Mathematics Problem Solving Ability in Terms of Adversity Quotient in PBL Model with DAPIC Problem-Solving Process

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Abstract

The study aims to describe the KPMM review of AQ on the PBL model with DAPIC problem-solving process of students in class VIII SMP Askhabul Kahfi Semarang. The descriptive qualitative method was chosen in this research, meanwhile, the researcher used a purposive sampling technique in taking the subject of research. There were six research subjects each consisting of two subjects on each AQ categorization. Research data was taken through an AQ questionnaire, TKPMM, interviews, and observation. The researcher used some techniques including reduction, presentation, then making a conclusion. TKPMM results showed that students in solving problems reviewed of AQ vary. Quitters' students got quite a similar score, tend to give up easily, and were only capable to fulfil the first KPMM indicator. Campers' students got various TKPMM scores, there was a student with high campers' category but had equivalent TKPMM scores with quitters, chose to do what was necessary for the sake of aborting obligation, and earned score without giving more effort, were capably fulfilling two KPMM indicator. Student climbers got quite the same TKPMM score, earnest and maximizing capabilities, as well as capable to fulfil all KPMM indicators.

INTRODUCTION

Mathematics' purpose makes students actualize their highest learning levels highest (Novriani & Surya, 2021). mathematical skill demand is not limited to counting expertise. However, it covers logical reasoning skills as well as a critical skills in solving a problem (Fathani, 2016). new necessary Standard that students need to understand is the mathematics learning process doesn't transfer existing knowledge and experience, but it builds the process with the principle of " self - construction of knowledge (Zakirova et al., 2019). The ability to solve a problem is a precondition for man to carry out his life (Fajariah et al., 2017). According to Taplin (Setiawan et al., 2014), the importance of solving a problem could be reviewed from three scores that are in a manner functional, logical, and aesthetic.

Lilljedahl et al., (2016) stated solving a mathematical problem has been seen as a means aspect of mathematics, teaching, and math education as well. It is related to research by Abdullah et al., (2014) that knowledge about mathematics problem solving does not only emphasize the settlement problem according to the scheme, but it also involves the ability of a higher level of thinking with the awareness and apply a heuristic to integrate with facts and information. PISA results in 2015, Indonesia ranked 62nd out of 70 countries in mathematics with 386 points which means it is still below the OECD average (OECD, 2018). A previous study from SMP Askhabul Kahfi Semarang also supports the result that the ability to solve the problem is not optimal mathematics.

The attitude of students in facing learning difficulties is also related to their ability to solve math. According to Stoltz in Cando & Villacastin, (2014), an expert is somebody who copes spiritually as well as endures experiencing challenges or responds to the hardships experienced with good in adversity. On the other hand, the measurement of adversity is known as Adversity Quotient (AQ).

Someone's AQ is classified into three types, namely low AQ (Qutters), medium AQ (Campers), and high AQ (Climbers) (Stoltz, 2007). According to Cando & Villacastin, (2014) quitters are people who just give up because it is very difficult for them to think, campers are people who have made an effort but ended on a safe spot for hiding, climbers are people who never give up to get what they want, believe in their own strength to achieve goals and face challenges. AQ relates to some vital aspects of a person (Beri & Monu, 2016). AQ is a potential study as a perspective aspect of successful students (Matore et al., 2015). So AQ is recommended for introduction and application.

A study by Bikić et al., (2016) stated the choice of learning method approach is important for learning mathematics in the classroom. To develop solving problem ability, learning must become an environment in which students could actively follow useful math activities (Suryati et al., 2013). Hence, the problem-based learning (PBL) model is a suitable model.

PBL is a learning model in which problems become the first step to getting new knowledge (Lintang & Wardani, 2017). According to Hanafiah & Suhana in Imam et al., (2018), PBL uses real problems as the context so that students could study and think critically in solving purposeful problems to obtain knowledge or essential concept from the material being taught. According to Major & Mulvihill, (2018) PBL could develop students' knowledge and students' mathematical problem-solving abilities every day. Siagian et al., (2019) showed that teaching materials that are PBL-oriented meet the criteria of effectively increasing problem-solving abilities and metacognition abilities.

Ability to solve problems supported by the ways and the processes of problem-solving, for instance by using the DAPIC Problem- solving process (Anwar et al., 2018). Sumirattana et al., (2017) stated that DAPIC (Define – Asses – Plan – Implement – Communicate) is a problem-solving process developed and used as a part in the Mathematics, Science, and Integrated Technology Program (IMaST). Students who explore and solve given problem in learning shows that the students potentially develop skills higher critical thinking (Sumirattana et al., 2017). DAPIC problem-solving process could construct students' knowledge so that they could understand mathematics through solving the problem. Study Anwar et al., (2018) stated that PBL with DAPIC problem-solving process facilitate students' self-trust in which could increase their mathematical literacy skills.

Based on the description above, the study focuses on the abilities of students' mathematical

problem solving reviewed from adversity quotient in completing math problems using PBL with DAPIC problem-solving process.

METHOD

This study uses descriptive qualitative. The study obtains a description from the observation process (Moleong, 2014). This study was conducted in class VIII SMP Askhabul Kahfi Semarang 2020/2021 academic year. The purposive sampling technique is used to determine the subject.

The researcher uses 4 criteria in determining the subject, including (1) The students have obtained theory related to sequences and series, (2) the students do all the tests, (3) included in AQ criteria, (4) can do two-ways communication fluently. There are six subjects selected with two students representing the categorization of each AQ. AQ questionnaire, TKPMM, interviews, and observations are used by the researcher to extract the data from the same source. The result of data analysis and data collection become the principle to describe the KPMM at each AQ categorization.

RESULTS AND DISCUSSIONS

The trial showed that from 7 TKPMM questions, there were 5 eligible questions. It was decided based on the results of validity, difficulty level, differentiator power, reliability, and contained students' KPMM indicator. The KPMM indicator was based on the NCTM indicator as stated in Harahap & Surya, (2017) that was modified ; (1) building new mathematics knowledge through problem-solving, (2) implementing and adapting suitable strategy to solve the problem, (3) solving problem that arises in math and inside the other contexts (4) monitoring and reflecting on the process of solving a mathematical problem.

Charging the 37 students in class VIII G a questionnaire that was used for classifying students into AQ criteria. Based on the AQ questionnaire, the lowest score was 48 meanwhile 192 was the highest. Classification results of the AQ questionnaire were presented in Table 1 below.

Table 1. Classification results from AQ Questionnaire

intervals	Criteria	Σsubject	Percentage (%)
X < 60	Quitters	4	10,81
60 ≤ X < 135	campers	22	59,46
200 ≤ X	climbers	11	29,73

Based on table 1, students in class VIII G were mostly classified as campers. There were unique findings during this study. The following explanation of each AQ.

Quitters

Students who scored 52 and 57 on TKPMM were classified as quitters. From 4 students in quitters, there were no differences in TKPMM score. Quitters had not capable of completing TKPMM questions correctly, still, there was an error in choosing a strategy, and doing internal calculations and processes. It was seen from their answer they did not show the capability to understand. Besides, according to Malik et al., (2018), quitters are not capable understand, plan, solve, and inspect the return of their job. The following example was the student's answer to question number 2.

Figure 1. Results of work quitter's student

Figure 1. showed quitters were only capable to understand the question by mentioning statements and information from the question. In line with the study by Hidayat & Sariningsih, (2018) quitters students could understand the problem by writing known information, asking about the problem as well as explaining it in sentences alone. Both subjects were in doubt and had difficulty when answering the question because there were still many errors in choosing a strategy. Hidayat & Sariningsih, (2018) stated quitters' students were likely to have trouble completing mathematical problems because they used to study with teacher-guided solutions algorithms, so

their abilities were limited to solving their routine problems. The study by Hulaikah et al ., (2020) also showed that quitters chose to give up and refused to understand, and failed to look for a solution to their problem.

Error in calculations and careless processes also caused the subject could not solve the problem correctly. This is in line with Hidayat & Sariningsih, (2018) quitters only could substitute data with appropriate formulas. Error in calculations and results from no end appropriate susceptible happened. Pratiwi, (2016) also stated quitters were carelessly doing calculations so the result was not straight and correct. Besides, the subject tended to easily give up and didn't enthusiastic about solving a difficult problem so it could not be resolved. Fitria et al., (2015) stated quitter is a group that doesn't hold on to all contained situations and conditions challenges and easily separated hope.

Quitters couldn't accept the challenge in life (Hakim & Murtafiah, 2020). Neither had they were capable to reflect the results in solving the problem that had been done. This was also in line with the Opinion of Chadha, (2021) that quitters had little passion and ambition for completing the problem, were rarely creative, didn't like to take risks, tended to avoid the problem, and tended to avoid their friends. Accordingly, the study by Hulaikah et al ., (2020) stated quitters felt satisfied with their answers, without reviewing them even once.

Campers

The camper's student scored 70 and 77 on TKPMM. From 22 students who belong to this classification, there were findings on TKPMM results; there were one camper's student who got an equivalent TKPMM score to climbers' students, and there were also Higher campers' students who scored below the BTA. The following example was the results from professional student campers on question number 4.

Figure 2. Results of camper's student

Figure 2. Showed campers were capable to understand the problem by writing known information and information asked from the question. They were also capable to implement and adapt suitable strategies to solve the problem. Malik et al ., (2018) stated campers could identify what was known and asked. Subject not yet capable of solving the problems that arose in math, monitoring and reflecting on the process of solving a mathematical problem. Both subjects had difficulty using suitable strategies and reflecting on the results of the problem's solution. Study by Hidayat et al ., (2018) campers could understand, design as well as carry out the plan into a complete plan. Campers were not yet capable to re-examine, only concluding the results.

Besides, campers did not answer the question maximally. The subject often felt distraught in solving the problem, gave up easily when facing trouble, and chose to focus on completing as many as possible questions to abort the obligation within the provided time. Research results (MZ et al ., 2017) stated that student-type campers didn't attempt their maximum. They think that no need to score high, their purpose was to finish their job.

Baharun & Adhimah, (2019) campers only look for safety from some problems and are easily satisfied with the achievements. Hakim & Murtafiah, (2020) campers had the willingness to try facing the problems, challenges, and obstacles but they were stopped if they felt inadequate. Campers didn't attempt too hard to complete their job because they argued that measurable things will have a higher risk, even if they were satisfied enough and in their safe place (Fitria et al ., 2015) Based on various descriptions above, it could be concluded that campers could only fulfill two problem-solving mathematical ability indicators built new mathematical knowledge through solving the problem and implementing and adapting the compatible strategy to solve the problem.

Campers obtained unique results, there was one subject to get a high score in campers category but was only capable to fulfill the first mathematical problem-solving ability indicator. Based on TKPMM subject had a similar score with quitters. This result was strengthened by the results of the interview, it was obtained the fact that the subject didn't quite understand the material because of her sickness during the research so she didn't follow the learning

process and was not used to the steps as well as the indicators about the problem-solving question.

Climbers

The students who scored 88 and 92 on TKPMM were categorized as climbers. The higher the student's AQ, the higher their learning outcomes (Nurhayati & Fajrianti, 2013). Climbers could complete mathematical problem-solving questions optimally, though still there was an error in doing internal calculations and the processes doing, however, subjects were capable to explain appropriately during the interview. Regardless of the background, profit, or loss, fine or bad, climbers always tried to complete the problem. They understood their goals and passions from whatever they were doing (Baharun & Adhimah, 2019). The results from 11 climbers were not quite different. Following results professional student climbers on question number 3.

Figure 3. Results of climber's student

Figure 3. Showed climbers were capable to understand and complete problems very well. Malik et al., (2018) stated climbers understood in solving problems including writing known information and asked information, planning to solve problems by determining the steps as well as the method for solving the problem, did solve the problem using the steps and methods that had been planned before and re-examine the answer. Research results from Hidayat & Sariningsih, (2018)strengthen that climbers fulfilled all indicators as well as could complete Polya problem-solving.

Climbers did solve the problem seriously, did not give up easily, and maximized their abilities for getting maximum results. Somebody with a high AQ will be pushed to get the best results by being active, always utilizing every opportunity, and having the will to study independently (Novilita & Suharnan, 2013). Research from Chadha, (2021) stated climbers were people who were diligent and willing to work hard hours to reach higher goals. This was strengthened by the results study (Fitria et al., 2015) which stated climbers were always ready to take risks and face all challenges, faced their fear, lead, worked hard, and focus on effort as well for a desired goal achieved without ignoring all obstacles he experienced until his job done. Climbers survived and fought in facing problems, challenges, and obstacles (Jemina et al ., 2022).

CONCLUSION

The ability to solve the mathematical problem of student class VIII in completing TKPMM from AQ varies. Quitters have less passion, easily give up, and are not used to completely solving mathematical problems so that only capable fulfill the first KPMM indicator which is building new mathematical knowledge through solving the problem. Campers complete the questions as needed, for the sake of aborting obligation and earning a score without giving the effort that will drain their energy and thoughts. Campers can fulfill two of the KPMM indicator, namely, build new mathematical knowledge by solving problems and applying them as well as adapt the strategy accordingly for solving problems. Campers get a relatively good score on TKPMM even if there is one subject received a similar score to climbers. This research finds one subject that is capable to do a question with her logic correctly without using provided formula. Campers are capable to choose a problem-solving strategy, however, it is still not enough thorough in the calculation. Limited time also makes campers only capable to write a conclusion in some answers but do not have time to re-examine their answer. Climbers choose to complete the question earnestly and maximize their capabilities. Climbers are capable to fulfil all KPMM indicators. TKPMM results get an impressive score. Climbers understand the question and get to write it down with complete mathematics symbols, capable to justify calculation errors during

the interview, and have good management of time for re-examine the written answer.

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