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Profil of Students' Mathematical Problem-Solving Ability with the Implementation of CRA-Adjacent Inquiry Learning in Terms of Adversity Quotient

Rafika Putri ✉, Isnarto Isnarto, Amin Suyitno

Universitas Negeri Semarang, Indonesia

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Abstract

The purpose of this study was to describe the profile of students' mathematical problem-solving abilities in terms of adversity quotient. This research is qualitative research with data triangulation. The population of this study were class VIII students of SMP Negeri 13 Semarang for the 2022/2023 academic year. Determination of research subjects using purposive sampling technique, to obtain 6 subjects, namely two categories of climbers, two categories of campers, and two categories of quitters. The results of this study are students in the climbers category are able to master all stages of Polya with the NCTM indicator, namely carrying out steps to understand the problem, develop a problem solving plan, carry out problem solving, and re-check the results of the settlement, students in the campers category are able to master three of the four stages of Polya with the NCTM indicator, namely carrying out steps to understand the problem, develop a problem solving plan, and carry out problem solving, and students in the quitters category are able to master two of the four stages of Polya with the NCTM indicator, namely carrying out steps to understand the problem and develop a problem solving plan.

✉Correspondence:
Jl. Kelud Utara III, Gajah Mungkur, Semarang 50237, Indones
E-mail: rafikaputri365@students.unnes.ac.id

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INTRODUCTION

Learning is essentially the occurrence of events in individuals towards changes in behavior because of individual experiences. Learning is a process of change in personality in the form of abilities, attitudes, habits, and intelligence that are permanent in behavior that occurs because of training or experience (Daryanto, 2014; Nurjan, 2016). In line with Dangnga & Muis (2015) who stated that learning is a human process to achieve various kinds of competencies, skills, and attitudes. Learning is about providing conditions that lead to the learning process of students (Nurdyansyah & Fahyuni, 2016). Learning is a combination of the words learning and teaching. Agree with Susanto (Susanto, 2013) who said that the word learning is a combination of two activities, namely learning and teaching. Learning activities according to the dominant methodology are carried out by students, while instructional teaching is carried out by the teacher.

Various subjects are taught at every level of education, one of which is mathematics. Mathematics is a deductive science, but most students still perceive mathematics as a frightening and very abstract subject so that students find it difficult to understand (Taneo et al., 2016). Mathematical skills are a competency that must be possessed by students in the functioning of reasoning and decision making in the current era of intense competition.

The National Council of Teachers of Mathematics (NCTM, 2014) defines five essential skills to explain the criteria for mathematical skills: problem-solving skills, reasoning skills, communication skills, connection skills and representation skills. Then Sari Marwan (2019) said that the ability to think at a higher level is the ability to provide facts to others, the ability to think critically, and the ability to solve problems. The ability to think at a higher level is very important in solving mathematical problems, so the ability to think at a higher-level students must continue to be trained by giving problems that are not routine or problems that are not routine, namely problems that have many correct ways of solving. Thus, it is not new when problem solving becomes a preference and focuses more on learning mathematics.

Hendriana et al. (2018), stated that problem solving is an effort to find a solution from a goal that is not so easy to solve. Meanwhile, according to Wahyudi Anugeraheni (2017), problem solving is the application of knowledge and skills to achieve goals appropriately. Then Wahyudi Anugeraheni, stated that problem solving means the process that individuals go through to overcome the problems they face until the problem is no longer a problem.

According to Wardhani et al. (2010), related to solving problems states that solving problems is the process of applying previously acquired knowledge into new situations that are not yet known. Wardhani et al. also state that solving problems is the management of a problem in a way that successfully meets the goals established for treating it. The statement if translated into language, has the meaning of solving problems is the management of problems in a way so that they succeed in finding the desired goal.

Thus, from some of the expert opinions that have been described, it can be seen that the ability to solve mathematical problems is an important ability of students and needs to be mastered in an effort to find a way out of a problem that does not easily find a solution or in other words in a situation that has not been known before by applying the knowledge, skills and understanding they have so as to successfully find a goal that desired, in addition, in order to recognize the solving procedure in solving mathematical problems, logical, systematic and orderly thinking is needed to utilize the known elements of the problem. The indicators in this study are described in Table 1 which refers to the Polya stage with the NCTM indicator.

Table 1. Mathematical Problem-Solving Ability Indicator

Polya Stages	NCTM Indicator
Understand the problem	Write down the information presented in the problem Include questions on the problem. Explain the sketch of the problem
Develop a troubleshooting plan	Develop a problem-solving plan using clear procedures Estimate the problem resolution plan to be used. Present the problem in simpler language
Implement a resolution	Create a mathematical model based on a given problem Solve problems based on strategies that have been prepared. Complete solving steps to communicate conclusions
Recheck the results of the resolution	Recheck the results of the solution. Compile a resolution conclusion. Use different ways to solve the problem

Adapted from Prabawa & Zaenuri (2017).

The following will be displayed a table of scoring guidelines to measure mathematical problem-solving abilities, researchers use the scoring techniques shown in Table 2 as follows.

Table 2. Scoring Rubric Mathematical Problem-Solving Ability Test

Assessed aspects	Description	Score
Understand problems	There was no answer.	0
	There has been little attempt to present known, but unresolved information.	1
	Students present known information, but there are many errors.	2
	Students present known information, but there are few errors.	3
	Students present known information correctly, but do not identify what is asked in the problem.	4
	Students present known information and are asked in full.	5
Apply and adapt various appropriate strategies to solve problems	There was no answer.	0
	There is little effort to write a solution plan, but students do not make drawings or examples based on problems.	1
	Students write down a resolution plan, but there are still many mistakes and no attempt to make drawings or examples based on problems.	2
	Students write a solution plan, but there are few errors and there are attempts to make drawings or examples based on the problem.	3
	Students write a solution plan by making drawings or examples based on problems but not yet appropriate.	4
	Students write down a completion plan by making drawings or examples appropriately.	5
Solve problems that arise in mathematics and other contexts	There is no solution.	0
	There was little attempt to implement a settlement, but it was not resolved.	1
	Students carry out solutions, but there are still many mistakes.	2
	Students carry out the solution, but there are few errors.	3
	Students carry out the solution correctly, but less completely.	4

	Students carry out the completion and write the answers completely and precisely.	5
Monitor and reflect on the process of solving mathematical problems	Did not write down the conclusion.	0
	There was little attempt to write a conclusion, but it was not resolved.	1
	Students write conclusions, but there are still many errors.	2
	Students write conclusions, but there are few errors.	3
	Students write down the conclusion, but it is wrong or imprecise.	4
	Students write down the results and make conclusions appropriately.	5

Modification of Pridiarti & Subanji (2022)

A problem presents an invitation to students to think in finding a solution. When solving mathematical problems, students must pay attention and get a variety of problems so that students represent concrete problems into abstract mathematical symbols. Students need representation skills in solving problems with different definitions into mathematical symbols so that they can be displayed in easy-to-understand language and speed up finding solutions. A difficult problem will be easy when using a representation that matches the problem, while choosing an incorrect representation makes the problem difficult to solve. Kelly (2006) stated that students tend to be more active in building and improving manipulative teaching aids during teaching and learning activities and outside learning hours.

Scientifically, the ability and characteristics of a person in responding to problems vary. Psychology with its various branches has identified several variables that indicate individual differences and influence the learning process, such as intelligence, giftedness, cognitive style, thinking style, and so on. These factors should ideally also be the teacher's concern in planning and implementing teaching and learning activities. Shivaranjani (2014) has introduced a new concept about another type of intelligence referred to as adversity quotient (AQ), which describes how well a person is able to overcome difficulties. Sudarman (2012) states that not only IQ or EQ determines one's success, but adversity quotient also has a tremendous influence in determining one's success. Stotlz (2000) classifies a person's adversity quotient into three categories, namely low (quitters), medium (campers), and high (climbers).

The purpose of choosing a suitable learning model is to maximize effectiveness in the learning process, which is the goal of learning. Rusman (2012), choosing the right learning model is the teacher's task to encourage the enthusiasm of students to be more active in participating in classroom learning. One reference learning model that involves students playing an active role in the learning process so that they do not feel bored is the inquiry learning model, a constructivist approach that emphasizes the thinking process to solve problems.

Effendi (2012) states that learners still feel confused in elaborating thoughts when dealing with abstract things. This is because the cognitive development of students is in the initial transition period between concrete thinking to abstract thinking, so that the abstract thinking process of students cannot be maximized (Suparno, 2001). Sumarmo (2004) added that the cognitive development of junior high school students is still mostly at the stage of concrete operations, so real examples are needed to build students' understanding of mathematics. Therefore, there is still a need for a learning approach that can bridge students from thinking concretely to thinking abstractly, including the Concrete-Representational-Abstract (CRA) approach. The CRA approach consists of three interrelated steps, namely concrete, representational, and abstract (Witzel, 2005). Riccomini (2010) the purpose of the CRA Approach is to strengthen students' comprehensive understanding of a mathematical ability they understand.

The inquiry learning model with the CRA approach is considered to have the potential to improve the psychological aspects of students, namely the adversity quotient. Hawadi (2004) said learning that can develop the adversity quotient of learners is learning that allows learners to apply problem-solving steps and communicate through activities that are challenging and interesting for learners. This can be found in the learning, as well as exploring and analyzing the problems given, so that

students can determine strategies when facing difficulties. In addition, the application of this learning provides opportunities for students to carry out these activities. Based on the description above, considering the importance of mathematical problem-solving skills for students' daily lives, researchers need to profile students' mathematical problem-solving abilities with the implementation of inquiry learning models with a CRA approach in terms of adversity quotient.

Based on the description that has been described, the formulation of the problem to be discussed in this study is how the mathematical problem-solving ability of students is seen from the adversity quotient. The purpose of this study is to describe the profile of students' mathematical problem-solving ability seen from the adversity quotient.

METHOD

This type of research is qualitative research with data triangulation. Sugiyono (2018: 372) revealed that there are several types of triangulation techniques, namely source triangulation, engineering triangulation, and time triangulation. The triangulation used in this study is a triangulation technique. Triangulation technique is to check the validity of data based on different collection techniques with the same source (Sugiyono, 2018: 373). Triangulation techniques are carried out by comparing the results of tests of students' mathematical problem-solving abilities with the results of interviews. Qualitative research methods are used to describe the ability to solve mathematical problems in terms of the adversity quotient of students in inquiry learning with the CRA approach.

This research was carried out at SMP Negeri 13 Semarang which is located at Jalan Lamongan Raya, Sampangan, Semarang, Central Java 50218 on November 1-30, 2022. The research activity began with the implementation of learning in class VIII H by applying the Inquiry Learning model learning with the CRA approach for 4 meetings. Then, students are given a mathematical solving ability test and an adversity response profile questionnaire.

Moleong (2016: 53) revealed that qualitative research requires research subjects who are people in the research background who are useful in providing information about the situation and conditions of the research background. Subject retrieval with purposive sampling technique, which is a sampling technique with certain considerations. The sample needs to be representative of the entire population both based on individual characters, group characters, spatial characters, and strata characters.

The subjects of the study were selected as many as 6 students, namely two categories of climbers, two categories of campers, and two categories of quitters. Quality data collection techniques include mathematical communication skills tests, adversity response profile questionnaires and student interviews. Qualitative data analysis in this study is reduction, presentation of data, verification and writing conclusions. Interview data was collected through direct interviews with subjects of 6 students of grade VIII H SMP Negeri 13 Semarang. After obtaining the data, a qualitative analysis was carried out.

RESULTS AND DISCUSSIONS

Learning is carried out using the inquiry learning model with the CRA approach. The number of meetings in the class is five meetings, with details of four meetings for learning implementation and one meeting for mathematical problem-solving ability tests. Inquiry learning with the CRA approach begins with providing motivation so that students understand the benefits obtained after learning the material in everyday life. After that, the teacher gives LKPD to students and invites students to find formula concepts. Furthermore, students are given project assignment sheets to be done in groups with each group of 5-6 students.

The teacher supervises the course of discussion and interviews students so that the teacher can find out the common mistakes made by students. After that, the teacher appoints a group representative to present the results of his work in front of the class. Teachers provide opportunities for other students to ask questions and express opinions. Furthermore, the teacher provides practice questions that are done individually to measure the mathematical communication skills of students. After the practice questions are discussed, students who have not achieved completion are given improvement questions. The last activity is that students are given homework about the lessons that have been taught.

Based on the results of the Adversity Response Profile (ARP) questionnaire for class VIII H students of SMP Negeri 13 Semarang, it was obtained that students classified as climbers were 11 students, students classified as campers were 18 students, and students classified as quitters were 3 students. The adversity response profile questionnaire is made according to the dimensions and indicators of the adversity quotient according to Paul G. Stoltz (2000) which is divided into five dimensions, namely (1) control, (2) origin, (3) ownership, (4) reach, and (5) endurance.

Table 1. Results of Adversity Quotient Grouping of Students

ARP Score	Category	Students
135-200	*Climbers*	E-08, E-10, E-13, E-14, E-17, E-19, E-20, E-26, E-30, E-31, E-32
60-134	*Campers*	Others
0-59	*Quitters*	E-01, E-16, E-27

Subject selection using purposive sampling technique. Students with the climber's category were selected 2 students, students with the campers category were selected 2 students, and students with the quitters category were selected 2 students. Based on the grouping of student adversity quotient measurement results, it can be seen in Table 2 as follows.

Table 2. Selected Subjects

No.	Subject	*Adversity Quotient*	Mathematical Problem-Solving Ability Test Scores
1	S-1	*Climbers*	93,33
2	S-2	*Climbers*	70
3	S-3	*Campers*	86,67
4	S-4	*Campers*	66,67
5	S-5	*Quitters*	73,33
6	S-6	*Quitters*	50

Analysis of mathematical communication skills in learning inquiry learning models with the CRA approach in terms of the adversity quotient of students was carried out by comparing the results of written tests, mathematical problem-solving skills and interview results. The analysis is carried out by taking into account the indicators of mathematical problem-solving ability in this study, namely (1) understanding the problem, (2) preparing a problem solving plan, (3) carrying out problem solving, and (4) re-examining the completion results Analysis of mathematical problem solving ability in terms of the adversity quotient of students is presented in Table 3 as follows.

Table 3. Mathematical Problem-Solving Ability Reviewed from Adversity Quotient

AQ Category	Indicators of Mathematical Problem-Solving Ability			
	I	II	III	IV
Climbers	good	good	good	good
Campers	good enough	good	good enough	good
Quitters	less good	less good	less good	less good

Based on Table 3, students with the climbers category seem to have the best mathematical problem-solving ability than the campers and quitters category. This is because climbers have achieved good criteria on all indicators of mathematical problem-solving ability. Campers category learners appear to have better mathematical problem-solving skills than quitters category learners. The following is a description of the mathematical problem-solving ability of students from each adversity quotient category.

4.1 Analysis of Mathematical Problem-Solving Ability Reviewed from Adversity Quotient Climbers Category

Climbers are students who tend to be tenacious in solving problems and trying until the goals are met. Learners of the climbers category are represented by S-1 and S-2 research subjects. Analysis of the mathematical problem-solving ability of Climbers category students was obtained based on the final test results of mathematical problem-solving ability and performance when the climbers category subjects were interviewed. Based on the results of the analysis, climbers category students have the best ability than the other 2 AQ categories. Learners of the climbers category demonstrate good mathematical problem-solving skills on all indicators. This is in line with Abdiyani's research, etc. (2019), which states that climbers can carry out all four problem-solving steps well.

Based on these facts, climbers always try to achieve the best achievement. This is in accordance with Stoltz (2000), which states that climbers are individuals who always try to achieve success, are ready to face problems, and are always enthusiastic in achieving their goals. Research by Dian Rochmad (2016) also shows that Climbers category learners have high persistence in solving problems to the end. In IL learning with the CRA approach, students in the climbers category show a high frequency in terms of asking questions, conveying ideas, and presentations. This is shown by the excellent activeness score of climbers category students in following learning. This study shows the same results as research by Indriani (2022), that the CRA approach plays a role in increasing student activity. The results of this study are also in accordance with research conducted by Baharullah, etc. (2022), which states that the mathematical problem-solving ability of climbers category students has an excellent ability to solve problems by meeting the four indicators.

4.2 Analysis of Mathematical Problem-Solving Ability Reviewed from Adversity Quotient Campers Category

Campers category students are students who tend not to take too big risks, are satisfied with the conditions or circumstances they have achieved currently, and do not maximize their efforts even though they have opportunities and opportunities. Campers category learners are represented by S-3 and S-4 research subjects. Based on the results of the analysis, campers category students have abilities that are in the middle than other categories, namely climbers and quitters. The results of the analysis showed that the mathematical problem-solving ability of campers category students was in the good category in all indicators of mathematical problem-solving ability set by the researcher. This good ability criterion occurs because individual campers category students show more diverse performance when compared to climbers and quitters category students.

The active participation of students in the campers category seems to be involved in conveying ideas, asking questions, and presenting to do problems. However, some of them seem to be looking for safety so as not to come forward for presentations or express their opinions and must be appointed first to be actively involved in learning. This is in accordance with Stoltz's statement (2000), that children of the campers category are children who do not want to take too big risks and are satisfied with the conditions or circumstances they have achieved today. Students in the campers category still seem to show that there is an effort to try to solve the problem, even though their efforts do not seem as good as the students in the climbers category.

4.3 Analysis of Mathematical Problem-Solving Ability Reviewed from Adversity Quotient Quitters Category

Quitters are students who tend to stay away from problems and have very little effort to overcome problems. Once they encounter difficulties, they will choose to retreat. Learners of the quitters category are represented by S-5 and S-6 research subjects. Based on the results of the analysis, students in the quitters category have the lowest ability than other categories, namely the climbers and quitters categories. The results of the analysis showed that the mathematical problem-solving ability of quitters category students was in the poor category in all indicators of mathematical problem solving ability set by the researcher. Poor ability criteria are shown by low involvement by quitters category students in following learning, little effort to try to solve problems, even quitters category students are the most difficult students to be asked to ask questions, ideas, and presentations in front of their friends.

The active participation of quitters category students in participating in inquiry learning with the CRA approach is very minimal. They tend to be passive. Observation of activeness of students in the quitters category also showed poor results. Students

in the quitters category tend to be difficult to be asked to move forward to do problems, express ideas, ask questions, or present the findings of their group. When asked to come forward, they still chose to stay in their seats, even though the researcher had asked his friend to accompany him to work on the questions in front of the class. This is in accordance with the opinion of Rahmawati, etc. (2015) which states that quitters usually give up easily and despair in answering math problems, especially because they do not like and consider mathematics a difficult subject. Therefore, students in the quitters category tend to avoid challenges or problems, for example not wanting to move forward to do questions in front of the class.

CONCLUSION

Based on the results of research and discussion, it can be concluded that the description of students' mathematical problem-solving abilities in inquiry learning with the CRA approach in terms of the adversity quotient is as follows. Students in the Climbers category are able to fulfill all stages of Polya with NCTM indicators, namely carrying out steps to understand problems, formulating problem solving plans, implementing problem solving, and re-examining the results of the solution. Campers category students are able to fulfill three of the four stages of Polya with NCTM indicators, namely carrying out steps to understand problems, develop problem solving plans, and implement problem solving. Students in the Quitters category are able to fulfill 2 of the 4 stages of Polya with NCTM indicators, namely carrying out steps to understand problems and develop problem solving plans.

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