Description of The Number Theory Course Problem Solving Abilities Based on Personality Type of The Math Student at Universitas Darussalam Ambon

Kasriana*, R Ode
Mathematics Education Study Program, Universitas Darussalam Ambon, Jalan Waehakila, Puncak wara ambon

* E-mail: kasriana@unidar.ac.id

Abstract. This research is a qualitative research, which aims to describe students in solving problems based on each personality type. The results showed that: (1) understand the problems the guardian wrote qualified enough and need; (2) was making plans the subject could detect information to complete about; (3) in implementing the plan doing it in accordance with the subject but incorrect. (1) understand the problems the subject of idealist only record that asked; (2) was making plans the subject could detect formula; (3) carry out a plan the subject of using formulas were formerly, although one measure. (1) understand the problems the subject of type artisan wrote very clearly all information is; (2) was making plans the subject of determining. formula(3) implement plan, problem solving able to solve. (1) understand the problems the subject type rational not have inscribed requirements enough and the requirements necessary; (2) was making plans subject to determine the steps the; (3) implement plan, problem solving skilled in algorithms and accuracy.

1. Introduction
Human civilization is not finished goods that fall from the sky inherited from generation to generation. Civilization is a human struggle from century to century by using all its abilities, both from birth and obtained from experience as a result of cultivation and engineering in dealing with all obstacles and challenges and limitations encountered throughout his life journey. In that process, education is always a determining factor both in terms of roles and in their use. Therefore, it can be understood if Immanuel Kant [1] a famous German philosopher has said that humans can only become humans because and by education.

The national education system states that the purpose of education is to develop the potential students to be religious and devote to God, have good character, be healthy, knowledgeable, capable, creative, independent, and become democratic and responsible citizens [2]. Mathematics is one of the subjects taught starting from elementary school, middle school, to college. It is not excessive, because by mastering and understanding mathematics, it is hoped that the Indonesian people can master and participate in developing technology. problem solving is an important part in learning mathematics, because with problem solving students are able to gain experience using knowledge and skills that are already possessed to be applied to problem solving that is not routine.
To guide students to be able to solve mathematical problems, a teacher must be able to design learning models. A learning model can be appropriate for a student, but may not be suitable for other students. This is due to the fact that each student is a unique individual and has different characteristics. Some things that can affect the characteristics of students are personality types they have.

In 1984, in his book Please Understand Me I and II, David Keirsey, a professor in psychology from California State University, classified personality into 4 types, namely Rational, Idealist, Artisan and Guardian. 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 do not like stability. Individuals with the idealist type prefer to complete the task 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 [3-4].

Keirsey also classifies ways of communicating both verbally and in writing into two categories, concrete and abstract. Guardians and Artisan are concrete communicators, while rational and idealists are abstract communicators. Concrete communicators prefer to talk and write about reality, whereas abstract communicators prefer to talk and write about ideas. Concrete communicators like facts, numbers, evidence, whereas abstract communicators like theories and hypotheses. Concrete communicators speak and write in detail, specific, empirical and factual. Whereas abstract communicators are schematic, general, theoretical and fiction [5].

According to Keirsey, how to choose a way to solve a problem is classified into two, namely cooperative and utilitarian. Guardians and idealists are included in the cooperative category, where they will choose the method that is commonly used and accepted by most people. Whereas artisan and rational are included in the utilitarian category, where they will find the most effective way according to them without thinking about whether the method is acceptable to others or not.

2. Research Method

2.1 Data analysis technique

The process of analyzing data using miles and huberman models [8] is carried out with the following steps:

a. Examine all available data from various sources, namely from interviews, observations that have been written, in field notes, and the results of tests of mathematical questions.

b. Data reduction is an activity that refers to the process of selecting and identifying data that has meaning if it is associated with a research problem, which then creates a code for each unit so that its source is known.

c. Data display (data presentation) is the classification of data, namely writing organized and categorized data sets so that it is possible to draw conclusions from these data. Data collected in the form of subject responses that show exploration of research subjects in working on problems of mathematical problems based on Polya step.
d. Make a coding that aims to facilitate the exposure of data on students' reasoning ability in mathematics achievement, then coding is done on the excerpt of the research subject's answers during the interview.

e. Conclusion drawing is done by paying attention to the results of mathematical problem solving questions and the results of interviews to determine the characteristics of exploration of research subjects based on personality types.

2.2 Research Procedures
In general, the stages in this study can be described as in the following figure.

- Look at the background of the subject
- Prepare personality type instruments, instruments of problem solving, and interview guidelines
- Validation of personality type instrument, instruments of problem solving, and interview guidelines
- Performing personality type tests
- Determination of the selected subject
- Carrying out written test problem solving questions and interviews
- Data analysis
- Describe the subject's exploration based on the results of written tests and interviews
- Drawing conclusions

3. Results
Following are the findings of the research results of students' mathematical problem-solving abilities based on personality types, four students were chosen as research subjects. This selection is based on the consideration/opinion of the teacher or other parties by taking into account the criteria: (1) personality type, (2) activeness during mathematics learning, and (3) can express opinions / thoughts thought orally or in writing.
Table 1. research subject

| Personality type | Artisan | Idealist | Guardian | Rational |
|------------------|---------|---------|----------|----------|
|                  | Irfan Latuconsina (I.L) | La Paneng Tomia (LP.T) | Nunu Solissa (N.S) | Yuyun Mayau (Y.M) |

The following are the findings of the research results of students' mathematical problem solving abilities based on personality types.

Table 2. Ability to solve mathematical problem type Artisan students.

| No | Solution to problem | artisan character |
|----|---------------------|-------------------|
| 1  | Understand the problem | make concrete communication |
| 2  | Make a problem solving plan | doing utilitarian thought processes |
| 3  | Carry out the plan | Communicate concretely and solve problems in a utilitarian manner |

Table 3. Ability to solve mathematical problem type Idealist students.

| No | Solution to problem | idealist character |
|----|---------------------|--------------------|
| 1  | Understand the problem | doing the thought process of abstraction |
| 2  | Make a problem solving plan | do the cooperative thinking process |
| 3  | Carry out the plan | do the abstraction thinking process and solve problems with cooperative categories |

Table 4. Ability to solve mathematical problem type Guardian students.

| No | Solution to problem | Guardian character |
|----|---------------------|-------------------|
| 1  | Understand the problem | carry out concrete thinking processes |
| 2  | Make a problem solving plan | doing utilitarian thought processes |
| 3  | Carry out the plan | carrying out concrete thinking processes and solving problems with utilitarian categories |

Table 5. Ability to solve mathematical problem type Rational students.

| No | Solution to problem | Rational character |
|----|---------------------|--------------------|
| 1  | Understand the problem | do the abstraction thinking process, always pay attention to the efficiency of everything done so that the RT subject does not write in full what is known and what is asked about the problem because it is |


very clear

|   | Make a problem solving plan | doing utilitarian thought processes |
|---|-----------------------------|-------------------------------------|
| 3 | Carry out the plan | doing the abstraction thinking process solving problems with utilitarian categories |

4. Discussion

4.1. Artisan subjects:
   a. Understanding the problem: at the stage of understanding the IL problem write correctly and completely what is known and what is asked about the problem. So basically the artisan type is happy in speaking and writing.
   b. Planning the strategy: in the planning phase of the strategy, the IL subject is able to determine the relevant information to solve the problem but is sometimes confused during the interview. This is in accordance with the artisan characters who prefer writing rather than explaining opinions orally.
   c. Implement the plan: IL subjects are able to work on the problem in accordance with the problem-solving steps that have been planned before but are unable to solve it correctly. Artisan characteristics that appear when solving a problem that is not like time constraints so relaxed in solving problems so running out of time to answer questions.

4.2. Idealist subjects:
   a. Understanding the problem: at the stage of understanding the problem, L.P.T is able to write what is known and what is asked about the problem clearly. By looking at the work of students during written tests where students are able to write what is known and what is asked completely and clearly shows the characteristics of idealists who like to write.
   b. Planning a strategy: at this stage the subject L.P.T is able to link between the thing that is known and the thing that is asked to determine the right formula in answering the question. This is in accordance with the idealist characteristics that process data by looking at patterns and relationships, even though during interviews one incorrectly mentions formulas because the subject is a little tense and nervous.
   c. carry out the plan: at this stage L.P.T uses the steps that have been previously prepared correctly, even though the completion stage is wrong in the calculation. Idealist characteristics that appear on the subject are fast in acting, but the impact is the subject is not careful in doing calculations.

4.3. Guardian subjects:
   a. Understanding the problem: at this stage sometimes the subject does not write in full what is known and what is asked about the problem because it is very clear. RT subjects assume that everything must be clear so that it is also clear to others, this is in accordance with the guardian character.
   b. Planning a strategy: at this stage the N.S subject is able to receive the information that is in the problem and connect to determine the right formula in solving the problem but at a different problem.
c. Carry out the plan: at this stage shows that the subject is able to solve the problem according to the strategy that has been designed, but sometimes in a hurry to be less thorough in the final solution.

4.4. Subject rational:
   a. Understanding the problem: subject Y.M is incomplete in writing what is known in the problem but can write clearly what is asked because this type tends to ignore things that are unnecessary or waste time. Because the things that are known to the problem are felt to be clear, the subject does not write them down by assuming that the things that are clear to them are also clear to others so that writing them down will only waste time and energy. Rational characteristics that appear on the subject when understanding a problem that is always trying to reduce or limit the explanation so that to explain the ideas / contents of their minds they choose to use images.
   b. Planning a strategy: at this stage the subject Y.M is able to relate the information available to the problem to determine the completion step. Rational characteristics seen in the problem solving planning stage are processing data by looking at patterns and relationships and good at analyzing
   c. Carry out the plan: at this stage the subject Y.M uses the steps correctly, and is skilled in the algorithm and the accuracy of answering the questions. Rational characteristics that appear on the subject Y.M at the stage of solving the problem that is "applying the principle and consistent".

5. Conclusions
Based on the results of data analysis and discussion that had been stated in the previous chapter, the following research conclusions are drawn:
1. In understanding the problem, Artisan students write very clearly all the information in the problem; (2) in making a problem solving plan, students are able to accept the information in the problem and connect it to determine the formula. (3) in implementing problem solving plans, students are able to solve problems according to the strategies that have been designed.
2. In understanding the problem, the idealist subject only writes what is asked of the problem without writing what is known; (2) in making a problem solving plan, students are able to link between the things that are known and the questions that are asked by using a clear formula; (3) in carrying out the problem solving plan, students use the steps that have been prepared beforehand correctly, even though the completion stage is wrong in the calculation.
3. In understanding the problem, Guardian type students write sufficient requirements and requirements in full; (2) in making problem solving plans, students are able to determine relevant information to solve problems; (3) in carrying out the problem solving plan, students work on the problem in accordance with the problem solving steps that have been planned before but are not right.
4. In understanding the problem, students of the rational type do not write down enough requirements and necessary conditions; (2) in making a problem solving plan, students are able to relate the information available to the problem to determine the completion step; (3) in implementing problem solving plans, students are able to use the steps correctly, and are skilled in the algorithm and the accuracy of answering questions.
References

[1] Sahabuddin 2007 *Teaching and learning two aspects of a process called education* Post graduate program, Makassar State University.

[2] Upu and Hamzah 2015 Analysis understanding of the smp student build concept and principle of flatin math Post graduate program, Makassar State University.

[3] Keirsey and David 1984 *Please understand me I (temperament sorter model).* Prometheus Nemesis Book Company: California.

[4] Keirsey, David. 1988. *Please understand me II (temperament character and intelligence).* Printed in the United States of America: USA.

[5] Yuwono A 2010 Profile high school students in solving mathematical problems in type personality *A course of study math education* Pascasarjana Universitas Sebelas Maret: Surakarta.

[6] Polya and George 1945 *How to Solve it*, Second Edition Princeton: Princeton University Press.

[7] Krulik J and Rudnik J A 1988 *Problem Solving a Handbook for Elementary School Teachers.* Temple University. USA.

[8] Sugiyono 2012 *Research methodology education* Alfabeta Publishing: Bandung