



Students' Translation of Verbal Representations to Graph in Solving HOTS-based SPtLDV Problem

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ABSTRACT

Translation of representation is translating information presented from the source representation to the target representation based on the translation stages, including unpacking the source, preliminary coordination, constructing the target, and determining equivalence. Translation of representation is one process that plays an essential role in learning mathematics because it can be used as a strategy to solve mathematical problems. Translation of representations of verbal problems needs to be changed to other forms, such as mathematical models or tables, to facilitate understanding so that solutions to given problems can be determined. This study aims to describe the translation of high school student representation in solving HOTS-based SPtLDV problems. Data was collected in class X-1 of SMAN 1 Situbondo for the 2023/2024 school year by providing a representation translation test consisting of 1 HOTS-based SPtLDV problem item, which contained a translation of representations from verbal to graphs. Then, interviews were conducted with two selected subjects. Then, interviews were conducted with two selected subjects. The results showed that in solving the problem, both subjects had gone through four stages of translation representation. At the stage of constructing the target, a subject provides arguments related to the solution obtained by describing the results of solving the problem he encounters through representation in the form of written words. In this case, the subject can produce reasoned criticism without being instructed on the question or the teacher.

Keywords: representation; translation of representation; HOTS

INTRODUCTION

According to NCTM (2000), there are five basic abilities that students must master in learning mathematics, namely problem-solving, reasoning and proof, connections, communication, and representation. Of these five things, representation is an essential criterion in growing students' mathematical abilities. Representations can help students develop and deepen their understanding of mathematical concepts and relationships as they create, compare, and use various representations and help communicate their thoughts (NCTM, 2000). In line with Fonger (2019), representation is used to communicate about mathematics. Representation indicators used to communicate mathematical ability are divided into language representations (spoken and written), visual, and symbolic/numerical notation (Cartwright, 2020). Verbal representation includes both spoken and written language. Written symbols refer to mathematical symbols and equations (Mainali, 2021). Visual representation in mathematics represents essential information about mathematical problems, including diagrams, drawings, graphs, etc. (Van Garderen et al., 2021). Therefore, representation should be treated as essential in supporting students' understanding of mathematical concepts and relationships in communicating mathematical approaches and arguments and understanding oneself and others (NCTM, 2000). The student's variety of representations is invaluable for observing his mathematical skills. Representation skills are crucial to understanding mathematical ideas meaningfully (Fonger, 2019). Student

representation skills are critical in learning because they can support mathematical activities and inform instructional design.

There is a translation term in representation. According to Bossé et al., (2014), translation of representation is defined as the cognitive ability to transform information contained in one form of representation (source) to another form of representation (target). Translation of representation is one of the processes of representation that plays an essential role in learning mathematics. Translational representation skills play an important role during the learning process because they influence the solution strategy in a mathematical problem (Nurrahmawati et al., 2021; Rahmawati et al., 2022). In line with Mainali (2021), translation of representation is a skill that students need to develop to become more proficient in learning mathematics. In addition, good translation skills representation will provide greater flexibility in solving mathematical tasks. Therefore, the translation of representations should be something that needs to be considered in learning mathematics because the translation of representations can be used as a learning strategy to analyze and solve mathematical problems.

One of the curriculum policies in countries, including Indonesia, is to equip students with higher-order thinking skills or HOTS (Kosasih et al., 2022). In line with efforts to improve education quality, problems requiring students to have higher-order thinking skills are highly recommended to be presented in learning (Rahmawati et al., 2022). Moreover, Lin et al., (2021) state that developing higher-order thinking skills has been considered an essential educational goal in the 21st century. Sofyatiningrum et al., (2019) also said that the challenges of 21st-century life can be achieved through educational activities that encourage students to think in higher order in the hope of familiarizing them with solving various problems, incredibly complex ones. According to Suparman et al., (2021), students with higher-order thinking skills (HOTS) can learn better, develop more perfect performance, and reduce weaknesses in learning. Therefore, practicing higher-order thinking skills is part of the basic skills that must be instilled in students at all levels of education; implementing HOTS-based learning can be one of the efforts to improve students' thinking skills.

There are several previous studies relevant to this research, including. (1) Sandie et al., (2019) examined students' thought processes in carrying out translational activities of mathematical representations through covariance problems from graphic to image forms; (2) Rahmawati & Anwar (2020) examine the characteristics of student activities at the unpacking of the source stage when translating representations from verbal to graphic; (3) Parameswari (2019) analyze students' higher-order thinking skills (HOTS) based on Bloom's Taxonomy in solving linear program problems. This research focuses on translating verbal representations of the HOTS-based SPtLDV problem into graphs, which contain four stages of translation of representations.

One crucial part of learning maths is drawing graphs. Based on the results of the study by Rahmawati & Anwar (2020), students' understanding of charts could be improved. This is because there are still many students who need help to unpack information. Graphics play an important role in visualizing verbal problems. For that, students must be able to construct graphs based on verbal problems. According to Bossé et al., (2011), *verbal representation* is defined as verbal problems or descriptions. Verbal problems are contextual problems described verbally, whereas verbal descriptions are verbal characterizations of symbolic representations, tables, or graphs. Based on Acevedo Nistal et al., (2009); Ihedioha (2014); and Bossé et al., (2011), research translations involving verbal representations both as source representations and as target representations are among the most difficult for students to complete. This can happen because problems that are represented verbally are more prone to confusion. Therefore, the translation of representations involving verbal representations still needs further study.

Translation of representations is also closely related to students' skills in solving mathematical problems. One of the problems that can measure students' skills in solving math problems is the HOTS-based problem. To solve HOTS-based math problems effectively, students must have translation skills to translate the information presented in mathematical problems into appropriate mathematical representations and connect mathematical concepts to solve problems. Based on this description, this research aims to study students' translation of verbal representations to graphs in solving the HOTS-based SPtLDV problem.

RESEARCH METHODS

This type of research is descriptive research with a qualitative approach. Data collection was carried out by providing a translation test of representation to 36 students of grade X-1 SMAN 1 Situbondo for the 2023/2024 school year. Retrieval of research subjects using purposive sampling techniques where data source sampling techniques use specific considerations. Two students were selected as research subjects based on the translational test representation results and suggestions from the mathematics teacher. The selected subjects are students who can solve problems through 4 stages of translation of representation and have good communication skills to explain the results of their work. The main instrument in this study is the researcher; in this case, the researcher acts as a planner and data collector of research analyzers. In its implementation, researchers need supporting instruments, namely a representative translational test sheet containing one HOTS-based SPtLDV problem item and an interview guideline containing an array of questions used to explore information about the answers written by research subjects on the answer sheet. Here are the HOTS-based SPtLDV issues used in this study. The following is a figure of nutritional adequacy figures (AKG) based on the Regulation of the Minister of Health of the Republic of Indonesia Number 28 of 2019.

Age's range	Calcium (mg)	Posphor (mg)	Magnesium (mg)	Iron ² (mg)	Iodium (mcg)	Seng ³ (mg)	Selenium (mcg)	Mangan (mg)	Fluor (mg)	Chromium (mcg)	Calium (mg)	Natrium (mg)	Chlor (mg)	Cuprum (mcg)
Male														
10 - 12 years old	1200	1250	160	8	120	8	22	1.9	1.8	28	3900	1300	1900	700
13 - 15 years old	1200	1250	225	11	150	11	30	2.2	2.5	36	4800	1500	2300	795
16 - 18 years old	1200	1250	270	11	150	11	36	2.3	4.0	41	5300	1700	2500	890
19 - 29 years old	1000	700	360	9	150	11	30	2.3	4.0	36	4700	1500	2250	900
Female														
10 - 12 years old	1200	1250	170	8	120	8	19	1.6	1.9	26	4400	1400	2100	700
13 - 15 years old	1200	1250	220	15	150	9	24	1.6	2.4	27	4800	1500	2300	795
16 - 18 years old	1200	1250	230	15	150	9	26	1.8	3.0	29	5000	1600	2400	890
19 - 29 years old	1000	700	330	18	150	8	24	1.8	3.0	30	4700	1500	2250	900

Figure 1. HOTS-based SPtLDV Problem Test

Najma is a 17 years old student at SMA Negeri 1 Situbondo. To meet his body's nutritional needs, he buys red salmon and chicken breast at the nearest traditional market. The prices for red salmon and chicken breast per 1 kg in traditional markets are IDR 300,000.00 and IDR 50,000.00 respectively. Seeing the high price of salmon, Najma buys no more than $\frac{1}{4}$ kg of salmon. The calcium and iron content of 1 kg of red salmon is 120 mg and 5 mg respectively, while the calcium and iron content of 1 kg of chicken breast is 150

mg and 10 mg respectively. If each person's daily calcium and iron requirements cannot exceed the recommendations of the Regulation of the Minister of Health of the Republic of Indonesia Number 28 of 2019 (can be seen in Table 1). Determine three possible weights each of red salmon and chicken breast (in kg) that Najma must purchase to meet the recommended calcium and iron requirements!

Data analysis is divided into two parts: written data analysis in the form of translational test results representation and oral data analysis in the form of interviews. The stages of data analysis are as follows: (1) data reduction is carried out by summarizing, selecting, and discarding unnecessary data; (2) the presentation of data is carried out by describing the translation of student representations; (3) Concluding is carried out by combining and matching the results of translational tests, representations, and interviews then used to answer the research objectives. There are four stages of translation of representation, along with the classification of HOTS for each stage as listed in Table 1.

Table 1. Translational Indicators of HOTS Representation and Classification

Stages of Translation of Representations	Indicators	HOTS Classification
Unpacking the Source	Unpack information and identify problems	-
Preliminary Coordination	Linking information that has been unpacked at the source stage with concepts that have been understood is then used to construct a target representation	Analyze
Constructing the Target	Transfer information from the source representation to the target representation so that solutions to the given problems are obtained	Create
Determining Equivalence	Re-examine the answers obtained by examining the suitability of concepts and ideas on the source and target representations	Evaluate

RESULTS AND DISCUSSION

The results of the representation translation test by 36 students of grade X-1 SMAN 1 Situbondo for the 2023/2024 school year in solving HOTS-based SPtLDV problems, classified based on meeting four stages of translation representation, and having good communication skills to explain the results of their work. The research was conducted in class X-1 of SMAN 1 Situbondo for the 2023/2024 academic year, consisting of 36 students. Based on the test results, there is one student who meets criteria I, nine learners meet criterion II, while the other twenty-six students did not, furthermore, interviews were conducted to obtain oral information related to the work of students, then 2 students were selected as research subjects consisting of 1 criterion I student and 1 criterion II student. The selected subject must be able to explain the results of his work well and based on the consideration of the X-1 grade mathematics teacher. Two students were selected as subjects, namely S1 as subject one and S2 as subject 2. An explanation of the translation of S1 and S2 representations in solving HOTS-based SPtLDV problems will be described in this section.

Unpacking the Source

Figure 2 is the stage of unpacking the source carried out by S1 in identifying the problem by writing down keywords related to the given problem. The thing S1 does in dismantling information is to write down known information on the answer sheet. S1 understands every piece of information presented for use in the following process. Problems presented in verbal form require higher precision, so when determining the resolution steps, S1 must first decipher the known information in its language. This is done because it can help S1 understand the information obtained from the problem well. In addition, S1 also includes a table to facilitate visualization of verbal problems.

Known :

- Najma = 17 y.o (female)
- Womens nutritional needs = 1.200 mg (Calsium)
15 mg (Iron)
- Price on the market \Rightarrow salmon (kg) = Rp. 300.000,00
chicken breast (kg) = Rp. 50.000,00
- salmon \leq $\frac{1}{4}$ kg
- Calsium \leq 1.200 mg
- Iron \leq 15 mg

	Calsium	Iron
salmon (kg)	120 mg	5 mg
chicken breast (kg)	150 mg	10 mg

Figure 2. Unpacking the Source S1

Based on Figure 3, for the unpacking of the source stage, S2 does not write down known information from the problem like S1. However, it is done by underlining the necessary words on the test sheet and then classifying them in table form. S2 did this to shorten the processing time. Although S2 does not detail what information is known on the answer sheet, S2 can understand what is ordered from the problem given well. Verbal information is information that tends to cause difficulties in unpacking information. Therefore, with the presentation of the table, S2 can summarize information and make it easier to visualize problems.

	Salmon	Chicken	supply
Calsium	120	150	1200
Iron	5	10	15

Figure 3. Unpacking the Source S2

Based on the previous presentation, it can be seen that the unpacking the source stage is the first step for someone to succeed in solving the problem because, at this stage, someone must thoroughly understand the information obtained and determine a strategy to find a solution to the problem given. Based on the test results, S1 and S2 have carried out the stage of unpacking the source well. This is evidenced by the results of the work of both subjects, who were able to disassemble information and identify the given problem appropriately.

Preliminary Coordination

In the preliminary coordination stage, S1 and S2 make a mathematical model of the problem by connecting the concepts understood. It can be seen in Figure 3 that S1 determines

the decision variable, namely by supposing x is the weight of red salmon and y is the weight of the chicken breast. In contrast, in Figure 4, S2 determines the decision variable x , the amount of red salmon, and y , which is the number of chicken breasts. Both subjects then make a mathematical model of the given problem by forming a linear inequality of two variables.

Ex : 1 kg salmon = x
 1 kg chicken breast = y

Inequality :

- $120x + 150y \leq 1.200$
- $4x + 5y \leq 40 \dots \textcircled{1}$
- $5x + 10y \leq 15$
- $x + 2y \leq 3 \dots \textcircled{2}$
- $0 \leq x \leq 1/4 \dots \textcircled{3}$
- $y \geq 0 \dots \textcircled{4}$

Figure 4. Preliminary Coordination S1

Ex = x : salmon
 y : chicken

- * $120x + 150y \leq 1200 \rightarrow 12x + 15y \leq 120 \rightarrow 4x + 5y \leq 40$
- * $5x + 10y \leq 15 \rightarrow x + 2y \leq 3$
- * $x \geq 0$
- * $y \geq 0$
- * $x \leq 1/4$

Figure 5. Preliminary Coordination S2

Based on Figure 4 and Figure 5, it can be seen that S1 and S2 are solving problems through the preliminary coordination stage. Both subjects can associate the information obtained with previously understood concepts. The mathematical model made by both shows that this is appropriate to be used as an initial plan to find a solution to the problem. At this stage, both subjects performed the HOTS activity, which was analyzed.

Constructing the Target

In the constructing the target stage, the subject constructs the results of the initial coordination by determining the area of the solving set by drawing a graph of the inequality first. The first step that the subject takes to draw a graph is to determine the delimiting line, namely by changing the sign of each inequality " \leq, \geq " with an equal sign "=" and then making a graph with the related equation by determining the intersection point of the x -axis and y -axis of the related equation as can be seen in Figure 6 and Figure 7. To visualize the intersection points of each equation, both subjects use a table to obtain two intersection points, which are used to draw the line equation.

• Inequality 1 $4x + 5y \leq 40$ $4x + 5y = 40$	• Inequality 2 $x + 2y \leq 3$ $x + 2y = 3$	• Inequality 3 $y \geq 0$ $y = 0$																		
<table border="1"> <tr><td>x</td><td>0</td><td>10</td></tr> <tr><td>y</td><td>8</td><td>0</td></tr> <tr><td>(x,y)</td><td>(0,8)</td><td>(10,0)</td></tr> </table>	x	0	10	y	8	0	(x,y)	(0,8)	(10,0)	<table border="1"> <tr><td>x</td><td>0</td><td>3</td></tr> <tr><td>y</td><td>3/2</td><td>0</td></tr> <tr><td>(x,y)</td><td>(0, 3/2)</td><td>(3,0)</td></tr> </table>	x	0	3	y	3/2	0	(x,y)	(0, 3/2)	(3,0)	• Inequality 4 $x \geq 0$ $x = 0$
x	0	10																		
y	8	0																		
(x,y)	(0,8)	(10,0)																		
x	0	3																		
y	3/2	0																		
(x,y)	(0, 3/2)	(3,0)																		

Figure 6. Constructing the Target S1

$4x + 5y = 40$	* $x + 2y = 3$																		
<table border="1"> <tr><td>x</td><td>0</td><td>10</td></tr> <tr><td>y</td><td>8</td><td>0</td></tr> <tr><td>x,y</td><td>(0,8)</td><td>(10,0)</td></tr> </table>	x	0	10	y	8	0	x,y	(0,8)	(10,0)	<table border="1"> <tr><td>x</td><td>0</td><td>3</td></tr> <tr><td>y</td><td>1,5</td><td>0</td></tr> <tr><td>x,y</td><td>(0, 1,5)</td><td>(3,0)</td></tr> </table>	x	0	3	y	1,5	0	x,y	(0, 1,5)	(3,0)
x	0	10																	
y	8	0																	
x,y	(0,8)	(10,0)																	
x	0	3																	
y	1,5	0																	
x,y	(0, 1,5)	(3,0)																	

Figure 7. Constructing the Target S2

After that, the subject draws intersect points on the cartesian coordinate plane. The inequality symbol is \leq and \geq , and the line depicted is solid. To determine which field to shade, subjects use a point test (x,y) that is not on the line.

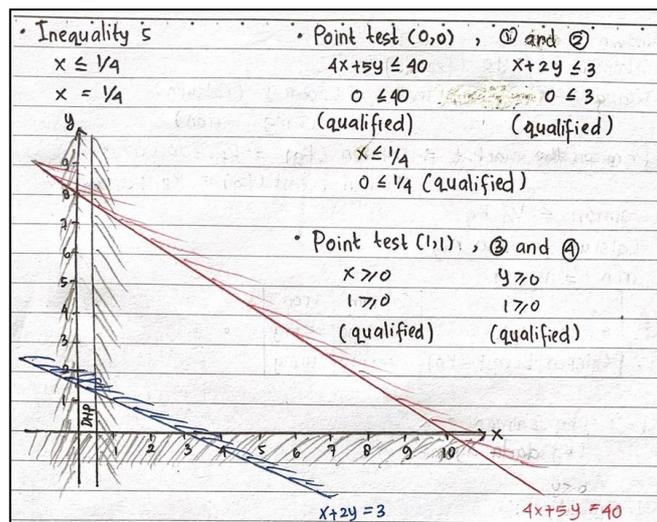


Figure 8. Constructing the Target S1

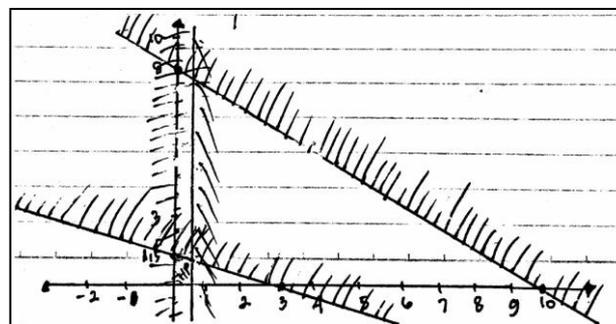


Figure 9. Constructing the Target S2

Based on Figure 8 and Figure 9, it can be seen that both subjects used the test point (0,0). Based on the interview results, the reason for choosing the test point (0,0) is to make it easier to calculate. If the point is the solution when tested, the subject shades the area that

does not contain that point and vice versa. In this study, the clean area is the area of the settlement set. Based on the graph drawn, to determine the possible weight of red salmon and chicken breast that should be purchased, evaluate the points (x,y) in the area of the settlement set. All dots (x,y) in the settlement set area are possible red salmon and chicken breast weights that Najma can purchase.

• Three Possibilities

When not buying salmon ($x=0$), intersection $x=0$ and $x+2y=3$

$$x + 2y = 3$$

$$2y = 3$$

$$y = \frac{3}{2}$$

$$y = 1\frac{1}{2}$$

So, when Najma doesn't buy salmon she can buy $1\frac{1}{2}$ kg chicken breast $(0, 1\frac{1}{2})$

When $y=0$ (don't buy chicken breast) as well as buying the maximum x , intersection $y=0$ and $x+2y=3$

$$x + 2y = 3$$

$$x = 3$$

However, because $x \geq \frac{1}{4}$ kg so when Najma doesn't buy chicken breast, she buys $\frac{1}{4}$ kg of salmon $(\frac{1}{4}, 0)$

When y maximum and x maximum, intersection $x=\frac{1}{4}$ and $x+2y=3$

$$x + 2y = 3$$

$$\frac{1}{4} + 2y = 3$$

$$1 + 8y = 12$$

$$8y = 11$$

$$y = \frac{11}{8} = 1\frac{3}{8}$$

So, when Najma bought $\frac{1}{4}$ kg salmon (x max), he can buy $1\frac{3}{8}$ chicken breast (y max) $(\frac{1}{4}, 1\frac{3}{8})$

Figure 10. Constructing the Target S1

Possibility:

$(0, 1\frac{1}{2})$, $(\frac{1}{4}, 1\frac{3}{8})$ dan $(\frac{1}{4}, 0)$

Intersect:

$$x + 2y = 3$$

$$x = \frac{1}{4}$$

$$2y = 3 - \frac{1}{4} = \frac{11}{4}$$

$$y = \frac{11}{8}$$

Figure 11. Constructing the Target S2

Based on the work of the subjects in Figure 9, Figure 10, and Figure 11, it can be seen that determining the three possible weights of red salmon and chicken breast is done by evaluating the corner points in the area of the settlement set. According to the interview results, this is done by the subject because evaluating the corner points makes it easier to determine the possibilities. Therefore, several possibilities of red salmon and chicken breast that Najma can buy are $A(0, \frac{3}{2})$, $B(\frac{1}{4}, \frac{11}{8})$, and $C(\frac{1}{4}, 0)$. This means, that when Najma doesn't buy red salmon, she can buy $1\frac{1}{2}$ kg of the chicken breast only, or when Najma buys $1\frac{1}{2}$ kg of red salmon, she can also buy $1\frac{3}{8}$ kg of chicken breast, or when Najma buys $\frac{1}{4}$ kg of red salmon, she did not buy chicken breast.

S1 added an argument to the final answer, stating that based on the question order to determine three possible weights each of red salmon and chicken breast (in kg) that must be purchased by Najma to "meet the recommended calcium and iron needs". S1 argues that this can be fulfilled if Najma gets calcium = 1,200 mg and iron = 15 mg. Therefore, according to S1, based on three possibilities of red salmon and chicken breast that Najma can purchase, it can only meet its iron needs while its calcium needs have not been met. According to S1, calcium, and iron needs can be met both if the line $4x + 5y = 50$ and line $x + 2y = 3$ line intersect at a point.

Meeting the needs for calcium and iron means getting calcium = 1.200 mg and iron = 15 mg , while the calcium line equation $4x + 5y = 50$ never intersects with the iron line equation $x + 2y = 3$ in quadrant I, so the need for iron will is always met first and calcium needs can only be met if the iron content exceeds the normal if x and y are positive.
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Figure 12. Argument S1

Based on Figure 12, it can be seen that S1 and S2 solve problems through the stage of constructing the target. Both subjects can transfer the information obtained at the preliminary coordination stage to obtain solutions to the problems. This is indicated by the correct answers obtained by both subjects. At this stage, both subjects have carried out the HOTS activity of creating.

Determining Equivalence

At this stage, it is not explicitly presented on the subject's answer sheet, so the researcher digs it up through interviews. Based on the interview results, students said to clarify the answers by rereading the problems given and then re-examining each linear inequality of the two variables written. Checking the graph is done by identifying the intersection points of both coordinates and ascertaining whether the results match those obtained. To clarify the area of the solution set created by substituting test points (x,y) to each inequality. Although the process is not explicitly presented on the answer sheet, it is revealed that the subject goes through the stage of determining equivalence. Both subjects have also carried out HOTS activities, namely evaluating.

Based on previous exposure, in unpacking the source, both subjects can form basic ideas in understanding the information presented in the verbal representation. Both subjects will use this basic idea to construct the graph. Both subjects could identify the keywords in the problem even though the methods used differed. S1 does this by describing information in its language on the answer sheet, while S2 does it by underlining the necessary words on the question sheet. According to Rahmawati et al (2017), representing the problem with one's language can be a form of understanding the problem. Moreover, Rahmawati & Anwar (2020) also stated that information that is represented verbally tends to cause difficulty in unpacking information and is more prone to confusion. Therefore, both subjects also included tables to visualize verbal problems. This is done to make it easier for both subjects to understand and see the relationship of each information used to answer the problem. In line with Van Garderen et al., (2021), visual representations in the form of tables are tools

used to assist students in solving verbal problems. Therefore, this needs to be done because verbal representations have a relatively low density of information, so it is more prone to confusion. Visual representations in the form of tables can help students visualize what is happening in the problem and are used as a tool to help them build ideas for solving the problem.

In the preliminary coordination stage, the two subjects form symbolic representations of verbal problems that have been dismantled and then relate them to concepts that have been understood. Both subjects can relate information to concepts that have been well understood. This is shown by the decision variables used to form a linear inequality system of two variables by which both subjects are correct. Based on this, the two subjects can relate the idea designed in the previous stage and then determine the analogy corresponding to the problem. Such activities in HOTS are classified by analysis. This is in line with Anderson & Krathwohl (2001), which state that students will break down information and identify parts that relate to each other while analyzing.

In the constructing the target stage, both subjects transfer the information obtained in the preliminary coordination stage to determine the solution to the problem. To determine the solution, both subjects use the help of tables and graphs. According to Utomo & Latifu (2021), visual representations like graphs or tables can help students clarify and solve problems. In line with Van Garderen et al., (2018), visual representation is used to show or explain the content or solution of a problem. Based on the presentation of the steps to construct graphs carried out by the two subjects, it can be seen that both subjects translate verbal representations into symbols first, then proceed with the translation of symbolic representations into graphs. According to Adu-Gyamfi & Bossé (2014), the process is called transitional representation. Transitional representations can assist subjects in constructing target representations. In line with Rahmawati et al., (2017), translation from verbal representation to graph requires more than one translation process. Both subjects have drawn the graph precisely. At this stage, both subjects have carried out the HOTS activity of creating. This is in line with Anderson & Krathwohl (2001), which states that when creating, students will plan ideas and establish procedures for solving problems, including generating solutions. When solving problems, S1 can reason, reflect, and make their own decisions without being instructed on the question or by the teacher. In this case, S1 can apply judgment or produce reasonable criticism, one example of higher-order thinking (Brookhart, 2010).

Finally, the stage of determining equivalence. Based on the interview results, the steps used by both subjects to check the suitability of concepts and ideas to represent sources and targets are almost the same. The initial step taken by the subject is to re-read the problem given, re-examine the basic idea when understanding the information, and then examine the linear inequality system of two variables that have been written. To examine the graph of each line equation, the subject identifies the intersection points of both coordinates and then ascertains the results' correctness. To clarify the set area, the solution is done by substituting the test points (x,y) for each inequality. Such activities in HOTS are classified on evaluation. This is in line with Anderson & Krathwohl (2001), who said that when evaluating, students will check the suitability of the given grades and methods with the objectives. In this case, both subjects check the suitability of the work already done and then draw conclusions.

Based on the identification results from the answer sheet and interview results, it can be seen that the two subjects have gone through four stages of translation of representation, namely unpacking the source, preliminary coordination, constructing the target, and determining equivalence well. The subject translates verbal representations into graphs by involving other representations, including symbolic representations, mathematical models to express information and solve problems, and visual representations in tables to clarify problems. In line with Polat (2020), the most crucial function of representation is visualizing mathematical ideas from one's thinking using symbol configurations.

CONCLUSION

The findings in this study about Students' Translation of Verbal Representation to Graph in Solving HOTS-based SPtLDV Problem of both subjects through four stages of translation of representation, namely unpacking the source, preliminary coordination, constructing the target, and determining equivalence. At the stage of unpacking the source, both subjects can unpack the information and identify the problem correctly so that it can be used to construct the representative of the requested target. In the preliminary coordination stage, the two subjects can relate the information obtained in the previous stage and then tie it to the concepts they have well so that a mathematical model is obtained in the form of a two-variable linear inequality system. At the stage of constructing the target, a subject provides arguments related to the solution obtained by describing the results of solving the problem he encounters through representation in the form of written words. In this case, the subject can produce reasoned criticism without being instructed on the question or the teacher. At the stage of determining equivalence, both subjects can reflect on the results of the answers obtained by validating and reconfirming the results of the answers obtained, whether they are appropriate or not, with the purpose of the questions in the problem. This process reflects the results of the subject's answer to the problem he encounters in the given problem.

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