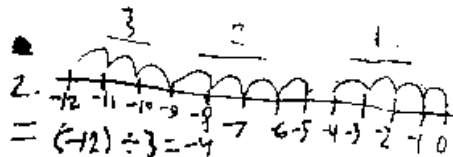


Figure 4. S3's Answer

S3 drew a number line with repeated and disconnected arrows. The arrows on the number line did not indicate an answer and the resulting number of steps was only 3 units to the left instead of 4 units to the left.

P : How about for Problem 2?

S3 : I think for Problem 2 the picture is correct like that, Miss.

This misconception stemmed from limited understanding of motion direction in division operations involving negative numbers and an incorrect visualization of division.

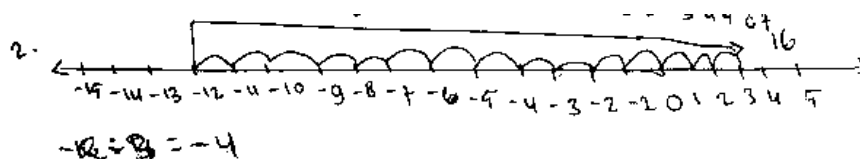


Figure 5. S4 Answer Result

S4 drew a number line with repeated arrows to the right from the starting point without consistent direction. The arrow is drawn from left to right without regard to the direction of negative division. No structure or logic of division is evident from the visual.

P : Problem 2, can you explain why it is like that?

S4 : I don't know Miss how to draw the number line. Especially for division.

This shows a representational misconception, influenced by a lack of experience relating arithmetic operations to visual representations. Students' difficulties demonstrate that symbolic manipulation is not automatically transferable to visual reasoning, highlighting the need for integrated representation instruction (Duit & Treagust, 2012).

Conceptual Misconceptions

Problem 3. Use a number line to solve this problem $-12 \div 3 = \dots$

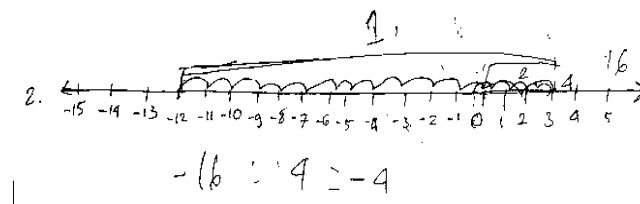


Figure 6. S2's Answer

S2 drew the number line without the correct concept of division, did not show the relevant steps, and the drawing was made simply without showing the negative division process.

P : Hi S2, can I know why you did Problem 3 like this? And why did the problem become $-16 \div 4$?

S2 : I think the question is $-16 \div 4$ Miss.

P : What about the number line?

S2 : I don't know how to draw a number line for division, so I just made it up.

The misconception was due to a weak grasp of the concept of division with negative integers and the inability to translate symbolic operations into visual representations. This supports findings that students' conceptual misconceptions arise when inverse relationships among operations are not understood (Vamvakoussi & Vosniadou, 2010)

Procedural Misconceptions



Figure 7. S5's Answer

S5 drew a number line similar to the first problem without understanding that the operations were different. The steps on the number line did not match the concept of division.

P : Hi S5, can I ask you about Problem 3?

S5 : Yes Miss, I can.

P : How did you get the answer -8?

S5 : I forgot how to divide Miss.

P : What about the number line drawing?

S5 : I think the way to draw the number line is the same as Problem 1, Miss. So, I made it like that.

This procedural misconception shows that S5 generalized previous procedures without understanding the specific steps required for division operations.

Problem 4. Jun did 20 out of 25 items test, 3 were wrong answers and the rest were correct. If a correct answer is worth 4, an incorrect answer is worth -1, and no answer is worth 0. Then Jun's test score is?

3.) $20 - 3 = 17 \times 4 = 68$
Jadi, nilai ulangan yang diperoleh jun adalah 68

Figure 8. S2's Answer

In Figure 8, it can be seen that S2 did not calculate the score of the wrong answer, so the result is wrong. Then the subtraction step is not included and the final result shows an error in the procedure.

P : For Problem 4, how did you solve it?

S2 : I forgot to subtract by 3 Miss and I thought the steps I did were enough.

The cause of the misconception was inaccuracy in the assessment procedure and not understanding the concept of penalty scoring.

3. ~~20 - 3~~ = 17 x 4 = 68

Figure 9. S3's Answer

In Figure 9 the results of S3's answer only calculate the correct score without taking into account the wrong score. The calculation is done only by multiplying the number of correct 4, without error correction.

P : Problem 4, how did you solve it?

S3 : I think the work is enough to multiply by 4, Miss.

The cause of misconception is an incomplete understanding of the scoring rules in penalty-based problems.

Operational Misconceptions

Problem 5. In a field, Han plays a kite that is flown 520 m above the ground. Due to many birds flying the kite was lowered to a height of 155 m. As the birds became more numerous, Han lowered the height of his kite to 125 m. After the birds moved away, Han raised the kite to be twice as high. What is the height of Han's kite now?

$$\begin{array}{r} 520 \\ -155 \\ \hline 365 \\ -125 \\ \hline 240 \\ \times 2 \\ \hline 480 \end{array}$$

Jadi jawaban soal tersebut adalah 480m

Figure 10. S1's Answer

S1 misunderstood the term “doubled” as addition, not multiplication. The height reduction calculation was done but the final doubling step was misinterpreted.

P : May I know for Problem 5, how did you do it?

S1 : I think I have done it correctly, Miss.

P : Can you tell me what the subtraction result of $520 - 155$ is?

S1 : I think I was wrong ma'am. 365 is the answer Miss.

P : How about the result of “twice the lump”?

S1 : It's the same as adding Miss. So, I think the result is the same if I add it.

The cause of the misconception is literal interpretation of mathematical terms and the habit of equating operations without understanding their meaning.

$$312$$

Figure 11. S3's Answer

In Figure 11 S3 did not complete the calculation and immediately gave an arbitrary number. There is no logical process in the process, the answer seems random.

P : May I know why you can answer 312?

S3 : I don't know how to do it, Miss, so I just wrote that.

The cause of misconception is a lack of understanding of the flow of work and the strategy for solving step-by-step problems.

$$4. 520 - 155 = 435 - 125 = 310 + 310 = 620m$$

Figure 12. S5's Answer

S5 added height instead of doubling it, misunderstanding “doubled” Subtraction was performed, but the concept of final multiplication was misinterpreted as addition.

- P : For problem No. 4, how did S5 solve the problem?*
S5 : I subtracted first and then I added the doubled part Miss.
P : Now for the 520 – 155 subtraction how much?
S5 : 435? No Miss, 365 is the answer.
P : What does S5 think doubling means?
S5 : I think it's the same as adding twice Miss.

The cause of the misconception is a misunderstanding of mathematical language and the influence of the habit of solving problems instantly.

$$\begin{array}{l} 4. 520 - 155 - (-125) \times 2 \\ 365 - (-250) = 615 \end{array}$$

Figure 13. S2's Answer

Figure 13 shows that S2 did not complete the calculation process and stopped at subtraction. The calculation was not completed, doubling was not done.

- P : S2 can you explain why you wrote – (–125) in your answer?*
S2 : I wrote it because I thought that lowering the height of the kite was the same as –125 Miss, so I subtracted it and then wrote –125 Miss.
P : What about the “doubled” part?
S2 : I think the steps are enough until there, Miss.

The cause of the misconception was limited understanding of the order of operations and errors in recognizing the instruction 'doubled'.

$$\begin{array}{l} 4. 520m - 155m = 365m - 125m \\ = 240m + 240m \\ = 480m \end{array}$$

Figure 14. S4's Answer

Figure 14 shows that S4 equated the term “doubled” with addition, not multiplication. After subtraction, S4 added the result twice as doubling.

P : Can you tell me how you did the steps for this problem?

S4 : I subtracted first according to the problem Miss then, to double it I added 240 m + 240 m. Because I thought it was the same as doubling Miss. Because I thought it was the same as doubling Miss.

The cause of misconception is misinterpretation of mathematical terms and limited experience using terms in the context of story problems.

Remediation Process through Role-Playing Approach

Remediation is conducted through a role-playing approach, which is designed to provide an active, contextual, and fun learning experience for students. The role-playing approach was implemented in four main stages—preparation, planning, action, and reflection—as summarized in Table 3.

Table 3. Stages of the Remediation Process

Stages	Activity Description
Preparation	Diagnostic test and data analyzed
Planning	Design the scenario (adjustes to the type of misconception found)
Action	Initial Activity
	a. Explaining the learning objectives
	b. Giving roles to students
	c. Conducting simulation
	Core Activity
	d. Students carry out roles according to scenario instructions
	e. Using number line
Reflection	f. Practicing multiplication, subtraction, division, and addition of integers through scenarios
	g. Providing direction and observing
Reflection	After role-playing, students discuss to compare results of posttest

Remediation Treatment through Role-playing Approach

Use of Physical Number Line

S2 plays the role of the main number, S1 the negative integer, S3 the positive integer, S4 the director, and S5 the result recorder. Students who play using a number line will play steps forward and backward using a large number line drawn on the floor. This helps students visualize addition and subtraction operations as movement along the number line.



Figure 15. Use of Physical Number Line

Simulation of Number Operations in Real Life

The “Buying Fruit” scenario is used to visualize addition and subtraction of integers in a familiar context. In this case, the narrative has been converted into mathematical form, so students only act out using numbers.



Figure 16. Simulation of Number Operations in Real Life

Operation Steps in Groups

Students role-play to solve mixed operations collaboratively in groups. Students work together to solve the story problem, ensuring the order of operations is appropriate (multiplication and division before addition and subtraction).



Figure 17. Operation Steps in Groups

Student Progress Results and Posttest After Remediation

Results of Student Development

The application of the role-playing approach in the remediation process showed positive results in the development of students' understanding of integer operations. During the activity, students showed active involvement, enthusiasm, and increased ability to understand and practice mathematical operations concretely. The use of concrete media such as a physical number line made of raffia rope and a simulated story of “buying fruit” helped students connect abstract concepts with real experiences.

According to Fadli (2021) and Watia et al. (2023), role-playing encourages active and contextualized learning that can strengthen concept construction through direct experience. This is evident in this study, where students are able to act out mathematical operations visually and verbally, thus strengthening the concept internalization process.

Posttest Results

The posttest results after remediation showed a significant decrease in students' misconceptions in integer operation. Of the 5 research subjects, 2 research subjects still had problems in answering questions using the number line.

The researcher also conducted interviews with students to get more information about students' experiences during the remediation process through the role-playing approach. The majority of students stated that they felt they understood the integer operation better after participating in the remediation.

Problem 1. *On the number line, the initial position of an object is at 6. The object first moves -4 units to the left, then 8 units to the left. Find the final position of the object!*

Problem 2. *Use a number line to solve this problem $15 \div (-3) = \dots$*

Problem 3. *Jun did 18 out of 30 test questions, 4 answers were wrong and the rest were correct. If a correct answer is worth 5, an incorrect answer is worth -2 , and no answer is worth 0. Then Jun's test score is?*

Problem 4. *In a field, Han plays a kite that is flown 680 m above the ground. Due to many birds flying the kite was lowered to a height of 225 m. As the birds became more numerous, Han lowered the height of his kite to 250 m. After the birds moved away, Han raised the kite 3 times higher. What is the height of Han's kite now?*

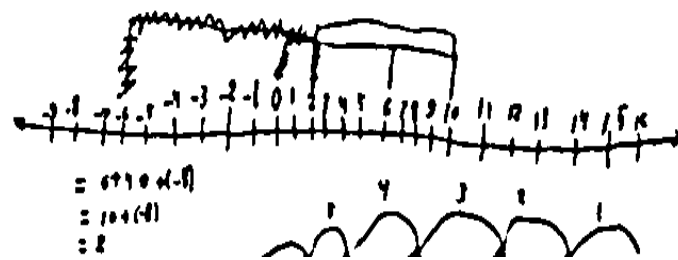


Figure 18. S3 Answer Result

In Figure 18 S3 was confused about the starting point of the number line. The number line was drawn without a clear starting point and the arrows were drawn randomly without the appropriate orientation.

P : Hi S3, may I know how you drew the number line for problem No. 1?

S3 : I'm confused Miss where to start.

The cause of representational misconceptions is the lack of understanding of the number line structure and the lack of spatial skills to represent number operations in S3.

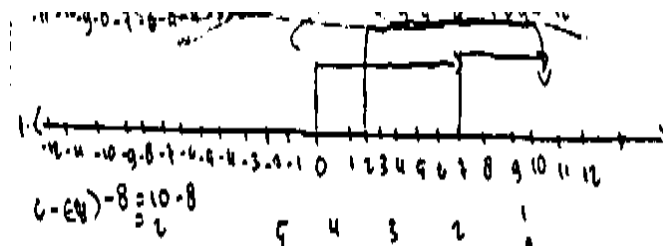


Figure 19. S4 Answer Result

In Figure 19, S4 misplaced the starting point and direction on the number line. The first arrow starts with the number 7, not from the point where it should be. The direction of the second arrow was also not in accordance with the question instructions.

P : Hello S4, I would like to ask you if the number line you drew is correct?

S4 : I think it's correct Miss.

P : On the number line, what number do you start from?

S4 : Number 7 Miss.

P : In the problem, what number should you start from?

S4 : 6 Miss.

P : What number does the second arrow point to?

S4 : 10 Miss.

P : Is the direction of the arrow correct?

S4 : No, Miss.

The misunderstanding of the initial position and direction of motion on the number line, as well as the lack of practice in reading the question order carefully, caused S4's representational misconception.

After remediation, posttest results showed a substantial reduction in misconceptions (see Table 4). Only two students (S3 and S4) still experienced minor representational difficulties in number line tasks, while conceptual and operational misunderstandings were fully resolved.

Table 4. Results Before and After Remediation

Misconceptions	Before	After
Representational	100% of students have misconceptions (students are not able to represent integer operations visually, especially using number lines)	60% correct, and 40% of students still have difficulty representing the number line correctly.
Conceptual	20% of students misunderstand the basic concepts of integer operations, such as subtraction of negative numbers and division.	100% of all students understand the basic concepts after remediation.
Procedural	100% of students have procedural misconceptions in the steps and order of mixed operations.	100% of students were able to solve mixed operation problems and there were no students who misunderstood the sign of integer operations after remediation.
Operational	40% of students misunderstand the sign function of mathematics operations, such as subtraction of negative numbers and multiplying by 2.	100% of students were able to solve mixed operation problems and there were no students who misunderstood the sign of integer operations after remediation.

These results indicate that the role-playing approach effectively reduces misconceptions by promoting embodied, visual, and contextual understanding. Students' interviews also revealed increased motivation and engagement, consistent with studies highlighting the role of active learning in fostering conceptual change (Hogan & Rutherford, 2020; Yazici & Şimsek, 2022). Overall, the findings reinforce the importance of interactive and visual-based instruction in remediating students' misconceptions in integer operations. The integration of role-playing supports both cognitive and affective domains, making mathematics more meaningful and less intimidating for junior high school students.

CONCLUSION

The implementation of remediation through the role-playing approach resulted in improved students' understanding of integer operations, particularly in conceptual, procedural, and operational aspects. These types of misconceptions were successfully remediated in all students, while representational misconceptions decreased significantly, although a few still persisted. Learning activities involving role simulation, number line visualization, and group discussion provided meaningful and engaging learning experiences that encouraged students to actively reconstruct their understanding. This finding supports the idea that well-designed role-playing can

effectively remediate mathematical misconceptions. In practice, teachers are encouraged to integrate role-playing strategies with visual aids such as number lines to strengthen conceptual understanding and engagement. Future research may explore the use of digital or interactive media to enhance visualization and retention of mathematical concepts.

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