PROFILE OF STUDENT MATHEMATICAL PROBLEM SOLVING BASED ON COGNITIVE STYLE IN GRADE VIII

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ABSTRACT

The ability to solve problems is one of the 21st-century skills that students master. In school, there are various cognitive styles in solving math problems. So it is necessary to describe the problem-solving skills of students of State Junior High School (SMP Negeri) 3 Kasihan Bantul class VIII in terms of the cognitive style of field-dependent (FD) and field independent (FI) of the academic year 2017/2018. This research is qualitative descriptive research. The subject of research consists of 2 students whose cognitive style FD and two students cognitive FI style. The instrument used in this research consists of the main instrument that is self-researcher. The auxiliary instruments are Group Embedded Figure Test (GEFT) and Problem Solving Testing (TKPM). For data collection techniques used are GEFT, TKPM, and interviews. To obtain data consistency, used technique triangulation. Data analysis techniques include data reduction, data presentation, and conclusions. The results showed that the subject of FD tends to think globally in solving the problem. Subjects have used three problem-solving indicators: understanding the problem by repeated reading, planning by analyzing, implementing plans that have been prepared to get the results of completion, and drawing conclusions. At the same time, the subject of FI is more analytical in solving the problem. The subject has used three troubleshooting indicators, understood the problem by repeated reading, drafted a settlement plan from the information obtained, executed the plan developed to get the result of completion, and drew conclusions. The subject of FD and FI equally did not re-examine the answer.

Keywords: Problem Solving, Cognitive Style, and Field Dependent (FD), Field Independent (FI)

INTRODUCTION

Based on RI Law No. 20 of 2003 concerning the National Education System states, Education is a conscious and planned effort to create an atmosphere of learning and learning process so that students actively develop their potential to have religious, spiritual strength, self-control, personality, intelligence, noble character. , as well as the skills needed by himself, society and the State . Learning is an activity undertaken to initiate, facilitate, and improve students' intensity and quality of learning (Winataputra et al., 2008: 1.18). Based on these statements, it can be interpreted that someone who has participated in learning is expected to have the ability or competence, especially in learning mathematics. There are many reasons about the need for students to learn mathematics, one of them according to Cockroft in Abdurrahman, Mulyono (2010: 253) argues that mathematics needs to be taught to students because: (1) it is always used in terms of life, (2) all fields of study require appropriate mathematical skills, (3) is a strong, concise and clear communication tool, (4) can be used to present information in various ways, (5) enhance the ability to think logically, accurately, and spatial awareness, and (6) provide satisfaction with efforts to solve problems challenging.

Students who have followed the process of learning mathematics may have gained experience regarding skills and knowledge in solving math problems. In 2000, the National Council of Teaching Mathematics (NCTM) established five mathematical ability standards that students must possess, namely problem-solving abilities, communication skills, connection skills, reasoning abilities, reasoning, and the ability of representation (representation). After knowing the five mathematical ability standards set by NCTM. So in measuring the academic level of students based on the theory put forward by Gagne in Suherman, Erman, et al. (2003: 89), The highest intellectual skills can be developed through problem-solving. Thus, the implementation of learning mathematics in schools should be done

through problem-solving activities that are often found in everyday life. This is where the teacher's task as an educator and a teacher who needs to know the profile of students' problem-solving abilities as a reference in the preparation of learning strategies.

Polya (1973) proposed four steps of problem-solving, namely: (1) understanding the problem, (2) devising out the plan, (3) carrying out the plan, (4) looking back. The cognitive style of the student influences every student in solving mathematical problems. Cognitive style is individual characteristics in cognitive functions (thinking, remembering, solving problems, making decisions, organizing and processing information, and so on) that are consistent and last long (Desmita, 2009: 146).

Psychologists and education experts' cognitive styles are the independent field (FI) and field-dependent (FD) cognitive styles. Witkin et al. (1977) say people are termed Independent Fields (FIs) to abstract an element from its context or background fields. In that case, they tend to be more analytic and approach problems more analytically. On the order hand, field-dependent (FD) people are more likely to be better at recalling social information such as conversations and relationships. The approach problems in a more global way by perceiving the total picture in a given context. This means that field-independent subjects tend to use the problem-solving approach more analytically and can easily find hidden elements in their context. Subjects who have a field-dependent cognitive style use a global problem approach by imagining the whole picture in a given context. This means that individuals who have a field-dependent cognitive style find it difficult to abstract elements from the context or background from the context.

This research is useful: (1) for teachers, providing information in understanding students' problem-solving abilities that are classified as independent and field-dependent cognitive styles so that they can be used as consideration in improving mathematics learning activities in the classroom; and (2) for other researchers, providing information for researchers who wish to conduct further research on the Profile of Problem Solving Capabilities of Grade VIII Students of SMP Negeri 3 Kasihan Bantul in terms of students' cognitive style.

METHODS

This research is a descriptive study with a qualitative approach. This research was conducted at SMP Negeri 3 Kasihan Bantul, with the research subjects being four students of class VIII B consisting of 2 students with FD cognitive style and two students with FI cognitive style. The following are the steps of the research procedures carried out, namely: (1) Making a research permit, as well as coordinating with the school in determining the schedule of activities, as well as determining the class used; (2) Preparation of daily problem solving test instruments related to SPLDV material based on Polya stages; (3) Perform validation of problem solving tests to the validator, namely the Mathematics Education lecturer; (4) Readability test for problem solving test for Mathematics subject of class VIII and 32 students of class VIII C in SMP Negeri 3 Kasihan Bantul; (5) If the test instrument for problem solving ability is valid and feasible, it can be continued at a later stage; (6) the researcher gave the Group Embedded Figure Test (GEFT) to each grade VIII B student of SMP Negeri 3 Kasihan Bantul; (7) The researcher determines the research subject based on the results of the GEFT and the mathematics teacher's consideration in the class regarding mathematical abilities, communication, and gender in equal conditions. Obtained 1 FD subject with male gender and 1 FI subject with the male gender. Likewise, 1 FD subject is female, and 1 FI subject is female. Obtained subjects S1 and S2 as FD and obtained subjects S3 and S4 as FI. The four students were given an SPLDV material problem-solving ability test. They were interviewed to obtain a more in-depth analysis of how students solve mathematical problems based on the Polya stage. So, from these activities can be obtained data about how students solve a problem in terms of FD and FI; (8) The researcher checks the validity of the data through triangulation of techniques. (9) Data analysis in this study uses the Miles and Huberman model, which includes: (1) data reduction, (2) data display, (3) concluding / verification; (10) The researcher compiles a research report on the profile of mathematics problem-solving abilities of students of class VIII of SMP Negeri 3 Kasihan Bantul in terms of cognitive style.

The research instrument was divided into two, namely (1) the main instruments were researchers, researchers conducted data collection, processing, and analyzing data directly; (2) assistive instruments in this study consisted of: (a) Group Embedded Figure Test (GEFT); (b) Problem-Solving Ability Test (TKPM); (c) Interview guidelines.

1. Analysis of GEFT Results. To identify the cognitive style students have, the GEFT instrument is used. Students with many correct answers> 9 include students with independent field cognitive styles. Whereas students with many correct answers ≤ 9 include students with field-dependent cognitive styles.
2. Analysis of Test Results for Problem Solving Ability (TKPM). The analysis of the results of the TKPM was carried out by examining the problem solving written by the subject based on the alternative key answers set by Polya's problem-solving steps.
3. Interview Analysis. In analyzing the results of the interview, the steps taken are reducing data, presenting data, and making conclusions or verifying data.

RESULTS AND DISCUSSION

1. Profile of Problem Solving Capabilities of Subjects with Field Dependent (FD) Cognitive Style
   a. Understand the Problem. From the results of interviews and problem-solving writing subjects, it is known that the subject identifies information after repeated reading. Then it can be said that the subject does not understand the problem directly. Subjects tend to write data that is known and asked in their language, so there is incomplete data writing. Because the subject of FD sees the problem given as a whole, this is in line with Vendiagrys, Lia et al. (2015) that FD subjects tend to think globally (comprehensively) in processing information obtained from questions. Whereas when interviewed, the subject can mention all the information contained in the question sheet.
   b. Make a Troubleshooting Plan. The subject processes information by telling the problem planning that is carried out coherently. The subject tells how he transforms the known thing into a mathematical model by creating variables that are used after, for example. Plan problem solving by the method by that requested by the problem. At this stage, the subject has met the indicators of problem planning. However, some subjects did not make a settlement plan at number 3. This is by the opinion of Ulya, Himatul (2014), which states that in planning the subject matter, the FD is unable to write the formula used to solve the problem, but some subjects can write a plan for completion precisely.'
   c. Implement a Problem Solving Plan. The subject wrote down the completion steps according to what was planned. The subject substitutes what method is known in the problem. The subject was right in carrying out the steps of its completion. However, when doing the calculation, the subject was less precise. The answers obtained were not right, so it needed correction. This is by Vendiagrys (2015) opinion, which states that the subject of FD uses problem-solving steps that have been designed but often cannot obtain correct answers.
   d. Check agan. In the re-checking stage, the subject does not re-examine the work results because he already feels confident with the answer. Because the subject did not re-check the answer, the subject was not aware of any miscalculation. The subject only realized when asked to re-examine the results of his work at the interview. At this stage, the subject of FD has not met the re-checking indicator. This is in line with the opinion of Ulya, Himmatul (2014), which states that the subject of FD is not able to check again and cannot write answers obtained in other ways.
2. Profile of Subject Problem Solving Ability with Independent Field Cognitive Style (FI)
   a. Understand the Problem. Based on the results of interviews and writing answers to the subject's problem solving, it is known that the subject understands the problem after repeated reading. Then it can be said that the subject does not understand the problem directly. FI subjects generally write and explain information that is known in the same language/sentence as the

sentence in the problem, so they cannot write the data in the problem briefly. At the time of the interview, the subject can explain the known data and ask in full. This is in line with Vendiagrys, Lia et al. (2015) that FI subjects tend to be analytical in processing information obtained from problems to find essential parts that can be used to solve problems.

b. Make a Troubleshooting Plan. The subject processes information by telling the problem planning that is carried out coherently. The subject tells how he transforms the known thing into a mathematical model by creating variables that are used after, for example. Plan problem solving by the method by that requested by the problem. This shows that the subject can use the concept of material that has been studied previously. At this stage, the subject meets the indicators of problem planning. This is in line with the opinion of Ulya, Himmatul (2014), which states that the subject of FI can write the formula used to solve the problem correctly.
c. Implement a Problem Solving Plan. The subject wrote down the completion steps according to what was planned before. Subjects work on the problem by doing calculations using a mathematical model that has been made before, then process it by writing down the steps to solve the problem in order. The FI subject understood the concept of finding a solution to the story problem properly and applied the method correctly. At this stage, the subject of the FI has fulfilled the indicators of carrying out the settlement. This is in line with the opinion of Ulya, Himmatul (2014), which states that FI subjects can answer problems correctly because they can plan solutions appropriately.
d. Check again. The subject did not re-examine the results of the process because he was sure of the answer. The subject said that he was not used to checking the answers. At this stage, the subject FI has not met the re-checking indicator. This is in line with the opinion of Ulya, Himmatul (2014), which states that the subject of the FI is not able to write another way in the process of checking back).

CONCLUSION

Students with field-dependent cognitive styles at the stage of understanding the problem, the subject accepts and understands the problem by repeatedly reading, which means the subject still cannot understand the problem directly. The subject tends to think globally (overall) in processing information. When making a plan, the subject processes information by telling a problem plan that is carried out coherently. It can be seen that the subject has understood the concept of the matter before. At the stage of carrying out the plan, the subject carries out by the planning that he disclosed earlier. However, the subject is wrong when doing calculations, so the results obtained are less precise. At the stage of re-checking, the subject does not re-check the results of the work.

Students with independent field cognitive styles at the stage of understanding the problem, the subject receives information from reading the questions repeatedly to find important information from the questions. The subject is more analytical in understanding the problem. At the stage of planning a solution, the subject processes information by telling the problem plan that is done with the right plan. When carrying out the plan, the subject works according to the plan that he revealed earlier correctly. In the re-checking stage, the subject does not re-check the results of the answers he has done.

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