International Journal Of Humanities Education And Social Sciences ***(IJHESS)*** *E-ISSN:* **2808-1765**
Volume 4, Number 3, December, *Page. 1609 – 1621*
Email : editorijhess@gmail.com

Mathematical Representation Ability Reviewed From The Learning Style Of High School Students In Cirebon City In Solving SPLDV And SPTLDV Problems

Nur Komalasari[1)], Sri Winarsih[2)], Anggita Maharani[3)], Muchamad Subali Noto[4)]
[1,2,3,4)]Universitas Swadaya Gunung Jati Cirebon

*Corresponding Author
Email: nurkomalasari637@gmail.com, arsyaibrahim2@gmail.com , anggitamaharani@ugj.ac.id, msnoto@ugj.ac.id

Abstract

This study aims to analyze the characteristics of students with visual, auditory and kinesthetic learning styles in solving SPLDV and SPtLDV problems. The research method taken is a qualitative research method. Qualitative research is carried out by means of observation, interviews, or document review. The results of this study are the characteristics of thirty-six students obtained that students who have symbolic representation skills are twelve students (33.33%) with five students (13.89%) having a kinesthetic learning style, three students (8.33%) having an auditory learning style, and four students (11.11%) having a visual learning style. Then students who had verbal representation skills were ten students (27.78%) with four students (11.11%) having a kinesthetic learning style, five students (13.89%) having an auditory learning style, and one student (2.78%) having a visual learning style. The students who had visual representation skills were fourteen students (38.89%) with four students (11.11%) having a kinesthetic learning style, one student (2.78%) having an auditory learning style, and nine students (25%) having a visual learning style.

Keywords : Mathematical Representation Ability, Learning Style, SPLDV and SPtLDV.

INTRODUCTION

Through education, it is hoped that the ability to face demands from within and outside society can be grown (Kurniawan, 2020). In order to achieve a predetermined educational goal, an effort or process called learning is needed. Various kinds of science are given to students, one of which is mathematics (Noto, *et al*, 2023). Mathematics is one of the sciences that plays an important role in daily life, both in the field of mathematics itself and in other fields (Elinda, *et al*, 2023). Therefore, mathematics is made one of the mandatory subjects that must be studied by students from the basic education level to the university level.

This is corroborated by the National Council of Teachers of Mathematics (NCTM) which states that the ability to represent is one of the process standards in mathematics learning."*The next five Standards address the processes of problem solving, reasoning and proof, connections, communication, and representation*" (Darwish, & Abed, 2023). NCTM stipulates that there are five standards of the mathematical ability process that students need. The skills that students need to have include problem *solving, reasoning and proof*, communication, connections, and representation). Based on this description, representation in mathematics learning is an ability that must be possessed by students (Adiastuty, *et al*, 2023). The objectives of mathematics subjects are for students to have the following abilities: (1) Understand mathematical concepts, explain the relationship between concepts, and apply concepts or algorithms flexibly, accurately, efficiently, and appropriately in solving problems, (2) Use reasoning on patterns and properties, perform mathematical manipulations in making generalizations, compiling evidence, or explaining mathematical ideas and statements; (3) Solving problems which includes the ability to understand problems, design mathematical models, solve models, and interpret the solutions obtained; (4) Communicating ideas with symbols, tables, diagrams, or other media to clarify the situation or problem; and (5) Have an attitude of appreciating the usefulness of mathematics in

life, namely curiosity, attention, and interest in learning mathematics, as well as an attitude of tenacity and confidence in solving problems (Rizqi, *et al*, 2021).

Based on the five objectives of mathematics subjects, one of the mathematical abilities that can realize them all is the ability to represent, where the ability to represent can be interpreted as a form or arrangement that can describe, represent or symbolize something in a way (Mayasari, & Slamet, 2021). The ability of mathematical representation is the ability to represent notations, symbols, images, tables, graphs, diagrams, equations or other mathematical expressions into other forms. Mathematical representation consists of visual representations, written text, and mathematical equations or expressions (Hidayat, *et al*, 2023). Representation skills are an important component that must be developed in every learning activity because they can help students build concepts and express mathematical ideas, and students can develop their ideas (Warti, *et al*, 2021).

The ability to represent gives students fluency to build a concept, think mathematically and make students have a good understanding and help students in communicating their thoughts (Syaputri, & Erita, 2024). The ability to represent students is an expression of ideas or ideas displayed by students in an effort to find solutions to the mathematical problems they are facing as a result of their interpretation of their minds (Renaldie, *et al*, 2024). Each student has a different way of coming up with an idea or idea to find a mathematical problem. Representation can help describe, explain, or expand mathematical ideas which include symbols, equations, words, drawings, tables, graphs, manipulative objects and internal ways of thinking about mathematical ideas (Muhsinah, & Fa'ani, 2024).

Students can expand their understanding of mathematical ideas or relationships by moving from one type of representation to different representations of the same relationship. In addition, representation can describe, represent, or symbolize something in a way (Ningsi, *et al*, 2024). Through multiple representations means rerepresenting the same concept in different formats, including verbal, mathematical, images and graphs. (Rizqi,*et al*, 2021). The brain's ability to absorb, manage, and convey information is different so that each person's learning style is different which is then known as a learning style (Listyotami, *et al*, 2024).

Learning style is a consistent way that a person uses when thinking about capturing, organizing, and processing information received (Hutasoit, & Siregar, 2024). Learning styles are a special way or preferred by everyone to receive and deliver information. Everyone tends to have one of the learning styles that plays a role in learning (Astuti, & Subarinah, 2024). The importance of mathematical representation according to rizqi, *et al* (2021) requires students to: (1) create and use representations to organize, record, and communicate mathematical ideas, (2) select, apply, and translate representations to solve problems, (3) use representations to model and interpret physical, social, and mathematical phenomena (Siswanto, *et al*, 2023).

Based on initial observations on the learning process in one of the vocational high schools in Pangenan District, Cirebon Regency, it was found that there are still many difficulties in working on SPLDV and SPtLDV problems. Some students are still unable to formulate mathematical models, even though mathematical models are indispensable in solving SPLDV and SPtLDV. In addition, students also experience difficulties in determining the solution area of a linear inequality system. Some students solve SPLDV and SPtLDV problems in a straightforward way, but there are also students who solve not by using methods but directly write down the answers by guessing. This is because students have different ways of solving SPLDV and SPtLDV problems. Nurvitasari, *et al*, (2024) stated that one of the factors that can affect students' mathematical representation ability is learning style. Learning style is a consistent way that a student does in capturing stimuli or information, how to remember, think, and solve problems (Sanggorani, *et al*, 2024). Based on research conducted by Kurniawan, B. (2020) on the Analysis of Mathematical Representation Ability of Vocational School Students Reviewed from Learning Styles. It was obtained that the mathematical representation ability of students

who had a visual learning style of 71.43%, auditory 71.25% and kinesthetic 73.89% was in the sufficient category. The kinesthetic learning style has the best representation ability in mathematics learning in the sufficient category.

RESEARCH METHODS

The research method taken is a qualitative research method. Qualitative research is carried out by observation, interviews, or document review (Mayasari, & Slamet, 2021). Qualitative research is research that produces descriptive data in the form of written or spoken words from observable objects (Rizqi, 2021).

The subjects used in this study are all students of class X of SMAN 4 CIREBON which totals 36 students. However, the author only took a sample of 6 students with the criteria of 2 students with visual learning styles, 2 students with auditory learning styles, and 2 students with kinesthetic learning styles whose observation results will be presented.

Table 1. Operational Forms of Mathematical Representation

It	Aspect of Representation	Operational Forms
1	Visual Representation	
	a. Graphs, diagrams, or tables	Re-presenting data or information from a representation of a graph, diagram, or table ($1a_1$).
		Use visual representations to solve problems ($1a_2$).
	b. Picture	Create a drawing of geometric patterns ($1b_1$).
		Create geometric construction drawings to explain and facilitate problem solving ($1b_2$).
2	Symbolic Representation (Mathematical equations or expressions)	Create an equation or mathematical model from a given representation ($2a_1$).
		Making a conjecture of a number pattern ($2a_{,2}$).
		Problem solving by involving mathematical expressions ($2a_3$).
3	Verbal Representation (Words or written text)	Create a problem situation based on the data or representations provided ($3a_1$).
		Write down the interpretation of a representation ($3a_2$).
		Write down the steps to solve a mathematical problem in words ($3a_3$).
		Constructing a story that is in accordance with a representation presented ($3a_4$).
		Answer questions using written words or texts ($3a_5$).

In Table 1, there are three aspects of representation, namely visual representation, symbolic representation and verbal representation with visual representation having operational forms, namely representing data or information from a representation of a graph, diagram, or table, using visual representation to solve problems, making drawings of geometric patterns, and making drawings of geometric constructions to explain and facilitate problem solving. The symbolic representation has operational forms, namely making equations or mathematical models from the given representations, making conjectures from a number pattern, and solving problems by involving mathematical expressions. While visual representation includes the following operational forms: Creating a problem situation based on the data or representation

provided, Writing the interpretation of a representation, Writing down the steps to solve a mathematical problem in words, Compiling a story that is in accordance with a representation presented, and Answering the problem using words or written text. The following are the questions and discussions used in this study, will be presented in Table 2, below:

Table 2. Question Grid

It	Question	Indicator
1	Dina and Santi go to the bookstore. Dina bought 2 notebooks and 3 pens with a total price of IDR 18,000. Santi bought 4 notebooks and 2 pens with a total price of IDR 28,000. Write down the two-variable linear equation system from the problem above. Determine the price of one notebook and one pen using the graph method. Verify the results obtained by substitution to one of the equations.	 (1a1) (1a2), (1b1) (1b1), (1b2)
It	Question	Indicator
2	A farmer has 20 hectares of land that will be planted with corn and rice. Each hectare of corn requires a capital of IDR 2,000,000, while each hectare of rice requires a capital of IDR 1,000,000. The total capital owned by farmers is IDR 30,000,000. State this problem in the form of a two-variable linear inequality system. Describe the area of the solution set of the inequality system. Determine a combination of corn and rice acreage that meets all conditions.	 (2a1) (2a2) (2a3)
It	Question	Indicator
3	An entrepreneur wants to produce two types of food, namely food *A* and food *B*. To produce these foods, flour and sugar raw materials are used with the following conditions: One food unit *A* requires 3 kg of flour and 2 kg of sugar. One unit of food *B* requires 2 kg of flour and 4 kg of sugar. The total available flour raw materials are 24 kg, and the total sugar available is 32 kg. In addition, entrepreneurs want to meet production targets: The total amount of food produced must be greater than or equal to 8 units. The amount of food *A* produced must be more than food *B*. State this problem in the form of a two-variable system of linear equations and inequalities. Describe the solution area of the inequality system in the coordinate plane. Determine the combination of the number of foods *A* and *B* that may be produced, if the solution must be an integer. Calculate the total raw material usage for one of the solutions.	 (3a1), (3a2), (3a3), (3a4) (3a5)

Based on the presentation of Table 2 about the questions and discussions used in this study, it was obtained that there were three essay questions that contained the aspects of representation used, as for these aspects, namely Visual Representation, Symbolic Representation and Verbal Representation.

Table 3. Indicators of Student Learning Style

Modalities	**Visual**	**Auditing**	**Kinesthetics**
Preferred Way of Learning	Learn by watching or watching	Learn through verbal direction from yourself or others	Learn by doing or being directly involved

Spell	Recognizing words by looking, focusing on the order of letters	Using a phonic approach that has the ability to detect words based on sounds	Is someone who is weak at spelling; write the specified word, if you feel the word "seems" to be true
Read	Interested description; it is not uncommon to stop reading to look up and describe the atmosphere read in the shadows; have a strong concentration	Enjoy dialogue and performances; avoid long descriptions; not paying attention to illustrations; Lip movements and whispers	Prefer stories where the action happens early; restlessness when reading; Not diligent in reading
Handwriting	Tends to be good, especially at a young age; spacing and size of writing are good; Taking is an important thing.	Had a lot of difficulties at the beginning of writing; tend to write at a slow pace	It's only good at the beginning, but it gets worse when the writing space gets smaller; Pressing harder on stationery
Memory	Remembering faces; but forgot the name; write anything; Always take notes	Remembering the name, but forgetting the waja; remembering with the repetition of the voice	Remembering well everything that has been done, but not remembering what has been seen or talked about
Depiction	His imagination is clear; thinking in pictures; Visualize systematically	Subvocalization; imagining things in sound; Details are not important	Filming is not that important; The image that occurs is accompanied by movement
Disturbing circumstances	Unaware of the sound; Disturbed by movement	Easily distracted by sound	Not paying attention to visual or auditory presentations so they may not appear distracted
Problem solving	Careful; first prepare a plan; Managing thoughts by writing them down lists of problems	Talking about problems; try solutions verbally or subvocally; Talk to yourself about the problem you are facing	Regarding the problem visually; rush to action; often choose the solution that involves the greatest activity.
Response when there is no activity	Daydreaming or drawing; Looking for something	Talking to yourself or with others	Restless or looking for an excuse to move
Respond to new activities	Look around or check things	Talking about the situation; Discuss the pros and cons of what to do	Trying different things; Pecking, feeling and manipulating

Table 3 contains the learning style indicators used in this study, where in the learning style owned by students consisting of visual learning style/auditory learning style/kinesthetic learning style, based on these three learning styles there are modalities consisting of preferred learning styles, spelling, reading, handwriting, memory, depiction, disturbing circumstances, problem solving, response when there is no activity, and response to new activity.

RESULT AND DISCUSSION

The results of the research in this study are divided into two parts according to the formulation of the problem. The two parts include the results of research on the characteristics of students with visual, auditory and kinesthetic learning styles in solving SPLDV and SPtLDV problems. Student grouping data based on learning styles was obtained from classroom learning observations, while the grouping categories were visual learning style groups, auditory learning styles, kinesthetic learning styles in solving SPLDV and SPtLDV problems.

There is a difference between students who are the upper group, middle group and lower group. The students are grouped according to their ability to solve SPLDV and SPtLDV problems. The presentation of the researcher's observation results in the classroom is shown in Table 4 below:

Table 4. Results of the grouping of students consisting of the upper group

It	Name	Representation Capabilities	Learning Style	Value	Group
1	Subject 1	Visual	Visual	92	High
2	Subject 2	Visual	Visual	90	
3	Subject 3	Visual	Visual	89	
4	Subject 4	Symbolic	Visual	89	
5	Subject 5	Verbal	Auditorium	88	
6	Subject 6	Verbal	Auditorium	85	
7	Subject 7	Verbal	Auditorium	84	
8	Subject 8	Symbolic	Visual	84	
9	Subject 9	Symbolic	Kinesthetics	83	
10	Subject 10	Visual	Visual	83	
11	Subject 11	Visual	Visual	82	
12	Subject 12	Visual	Visual	81	
13	Subject 13	Visual	Kinesthetics	81	
14	Subject 14	Symbolic	Kinesthetics	80	
15	Subject 15	Symbolic	Kinesthetics	80	
Average				84,73	

In Table 4, the results of the 15 students studied were obtained with an average of 84.73 with five students who have symbolic representation skills with three students with kinesthetic learning styles, and two students who have visual learning styles. There were three students who had verbal representation skills with all three auditory learning styles, then there were seven students who had visual mathematical representation skills with six students with visual learning styles and one kinesthetic learning style.

Table 5. Results of grouping students consisting of middle groups

No	Name	Representation Capabilities	Learning Style	Value	Group
1	Subject 16	Symbolic	Kinesthetics	78	Moderate
2	Subject 17	Verbal	Kinesthetics	78	

3	Subject 18	Verbal	Kinesthetics	76	
4	Subject 19	Visual	Auditorium	76	
5	Subject 20	Symbolic	Visual	75	
6	Subject 21	Symbolic	Visual	75	
7	Subject 22	Verbal	Visual	75	
8	Subject 23	Visual	Kinesthetics	73	
9	Subject 24	Symbolic	Auditorium	72	
10	Subject 25	Verbal	Auditorium	70	
11	Subject 26	Verbal	Auditorium	68	
12	Subject 27	Visual	Visual	65	
13	Subject 28	Symbolic	Kinesthetics	60	
Average				72,38	

In Table 5, thirteen students with an average of 72.38 were obtained. There were five students who had the ability to represent symbolic categories as many as five people with two students with kinesthetic learning styles, one student with auditory learning styles and one student with visual learning styles. Then there are three students who have the ability of mathematical representation in the visual category with each student having auditory, visual and kinesthetic learning styles and five students have the ability of representation in the verbal category with two students in the auditory category, one student in the visual category, and two students in the kinesthetic category.

Table 6. Results of grouping students consisting of lower groups

No	**Name**	**Representation Capabilities**	**Learning Style**	**Value**	**Group**
1	Subject 29	Symbolic	Auditorium	60	Low
2	Subject 30	Symbolic	Auditorium	59	
3	Subject 31	Verbal	Kinesthetics	59	
4	Subject 32	Verbal	Kinesthetics	55	
5	Subject 33	Visual	Kinesthetics	40	
6	Subject 34	Visual	Kinesthetics	40	
7	Subject 35	Visual	Visual	40	
8	Subject 36	Visual	Visual	30	
Average				47,88	

In Table 6, based on the results of the research in the lower group of 8 students, an average of 47.88 was obtained with four students having visual representation skills with two students with visual learning styles and two students with kinesthetic learning styles, then two students having verbal representation skills with both kinesthetic learning styles and two students having symbolic representation skills with auditory learning styles.

Table 7. Results of the grouping of students consisting of upper, middle and lower groups

No	Name	Representation Capabilities	Learning Style	Value	Group
1	Subject 1	Visual	Visual	92	High
2	Subject 2	Visual	Visual	90	
3	Subject 3	Visual	Visual	89	
4	Subject 4	Symbolic	Visual	89	
5	Subject 5	Verbal	Auditorium	88	
6	Subject 6	Verbal	Auditorium	85	
7	Subject 7	Verbal	Auditorium	84	
8	Subject 8	Symbolic	Visual	84	
9	Subject 9	Symbolic	Kinesthetics	83	

10	Subject 10	Visual	Visual	83	
11	Subject 11	Visual	Visual	82	
12	Subject 12	Visual	Visual	81	
13	Subject 13	Visual	Kinesthetics	81	
14	Subject 14	Symbolic	Kinesthetics	80	
15	Subject 15	Symbolic	Kinesthetics	80	
16	Subject 16	Symbolic	Kinesthetics	78	Moderate
17	Subject 17	Verbal	Kinesthetics	78	
18	Subject 18	Verbal	Kinesthetics	76	
19	Subject 19	Visual	Auditorium	76	
20	Subject 20	Symbolic	Visual	75	
21	Subject 21	Symbolic	Visual	75	
22	Subject 22	Verbal	Visual	75	
23	Subject 23	Visual	Kinesthetics	73	
24	Subject 24	Symbolic	Auditorium	72	
25	Subject 25	Verbal	Auditorium	70	
26	Subject 26	Verbal	Auditorium	68	
27	Subject 27	Visual	Visual	65	
28	Subject 28	Symbolic	Kinesthetics	60	
29	Subject 29	Symbolic	Auditorium	60	Low
30	Subject 30	Symbolic	Auditorium	59	
31	Subject 31	Verbal	Kinesthetics	59	
32	Subject 32	Verbal	Kinesthetics	55	
33	Subject 33	Visual	Kinesthetics	40	
34	Subject 34	Visual	Kinesthetics	40	
35	Subject 35	Visual	Visual	40	
36	Subject 36	Visual	Visual	30	
Average				72,08	

In Table 7 there is a division of student groups consisting of upper, middle and lower groups, where in the upper group of students there are fifteen students, while in the middle group there are thirteen students, and for the lower group there are eight students. The upper group has an average score of 84.733, then for the middle group the average score is 72.38 and the lower group has an average score of 42.56. As for the upper group of students who have the ability of visual representation of seven students (19.44%), symbolic five students (13.89%), and verbal as many as three students (8.33%), while in the middle group of students who have visual representation ability of three students (8.33%), symbolic as many as five students (13.89%), and verbal as many as five students (13.89%). and for the lower group of students who have the ability of visual representation of four students (11.11%), symbolic as many as two students (5.56%), and verbal as many as two students (5.56%).

In Table 4 above, it was also obtained that the students in the upper group had a visual learning style of eight students (22.22%), an auditory learning style of three students (8.33%), and a kinesthetic learning style of four students (11.11%), then in the middle group there were students who had a visual learning style of four students (11.11%), auditory learning style as many as four students (11.11%), and kinesthetic learning style as many as five students (13.89%), and the lower group there are students who have visual learning style as many as two students (5.56%), auditory learning style as many as two students (5.56%), and kinesthetic learning style as many as four students (11.11%).

After the results were obtained and presented in Table 4, then a sample of 6 students was taken with the criteria of 2 students with visual learning styles, 2 students with auditory learning styles, and 2 students with kinesthetic learning styles whose observation results were presented as follows.

Table 8. Recapitulation of Observation Results

It	Name	Representation Capabilities	Learning Style	Observation Results
1	Subject 1	Visual	Visual	Subject 1 is able to apply operational forms of visual variables, namelyre-presenting data or information from a graph, diagram, or table representation, using visual representations to solve problems, drawing geometric patterns, and making geometric construction drawings to explain and facilitate problem solving. Then for the learning style of subject 1 is visual because I made observations that students can understand the material more easily if they learn by seeing, then the distance and size of the writing are good,
2	Subject 36	Visual	Visual	Subject 36 is able to apply visual operational forms, but not all of them can be applied well, so there are only a few that are applied, namely Re-presenting data or information from a graph, diagram, or table representation, and Using visual representations to solve problems. Then for the learning style is visual because students prefer to learn by watching and seeing, but lack focus and are not confident in doing problems, so that the results obtained are not according to expectations and do not even exceed the KKM that has been determined by the school.
3	Subject 9	Symbolic	Kinesthetics	Subject 9 is able to do the problem well, so that there are several operational forms that are in accordance with symbolic representation, namely making equations or mathematical models from the given representations, making conjectures from a number pattern, and solving problems by involving mathematical expressions. Subject 9 is also based on the results of observations during learning in class, namely kinesthetic learning styles, it can be seen that
4	Subject 31	Verbal	Kinesthetics	Subject 31 has done poorly on representation problems, but still fulfills several operational forms, namely creating problem situations based on the data or

				representations given, and writing down the interpretation of a representation. While subject 31 has a way of learning by doing or being directly involved and always trying to try various things, with efforts to solve these problems
5	Subject 5	Verbal	Auditorium	Subject 5 has solved the representation problem well, because it has fulfilled the operational forms of verbal representation, namely creatinga problem situation based on the data or representation given, writing the interpretation of a representation, writing down the steps to solve a mathematical problem in words, compiling a story that is in accordance with a representation presented, and answering the problem using words or written text. Subject 5 also has an auditory learning style because it is more interested if the teacher delivers learning with verbal directions and is easily distracted by sound.
6	Subject 30	Symbolic	Auditorium	Subject 30 has worked on mathematical representation problems even though the results are not good, but still fulfills the aspect of symbolic representation and there are operational forms, namely makingequations or mathematical models of the given representations, making conjectures from a number pattern, and solving problems by involving mathematical expressions. Then subject 30 has an auditory learning style because students have a way of learning more happily if they learn through verbal directions from themselves or others, and enjoy dialogue and performance; avoid long descriptions; not paying attention to illustrations; Lip movements and whispers

In Table 8, six students were taken consisting of the upper and lower groups, but representing two visual learning styles, two auditory learning styles, and two kinesthetic learning styles. Based on the six students, they have different representation abilities according to the results of student observations in class. This is in line with his opinion Rizqi, *et al* (2021) stated that (1) Students with visual learning styles experience difficulties in mathematical skills (addition, subtraction, multiplication, and division and basic sequences of operations) and difficulties in intentional skills (copying numbers correctly and observing operational symbols correctly) in solving mathematical problems. (2) Students with auditory learning styles experience difficulties in linguistic skills (related to understanding mathematical terms and converting written problems into mathematical symbols), perceptual skills difficulties (the ability to recognize symbols and understand symbols and sort groups of numbers), and difficulties with

intentional skills (copying numbers correctly and observing operational symbols correctly) in solving mathematical problems. (3) Students with kinesthetic learning styles experience difficulties in linguistic skills (which are related to understanding mathematical terms and converting written problems into mathematical symbols), difficulties in mathematical skills (basic addition, subtraction, multiplication, and division and basic sequences of operations), and difficulties in intentional skills (copying numbers correctly and observing operational symbols correctly) in solving problems mathematics. The research conducted by Nuriza, *et al* (2020) (1) There are three types of learning styles known in class XI IPS 4 SMA Negeri 1 Sungai Raya, namely Visual, Auditorial, and Kinesthetic. But of the three types of learning styles that are more likely to be Auditorial.; (2) The difficulties that students with visual learning styles are most likely to experience are understanding problems, making mathematical models and performing procedures correctly; The difficulty that students tend to experience with auditory learning styles is making mathematical models so that the final result is incorrect calculations; The difficulties that students with kinesthetic learning styles tend to experience are understanding problems and making mathematical models, so that some do not continue to work on the next number on the problem.; (3) The factors that cause students to have difficulties in solving story problems in SPLDV and SPtLDV materials are: Factors that come from students, namely lack of understanding of the material by students in SPLDV and SPtLDV materials, lack of thoroughness in doing problems, lack of student perseverance in learning.

In line with this, research conducted by Warti, *et al* (2021) that based on the three learning styles seen, better results were seen in the visual group that had the highest average student score, namely the visual learning style of 13 people had a complete learning outcome of 3 people with an average student score of 63.69 with a maximum score of 100 and a minimum score of 30. The learning outcomes of matematics are reviewed from the auditory learning style of 7 people who have 2 complete learning outcomes with an average student score of 54.85 with a maximum score of 84 and a minimum score of 15. Mathematics learning outcomes reviewed from the kinesthetic learning style of 3 people had incomplete learning outcomes with an average student score of 40 with a maximum score of 51 and a minimum score of 23. According to Mayasari, & Slamet, (2021) stated the following: (1) In the understanding of group action stages with a visual-dominant learning style, there are more action stages than other groups. This shows that students with visual learning styles will be more able to imitate what is exemplified by their teachers than students who have other learning styles. (2) In the understanding of the process stages, each group showed an increase from the action stage, where subjects with auditory dominant learning styles carried out the most process stages. From this it means that subjects with auditory learning styles are able to internalize actions into processes well. (3) In the understanding of the object stages of the subject group with a visual dominant learning style, the object stages are carried out than other groups. In addition , based on the results of research conducted by Delima, *et al* (2019) it was obtained that the success of the learning process can be seen from the mathematical thinking ability achieved by students. Meanwhile, the success of the teaching and learning process cannot be separated from the student's learning style. Therefore, the author suspects that there is a relationship between students' mathematical thinking and their learning style. These two variables will be researched in a study entitled Analysis of Students' Mathematical Thinking Based on Their Learning Styles. The purpose of this study is to describe students' mathematical thinking based on their learning style. The purpose of the second study is to find out which learning style has the highest average score of students' mathematical thinking. In addition, this study also aims to find out whether there is a relationship between students' mathematical thinking and their learning style. The results of research conducted by Noto, *et al*, (2023) revealed that learning style is an approach that explains how individuals learn or the way everyone takes to concentrate on the learning process, and master difficult information through

different perceptions. A person's learning style is a combination of how a person absorbs, organizes, and manages the information he obtains.

CONCLUSION

Based on the data of the research findings and discussions presented in this study, the following conclusions can be drawn that there are characteristics of students who have symbolic representation abilities as many as twelve students (33.33%) with five students (13.89%) having a kinesthetic learning style, three students (8.33%) having an auditory learning style, and four students (11.11%) having a visual learning style. Then students who had verbal representation skills were ten students (27.78%) with four students (11.11%) having a kinesthetic learning style, five students (13.89%) having an auditory learning style, and one student (2.78%) having a visual learning style. The students who had visual representation skills were fourteen students (38.89%) with four students (11.11%) having a kinesthetic learning style, one student (2.78%) having an auditory learning style, and nine students (25%) having a visual learning style.

REFERENCES

Adiastuty, N., Waluya, S. B., & Aminah, N. (2020). Neuroscience study: Gender and mathematical creative thinking skills in vocational high school students. *Journal of Physics: Conference Series.* 1613(1).

Aribah, A. K. Z., & Swasxtika, A. (2024). Students Mathematical Communication Skills in Solving Contextual Problems of Three Dimensional Figures at Junior High School Level. *MATHEMA: JURNAL PENDIDIKAN MATEMATIKA*, *6*(1), 141-151.

Astuti, A. P., & Subarinah, S. (2024). Analisis Kemampuan Investigasi Matematika pada Materi Bangun Ruang Sisi Datar Ditinjau dari Gaya Belajar Siswa. *Journal of Classroom Action Research*, *6*(1), 1-8.

Azzahra, A., Rianti, T. D., & Wandani, R. R. (2024). Analisis Kemampuan Representasi Visual Matematika pada Materi Geometri. *Jurnal Pendidikan Tambusai*, *8*(1), 57-61.

Darwish, H. F., & Abed, E. R. (2023). An Analysis of the Mathematics Textbook for the First Grade in Jordan in Light of the National Council of Mathematics Teachers (NCTM) Standards. *Dirasat: Educational Sciences*, *50*(1), 77-91.

Delima, N., Rahmah, M. A., & Noto, M. S. (2019). Students' mathematical thinking and their learning style. *Journal of Physics: Conference Series*. 1280(4).

Elinda, E., Aminah, N., Pramuditya, S. A., & Maharani, A. (2023). Analysis Od Primary School Students Mathematical Conceptual Understanding Based On Learning Interest. *Kalamatika: Jurnal Pendidikan Matematika*, *8*(2), 177-190.

Hutasoit, R. E., & Siregar, N. (2024). Penerapan Teori Pembelajaran Van Hiele Berbantuan Geogebra untuk Meningkatkan Kemampuan Representasi Matematis Siswa Kelas VIII SMP Negeri 2 Sibolga. *Journal on Education*, *6*(2), 12376-12388.

Hidayat, Y. W., Pramuditya, S. A., & Aminah, N. (2023). Analysis of Mathematical Representation Capabilities in Geometry Materials Assisted by Geogebra Applications. *IndoMath: Indonesia Mathematics Education*, *6*(1), 35-46.

Kurniawan, B. (2020). Pengembangan SDM dalam Pendidikan Islam. *Jurnal Cakrawala: Studi Manajemen Pendidikan Islam dan Studi Sosial;* Vol. 4 No.2.

Listyotami, M. K., Anwar, Y., & Bramana, S. M. (2024). Efektivitas Model Discovery Learning Berbasis Kemampuan Koneksi Matematika, Berpikir Reflektif, Dan Representasi

Matematis Mahasiswa Dalam Pembelajaran Online. *Trigonometri: Jurnal Matematika*, 1(1), 6-12.

Mayasari, T., & Slamet, S. (2021). Analisis pemahaman siswa SMA kelas XI materi program linear berdasarkan teori apos ditinjau dari gaya belajar. *Jurnal MIPA dan Pembelajarannya (JMIPAP)*, 1(11), 879-884.

Muhsinah, T. I., & Fa'ani, A. M. (2024). Perbandingan Kemampuan Representasi Matematis dengan Pembelajaran RME dan Pembelajaran Kooperatif tipe STAD pada Siswa Kelas XI MAN Sumenep. *Galois: Jurnal Penelitian Pendidikan Matematika*, 3(1), 1-11.

Nurvitasari, T., Subarinah, S., & Kurniawan, E. (2024). Analisis Kemampuan Pemecahan Masalah Matematika Materi Sistem Persamaan Linear Dua Variabel Ditinjau Dari Gaya Belajar Pada Siswa Kelas VIII. *Journal of Classroom Action Research*, 6(1), 9-16.

Noto, M. S., Amiruddin, M. H., Maemunah, S., Bakar, M. T., & Sumarni, P. (2023). Students' Mathematical Logical Thinking in Terms of Learning Style. *Rangkiang Mathematics Journal*, *2*(1), 9-17.

Renaldie, Z., Ahzrani, A. S., Anggraini, A., & Aji, B. (2024). Pengembangan Desain Pembelajaran Matematika Menggunakan Model Dick & Carey Pada Materi Sistem Persamaan Linear Dua Variabel (SPLDV). *Jurnal Arjuna: Publikasi Ilmu Pendidikan, Bahasa dan Matematika*, *2*(1), 242-251.

Rizqi, M., Suyitno, H., & Dwijanto, D. (2021). Students' Mathematical Creative Thinking Ability in terms of Learning Styles and Gender in Problem Based Learning. *Unnes Journal of Mathematics Education Research*, *10*(1), 24-34.

Rizqi, M. (2021). Learning Tools with SAVI Participation (Somatic, Auditory, Visualization, Intellectual) in Improving Mathematical Communication Skills in the Industrial Revolution Era 4.0. In *Journal of Physics: Conference Series*, 1779(1).

Sanggorani, A., Hendrowati, T. Y., & Rahayu, S. (2024). Kemampuan Berfikir Reflektif Matematis Siswa Ditinjau Dari Gaya Belajar. *JURNAL e-DuMath*, *10*(1), 11-16.

Siswanto, R. D., Dasari, D., Hendriyanto, A., Muhaimin, L. H., Kusharyadi, R., & Sahara, S. (2023). The effect of GeoGebra android on increasing mathematical understanding ability based on gender. *Union: Jurnal Ilmiah Pendidikan Matematika*, *11*(1), 160-166.

Syaputri, I. J., & Erita, S. (2024). Analisis Kemampuan Representasi Matematis Untuk Meningkatkan Hasil Belajar Matematika Siswa SMA. *Konstanta: Jurnal Matematika dan Ilmu Pengetahuan Alam*, *2*(1), 339-348.

Warti, D., Yunita, A., & Delyana, H. (2021). Analisis Hasil Belajar Matematika Ditinjau dari Gaya Belajar Siswa SMA pada Materi Program Linear. *Jurnal Equation: Teori dan Penelitian Pendidikan Matematika*, *4*(2), 1-10