ANALYSIS OF NUMERACY LITERACY SKILLS OF INTROVERTED AND EXTROVERTED LEARNERS IN SOLVING SPLDV

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Abstract
The focus of this research is to analyse the numeracy literacy ability in solving System of Linear Equations Two Variables (SPLDV) problems in terms of students' personality. The approach used in this research is descriptive qualitative. The subjects taken were two students of class VIII SMP PGRI 4 Kalipare. Subjects in this study were determined using a questionnaire. Data collection techniques in the form of tests and interviews. Based on the results of the study, it shows that students with introverted personality types are able to meet the three indicators of numeracy literacy skills, namely solving problems using various numbers and symbols related to mathematics; analysing information presented in various images (graphs, tables, charts and so on); and interpreting the results of these analyses to make predictions and decisions. However, extroverted learners' personality type is only able to present one indicator of numeracy literacy, namely analysing information presented in various images (graphs, tables, charts and so on).

Keywords: *personality, numeracy literacy, SPLDV.*

INTRODUCTION

The most important process in education is learning. One of the lessons found at all levels of education is mathematics learning (Kurniawati and Ekayanti; 2020). Mathematics learning is designed to develop students' ability to think creatively, improve reasoning skills, and encourage the construction of new knowledge, with the aim of achieving a strong understanding of the material (Hulu and Siswanti; 2024). The scope of the field of mathematics is structure, change, spatial patterns, and numbers (Jannah and Hayati; 2024). The characteristics of mathematics in the form of abstract objects, elements in complex mathematical formulas, many definitions, the use of varied symbols and various formulas, require students to focus their minds more in order to master these

mathematical concepts. Learners usually experience many problems in various forms of mathematics problems, including story problems. This is because story problems require in-depth understanding in converting them into mathematical symbols (Hidayati, Ngazizah, and Pangestika; 2025). However, errors in solving mathematics problems should not be ignored, such as calculation errors in problems, because in essence these errors reflect that learning objectives have not been achieved optimally (Hariyani and Aldita; 2020).

Numeracy literacy is an understanding of the use of mathematical symbols and numbers in solving problems related to everyday life (Kirani et al.; 2023). Numeracy literacy consists of three aspects, namely calculation, numerical relationships, and arithmetic operations (Perdana and Suswandari; 2021). Numeracy literacy is literacy that is closely related to the ability to think and reason (Ate and Lede; 2022). Literacy is more associated with language, while numeracy is more associated with mathematics, so numeracy literacy is the ability to reason using language and mathematics. Three indicators of numeracy literacy include: (1) Solving problems using various numbers and symbols related to mathematics; (2) Analysing information presented in various images (graphs, tables, charts, diagrams

and so on); and (3) Interpreting the results of these analyses to make predictions and decisions (Han et al.; 2017)). The numeracy literacy skills of junior high school students still need to be improved because junior high school students often experience difficulties in solving problems related to mathematics in the form of stories (Putri, Utomo, and Zukhrufurrohmah; 2021).

Many factors lead to low numeracy literacy skills in students (Agustiani, Agustiani, and Nurcahyono; 2021). One of these factors is learning independence. Learning independence affects students' mathematical numeracy literacy skills in the learning process (Wijianti and Wardono; 2020). Low numeracy literacy skills are caused by the lack of giving questions to students and the low learning independence of students (Kholifasari, Utami, and Mariyam; 2020). Therefore, it is important for students to improve their mathematical numeracy literacy skills.

One of the mathematics lessons taught at the junior high school / MTs level is SPLDV material which presents several problems related to everyday life (Syafina and Pujiastuti; 2020). Through daily life problems, students can more easily understand the problems and convert them into mathematical form. There are several learning activities related to SPLDV, including: translating problems into

SPLDV formulas, formulating problems, and writing SPLDV problem solving (Maspupah and Purnama; 2020). Based on the results of observations that have been carried out at SMP PGRI 4 Kalipare, students still have difficulty in processing story problems into mathematical language and finding solutions to problems with SPLDV material. The main difficulty experienced by students in problem solving is converting written words into mathematical operations and symbols. One of the factors that can lead to low numeracy literacy skills in students is the personality of students. Personality is all things that include a person's feelings, attitudes, temperament, expressions, characteristics, and behaviour (Riyanti, Nurmalisa, and Rohman; 2024). These attitudes, expressions, feelings and temperaments will manifest in a person's actions if faced with certain situations. Each learner's personality shows differences in solving mathematical literacy problems when combining flexible skills according to the context (Rudianti, Rudianti, and Muhtadi; 2021). Carl Gustav Jung and Hans Eysenck divided personality types into two types, namely introverted and extroverted personality types (Wahyuningsih, Noviekayati, and Rina; 2021). The numeracy ability of students in terms of different learning styles shows that students with pragmatic

learning styles tend to have higher numeracy abilities, compared to students with activist, reflector, and theorist learning styles (Krisyani, Hariyani, and Suwanti; 2024). This study complements previous research, this study analyses the literacy and numeracy skills of learners in terms of their personality (introvert and extrovert).

Based on the background exposure, this study aims to describe and compare the numeracy literacy skills of students who have introverted and extroverted personality types in solving SPLDV problems. With the teacher's awareness of the different personality types of students, the teacher can determine the learning method that suits the personality type of students, so it is hoped that the students' mathematics literacy and numeracy skills can increase.

RESEARCH METHODS

The type of research used in this study is descriptive qualitative. This approach was chosen to compare numeracy literacy skills between introverted and extroverted students in solving SPLDV problems. The subjects chosen were all VIII grade students at SMP PGRI 4 Kalipare. The sample in this study was taken by purposive sampling, namely students who have been identified as having introverted or extroverted

personality tendencies through a questionnaire. Based on the results of the questionnaire obtained research subjects totalling 20 students in class VIII. Table 1 shows the results of determining the research subjects as follows:

Table 1. Determination of Research Subjects Based on Questionnaires

No	Research Subject	Score	Conclusion
1	ADS	25	Introverted
2	AKA	41	Extroverted
3	AM	37	Extroverted
4	BS	30	Introverted
5	CMP	31	Introverted
6	CCSL	37	Extroverted
7	DCT	18	Introverted
8	DH	29	Introverted
9	GCF	28	Introverted
10	HAF	42	Extroverted
11	JEB	25	Introverted
12	KAW	32	Introverted
13	LVM	31	Introverted
14	LER	25	Introverted
15	R	23	Introverted
16	RK	36	Extroverted
17	SEDR	33	Introverted
18	SMS	19	Introverted
19	S	33	Introverted
20	YAS	33	Introverted

Based on table 1, the questionnaire completion score based on personality type is obtained, then two students are taken with one introverted personality and one extroverted personality. The selected subjects were given a written test of numeracy literacy skills regarding SPLDV problems, followed by an interview through several questions according to the indicators of numeracy literacy skills.

Questionnaires in research are useful for grouping students based on personality type. The questionnaire consists of 34 introvert statements and 36 extrovert statements. The questionnaire contains questions about social tendencies, energy sources, and decision making. Determination of introverted and extroverted subjects is done by giving a score of 1 for each 'yes' answer to the extroverted statement and a score of 0 for the 'no' answer to the extroverted statement. Conversely, giving a score of 0 for each 'yes' answer to the introvert statement and a score of 1 for the 'no' answer to the introvert statement. Table 2 shows the scoring categories for introverted and extroverted learners.

Table 2. Criteria for Grouping Learners Based on Score

Statement	Yes	No
Introverted	0	1
Extroverted	1	0

The data collection methods in this study were tests and interviews. Written tests were used to measure students' numeracy literacy skills in solving mathematics problems on SPLDV material. The components of the written test, namely concept understanding questions and reasoning and analysis questions. Test validation was carried out by requesting an assessment from a mathematics education lecturer. The assessment includes aspects of the suitability of the questions with the

expected competency demands and language aspects. Validation also contains expert suggestions for improving question instruments.

The interviews in this study were used to further explore how students solve mathematics problems, as well as to find out how introverted and extroverted personality types affect how to solve mathematics problems. The components used in this interview, namely questions about the problem solving process, the obstacles faced, and the learning strategies of students. Personality factors affect how to solve numeracy problems. This shows that personality affects numeracy literacy skills, both in terms of thinking processes and problem-solving strategies.

Data analysis in this study was carried out qualitatively starting from data reduction, data presentation, and conclusion drawing. The data reduction stage, namely simplifying and sorting out the raw data obtained from questionnaires, tests, and interviews. The test results of students who have been classified based on personality type (introvert and extrovert), then analysed using numeracy literacy indicators. Table 3 shows the indicators of literacy and numeracy skills.

Table 3. Indicators of numeracy literacy skills

Indicator	Description
Solve problems using a variety of numbers and symbols related to maths	Learners can use numbers/symbols and mathematical operations
Analyse information presented in various representations (graphs, tables, charts, diagrams and so on)	Learners can write a relevant mathematical description
Interpret analysis results by making predictions and decisions	Learners can justify and make conclusions based on analysis

Source: (Han et al.; 2017)

After the data has been reduced, the next stage is to present the data in the form of tables, graphs and descriptive narratives. This presentation makes it easier for researchers to see the comparison between literacy and numeracy skills of introverted and extroverted learners. To increase the validity of the data, researchers triangulated the technique by comparing data from various questionnaire, test and interview techniques. This aims to ensure the consistency and correctness of the data analysed.

FINDINGS AND DISCUSSION

The following is an explanation of the results of numeracy literacy analysis. DCT subject with introverted personality solved the SPLDV problem as shown in Figure 1.

Picture 1. Problem solving by DCT subject

Based on Figure 1, DCT Subjects are able to work on problems using numbers and mathematical symbols. The introduction of numbers and symbols helps the subject in determining the right solution (Nadjamuddin and Hulukati; 2022). DCT subject worked on the problem by reading the problem. DCT subject wrote down what was known and asked in the problem, then DCT subject visualised the tickets for students and adults into the variables a and b. DCT

subject could also analyse the information presented. According to DCT subject $a + b = 450$ as equation 1 and $20a + 45b = 15,950$ as equation 2. DCT subject used the substitution method from equations 1 and 2 to produce $b = 278$ and then substituted the value of b into equation 1 to produce $a = 172$. However, in this case DCT subject did not operate equation 1, it should be $a + b = 450 \rightarrow a = 450 - b$ is equation 1 and also DCT subject did not provide information by using the substitution method in the answer.

In fact, the DCT subject already knew the method, it was just that the delivery of the answer was still not correct. DCT subject fulfilled the indicator in interpreting the analysis results to make predictions and decisions. DCT subject can understand the meaning of the problem that has been presented. DCT subject wrote that the tickets sold among teenagers were 172 tickets and the tickets sold among adults were 278 tickets. The numeracy literacy ability of DCT Subject can be seen in Table 4.

Table 4. Triangulation of DCT Subject Techniques

Indicator	Written Test Results	Interview Test Results	Conclusion
Solve problems using various numbers and symbols related to maths	DCT subject worked on the problem by using numbers and symbols by reading the problem and understanding the problem. However, the answer written by DCT subject was correct.	DCT subject can understand the problem well by reading the problem and understanding the problem. The answer given by DCT subject was correct.	DCT subject can solve problems by using various numbers and symbols related to maths.

Analyse information presented in various images (graphs, tables, charts, diagrams, etc.). and so on)	DCT subject was able to analyse the information presented by determining the number of each ticket sales among students and adults.	DCT subject was able to analyse the information that had been presented by determining each of the number of student and adult ticket sales using the method of Substitution method.	DCT subjects can analyse information presented in various depictions
Interpret the results of the analysis by making predictions and decisions.	The DCT subject is able to make decisions by determining the number of each ticket sale for students as many as 172 tickets and adults as many as 278 tickets. The DCT subject's answer is correct.	The DCT subject provides a conclusion by determining the respective number of ticket sales among students and adults. The DCT subject's answer is correct.	DCT subjects can interpret the results of the analysis to make decisions.

Based on Table 4, DCT subjects can fulfill all indicators of numeracy literacy abilities. The results of problem solving by HAF subjects with extroverted personalities are shown in Figure 2.

Figure 2. Results of the HAF Subject Written Test

The researcher asked several questions to the HAF subjects related to solving the problem. When asked about their understanding of the problem, the HAF subjects explained that the question was to find the number of student and adult ticket sales. However, when asked to explain how to create a mathematical model of the problem, the HAF subjects admitted that they did not know. However, the HAF subjects stated that in creating the model, they used the symbols "p" and "r". Furthermore, in solving the problem, the HAF subjects composed two equations and used the substitution method to find the solution, with the results r = 278 and p = 172. When asked about the concept used, the HAF subjects explained that they used the substitution method by inserting equation one into equation two. To draw conclusions, the HAF subjects relied on the answers they had obtained, and when asked to justify, they reiterated that the final results were r = 278 and p = 172, according to the context of the problem. Table 5 shows the numeracy literacy skills of the HAF subjects.

Table 5. Triangulation of HAF Subject Techniques Question Number 1

Indicator	Written Test Results	Interview Test Results	Conclusion
Solve problems using various numbers and	HAF subjects do not understand the questions	Subject HAF does not understand the problem well,	HAF subjects are unable to solve

symbols related to mathematics.	that have been presented. HAF subjects do not write down what is known and asked, HAF subjects also do not compare student and adult tickets.	the subject only knows what is ordered in the question, namely finding the number of ticket sales in each group, namely students and adults. Subject HAF uses the symbols p and r in the answer.	problems using various numbers and symbols related to mathematics.
Analyze information presented in various forms (graphs, tables, charts, diagrams, etc.)	HAF subjects can analyze the information that has been presented. However, in this case, HAF subjects do not operate the equation $p + r = 450$ and do not provide information on where $20p + 45r = 15,950$ was obtained from. In fact, HAF subjects have done it correctly.	HAF subjects analyze the information obtained by entering equations 1 and 2 and working using the substitution method. HAF subjects can answer the questions well.	HAF subjects can analyze information presented in various images, only HAF subjects do not write complete answers.
Interpret the results of the analysis by making predictions and decisions.	HAF subjects do not meet the indicators for making decisions, because HAF subjects do not make conclusions or decisions.	HAF subjects can provide conclusions regarding ticket sales among students and adults, namely 172 tickets and 278 tickets.	HAF subjects are unable to interpret the results of these analyses to make decisions.

HAF subjects were only able to fulfill one indicator of numeracy literacy ability, namely analyzing information presented in various images (graphs, tables, charts, diagrams, and so on). Subjects with low visual abilities failed to interpret the questions given (Susilawati, Musiyam, and Wardana; n.d.). HAF subjects still did not fulfill all indicators of numeracy literacy ability, namely in the indicator of solving problems using various numbers and mathematical symbols and interpreting the results of the analysis.

The research findings show that there are differences in the approach between introverted and extroverted students in solving SPLDV. Introverts tend to be more analytical and thorough in understanding problems, while extroverts are quicker in trying various solution strategies, although sometimes less accurate. Students' personalities influence their approach to solving mathematical problems (Ana and Munawir; 2024). Introverts tend to use a systematic and in-depth approach, while extroverts are quicker in exploring strategies, although sometimes they pay less attention to the steps in detail.

CONCLUSION

The results of the study on the analysis of numeracy literacy skills in solving two-variable linear equation system problems based on student personality, some conclusions include: (1) Students with introvert personality characteristics are able to meet all indicators of numeracy literacy skills. Introverted students are able to recall the material that has been obtained, so that

students have high creativity in solving problems; (2) Students with extrovert personality characteristics are less able to meet the indicators of numeracy literacy skills. Extroverted students do not understand the questions correctly.

The limitations of this study are (1) The researcher only involved two subjects, so the results cannot be generalized to the entire population of students at SMP PGRI 4 Kalipare; (2) The classification of introvert and extrovert personalities was carried out using a subjective questionnaire, so there is a possibility of bias in the classification; (3) The study was only limited to the SPLDV topic, so it does not represent numeracy literacy skills as a whole; and (4) The short research implementation time limited the depth of analysis, especially in exploring students' thinking strategies and cognitive processes.

Based on the research results, several suggestions can be given, namely researchers are expected to involve more students from each personality category so that the research results are more representative and can be generalized, researchers use more standard and valid personality measurement tools, research can be developed by examining numeracy literacy skills in other mathematical topics, researchers can focus on thinking strategies or problem solving used by students based on personality types in order to deepen understanding of students' cognitive processes.

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