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Sequence Indicators of Junior High School Students' Mathematical Imagination Abilities

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Abstract:
Each student has a different level of mathematical imagination ability. To find out the level of mathematical imagination ability, it is first necessary to arrange indicators of mathematical imagination ability based on the sequence of appearance from the earliest. The participants of this study were 20 8th grade students consisting of 13 female students and 7 male students. This research is a descriptive qualitative research. Assist instruments in this study consisted of written tests in the form of essays, interview guidelines, and observation sheets. Data analysis was performed by data reduction, data display, and conclusion drawing. The results obtained from this study are sequence indicators of junior high school students' mathematical imagination abilities namely, sensibility, intuition, crystallization, transformation, exploration, elaboration, productivity, effectiveness, novelty

Keywords: Junior high school students; mathematical imagination abilities; Sequence Indicators.

INTRODUCTION

Imagination is the basis of all creative activity (Vygotsky, 2004). Developing mathematical creativity in junior high school students is one of the important goals of school mathematics education(Leikin, 2009). All products produced by humans are the result of imagination. Certain types of imagination that can be developed in learning mathematics is called mathematical imagination (Nemiroysky. Dkk, 2009). Mathematical imagination needs to be raised so that students more easily understand abstract mathematical material. Imagination is a form of mathematical thinking transition, from the real world to the world of symbols (Tall, 2008). Thus, the ability of mathematical imagination is needed, especially by

junior school students where they are in the transition phase of thinking the real world to the world of symbols.

The ability of mathematical imagination has several indicators. However, no one has examined the relationship between these indicators. So far, these indicators have been seen as separate parts. So it is necessary to conduct research on the relationship between these indicators. As expected, each of these indicators are interrelated and sequential. This is based on the definition of each indicator and several different representations made by students in solving problems that illustrate mathematical imagination (Wulke. Dkk, (2006).

Based on the description above, the problem to be solved in this study is how the sequence indicators of junior high school students' mathematical imagination ability? So, based on the results of this study, it is hoped that later it can be used to analyze the level of junior high school students' mathematical imagination ability. And it can be used as a reference by teachers in school in improving the quality of education. The quality of education can be realized if the learning process is carried out effectively, namely the learning process can run smoothly, directed, and in accordance with the learning objectives (Septia.dkk, (2018). The indicators to measure junior high school students' mathematical imagination ability are as follows (Liang.dkk, 2012).

1. Exploration is the ability to explore the unknown.
2. Productivity is the ability to produce many ideas.
3. Intuition is the ability to produce direct associations to the target.
4. Effectiveness is the ability to produce effective ideas for the desired goals.
5. Transformation is the ability to perform tasks by changing knowledge in various fields of study.
6. Elaboration is the ability to seek improvement by formalizing ideas.
7. Crystallization is the ability to express abstract ideas using real examples.
8. Sensibility is the ability to evoke feelings during the creation process.
9. Novelty is the ability to create unusual ideas.

RESEARCH METHOD

The preparation of indicators of students' mathematical imagination abilities is done by using descriptive qualitative methods. This method can describe how the arrange students' mathematical imagination indicators but not used to make broader conclusions. The procedures used are (a) determining participants, (b) making research aid instruments, (c) analyzing data, (d) validating data. Furthermore, participants, instruments and procedures, and data analysis can be seen in detail in the following discussion.

Participants in this study were 20 (8^{th}-grade) students consisting of 13 female and 7 male students. Participants in this study were aged between 13-14 years, taken from several different schools. The determination of participants is done by setting special characteristics that can communicate well and have an indication of high mathematical imagination ability based on recommendations from the teacher of mathematics. The participant is given a code in the form of 4 digit number where the first 2 digits indicate gender and the last 2 digits indicate the order of participants. Male participants were coded 01 and female participants were coded 02. However, the two participants who will be shown the answer analysis are called participant 1 (P1) and participant 2 (P2).

The instrument used in this study was written tests in the form of essays. The instrument was validated by 2 junior high school learning experts, 2 learning evaluation experts and 2 mathematics education experts. Learning experts in this study was mathematics teachers in junior high school. Evaluation experts and mathematics education experts were 3 mathematics education lecturers from 3 different universities and 1 lecturer at the ministry of education and culture of the Republic of Indonesia. After validation, the next test instrument is given to participants. The results of student work are then analyzed based on mathematical imagination

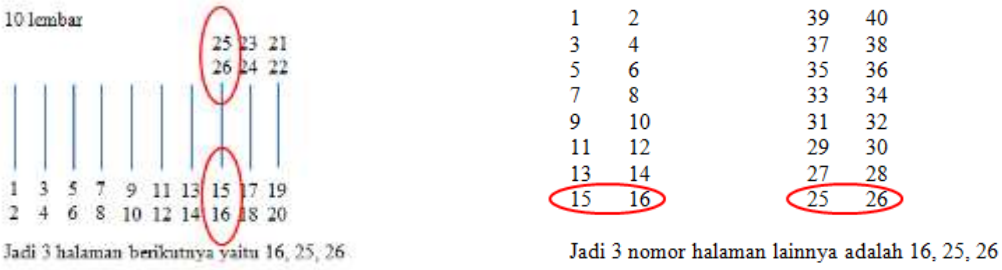
indicators that have been obtained from literature studies. Furthermore, the instrument used in the form of observation sheets and interview guidelines to obtain information or data that supports the findings of the written test. This article will only display 2 examples of analysis of student answers. 2 analysis of student answers displayed is the answer of students with the appearance of the most mathematical imagination indicators. Meanwhile, 18 others will only be shown the final result. This is because of the limited number of article pages allowed.

Data analysis conducted in this study is data reduction, presenting data into patterns, and drawing conclusions or verifying data. Data reduction is done by sorting data obtained from written tests, observation sheets, and interview guidelines. Based on the data obtained from these auxiliary instruments, coding is done to categorize the data, thus obtaining core data and removing unnecessary. The categorized data is then presented in a pattern. The presentation of data is done to be able to see the whole picture or certain parts of the whole picture. The presentation of data is done to facilitate concluding. Conclusions are drawn by looking for similarities and differences from the data that has been categorized in the presentation of data.

RESULT AND DISCUSION

Analysis of the answers P1 (participant number 0108) and P2 (participant number 0214) can be seen in the following description.

Item Number 1



(a) (b)

Figure 1. Answer to Question Number 1, P1 (a) and P2 (b)

Based on figure 1, the following analysis results are obtained:

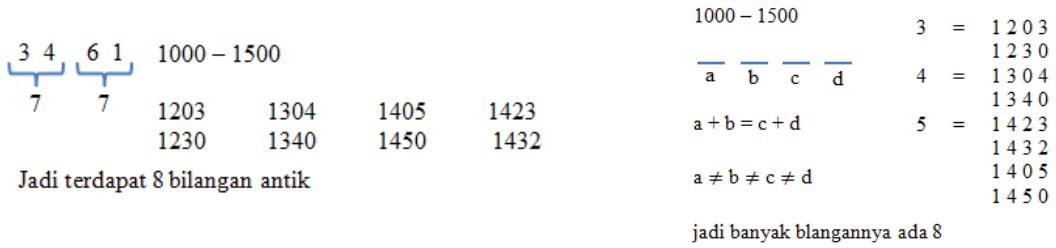
Table 1
Analysis of Answer Sheets for item Number 1

P1	P2
1. P1 envisions a book that is not folded but bound by describing it as 10 vertical lines. 2. P1 writes the number that is supposed to be the page number on the bottom right and left of each end of the vertical line. 3. After the bottom runs out to continue to the top as the other side of the page. 4. P1 stops after writing a number in a vertical line with the other end written 15 and 16, which are numbers 25 and 26. 5. P1 marks the 4 digits at the end of the vertical line. 6. P1 emphasizes that the page number referred to as the answer to the question is 3 of the 4 digits marked, that is, other than the number 15.	1. P2 shadows the pages of a book by listing the page numbers as if in 2 columns, each column written in 2 consecutive numbers. 2. In column 1 starting from the smallest number, 1 and 2, while in the second column is written from the largest number, 39 and 40. 3. P2 stops on the row where there are numbers 15 and 16 in column 1 and 25 and 26 in column 2. 4. P2 marks it as the answer to the problem. Based on the process, the following indicators are obtained: **Sensibility**: P2 can evoke feelings by imagining a book and numbering its pages. **Intuition**: P2 can make associations between his shadow of the book and the sketches made.

Based on the process, the following indicators are obtained: **Sensibility**: P1 can evoke feelings by imagining a book and numbering its pages. **Intuition**: P1 can make an association between its shadow of the book and the sketch that was made. **Crystallization**: Drawings and ideas are sketched. **Transformation**: P1 can link books and page numbering **Exploration**: P1 can explore what it does not know by using the graffiti created.	**Crystallization**: Drawings and ideas are sketched. **Transformation**: P2 can link books and page numbering. **Exploration**: P2 can explore what he doesn't know by using graffiti.

So the sequence of mathematical imagination indicators that emerge both from P1 and P2 was sensibility, intuition, crystallization, transformation, and exploration, as well as 18 other participants.

Item Number 2



(a) (b)

Figure 2. Answer to Question Number 2, P1 (a) and P2 (b)

Based on figure 2, the following analysis results are obtained:

Table 2
Analysis of Answer Sheets for item Number 2

P1	P2
1. P1 rewrites the example resolution provided in the problem. 2. P1 writes down the problem-solving requirements. 3. P1 tries to arrange numbers that meet the requirements. 4. P1 writes it starting from 2 starting numbers starting from the smallest one. 5. P1 stops when the first 2 numbers are nearing the maximum limit of the specified number. Based on the process, the following indicators are obtained: **Sensibility**: P1 can evoke feelings by imagining the numbers asked. **Intuition**: P1 can make associations between antique numbers and their conditions. **Transformation**: P1 can connect examples and antic numbers in question. **Exploration**: P1 can explore what it doesn't know by trial and error.	1. P2 writes down the problem-solving requirements. 2. P2 envisions 4 numbers by drawing 4 horizontal lines. 3. each line is named as a, b, c, and d. 4. P2 tries to make a mathematical sentence. 5. P2 writes down the number of conditions that can be used. 6. P2 starts compiling numbers that meet the requirements. 7. P2 writes the arrangement of numbers that do not meet the requirements but are aware of them so that they are crossed out / canceled. 8. P2 finds 8 arrays of numbers that meet. Based on the process, the following indicators are obtained: **Sensibility**: P2 can evoke feelings by imagining the numbers in question. **Intuition**: P2 can make associations between antique numbers and their conditions.

Productivity: P1 can generate many ideas about combinations of antic numbers. **Effectiveness**: P1 can sort possible antique numbers based on the conditions.	**Crystallization**: P2 sketches antic numbers consisting of 4 digits. **Transformation**: P2 can connect examples and antique numbers in question. **Exploration**: P2 can explore what he doesn't know by trial and error. **Productivity**: P2 can generate many ideas about combinations of antic numbers. **Effectiveness**: P2 can sort possible antique numbers based on the conditions.

So the sequence of mathematical imagination indicators that emerge from P1 is sensibility, intuition, transformation, exploration, productivity, and effectiveness. Meanwhile, P2 is sensibility, intuition, crystallization, transformation, exploration, productivity, and effectiveness. Following is the order of the indicators that emerged from 18 other participants:

Table 3
Sequence Indicators of 18 Participants for Item Number 2

Code	Sequence Indicators
0101	sensibility, intuition, crystallization, transformation, exploration, productivity, effectiveness.
0102	sensibility, intuition, transformation, exploration, productivity, effectiveness.
0203	sensibility, intuition, crystallization, transformation, exploration, effectiveness, productivity.
0204	sensibility, intuition, transformation, exploration, productivity.
0205	sensibility, intuition, transformation, exploration, productivity, effectiveness.
0206	sensibility, intuition, transformation, exploration, productivity, effectiveness.
0207	sensibility, intuition, transformation, exploration, productivity.
0209	sensibility, intuition, transformation, exploration, productivity.
0110	sensibility, intuition, transformation, exploration, productivity, effectiveness.
0111	sensibility, intuition, transformation, exploration, productivity.
0212	sensibility, intuition, crystallization, transformation, exploration, effectiveness, productivity.
0113	sensibility, intuition, crystallization, transformation, exploration, productivity, effectiveness.
0215	sensibility, intuition, transformation, exploration, productivity.
0216	sensibility, intuition, transformation, exploration, productivity, effectiveness.
0217	sensibility, intuition, transformation, exploration, productivity.
0218	sensibility, intuition, transformation, exploration, productivity.
0219	sensibility, intuition, transformation, exploration, productivity, effectiveness.
0120	sensibility, intuition, crystallization, transformation, exploration, productivity, effectiveness.

Item Number 3

(a) (b)

Figure 3. Answer to Question Number 3, P1 (a) and P2 (b)

Based on figure 3, the following analysis results are obtained:

Table 4
Analysis of Answer Sheets for item Number 3

P1	P2
1. P1 imagines a queue by describing people who are lining up with horizontal lines. 2. P1 makes 2 possible queue versions according to multiples of the comparison. 3. P1 stops when the comparison of queues 1 and 2 reaches the same number of people. 4. P1 marks the same number of people in the queue. 5. P1 emphasizes that the number of people in the line is 29 people. Based on the process, the following indicators are obtained: **Sensibility**: P1 can evoke feelings by imagining a queue. **Intuition**: P1 can make an association between the shadow of a queue and the sketch that was made. **Crystallization**: Drawings and ideas are sketched. **Transformation**: P1 can connect information in questions about comparisons and sketches made. **Exploration**: P1 can explore what it doesn't know by trial and error.	1. P2 writes a comparison of queues of version 1 and version 2. 2. P2 adds up the comparison of each version and then looks for the KPK. 3. P2 adds up the KPK obtained and adds it with 1. 4. The final sum is the completion. Based on the process, the following indicators are obtained: **Sensibility**: P2 can evoke feelings by imagining a queue. **Intuition**: P2 can make an association between the shadow of a queue and the sketch that was made. **Transformation**: P2 can link information in a matter of comparison with the KPK concept. **Exploration**: P2 can explore what he does not know by using the KPK. **Elaboration**: P2 formalize ideas using the KPK formula. **Effectiveness**: P2 uses a more effective method of trial and error, using the KPK. **Novelty**: P2 can create ideas for solving problems other than by trial and error.

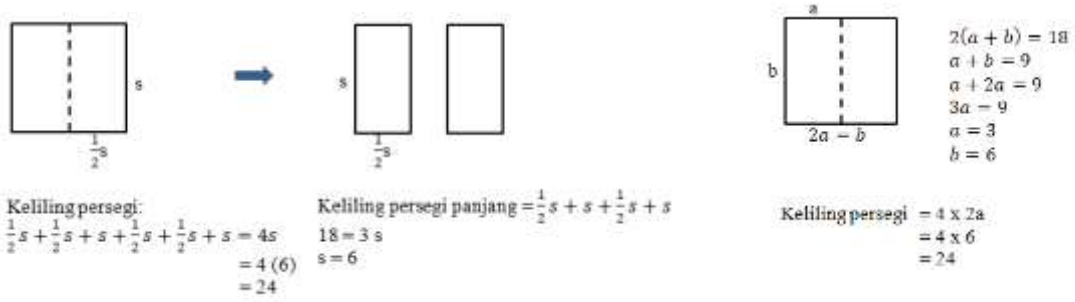
So the sequence of mathematical imagination indicators that emerge from P1 is sensibility, intuition, crystallization, transformation, and exploration. Meanwhile, P2 is sensibility, intuition, transformation, exploration, elaboration, effectiveness, and novelty. Following is the order of the indicators that emerged from 18 other participants:

Table 5
Sequence Indicators of 18 Participants for Item Number 3

Code	Sequence Indicators
0101	sensibility, intuition, transformation, exploration, elaboration, effectiveness, novelty.
0102	sensibility, intuition, crystallization, transformation, exploration, elaboration, effectiveness, novelty.
0203	sensibility, intuition, crystallization, transformation, exploration.
0204	sensibility, intuition, transformation, exploration, elaboration, effectiveness, novelty.
0205	sensibility, intuition, transformation, exploration, elaboration, effectiveness, novelty.
0206	sensibility, intuition, crystallization, transformation, exploration.
0207	sensibility, intuition, transformation, exploration, elaboration, effectiveness, novelty.
0209	sensibility, intuition, crystallization, transformation, exploration, elaboration, effectiveness, novelty.
0110	sensibility, intuition, transformation, exploration, elaboration, effectiveness, novelty.
0111	sensibility, intuition, crystallization, transformation, exploration.
0212	sensibility, intuition, crystallization, transformation, exploration.
0113	sensibility, intuition, crystallization, transformation, exploration, elaboration, effectiveness, novelty.
0215	sensibility, intuition, crystallization, transformation, exploration.
0216	sensibility, intuition, transformation, exploration, elaboration, effectiveness, novelty.
0217	sensibility, intuition, transformation, exploration, elaboration, effectiveness, novelty.

0218	sensibility, intuition, crystallization, transformation, exploration, elaboration, effectiveness, novelty.
0219	sensibility, intuition, crystallization, transformation, exploration, elaboration, effectiveness, novelty.
0120	sensibility, intuition, transformation, exploration, elaboration, effectiveness, novelty.

Item Number 4



(a) (b)

Figure 4. Answer to Question Number 4, P1 (a) and P2 (b)

Based on figure 4, the following analysis results are obtained:

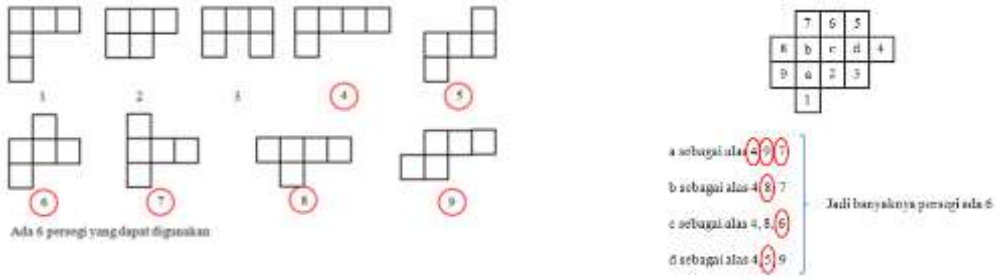
Table 6
Analysis of Answer Sheets for item Number 4

P1	P2
1. P1 draws a square as in the problem. 2. P1 then draws the square into 2 separate rectangles. 3. P1 makes the equation around the rectangle by dividing the sides of the rectangle and rectangles into a variable. 4. P1 finds the value of the variable used. 5. P1 uses the formula around the square to find a solution to the problem. Based on the process, the following indicators are obtained: **Sensibility**: P1 can evoke feelings by imagining a square consisting of two rectangles. **Intuition**: P1 can make associations between the shadow of a square and rectangle **Crystallization**: Drawings and ideas are sketched. **Transformation**: P1 can connect sketches made with the concept of a square and rectangular circumference. **Exploration**: P1 can explore what it does not know by remembering the concepts that can be used namely around the square and rectangle. **Elaboration**: P1 formalizes the idea by using square and rectangular circumference. **Effectiveness**: P1 uses an effective way by using the formula around square and rectangle.	1. P2 draws a square and divide it into 2 parts in the form of congruent rectangles. 2. P2 puts the length of the rectangle as b and the width of the rectangle a. 3. P2 writes that b = 2a means that 2 x the width of the rectangle is equal to the length of the rectangle so that the side of the square is b or 2a. 4. P2 uses the formula around the rectangle to get an equation. 5. P2 substitutes the split side perspective into the equation. 6. P2 finds the value of the length of the rectangle which is also the side of the square. 7. P2 uses the formula around the square to find a solution to the problem. Based on the process, the following indicators are obtained: **Sensibility**: P2 can evoke feelings by imagining a square consisting of two rectangles. **Intuition**: P2 can make an association between the shadow of a square and rectangle. **Crystallization**: Drawings and ideas are sketched. **Transformation**: P2 can connect sketches made with the concept of a square and rectangular circumference. **Exploration**: P2 can explore what he does not know by remembering the concepts that can be

	used, namely the circumference of a square and rectangle. **Elaboration**: P2 formalize ideas by using square and rectangular circumference. **Effectiveness**: P2 uses an effective way by using the formula around square and rectangle.

So the sequence of mathematical imagination indicators that emerge both from P1 and P2 is sensibility, intuition, crystallization, transformation, exploration, elaboration, and effectiveness, as well as 18 other participants.

Item Number 5



(a) (b)

Figure 5. Answer to Question Number 5, P1 (a) and P2 (b)

Based on figure 5, the following analysis results are obtained:

Table 7
Analysis of Answer Sheets for item Number 5

P1	P2
1. P1 illustrates the possibility of cube nets that can form cubes without a lid. 2. P1 draws the possible nets using each numbered square, so that nine nets are found. 3. P1 concludes that out of the nine nets, only 6 can form a cube without a lid. Based on the process, the following indicators are obtained: **Sensibility**: P1 can evoke feelings by imagining a cube without a lid. **Intuition**: P1 can make associations between cube shadows without a lid and cube nets. **Crystallization**: Drawings and ideas are sketched. **Transformation**: P1 can connect sketches made with the concept of a cube without a lid. **Exploration**: P1 can explore what it doesn't know by experimenting with possible nets. **Productivity**: P1 can generate several ideas regarding possible nets. **Effectiveness**: P1 uses an effective way to sort possible cubes.	1. P2 draws a collection of squares contained in the problem. 2. P2 gives the name of the shaded cube as a, b, c, and d. 3. P2 conducts the first example, for example, a as the base. 4. P2 finds 3 squares that can make shaded squares to form cubes without a lid. 5. P2 conducts a second example, for example, b as a base. 6. P2 finds 3 squares that can make shaded squares to form cubes without a lid. 7. P2 makes the third example, for example, c as the base. 8. P2 finds 3 squares that can make shaded squares to form cubes without a lid. 9. P2 makes the final decision, for example, d as the base. 10. P2 finds 4 squares that can make shaded squares to form cubes without a lid. 11. P2 lists the squares found and counts the numbers, the same square is counted once. Based on the process, the following indicators are obtained:

	Sensibility: P2 can evoke feelings by imagining a cube without a lid. **Intuition**: P2 can make associations between cube shadows without a lid and cube nets. **Crystallization**: Image sketched. **Transformation**: P2 can connect the shadow of a cube without cover with the shadow of possible nets. **Exploration**: P2 can explore what he doesn't know by imagining a square that might be paired in a net. **Elaboration**: P2 can try to formalize the idea that every possible base will be paired with a minimum of 3 squares. **Productivity**: P2 can produce several possible square ideas. **Effectiveness**: P2 uses an effective method by sorting shaded squares as bases.

So the sequence of mathematical imagination indicators that emerge from P1 is sensibility, intuition, crystallization, transformation, exploration, productivity, and effectiveness. Meanwhile, P2 is sensibility, intuition, crystallization, transformation, exploration, elaboration, productivity, and effectiveness. Following is the order of the indicators that emerged from 18 other participants:

Table 8
Sequence Indicators of 18 Participants for Item Number 5

Code	Sequence Indicators
0101	sensibility, intuition, crystallization, transformation, exploration, elaboration, productivity, effectiveness.
0102	sensibility, intuition, crystallization, transformation, exploration, productivity, effectiveness.
0203	sensibility, intuition, crystallization, transformation, exploration, productivity.
0204	sensibility, intuition, crystallization, transformation, exploration, effectiveness, elaboration, productivity.
0205	sensibility, intuition, crystallization, transformation, exploration, elaboration, productivity, effectiveness.
0206	sensibility, intuition, crystallization, transformation, exploration, productivity, effectiveness.
0207	sensibility, intuition, crystallization, transformation, exploration, productivity, effectiveness.
0209	sensibility, intuition, crystallization, transformation, exploration, elaboration, productivity, effectiveness.
0110	sensibility, intuition, crystallization, transformation, exploration, productivity, effectiveness.
0111	sensibility, intuition, crystallization, transformation, exploration, productivity, effectiveness.
0212	sensibility, intuition, crystallization, transformation, exploration, effectiveness, elaboration, productivity.
0113	sensibility, intuition, crystallization, transformation, exploration, productivity, effectiveness.
0215	sensibility, intuition, crystallization, transformation, exploration, productivity, effectiveness.
0216	sensibility, intuition, crystallization, transformation, exploration, elaboration, productivity, effectiveness.
0217	sensibility, intuition, crystallization, transformation, exploration, productivity, effectiveness.
0218	sensibility, intuition, crystallization, transformation, exploration, productivity.
0219	sensibility, intuition, crystallization, transformation, exploration, elaboration, productivity, effectiveness.
0120	sensibility, intuition, crystallization, transformation, exploration, productivity.

Item Number 6

(a) (b)

Figure 6. Answer to Question Number 6, P1 (a) and P2 (b)

Based on figure 6, the following analysis results are obtained:

Table 9
Analysis of Answer Sheets for item Number 6

P1	P2
1. P1 makes an example in the form of an equation from the information contained in the problem. 2. P1 uses a comparison of worth to find other equations. 3. P1 links the results of the comparative scores with the questions asked. 4. Next, P1 uses a comparison worth again. Based on the process, the following indicators are obtained: **Sensibility**: P1 can evoke feelings by imagining a book and its pages. **Intuition**: P1 can make an association between the shadow of the page sheet and the information provided in the problem. **Transformation**: P1 can connect one equation to another equation. **Exploration**: P1 can explore what it does not know by imagining pages of books and reading speed into mathematical sentences in the form of comparative values. **Elaboration**: P1 can try to formalize an idea by using a comparative value. **Effectiveness**: P1 uses an effective method using a comparative value.	1. P2 makes an example using 1 variable, i.e. is the total page of the book. 2. P2 makes the first example, namely the number of pages of a book that is read over 8 days, so that it is found that h is 16. 3. P2 realizes that the example is wrong so it makes a second example, namely the number of pages of the book that are read in the next four days. 4. P2 finds that the total number of pages of the book is 208. 5. P2 checks by substituting it into the equation but the results do not match. 6. P2 again decides by using 2 variables. 7. P2 uses the substitution method to solve the existing system of equations. Based on the process, the following indicators are obtained: **Sensibility**: P2 can evoke feelings by imagining a book and its pages. **Intuition**: P2 can make an association between the shadow of the page sheet and the information provided in the problem **Transformation**: P2 can connect equation one with other equations obtained in the problem **Exploration**: P2 can explore what he doesn't know by imagining pages of books and reading speed into mathematical sentences. **Elaboration**: P2 can try to formalize ideas by using a two-variable equation system. **Productivity**: P2 can produce several ideas about possible equations. **Effectiveness**: P2 uses an effective way by using a two-variable equation system.

So the sequence of mathematical imagination indicators that emerge from P1 is sensibility, intuition, transformation, exploration, elaboration, and effectiveness. Meanwhile, P2 is sensibility, intuition, transformation, exploration, elaboration, productivity, and effectiveness. Following is the order of the indicators that emerged from 18 other participants:

Table 10
Sequence Indicators of 18 Participants for Item Number 6

Code	Sequence Indicators
0101	sensibility, intuition, transformation, exploration, elaboration, productivity, effectiveness.
0102	sensibility, intuition, transformation, exploration, elaboration, productivity, effectiveness.
0203	sensibility, intuition, transformation, exploration, elaboration, productivity, effectiveness.
0204	sensibility, intuition, transformation, exploration, productivity, effectiveness.
0205	sensibility, intuition, transformation, exploration, elaboration, productivity, effectiveness.
0206	sensibility, intuition, transformation, exploration, effectiveness.
0207	sensibility, intuition, transformation, exploration, elaboration, productivity, effectiveness.
0209	sensibility, intuition, transformation, exploration, elaboration, productivity, effectiveness.
0110	sensibility, intuition, transformation, exploration, elaboration, productivity, effectiveness.
0111	sensibility, intuition, transformation, exploration, productivity, effectiveness.
0212	sensibility, intuition, transformation, exploration, elaboration, productivity, effectiveness.
0113	sensibility, intuition, transformation, exploration, elaboration, productivity, effectiveness.
0215	sensibility, intuition, transformation, exploration, elaboration, productivity, effectiveness.
0216	sensibility, intuition, transformation, exploration, elaboration, productivity, effectiveness.
0217	sensibility, intuition, transformation, exploration, productivity, effectiveness.
0218	sensibility, intuition, transformation, exploration, productivity, effectiveness.
0219	sensibility, intuition, transformation, exploration, effectiveness.
0120	sensibility, intuition, transformation, exploration, productivity, effectiveness.

DISCUSSION

Based on the result, the sequence of indicators per item is obtained as follows:

Table 11
Sequence Indicators of Mathematical Imaginations' Students

Item Number	Sequence Indicators
1	Sensibility, intuition, crystallization, transformation, exploration.
2	Sensibility, Intuition, Crystallization, Transformation, Exploration, Productivity, Effectiveness.
3	Sensibility, intuition, transformation, exploration, elaboration, effectiveness, novelty.
4	Sensibility, intuition, crystallization, transformation, exploration, elaboration, effectiveness.
5	Sensibility, Intuition, Crystallization, Transformation, Exploration, Elaboration, Productivity, Effectiveness.
6	Sensibility, Intuition, Transformation, Exploration, Elaboration, Productivity, Effectiveness.

CONCLUSION

Based on result and discussion, it can be concluded that sequence indicators of students' mathematical imagination is sensibility, intuition, crystallization, transformation, exploration, elaboration, productivity, effectiveness, and novelty.

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