

# Profile of Junior High School Students' Symbol Sense Thinking

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## ABSTRACT

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Algebra is one of the mathematics materials in junior high school which is synonymous with symbols. There is a concept to assess students' sensitivity to symbols, namely symbol sense. One of the skills that must be possessed by students is thinking skills. The purpose of this study is to describe the thinking process of junior high school students from the symbol sense task. This is qualitative research. The steps in this research is (1) making instruments; (2) selecting subjects; (3) collecting data; and (4) analyzing data. The subjects in the study consisted of four ninth-grade students who had good math and communication skills. Data collection was carried out by giving symbols of sense assignments and followed by task-based interviews. The collected data was then analyzed using the stages of data collection, data condensation, data display, and drawing conclusions. The results showed that all subjects showed good thinking skills. It's just that a student is not good at drawing conclusions because he does not check the answers independently. For the ability of the sense of symbol students lack achievement in two characteristics of the symbol sense. Only two people demonstrated the "friendliness with symbol" characteristic well. This research only examines students' symbol sense thinking on two of the six characteristics of symbol sense. Other researchers can conduct research on the six characteristics of sense symbols thinking.



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## A. INTRODUCTION

Mathematics is primarily communicated through a written system dense with symbols (Douglas et al., 2020). Symbols in mathematics have a communicative function and play an instrumental role (Maracchia, 2013). Symbols in mathematics are designed to express mathematical thinking to improve understanding of mathematical concepts and provide a universally accepted way of representing mathematical ideas or describing mathematical concepts. The use of symbols in mathematics reduces confusion and errors (Kharde, 2016; Oguguo, 2020). There are three types of symbols in mathematics, namely (1) symbols for numbers, quantities, and variables. Included in this category are trigonometric functions, ranks, roots, logarithms or symbols to found variables; (2) operating symbols that describe operations againts numbers. Included in this category are addition, subtraction, division, multiplication, and symbols in sets, factorial, integral, and differential; and (3) the symbols of relationships that describe something are defined. Included in this category are equals ( $=$ ), inequalities ( $<$ ,  $\leq$ ,  $>$ , and  $\geq$ ), and ratio (Azis & Nurlita, 2017).

Algebra is a mathematical material that is synonymous with symbols. Algebra uses symbols to generalize arithmetic. These symbols have different meanings and interpretations in different situations (Samo, 2009). Algebra has become an obstacle and challenge for students, causing difficulties for students both in terms of concepts and principles of algebra (Chow, 2011; Joseph, 2020; Sugiarti & Retnawati, 2019). One study gave a concept challenge to 120 grade 12<sup>th</sup> students by giving an assignment related to mathematical symbols. By using the SPSS calculation, 41.6% of students found it was very difficult to complete the challenge (Mutodi & Mosimege, 2021). Meanwhile, based on the experience of researchers in the field, on the indicator "students can determine the value of a function", only 30% of 105 students can finish correctly. Some mistakes made by students, (1) students have the wrong interpretation of doing algebraic multiplication operations. Some students mean that the multiplication result  $3x(x - 2) = 3x - 6x$ ; (2) students have the wrong interpretation in determining the value of a term if the value of the variable is known. Some students mean that the value of  $2x$  if  $x = 4$  is 24, not  $2 \times 4 = 8$ ; (3) students have the wrong interpretation in determining the coefficient of a term which is only a variable. Some students interpret  $3x(x - 2) = 0x - 6x$ ; and (4) students have the wrong interpretation in performing algebraic addition operations. Some students perform addition operations by adding up the coefficient with the coefficient and the variable with the variable,  $3x + 2x = 5xx$ .

Understanding algebra is important in mathematics education (Chow, 2011). Algebra acts as a gatekeeper for the success of middle school and post-secondary students (Stoelinga & Lynn, 2013). Some important general algebraic skills, such as interpreting formulas, linking graphs, tables, formulas, and those needed to solve more complex algebra problems (Kop et al., 2020). The results of the study found that in the first-semester mathematics education students' understanding of algebraic concepts was still relatively low, namely 50.54% (Sari, 2019).

Algebraic skills mostly refer to representational skills that can be investigated through symbol sense (Jupri & Sispiyati, 2020b). Arcavi created a concept to assess sensitivity to symbols, namely symbol sense (Arcavi, 1994). The symbol sense cannot be defined directly, but it can be list indicators that are suitable for the learning objectives, namely the ability to make algebraic expressions, the ability to compare information in the form of algebraic expressions, the ability to translate a table of function values or graphs expressed verbally, the ability to check algebraic operations and predictive outcomes and the ability to determine equivalent forms (Arcavi, 2005b; Butler et al., 1991). Symbol sense is a person's sensitivity in determining work strategies and the ability to use symbols in solving a problem (Rini et al., 2021). The main components of symbol sense are (1) friendliness with symbols; (2) an ability to manipulate and 'read through' symbolic expressions in solving problems; (3) the awareness to the capability of creating symbolic relationships that express verbal or graphical information (4) the ability to select one possible symbolic representation for a problem; (5) the realization of the need to check for symbol meanings during the process of solving problems; and (6) the realization that symbols can play roles as variables or parameters (Arcavi, 2005a).

Component symbol sense task "checking the meaning of symbols during the execution of a problem-solving procedure". Assigned task: solving the equation of  $38 - (1 - 2x)^2 = 13$  (Jupri & Sispiyati, 2020a). The usual completion steps are (1) to describe  $(1 - 2x)^2 = (1 - 4x + 4x^2)$ , so that it becomes  $38 - (1 - 2x)^2 = 13 \leftrightarrow 38 - (1 - 4x + 4x^2) = 13$ . After that solve by; (2)

and perform the multiplication operation of all the terms in brackets by -1, so that you get  $38 - 1 + 4x - 4x^2 = 13$ ; then (3) simplify so that a quadratic equation is obtained  $37 + 4x - 4x^2 = 13 \leftrightarrow 24 + 4x - 4x^2 = 0$ ; then (4) is simplified by dividing all terms by 4, so that we get  $6 + x - x^2 = 0$ , After that (5) find the value of  $x$  by factoring  $(x + 2)(-x + 3) = 0$ ,  $(x + 2) = 0 \rightarrow x = -2$  or  $(-x + 3) = 0 \rightarrow x = 3$ . The strategy expected in the symbol sense is not like that, but by directly heading to check the term that has the symbol, the expected steps are as follows: (1) make an example,  $(1 - 2x)^2 = y$ , so that it is obtained  $38 - y = 13$ ; (2) look for a number that is  $y$  so that it fulfills the equation, or in a way  $38 - \dots = 13$ , that is 25, so the value of  $y = 25$ . After that; (3) substitution  $y$  to instance, i.e.  $(1 - 2x)^2 = 25$ ; Then (4) both sides are rooted, so that it becomes  $\sqrt{(1 - 2x)^2} = \sqrt{25}$ ; (5) simplifies so that  $1 - 2x = \pm 5$ ; and (6) determines the value of  $x$ ,  $1 - 2x = 5 \rightarrow x = -2$  or  $1 - 2x = -5 \rightarrow x = 3$ .

Symbol sense assignments on components "check the meaning of symbols during the execution of the problem-solving procedure". Another simple example of choosing an alternative variable is choosing to represent the sum of two negative numbers as  $a + b$  or as  $-a - b$  (depending on whether we choose  $a$  and  $b$  to represent a negative number or a natural number) or choosing to represent a rational number as  $a$  or as  $\frac{p}{q}$  (where  $p$  and  $q$  are natural numbers). The meaning of the symbols helps to make the right choice taking into account the purpose of the problem (Arcavi, 1994).

The task of the symbol sense component is the "ability to be friendliness with symbols". The task is given: determine two positive numbers which if added up the result is 5 and the product of the two numbers is also 5. The desired solution, students solve by connecting algebraic material so that the form of a system of equations is obtained  $x + y = xy = 5$ . By solving these equations students will get two numbers, namely  $x = \frac{5+\sqrt{5}}{2}$  and  $y = \frac{5-\sqrt{5}}{2}$  (Jupri & Sispiyati, 2021). Another symbol sense task is on the "friendliness with symbols" component. Example task: complete the blank cells to get a magic square, provided that each row, column and diagonal add up to 9, as shown in Figure 1.

	3	
2		1

Figure 1. Magic Box

To complete the blank cells, one must have intuitively invoked the addition symbol to solve the magic square problem. Students cannot be said to learn something useful unless they can use information and skills to solve problems (Arcavi, 1994). Mathematics is one of the most important tools for the development of thinking skills, these skills are needed by students to describe ideas in the form of recognizable abilities and intelligence and to solve problems (Bradbury, 2013; Kızıltoprak & Köse, 2017). When students are faced with a problem, it will affect the thinking process in such a way that the student finally knows the answer to the problem (Nurpratiwi & Setianingsih, 2021; Pamungkas et al., 2021). Thinking skills are important for educated people to face a rapidly changing world (Cottrell, 2023; Gough, 1991). Thinking is a process of obtaining information, processing information, and recalling

information that is controlled by the brain (Slavin, 2018). The process of thinking is a process that someone does in recalling the knowledge already stored in his memory for a moment used in receiving information, processing, and concluding something (Widyastuti, 2015). The thought process carried out by each individual is different (Widodo & Turmudi, 2017). This difference is because each student has a different personality and cognitive ability (Sanjaya et al., 2018; Sunarto & Dewiyani, 2009). Thinking process in learning: stage 1: receiving information, at this stage students receive the information taught by the teacher so that it affects the students' senses to attract attention and provoke curiosity, stage 2: information processing, students process information including connecting new information with information what is known, stage 3: information storage, students carry out the information transformation process with the support of the teacher using coding (Loc et al., 2019).

Several previous studies, namely (Jupri & Sispiyati, 2020b) analyzing the algebraic skills of junior high school students from the perspective of symbol sense, (Prasetya Rini et al., 2021) described the symbol sense of STKIP Muhammadiyah Sampit students to solve algebra problems based on the Polya stage. In addition (Jupri & Sispiyati, 2021) designed a mathematical task based on the characteristics of symbol sense. Further (Jupri & Sispiyati, 2020a) designed a symbol sense task on quadratic equation material. In previous research, there were no researchers who looked at the ability of symbol sense from the stages of students' thinking. Given the importance of symbols in mathematics as described above and knowing the understanding of symbols through the ability of symbol sense, the purpose of this study is to describe the thinking process of junior high school students from the symbol sense task.

## B. METHODS

This is qualitative research.. The procedures for this research are (1) making instruments; (2) selecting subjects; (3) collecting data; and (4) analyzing data. The research instrument consisted of a symbol sense task and an interview guide. The symbol sense task in the study was adapted from Jupri's task design. The characteristics of the symbol sense used in this study are friendliness with the symbol and the realization of the need to examine the meaning of the symbol during the procedure. Before the instrument was used, the instrument was validated by three experts. The validation carried out includes content validity and construct validity. While the interview guidelines refer to the following indicators, as show in Table 1.

**Table 1.** Indicators of Thinking Based on the Characteristics of Symbol Sense

Tasks	Characteristics of Symbol sense	Thinking Stage		
		Receiving Information	Processing Information	Drawing Conclusion
1	Friendliness with symbols	Explaining known information	<ol style="list-style-type: none"> <li>1. Explain the material received previously when reading this assignment</li> <li>2. Explain what is remembered from the material</li> <li>3. Explain the relationship of previously received material with the information contained in the assignment</li> </ol>	Recheck the final answer

Tasks	Characteristics of Symbol sense	Thinking Stage		
		Receiving Information	Processing Information	Drawing Conclusion
2	The realization of the need to check for symbol meanings during the process of solving problems	Explaining known information	4. Use symbols to solve problems correctly.	Recheck the final answer
			5. Explain the steps to solve	
			6. Explain the material received previously when reading this assignment	
			7. Explain what is remembered from the material	
			8. Explain the relationship of previously received material with the information contained in the assignment	
			9. Be aware of the specifics of symbolic problems in the process of solving them so that they can solve them in an efficient manner	
			10. Explain the steps to solve	

The subjects in this study consisted of four 9<sup>th</sup> grade students who had good math and communication skills. The purpose of selecting subjects with good mathematical and communication skills is to obtain broader data. The way to select students with good abilities is to ask the student's math teacher for recommendations. The four students were given a symbol sense task, after which an interview was conducted to dig deeper into the students' thinking in completing the symbol sense task. Interviews in this study used semi-structured interviews. After that, from the results of student work and interviews, data analysis was carried out according to the indicators. From the two data generated, a triangulation method was carried out (Sugiyono, 2011). To make it easier to understand, a subject code is given. Here's the subject code, as shown in Table 2.

**Table 2.** Subject Code

No	Initial	Code
1	AEP	S1
2	HMS	S2
3	ZZN	S3
4	MAIA	S4

### C. RESULT AND DISCUSSION

The research instrument consisted of a symbol sense task and an interview guide. The symbol sense task in the study was adapted from Jupri's task design. The following is a validated symbol sense task. After getting the data, namely the results of student work and interviews. The next step is to describe each data based on indicators. Furthermore, from these results, triangulation of methods is carried out to obtain research results. The following are the results of the study in the form of a picture of junior high school students' symbol sense thinking in completing task 1: friendliness with symbols, as shown in Table 3 and Table 4.

**Table 3.** Profile of Middle School Students' Symbol Sense Thinking in Completing Task 1: Friendliness with Symbols

Code Student	Thinking Stage		
	Receiving Information	Processing Information	Drawing Conclusion
S1	S1 understands task 1. To understand, S1 reads three times. S1 can explain what is known and asked from task 1. S1 writes what is known by using symbols. Assuming the first number is $x_1$ and the second number is $x_2$ . So we write down what is known as $x_1 \times x_2 = 6$ and $x_1 + x_2 = 6$ .	S1 uses the quadratic equation material to complete task 1. The quadratic equation material that S1 remembers is the new quadratic form and the quadratic formula to find the roots of the quadratic equation. S1 can complete task 1 correctly. S1 explains the relationship between quadratic equation material and task 1, which is to convert it into a new quadratic form and solve quadratic equations using the quadratic formula. S1 can explain each step in the answer well. The calculations made by S1 are correct.	S1 checks the answer before being asked by substituting the value of $x_1$ and $x_2$
S2	S2 understands task 1. To understand, S2 reads five times. S2 can explain what is known and asked from task 1. S2 writes what is known using symbols. Assuming the first number is $x$ and the second number is $y$ so write down what is known as $x \times y = 6$ and $x + y = 6$ .	S2 uses the integer material he got in 7 <sup>th</sup> grade. In the integer material, he remembers addition, subtraction, multiplication, and division. S2 can't complete task 1. S2 explains the relationship between integers and task 1, that is because in the assignment we know addition and multiplication. S2 explained his answer and realized that the score $x$ and $y$ he wrote was wrong. The calculation done by S2 is wrong.	S2 had checked the answer before being asked and realized that the answer he wrote was wrong.
S3	S3 understands task 1. To understand, S3 reads twice. S3 can explain what is known and asked from task 1. S3 writes what is known by using symbols. Assuming the first number is $x_1$ and the second number is $x_2$ . So write down what you know $x_1 \times x_2 = 6$ . $x_1 + x_2 = 6$ .	S3 uses the quadratic equation material to complete task 1. The quadratic equation material that S3 remembers is the quadratic formula to find the roots of a quadratic equation. S3 can complete task 1 but is not careful in calculating. S3 explains the relationship between quadratic equations and task 1, which is to find quadratic equations using the quadratic formula. S3 can explain each step in the answer well. But S3 is not careful in calculating	S3 did not check and when asked to check the answers, S3 had difficulty multiplying the multiplication of roots
S4	S4 understands task 1. To understand, S4 reads twice. S4 can explain what is known and asked from task 1. S4 writes what is known using symbols.	S4 uses a system of linear equations with two variables that he got in 8 <sup>th</sup> grade. The material for algebra that S4 remembers is that there are three ways to solve linear equations in two variables, namely substitution, elimination, and combination	S4 checks the answer before being asked by substituting the value $x$ and $y$ obtained into the known one

Code Student	Thinking Stage		
	Receiving Information	Processing Information	Drawing Conclusion
	Assuming the first number is $x$ and the second number is $y$ . So write down what you know $x \times y = 6$ . $x + y = 6$ .	(elimination and substitution). S4 can complete task 1 correctly. S4 explains the relationship between linear equations in two variables material and task 1, namely, two variables in the question must be searched. S4 explains each step in the answer well. S4's calculations are correct.	
Conclusion	<p>Based on the explanation above, it can be concluded that the thinking profile of middle school students' symbol sense in task 1:</p> <ul style="list-style-type: none"> <li>✓ the symbol sense thinking profile is at the stage of receiving information: S1 understands task 1, can explain what is known and asked well, and converts questions into symbolic form. The information processing stage: S1 uses quadratic equation material, S1 can complete task 1 correctly, S1 explains well the relationship of the material used with the given task, S1 explains well the completion steps made and S1 does the calculations correctly. At the stage of drawing conclusions, S1 checks the answers without being asked.</li> <li>✓ the symbol sense thinking profile is at the stage of receiving information: S2 understands task 1, can explain what is known and asked well, and converts questions into symbolic form. The stage of processing information: S2 uses number material, S2 can't complete task 1, S2 has difficulty in relating the material used to the given task, S2 has difficulty finding answers and S2 realizes that the calculations are wrong. At the stage of drawing conclusions, S2 checks the answers without being asked and realizes if the answer is wrong</li> <li>✓ the symbol sense thinking profile is at the stage of receiving information: S3 understands task 1, can explain what is known and asked well, and converts questions into symbolic form. The stage of processing information: S3 uses quadratic equation material, S3 can complete task 1 but is not careful in counting, S3 explains well the relationship of the material used with the given task, S3 explains well the completion steps made but S3 makes a calculation error. At the stage of drawing conclusions, S3 did not check the answers without being asked.</li> <li>✓ the symbol sense thinking profile is at the stage of receiving information: S4 understands task 1, can explain what is known and asked well, and converts questions into symbolic form. The stage of processing information: S4 uses linear equations in two variables material, S4 can complete task 1 correctly, S4 explains well the relationship of the material used with the given task, S4 explains well the completion steps made and S4 does the calculations correctly. At the stage of drawing conclusions, S1 checks the answers without being asked.</li> </ul>		
summary	<p>Profile of thinking symbol sense of junior high school students. The stage of receiving information: all students understand the given task, can explain what is known and asked well, and convert the questions into symbols. The stage of processing information: two students using quadratic equations, one student using integers, and one student using linear equations in two variables, two students can solve the problem correctly, All students can explain well the relationship between the material used and the task is given as well as explain well the steps for the solution. Two students did the wrong calculation. The stage of drawing conclusions: one student did not check the answer before being asked.</p>		

**Table 4.** Profile of Middle School Students' Symbol Sense Thinking in Completing Task 2: Realization of the Need to Check the Meaning of Symbols During Procedure

Student Code	Thinking Stage		
	Receiving Information	Processing Information	Drawing Conclusion
S1	S1 understands task 2. To understand, S1 reads twice. S1 can explain what is known and asked from task 2.	S1 uses algebra material in grade 7 and quadratic equations in grade 9 to complete task 2. The algebraic material that S1 remembers is addition, subtraction, power, multiplication, and division while the quadratic equation material that is remembered is new quadratic forms and quadratic formulas to find roots. the root of the quadratic equation. S1 explains the relationship between algebraic material and task 2, namely to describe $(2x + 4)^2$ using algebraic material so that it is obtained $4x^2 + 16x + 16$ and to solve quadratic equations using the quadratic formula. S1 didn't realize there was a more efficient way. S1 explains each step in the answer well. The calculations made by S1 are correct.	S1 checks the answer before being asked by substituting the value $x$ into $40 - (2x + 4)^2 = 4$
S2	S2 understands task 2. To understand, S1 reads twice. S1 can explain what is known and asked from task 2.	S2 uses trial and error to complete task 2. S2 explains that $40 - \dots = 4$ . The value of $\dots$ is 36. After that, S2 did trial and error by entering an $x$ positive value so that it was obtained that $x = 1$ S2 did not realize that the value $x$ in the problem was not only a positive integer and S2 did not realize that there was a more efficient way. S2 explains each step in the answer well. S2's calculations are correct but S2 is not aware that there are other possible answers.	S2 checks the answer before being asked by substituting the value $x$ into $40 - (2x + 4)^2 = 4$
S3	S3 understands task 2. To understand, S3 reads four times. S3 can explain what is known and asked from task 2.	S3 uses quadratic equations in grade 9 to complete task 2. The material for quadratic equations that S3 remembers is the quadratic formula. S3 explains the relationship between quadratic equations and task 2, which is to solve quadratic equations using the quadratic formula. S3 didn't realize there was a more efficient way. S3 explains each step in the answer well. But S3 is not careful in calculating	S3 did not check the answer before being asked and when asked to check, S3 realized that the answer was wrong
S4	S4 understands task 2. To understand, S4 reads twice. S4 can explain what is known and asked from task 2.	S4 uses quadratic equations in grade 9 to complete assignment 2. The material for quadratic equations that S4 remembers is the quadratic formula. S4 explains the relationship between quadratic equations and task 2, which is to solve	S4 did not check the answer before being asked but S4's answer was correct.



Student Code	Thinking Stage		
	Receiving Information	Processing Information	Drawing Conclusion
		quadratic equations using the quadratic formula. The S4 didn't realize there was a more efficient way. S4 explains each step in the answer well. S4's calculations are correct.	
Conclusion	<p>Based on the explanation above, it can be concluded that the thinking profile of middle school students' symbol sense in task 2:</p> <ul style="list-style-type: none"> <li>✓ symbol sense thinking profile is at the stage of receiving information: S1 understands task 2, can explain what is known, and asks well. Information processing stage: S1 uses algebraic material and quadratic equations, S1 explains well the relationship of the material used with the given task, S1 does not realize there is a more efficient way, S1 explains well the completion steps made, and S1 performs calculations correctly. At the stage of drawing conclusions, S1 checks the answers without being asked.</li> <li>✓ symbol sense thinking profile is at the stage of receiving information: S2 understands task 2, can explain what is known, and asks well. The stage of processing information: S2 uses trial and error, S2 explains well the relationship of the material used with the given task, S2 does not realize there is a more efficient way, S2 explains well the completion steps made, and S2 does the calculations correctly but S2 is not aware of other possible answers. At the stage of drawing conclusions, S1 checks the answers without being asked.</li> <li>✓ symbol sense thinking profile is at the stage of receiving information: S3 understands task 2, can explain what is known, and asks well. The stage of processing information: S1 uses quadratic equation material, S3 explains well the relationship of the material used with the given task, S3 does not realize there is a more efficient way, S3 explains well the completion steps made, and S3 makes a calculation error. At the stage of drawing conclusions, S3 did not check the answers without being asked.</li> <li>✓ symbol sense thinking profile is at the stage of receiving information: S4 understands task 2, can explain what is known, and asks well. Processing stage information: S4 uses quadratic equation material, S4 explains well the relationship of the material used with the given task, S4 doesn't realize there is a more efficient way, S4 explains well the steps to solve the problem, and S4 does the calculations correctly. At the stage of drawing conclusions, S4 checks the answers without being asked.</li> </ul>		
summary	<p>Profile of thinking symbol sense of junior high school students. The stage of receiving information: all students understand the given task and can explain what is known and asked well. The stage of processing information: two students using quadratic equation material, one student using trial and error method, and one student using algebra and quadratic equation material, All students can explain well the relationship between the material used with the given task and explain well the completion steps. But all students do not realize there is a way that is more efficient than the way they are using. one student made a calculation error and one student was not aware of any other answers. The stage of drawing conclusions: one student did not check the answer before being asked.</p>		

In task 1, that is friendliness with symbols. At the stage of receiving information, when given a task, all students focus on understanding task 1. This is suitable for Slavin's statement which explains that attention is an active focus on certain stimuli for other exceptions (Slavin, 2019), and is suitable for the results of research from Puspitasari which explains that when

receiving information, students will access information from the questions given by reading the questions without making a sound and focusing on the information provided without the help of other things (Puspitasari, 2019). At the stage of processing information, all students work on task 1 using their previous knowledge. In this case, the students relate to the material that the students got previously. This is suitable for Slavin's statement which explains that the perception of stimulation is influenced by mental conditions, past experiences, knowledge, and others (Slavin, 2009), and is suitable for the results of research from Puspitasari which explains that students process information by connecting previous knowledge (Puspitasari, 2019). At this stage, one student had difficulty and did not find an answer. This one student relates the material to integers and trial and error. This is suitable for Jupri's prediction that if students consider task 1 as an arithmetic problem, students will have difficulty completing it (Jupri 2020). Two students can complete task 1 correctly, two students relate to the quadratic equation material and one student relates to algebra material. This is suitable for Jupri's prediction that if students consider task 1 as algebraic then students can complete the task (Jupri, 2020). In addition, at this stage, three students did not understand the examples and meanings of symbols. In this case, 75% do not have a symbol sense for the characteristic of "friendliness with symbols". At the stage of drawing conclusions, one student did not check the answers before being asked.

In task 2, namely the realization of the need to check the meaning of symbols during the implementation of the procedure. At the stage of receiving information, when given an assignment, all students focus on understanding task 2. This is suitable for Slavin's statement which explains that attention is an active focus on certain stimuli for other exceptions (Slavin, 2019), and is suitable for the results of research from Puspitasari which explains that when receiving information, students will access information from the questions given by reading the questions without making a sound and focusing on the information provided without the help of other things (Puspitasari, 2019). At the stage of processing information, all students work on task 3 using their previous knowledge. In this case, the students relate to the material that the students got previously. This is suitable for Slavin's statement which explains that the perception of stimulation is influenced by mental conditions, past experiences, knowledge, and others (Slavin, 2009), and is suitable for the results of research from Puspitasari which explains that students process information by connecting previous knowledge (Puspitasari, 2019). At this stage, two students relate algebraic material and one student by trial and error, namely by trying to change the value  $x$  with positive integers. This is suitable for Jupri's prediction that students will tend to solve by describing and finding values  $x$  by factoring (Jupri 2020). In addition, at this stage, all students do not realize there is a more efficient way. In this case, 100% do not yet have a symbol sense for the characteristic "i.e. the realization of the need to check the meaning of the symbol during the implementation of the procedure ". At the stage of drawing conclusions, one student did not check the answers before being asked. Briefly the conclusion of the student profile as follows. All subjects showed good thinking skills. It's just that a student is not good at drawing conclusions because he does not check the answers independently. For the ability of the sense of symbol students lack achievement in two characteristics of the symbol sense. Only two people demonstrated the "friendliness with symbol" characteristic well. The second characteristic of symbol sense is not achieved because

students only work procedurally. They are not used to coming up with creative ideas to get results with more efficient way. Students are also less careful about some algebraic knowledge.

#### D. CONCLUSION AND SUGGESTIONS

From the results and discussion, it can be concluded that (1) for task 1, at the stage of receiving information, when students are given assignments, all students focus on understanding the information. So that all students can explain what is known and asked. All students write down the information on the questions using symbols. At the stage of processing information, students associate with previously known materials. All students can explain well the steps of the solution made. However, 50% of the students did not have a symbol sense for the characteristic "friendliness with symbols" and one student was less careful in counting. At the stage of drawing conclusions, one student did not check the answers independently. (2) for task 2, at the stage of receiving information, when students are given an assignment, all students focus on understanding the information. So that all students can explain what is known and asked. At the stage of processing information, students associate with previously known materials. All students can explain well the steps of the solution made. However, 100% of the students did not have a symbol sense for the characteristic "realization of the need to check the meaning of symbols during the procedure" and one student was less careful in counting and one student was not aware of other possibilities. At the stage of drawing conclusions, one student did not check the answers independently. Researcher suggestions for teachers. Teachers should design learning that is suitable for the characteristics of symbol sense by paying attention to students' abilities. This research only examines students' symbol sense thinking on two of the six characteristics of symbol sense. Other researchers can conduct research on the six characteristics of sense symbols thinking.

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