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Students' Thinking Process in Solving Mathematics Problems Based on Adversity Quotient

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ABSTRACT
This article presents the research results intended to identify students' thinking processes in solving mathematical problems in terms of the adversity quotient. The type of research used is descriptive qualitative. This study involved three eighth-grade students of SMP 1 Pallangga, Gowa: one quitter type student, one camper type student, and one climber type. The selection of research subjects was made by first providing an Adversity Response Profile (ARP) questionnaire. The students' thinking process data was obtained by using mathematical problems solving task instruments and interviews. The task of solving mathematical problems that students must complete is a problem with number patterns. The results of this study indicate differences in the thinking processes of each student. (1) *Quitter*-type students cannot express the information presented in problem-solving tasks. In solving problems, they tend to use intuition and cannot re-explain the steps taken to solve problems. Quitter-type students have a computational thinking process in solving problems. (2) *Camper* type students can identify the information contained in problem-solving tasks, not linking previous concepts when completing problem-solving tasks, more combining concepts, and intuition. Camper-type students also do not think of ways to re-check the correctness of the answers obtained. Camper-type students have semi-conceptual thinking processes in solving problems. (3) *Climber* type students can identify information and problems in the given problems solving task. When solving problems, the climber subject tends to apply and relate the concepts he has learned and think about how to re-examine the correctness of the answers he wrote. Climber-type students have conceptual thinking processes in solving mathematical problems.

Keywords: *Thinking Process, Problem Solving, Adversity Quotient.*

1. INTRODUCTION

Mathematics is one of the sciences that underlies the development of science and technology. The role of mathematics is also very important for other fields of science, such as physics, engineering, and statistics [1]. One sharpens the ability to think logically, analytically, systematically, critically, and creatively through mathematics. These various thinking abilities are important for a person to have as a provision to live life. Therefore, mastery of mathematics from an early age is necessary. The National Council of Teacher Mathematics (NCTM) explains that the primary purpose of learning mathematics in schools is to develop students' mathematical abilities, such as reasoning, communication, problem-solving, connection, and representation skills [2]. This objective illustrates that one of the most critical aspects of the learning process is developing students' mathematical problem-solving abilities.

Many factors can affect the success of students in solving mathematical problems, one of which is Adversity Quotient (AQ). Adversity Quotient is a person's ability to survive in the face and exit from the obstacles. This makes AQ something that affects the success and failure of students in solving mathematical problems. The first person to introduce AQ was Paul G. Stoltz. There are three types of people in dealing with issues in terms of Adversity Quotient, namely: (1) the type of quitters (those who quit), namely those who do not have the desire to take challenges and prefer to avoid and quickly give up and give up easily. (2) the type of campers (those who camp) namely those who have the desire to accept a challenge but are consistent not to take or

accept risks and choose to stay safe and easily satisfied with what has been done, and (3) the type of climbers (those who climb) are those who dare to accept challenges in solving a problem or problem and are willing to take risks so that what they do is always completed and resolved according to the intended purpose [3]. The three types of Adversity Quotient image the extent to which a person's effort and tenacity are made to turn an obstacle or obstacle into an opportunity and success.

Students' success in solving mathematical problems is not only supported by students' abilities and knowledge in working on problems but also requires a process or a good way of thinking in solving mathematical problems. In this case, students in the process of thinking between one another are not always the same. According to Ahmadi, thinking is an intentional mental activity carried out by humans when facing a problem or problem by linking one understanding to another to obtain solutions to their problems [4]. Various aspects of reasoning are involved in the thinking process, such as decision-making, problem-solving, critical thinking, reflective thinking, and creative thinking. This makes the thinking process important in solving every problem, including solving mathematical problems.

Thinking means using the mind to consider and decide something, weigh it in memory. When thinking, a person questions and answers with his mind to put the relationship between the parts of one's knowledge. These questions will give direction to one's mind. Someone will carry out thinking activities after there are potential triggers, both internal and external.

The stage of cognitive development or the level of thinking ability of an individual according to his age. The more mature a person increases the ability to think. In learning, it is required to pay attention to the stage of students' cognitive development so that students do not experience difficulties because what is presented in learning must be in accordance with the ability of students to absorb the material provided. Jean Piaget argues that the human thinking process is a gradual development from concrete to abstract intellectual thinking sequentially through four periods, namely:

- Sensory Motor Stage, from birth to about 2 years old
- Pre-Operational Stage, from around the age of 2 years to 7 years
- Concrete Operations Stage, around the age of 7 years to 11 years
- Formal Operations Stage, from around the age of 11 years onwards

Piaget also referred to cognitive structures as schemata (schemas), which is a collection of schemas. An individual can bind, understand, and respond to a stimulus because of the workings of these schemata. These schemata develop chronologically as a result of interactions between individuals and their environment. Thus a more mature individual has a more complete cognitive structure than when he was a child.

A person's cognitive structure is developed in his brain in two ways, namely assimilation and accommodation. In the cognitive structure of each individual, there must be a balance between assimilation and accommodation. This balance is intended to detect similarities and differences in the stimuli encountered. This balance is often called equilibration. From this explanation, it can be concluded that four basic Piaget concepts can be applied to education in various forms and fields of study, which have implications for the organization of the educational environment, curriculum content and sequences, teaching methods, and evaluation. The four basic concepts are (1) schemata, (2) assimilation, (3) accommodation, (4) equilibration.

Each student has a different thought process in the learning process, not always the same from one student to another. By knowing students' thinking processes, teachers can discover students' weaknesses and design learning according to students' thinking processes. According to Zuhri, the thinking process is divided into 3 types, namely: (1) conceptual, namely the thinking process that is carried out by someone in solving problems by using the concepts they have in accordance with their understanding so far, (2) semi-conceptual, namely the thinking process. that is done by someone who generally uses the concepts that he has learned, but because they do not master the concept so that in solving problems or problems they are combined using intuition, (3) computing is a thinking process that is carried out by someone in solving problems that generally do not use concepts but rather rely on intuition to solve a problem [5].

AQ affects students' thinking processes in solving math problems. This is supported by research conducted, which describes students' thinking process in solving math problems according to Bransford Stein's theory of each type of AQ with the subject of class X at MAN 1 Bandar Lampung. From the results of his research, it is known that each student has a different thought process in each type of AQ [6]. Based on Bransford Stein's steps, learners with the

climbers' type tend to carry out conceptual thinking processes when working on math problems. Meanwhile, students of the campers type tend to carry out semi-conceptual thinking processes when working on math problems based on Bransford Stein's steps. Students with the quitters tend to carry out computational thinking processes in math problems based on Bransford Stein's steps.

2. RESEARCH METHODS

This type of research is descriptive qualitative. Studentsescribes or describe carefully and coherently the nature, facts, and relationships between things investigated entirely and thoroughly and present it without processing statistical data in depth. This study reveals in-depth the thinking processes of class VIII junior high school students in solving mathematical problems that are reviewed based on the adversity quotient, namely climber, camper, and quitter types.

This research was conducted at SMP 1 Pallangga, Gowa Regency. The subjects in this study were grade VIII junior high school students consisting of one climber type student, one camper type student, and one quitter type student. Subject selection was carried out by giving Adversity Response Profile (ARP) tests to determine the type of student AQ and passing written tests in the form of descriptions to determine students' thinking processes in solving number pattern problems. Data collection techniques used in this study were unstructured interviews, questionnaires, and written tests. Data analysis techniques were carried out through data reduction, data presentation, and concluding. Meanwhile, checking the validity or correctness of the data is done using the triangulation method, namely by comparing or combining the data from written tests and interviews with climber, camper, and quitter subjects.

3. RESULTS AND DISCUSSION

Based on the data from the ARP (Adversity Response Profile) test obtained in the field, the students' Adversity Quotient (AQ) abilities can be grouped into three types of AQ, namely climbers, campers, and quitters based on scoring. The subjects selected in this research can be seen in the table below.

Table 1. Research Subjects

No.	Initial	AQ Type
1.	NSB	*Climber*
2.	RI	*Camper*
3.	SD	*Quitter*

In this research, the subjects in the table above were then interviewed to find out more about students' thinking processes in solving mathematical problems.

3.1. Thinking Process of Climber Type

Based on data analysis and exposure to research results, it can be seen that the climber subject in solving mathematical problems based on Bransford Stein's steps can identify the existence of problems in the problem well, where the climber subject can state what they want to know in their own language. In determining the goal, the subject of the climber can also understand the purpose of each question well because it can state what is being asked in the question. This is in accordance with the results of research that Taufik has done that in identifying problems and determining goals, the climber subject can identify the existence of problems and know the purpose of the problem as a whole because it can reveal the elements that are known and which are asked in the question on his own words.

In exploring strategies, the subject of the climber can plan or make strategies to solve problems correctly and precisely. The climber subject can also explain the method or formula used in answering the questions or problems given in verbal language. In addition, in identifying the results and actions, the climber subject can also tell or reveal the steps taken in working on the problem based on the concepts he has learned.

Meanwhile, in viewing and studying the subject, the climber can re-examine the correctness of the results obtained or correct errors from each step of problem-solving so that the correct results are received and confident in the results of the answers they have written. This is in accordance with the opinion, which suggests that the climber type is the type of person who often feels confident in something bigger than himself.

Based on the description above and the indicators of the thinking process, it can be concluded that the subject of the climber in solving mathematical problems tends to carry out the conceptual thinking process. As stated by Zuhri, the conceptual thinking process is a way of thinking that always solves problems using concepts that are owned in accordance with the results of their understanding so far.

The results of this study are supported by previous research conducted in class X MIA 4 MAN 1 Bandar Lampung with the material of a two-variable linear equation system. Based on the results of his research, it was concluded that the climber subject tends to have a conceptual type of thinking process in doing math problems based on the steps of Bransford Stein. Even though it was carried out on different subjects and research materials, it turns out that the research results obtained by Yanti & Syazali also apply to this study.

3.2. Thinking Process of Camper Type

Based on data analysis and exposure to research results, it can be seen that camper subjects in solving mathematical problems based on Bransford Stein's steps can identify the existence of problems in the problem well and can state what is known in the problem with his own language. In determining the goal, the camper subject can also understand the purpose of each question well because it can reveal the elements asked in the question. However, in exploring the strategy of the subject camper is less able to plan or make problem-solving strategies. Camper subjects make plans for solving problems, but they are incomplete and sometimes wrong or inaccurate in choosing the formula or concept that fits the problem. This is in line with the research results, which revealed that the camper subject could plan problem-solving in exploring strategies but is incomplete. In identifying results and actions, camper subjects were less able to state the steps to solve problems using the concepts they had learned.

In viewing and learning, the results of this study are different from the results of research, which concluded that the camper subject in seeing and learning was able to re-check the results he obtained. Meanwhile, in this study, although the camper subject had checked the answers he wrote before being collected, he was unable to re-check the correctness of the results obtained or correct errors from each step of completion so that the written answers often made mistakes.

Based on the description above and the indicators of the thinking process, it can be concluded that the camper subject in solving mathematical problems tends to do semi-conceptual thinking processes. As stated by Zuhri that the semi-conceptual thinking process is a way of thinking that tends to solve problems using concepts but does not understand the idea so that solving problems is mixed with solutions that use intuition.

The results of this study are also supported by previous research that camper subjects tend to carry out semi-conceptual thinking processes in working on math problems.

3.3. Thinking Process of Quitter Type

Based on data analysis and exposure to research results, it can be seen that quitter subjects in solving mathematical problems based on steps are sometimes less able to identify the existence of problems in questions well; there are several questions that quitter subjects cannot express the known elements in the problem using their own language. In determining goals, the quitter subject is sometimes unable to understand the purpose of each question because he is unable to state what is being asked in his language.

In exploring strategies, the quitter subject is also unable to make a complete plan of completion. It is sometimes wrong or inaccurate in choosing the formula or concept that fits the problem. Similarly, in identifying results and actions, quitter subjects are also less able to state the steps taken in solving problems using the concepts they have learned.

Meanwhile, in viewing and learning, the quitter subject did not check the answers he wrote before being collected because he did not understand the questions given. This is the same as the research results conducted by Taufik, which concluded that in viewing and learning, the quitter subject could not check or re-check the results of the answers he obtained.

Based on the description above and the indicators of the thinking process, it can be concluded that quitter subjects in solving mathematical problems tend to carry out computational thinking processes. As stated by Zuhri that the computational thinking process is a way of thinking that, in general, in solving problems, tends to rely on intuition and does not use concepts.

The results of research on the thought process of the quitter subject are also the same as the results of the study conducted. Based on the results of his study, it was concluded that quitter subjects tend to have a computational type of thinking process in solving mathematical problems.

4. CONCLUSION

From the exposure of data analysis and discussion of research results, it was concluded that climber subjects tended to carry out conceptual thinking processes in doing math problems on number pattern

material. When solving problems, the subject of the climber can identify problems and understand the objectives contained in the problem by stating the known elements and which are asked in the question using their own language. In addition, when working on questions, the subject of the climber also tends to use the concepts he has learned and can re-examine the correctness of the answers from the results he writes.

Meanwhile, camper subjects tend to carry out semi-conceptual thinking processes in math problems on number pattern material. While solving the problem, the camper subject can identify the problem and determine the objectives contained in the problem by presenting the known elements and which are asked in the question using their own language. However, when solving the problem, the camper subject did not understand the concepts he had learned so that in working on the questions, he combined concepts and intuition. In addition, the camper subject is also less able to re-examine the correctness of the answers he gets, so that sometimes errors often occur.

As for the quitter, the subject tends to carry out computational thinking processes when solving math problems on number pattern material. Where in solving the problem, the quitter subject is less able to express the known and asked elements in the question using their own language, and in answering the questions, they tend to use their intuition and are unable to retell the steps taken in working on the questions, and do not re-examine the answers they have written.

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