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# Type of Personality Analysis in Solving Mathematical Problems Reviewed from the Metacognitive Perspective

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### Abstract:

This research article describes the personality types of students in solving mathematical problems from a metacognitive perspective. There are four types of student personalities, namely guardian, rational, artisan, and idealist. The study was conducted in a qualitative exploratory manner. Research subjects are high school students in Jambi province. The results of the study describe the stages of understanding mathematical problems based on the categories of students' personality types from different metacognitive perspectives.

Keywords: Metacognition, personality type, mathematical problems

## 1. Introduction

The problem that often occurs when students are faced with mathematical problems is not thinking about how he is able or unable to solve them. Thinking for itself is related to students' awareness of their ability to develop various ways that might be taken in solving problems. The process of realizing and organizing students' thinking is known as metacognition. The term metacognition was introduced by Flavell (1976) and is defined as thinking about thinking or 'one's knowledge of cognitive processes'. Metacognition is the executive function that manages and controls how a person uses his mind and is the highest and most sophisticated cognitive process. Matlin (1994) says that metacognition is very important in helping us manage the environment and selecting strategies to improve our cognitive abilities further. In relation to solving mathematical problems, knowledge of learning strategies is important for students to know. Learning strategies involve mental activity, used to acquire, remember and improve various kinds of knowledge.

McLoughlin and Hollingworth's (2003) research shows that effective problem solving can be obtained by giving students the opportunity to apply their metacognitive strategies when solving problems. Mathematics as a vehicle for education can not only be used to achieve goals, for example educating students, but can also form students' personalities and develop certain skills (Soedjadi, 2000).

One effort to be able to educate students psychologically is to make observations in advance of the condition of each student in their daily lives. The results of these observations will reveal the differences in each student. Individual differences can occur due to the influence of different personalities. Keirsey and Bates (1984) classify personality into 4 types, namely Guardian, Artisan, Rational, and Idealist. The classification is based on how someone gets energy (Extrovert or Introvert), how someone takes information (Sensing or Intuitive), how someone makes a decision (Thinking or Feeling), and how is the basic style of life (Judging or Perceiving).

Individuals with guardian types prefer to follow routine procedures with detailed instructions, or in other words this type likes classes with traditional models with regular procedures. Individuals with an artisan type like the class form that has a lot of discussion and presentation because they tend to want to show their abilities, and like change and dislike the stability. Individuals with an idealistic type prefer to complete tasks in group discussions, like reading and writing so that it is more suitable if given a test in the form of a description or question story. Individuals with rational type like learning methods with complex problem solving, prefer to learn independently, and are able to capture abstractions and materials that require high intellect (Keirsey and Bates, 1984).

Its implementation in mathematics learning, each personality type has a different character in solving problems. To achieve this, this study aims to determine the characteristics of students' metacognition on the basis of Idealist, Rational, Artisan and Guardian personality types in solving mathematical problems. For this reason, the researcher uses Polya's (1973) step, which is understanding the problem, planning a solution, implementing the plan, and checking the answers. In this research, metacognition is an individual's awareness of the process and the results of his

thinking, in developing plans, monitoring implementation, and evaluating actions. Mathematical problems are mathematical problems that cannot be solved by routine procedures.

#### 2. Research Methodology

The study was conducted in a qualitative exploratory manner with main data in the form of words arranged in sentences. Data analysis was carried out in three stages, namely data reduction, data presentation, and drawing conclusions (Miles and Huberman, 1992) with the main instrument being the researchers themselves. In-depth analysis of students about solving mathematical problems, based on their personality types.

Data collection was conducted using the Think Aloud method with data in the form of written answers, and indepth interviews (indepth interview) to determine the subject's metacognition characteristics in solving mathematical problems. Through interviews, students convey what is thought when solving mathematical problems.

#### 3. Results and Discussion

Students with the guardian type have the following metacognitive characteristics. First, in understanding the problem, students realize that in order to solve a problem, one must first understand what is known and what is not asked by reading, writing what is known and what is being asked, being aware of the relationships between known elements and being aware of the formula needed. Second, in planning, students believe in the steps to be taken and have a good plan so that the direction to go is clear and can do it steadily and choose the most appropriate formula. In addition, students monitor their calculations, realize the calculations are wrong and can connect what is known in the problem with what is asked. Third, in solving problems, students carry out according to plan by doing calculations (questions 1) and proofs (questions 2), monitoring calculations, realizing that their calculations are wrong (question 1), and being able to choose and use the formula correctly. Fourth, in evaluating, students realize that it is necessary to re-examine their work by sorting out what is known, what is asked, the relationship between known variables, rechecking the truth (question 1), realizing that to check the work in addition to sorting the work, also by matching the results with the known, and realize there are other ways but can choose the right way.

The metacognition characteristics of guardian type students are in accordance with the opinion of Keirsey and Bates (1984) that guardian types prefer to follow routine procedures with detailed instructions. In other words, this type of class likes the traditional model with regular procedures. When not asked, students with the guardian type do not realize that the calculation results are wrong because they are not thorough. The metacognition characteristics of the guardian students are also in line with the results of Dewiyani's (2010) research, that guardian type students are students who always want to know the usefulness of a material or a problem.

Students with rational types have the following metacognitive characteristics. First, in understanding the problem, students realize that to solve problems must understand what is known and what is not asked by reading, writing what is known and what is asked, aware of the relationship between known data, and aware of the completeness of the data. Second, in planning problem solving, students are aware of the steps that will be taken, are aware of the formulas needed, and can choose the right formula. Third, in solving problems done according to plan, students do calculations / proof carefully, so there are no counting errors, or proof errors. Fourth, in evaluating, students realize to re-examine their work by sorting out what is known, what is asked, the relationship between known variables and rechecking the truth, also realizing to check their work by matching the results with those known.

Based on the analysis, the metacognition characteristics of rational type students are in accordance with the opinion of Keirsey and Bates (1984) that students with this type like learning how to solve complex problems, like learning independently, able to capture abstractions and materials that require high intellectuality. With the ability to capture the abstraction that is owned, students with rational type realize how to understand the problem, plan and solve and reflect the results obtained. Tip rational students are very rich in imagination, work on the basis of high reasoning power, and with more abstract types of questions will be increasingly challenging for students with this type. This is also in line with the results of Dewiyani's (2011) study that rational students have the attributes of soft skills that are able to think synthetically, thoroughly, wisely, and consistently. While the attributes of Soft skills that must be improved are the ability to accept the opinions of others, the ability to work together in a group, and the ability to get along socially.

The metacognition characteristics of the artisan type students are in accordance with the opinion of Keirsey and Bates (1984) who say that students with this type like class forms that have lots of discussion and presentation. The characteristics of this type tend to want to show their abilities, and like change, and do not like stability. The metacognition characteristics of these artisan type students are explored with many questions and students provide detailed answers. The metacognition characteristics of the artisan type students are students are also in line with the results of Dewiyani's research (2010) which says that artisan type students are students who do not give up easily and can be guided to go to a higher level of questions, as long as the educator starts with anything concrete or fact. Clear steps are really needed by students are the ability to work together, influence other friends, and good documentation, while the attributes of soft skills that must be improved are the ability to think analytically, the ability to abstract problems, and emotional control that blew up.

Students with idealist types have the following metacognitive characteristics. First, in understanding the problem, students realize that to solve problems must understand what is known and what is asked by reading, feel the need to write what is known, realize the relationship between known data and review the truth of the relationship between existing data, there was an error, so the subject needed to reread. Second, in planning problem solving, students are aware

of the steps that will be taken, monitor their plans, and it turns out that the information written is incorrect (question 1). Next, the subject realizes that they need formulas so they need to write formulas that might be useful. Third, in carrying out problem solving the subject performs a rushed calculation, realizing his weaknesses in the field of trigonometry, so that inaccuracy in translating problems. It seems that planning is not mature enough, so that after a step, there are mistakes, but immediately realize their mistakes. Fourth, in conducting a review, the subject realizes that to see the truth of his work, he relates to what is known. In addition, in evaluating students realize that it is necessary to re-examine the work, check the truth, match the work using other alternative solutions.

#### 4. Conclusion

Students with guardian types in understanding the problem feel the need to write the known, know the relationship between data, but cannot formulate what is asked. In doing planning, the person concerned can do it well, can connect the known data with the intended, but not careful in implementing it. In conducting an evaluation, the person concerned immediately realizes that the method used is incorrect, so reread it more thoroughly and immediately work on it in a more careful manner.

Students with the rational type are able to work fast and can use metacognition strategies well so that they can solve tasks systematically. In solving mathematical problems, the question read carefully, to find out about the known, asked, and immediately solve the problem. Students with the rational type generally have metacognitive knowledge, understand the relationship between data in the problem, connect between initial knowledge and the problem at hand, know which way to go, so they can plan well. Students consciously examine again to see the accuracy of the results of its completion. Rational type students can search for and recognize various combinations of ways, can choose how to solve problems with the shortest steps, ask themselves, and try to clarify their opinions.

Students with the artisan type in understanding mathematical problems can connect the data or information contained in the problem. In making a plan, can connect between the known and the unknown well, know the formulas needed, can choose the most appropriate formula so that the steps it does systematically, and get the most concise steps. Students are aware of the relationship of the known and the direction to be headed, realize there are several steps that can be used, and consciously choose the shortest way. In solving a problem, being able to do it according to careful planning, and in conducting an evaluation, the relevant person checks the results of his work.

Students with the Idealist type understand the problem in a hurry so that it is wrong in translating or interpreting problems. The person concerned is planning in a less mature way so that after a step, there are mistakes, but immediately realize their mistakes. In resolving the problem, it seems rather hasty so make mistakes. In reviewing, students realize that to see the truth of the results of their work, they are concerned about connecting between the results obtained and what they know.

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