Problem Solving Skill Seen from *Adversity Quotient* through *Problem Based Learning* Assisted by *E-Comic Math*

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Article Info	Abstrak
	This research aimed to describe problem solving skill of students seen from *adversity quotient* through *Problem Based Learning* assisted by *E-Comic Math.* This mixed method research used *sequential explanatory* design with 23 subjects taken from VII A4 class at Islamic JHS Sultan Agung 4, Semarang, selected based on three *adversity quotient* categories: *quitter, camper,* and *climber.* The techniques of collecting quantitative data were problem solving test and *adversity quotient* questionnaire. The qualitative data collecting techniques were based on interview and *adversity quotient* questionnaire results and problem solving skill test. The findings showed that *Problem Based Learning* assisted by *E-Comic Math* was effective and the description of problem solving skill seen from the students' *adversity quotient* based on three categories through *Problem Based Learning* assisted by *E-Comic* were different. They were shown by *quitter* student category reached good and sufficient levels of problem solving skill. The camper students reached excellent, good, and sufficient levels. The climber students reached excellent and good levels of problem solving skills.

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INTRODUCTION

According to OECD (2012), mathematics is a part of curriculum which is not learnt conceptually but also applicatively to solve various life problem context. Problem solving is an important matter in mathematics curriculum because it allow studnets to obtain experience in using their prior knowledge and skills to solve irregular problems (Suherman, 2003 in Hendriani, 2017)

According to Chao (2017), Alcantara (2017), problem solving is a process of finding answers by each individual whom applies his prior knowledge and skill into any device and applications to meet the new requirements which are unknown so problem solving is assumed as high mental activity. Nasution (2018) argued that mathematics problem solving skill is a meant in solving various daily life problems. Bickic et al (2016) argued that problem solving skill trains students to connect prior experience into new experience and to learn through active process. Siswanto et al (2013) in Millah (2018) stated that problem solving skill is important in learning mathematics, especially in problem understanding process. The step in problem solving skill used in this research was based on Polya (1973), consisting of (1) understanding the problem – referring to the known, the inquired, sufficient information existence, condition to meet, re-statement of the original problem into operational form (being able to solve); (2) *planning the solution* – devising a plan by connecting the known data with the current problems. Then, to decide what theory and formula to us as good as to think similar problems with the investigated problems. Thus, it could crate a certain mathematics model from the given questions; (3) finishing the plan – referring to the mathematics problem solution by using the arranged mathematics model; (4) re-checking – referring to analysis and evaluation whether the already implemented procedure and the obtained results were correct or the existence of any more efficient procedure. The problem solving would consist of Polya stages and each stage would have problem solving indicators based on NCTM (2000). They were: (1) developing new mathematics knowledge through problem solving, (2) solving mathematics problem in various contexts, (3) implementing accurate strategy in solving problems, and (4) reflecing the problem solving process.

Stoltz (2000) in Shivaranjani (2014) introduced new interesting – new concept. It was *Adversity Quotient* (AQ) which describes about how good an individual's skill to face problems. According to Effendi (2005), Candisa (2006), Sugiyanto (2006), and Laksomono (2006) in Sudarman, the term AQ refers to endurance and durability potency. AQ is an intelligence which is able to change difficulty into opportunity. It deals with how human sees problems and tries to figure out the solution. Stoltz in Sudarman (2012) stated that there was not only cause by IQ or EQ, which determined an individuals' success, but also AQ which greatly influenced to realize an individual's success. This statement is supported by Leonard and Amanah (2014), Hidayat and Sariningsih (2018) which showed that AQ positively and significantly influenced mathematics learning achievements, especially dealing with problem solving process. AQ is categorized into three: *quitter* (the lowest one), *camper* (the moderate one), and *climber* (the highest one). Stoltz's theory (2000) about *Climber* typed individuals are individuals whom always struggle to reach their success. They are ready to face problems and have spirit in reaching their objectives.

Based on preliminary observation results done at Islamic JHS Sultang Agung 4, Semarang, the problem solving skills of VII A4 sutdents, seen from AQ, were still low. It was shown by *pretest* score. Only 17.39% students reached the passing grade while the other, 82.61%, were not. It was caused since some of the students had difficulties in solving problems. Moreover, when it was done independently. They had low understanding about what stages used to solve the problems. Besides that, when the teacher gave new problems with similar context but it had different numbers, the students seemed giving up to work on the questions. It showed their determination to face problems was still low.

Besides that, based on the interview with the mathematics teachers of the school, it was found that

the teachers did not maximize in using learning media and only focused on the speed of the material delivery accomplishment without considering the students' accomplishments. In fact, learning media is really important to improve the students' accomplishments and learning success. According to Regulation of Educational and Cultural Ministry, number 16 (2007), learning mathematics should be made as enjoy as possible and as interesting as possible to make students more enthusiastic in learning process. One of them can be done by using learning media.

Learning medium is defiend as embodiment of the used media to facilitate teachers in carrying out their teaching task in the classroom (Majid, 2015:174). Accordint to Septy (2015) in Nida (2017).

One alternative to overcome such learning challenge is by using comic as learning medium. Comic is series of pictures which are arranged based on the purposes and the writer's philosophy so the message is conveyed. Comic tends to have lattering which is adjusted to the needs (Gumelar, 2011:7) in Nida (2017:32). Pardimin and Sri Ardi (2017), Widiyastuti et al (2007), and Cahyono et al (2016) stated that comic is a good, reliable, practical, and effective medium to use in learning mathematics. Grade VII students on average still like to read picture stories because they are transitioning from elementary school so that the comic media is well used in learning. E-*Comic Math* is a learning media in the form of comic consisted on educational elements, such as mathematics material which has been adjusted to environmental and students' needs. *E-Comic Math* is an electronic comic medium to use by students as learning source in the class or in independent manner. In the effort of improviing problem solving skill seen from *AQ,* there is a need of certain model implementation. It is *Problem Based Learning* assisted by *E-Comic Math.* Accordint to Rusman (2013), training in PBL facilitates in improving connectivity, data collection, elaboration, and information communication. Sariningsih (2017:169) stated that problem based learning was developed to assist students in learning to transfer knowledge with new situations to be moved into more general understanding. Therfore, in PBL,

studnets are expected to be involved in solving problems with all group members to achieve learning objectives (Wang & Posey, 2011) in Botty (2016:36). It is strengthened by Ismawati (2017) and Sunandar (2018) telling that PBL and AQ reviews in learning could make problem solving more optimal.

The syntax of *Problem Based Learning* are (1) problem orientation of the students, (2) student organization to learn, (3) guiding students in individual or collective experience, (4) developing and presenting their works, and (5) analyzing and evaluating problem solving process. Based on the background of the problems, this research aimed to find out problem solving skill pattern seen from *adversity quotient* through *Problem Based Learning* assisted by *E-Comic Math.*

METHOD

This research used *mixed method* approach. According to Cressgood (2015), *mixed method* is a method focusing on collection, analysis, and quantitative and qualitative data mix in a research. Meanwhille, the design of the research was *sequential explanatory.* Clard in Subedi (2016) stated that *sequential explanatory,* at the first stage, it is started by quantitative data collection. Then, it is continued bby qualitative data collection.

The quantitative data was used to find out effectiveness of PBL model assisted by *E-Comic Math* to the students' problem solving skill. The data was obtained from problem solving skill test of the students. Problem solving skill test in this reserch is TKPM .

The qualitative data was used to analyze and describe the problem solving skill seen from AQ. The data was obtained from AQ questionnaire, observation, interview, and documentation. The questionnaire was used to collect data about the students' AQ by using *Adversity Response Profie* (ARP). It was an addition of *CO₂RE* (Control, Origin, and *Ownership, Reach, Endurance*). The observation was done to get information about the classroom conditions, attitudes, and enthusiasm of the students during PBL learning process assisted by *E-Comic Math.* The documentation used in this

research had purpose to collect data in the forms of photographs and the students' works to strengthen the observation and interview results during the investigation.

FINDINGS AND DISCUSSION

This research obtained two classes: VII A1 as control group and VII A4 as experimental group. The model implemented in control group was PBL while the experimental group intervened by PBL assisted by *E-comic math.* Before being intervened, normality and homogeneity tests were carried out. It had purpose to check whether the data was taken from normal distribution population or not. Based on the normality test, it was obtained $sig = 0.200 > 0.05$. It meant H_0 was accepted or the initial data of TKPM (PSST) was from normal distribution population. Then, homogeneity test was carried out to find out variance difference between two samples. Based on the test, it was obtained $X_{count}^2 < X_{table}^2 = 1.48 < 3.84$ then H_0 was accepted. It meant both groups had similar variances or homogeneous. Then, test of average equivalence was done. This test used t-test to find out the equivalence of problem solving skill average from both groups. Based on the test, assisted by SPSS, it was obtained $sig = 0.479 > 0.05$ thus H_0 was accepted and H_1 was denied. It meant the problem solving average score of both groups were equal. Then, quantitative and qualitative data analysis were carried out.

The quantitative data analysis had purpose to find out effectiveness of PBL model assisted by *E-Comic Math* to problem solving skills when it met three criteria: (1) problem solving skill reached minimung passing grade 75% classically and reached good criterion individually; (2) the average of problem solving skill of the students taught by PBL assisted by *E-Comic Math* was btter than those taught by PBL, and (3) the proportion of problem solving skill intervened by PBL assisted by *E-Comic Math* was better than those taught by PBL.

The first criterion is problem solving skill must reach minimum passing grade 75% classically. To test the criterion, variance test used t-test. It resulted to $t_{count} > t_{(0,95)}22$. It was $6.0228 > 1.71$. Thus, H_0

was denied and H_1 was accepted. It meant problem solving skill average of the students taught by PBL assisted by *E-Comic Math* was higher than 65. Then, classical accomplishment test was done by using one party proportion test. It resulted to $z_{count}=1.324$. Based on Z table, it obtained $z_{table} = 0.41$ with significant level 0.05. Thus, $z_{count} \geq z_{table}$ then H_o was denied. It meant the proportion of problem solving skill was higher than 75% or the skill had been higher than 75%. Then, TKPM (PSST) scoring by using scoring rubric was done as follows.

Table 1. TKPM Scoring Rubric

The Assessed Aspects	Reactions toward the questions	Scrs
Understanding the problems	No answer at all.	0
	Writing the known, inquired, sketched elements although they were incorrect or incomplete	1
	Successfully understanding the problem comprehensively	2
Arranging Plan	No orders of solution at all.	0
	Irrelevant or unclear strategies/solution steps	1
	Providing correct solution steps	2
Finishing the Plan	No finishing stage at all	0
	Solution with unclear/incorrect procedure	1
	Using certain incorrect procedure but having complete calculation	2
	Using certain correct procedure but not complete	3
	Using certain correct procedure	4

Rechecking	No conclusion and re-checking step toward the process and the answer	0
	Writing the conclusion and/or doing re-checking although incorrect/incomplete	1
	Writing conclusion and rechecking the process correctly	2

Based on the rubric, it was obtained percentage of TKPM score.

Table 2. TKPM Score

Percentage (%)	Categories	Numbers of Students
$85 \leq P_k \leq 100$	Excellent	9
$70 \leq P_k \leq 84,99$	Good	10
$55 \leq P_k \leq 69,99$	Sufficient	4
$40 \leq P_k \leq 54,99$	Low	0
$0 \leq P_k \leq 39,99$	Very low	0

Based on the table, the students whom reached good category consisted of 10 people and 9 students reached excellent category. Thus, there were 19 students or 83% of experimental group had good mathematics problem solving skill category. Therefore, the first effectiveness requirement was met.

The second criterion was problem solving skill average of students taught by PBL assisted by *E-Comic Math.* It was found better than those taught by PBL. This second criterion used variance test resulting into $t_{count} = 4.54$. Based on the t-table, it was obtained that $t_{table} = 1.67$ with significant level 0.05. Thus, $t_{count} \geq t_{table}$ meaning that H_0 was denied. It meant that problem solving skill of the students taught by PBL assisted by *E-Comic Math* was better than those taught by PBL. It was said that second effectiveness requirement was met.

The third criterion was proportion of problem solving skill taught by PBL assisted by *E-Comic* Math was better than those taught by PBL. The third effectiveness criterion used proportional variance test. It resulted to $z_{count} = 3.903$. Based on Z table, it was obtained $z_{table} = 0.500$ with significant level 0.05. Thus, $z_{count} \geq z_{table}$ it meant H_0 was denied. It meant the problem solving skill proportion of the students taught by PBL assisted by *E – Comic Math* was better than the proportion of those taught by only PBL. It could be said that the third effectiveness criterion was met.

Based on those three criteria, it was known that the effectiveness of a learning had been met. It could be concluded that PBL assisted by *E-Comic Math* was effective in improving problem solving skill of the students seen from AQ.

The qualitative data analysis had purpose to analyze and describe problem solving skill seen from each AQ category. There were 23 students of VII A4 Islamic JHS Sultang Agung 4, Semarang, categorized into three AQ: climber (high), camper (moderate), and quitter (low). Based on the AQ questionnaire, it showed that there were 3 *climbers,* 16 *campers,* and 4 *quitters.* Then, each AQ category was explained into 5 problem solving skill levels: low, moderate, and high. Here is the analysis of problem solving based on AQ.

Table 3. TKPM (PSST) Analysis Result based on AQ

No	AQ	TKPM Numbers of Students	Categories
1	*Climber*	2	Excellent
		1	Good
		0	Sufficient
		0	Low
		0	Very Low
2	*Camper*	6	Excellent
		9	Good
		1	Sufficient
		0	Low
		0	Very Low
3	*Quitter*	0	Excellent
		1	Good
		3	Sufficient
		0	Low
		0	Very Low

Based on the table, three climbers consisted of 2 learners with excellent category and 1 with good category. The campers consisted of 6 students with excellent category, 9 students with good category, and 1 student with sufficient category. The quiiters consisted of 1 student with good category and 3 students with sufficient category. All AQ categories did not have students categorized into low and very low.

The climber students consisted of 2 excellent category students whom mastered 4 indicators (1) understanding the problem good, (2) planning the solution, (3) completing the plan, and (4) rechecking.

The students with good problem solving skill category consisted of 1 student whom mastered (1) problem understanding good, (2) problem solving, (3) solving based on the plan although it was imperfect, and (4) rechecking. Thus, it could be concluded that individuals with high AQ (*climbers*) had not always obtained excellent problem solving skill.

It is in line with Stolz (2000) that *climber* individuals were individuals whom always tried to achieve their success. They were ready to face problems and had spirit to achieve the purposes. Ismawati (2017) showed that *climber* typed students could develop new mathematics knowledge through problem solving skill. They could arrange the strategies completely and systhematically so they could solve problems. According to Hastuti *et al* (2017), high *AQ* students showed better performance and works.

The *camper* students consisted of 6 persons with excellent problem solving skill, 9 students with good problem solving skill, and 1 student with sufficient problem solving skill. 6 students with very good problem solving skill could master 4 indicators (1) understanding the problem good, (2) planning the solution, (3) solving based on the plan, and (4) rechecking the plan. 9 students with good problem solving skill only reached three indicators: (1) understanding the problem good, (2) planning the solution, (3) solving based on the plan. Meanwhile for rechecking stage, it could not be done properly. Meanwhile, 1 student with sufficient problem solving skill only reached two indicators: understanding the problem and planning the solution. However, they still could not solve the problems good and could not do rechecking their works. Therefore, it could be concluded that individuals with moderate AQ *(camper)* did not always have moderate problem solving skill.

This ilinierity is in line with Naimnule (2019). He found that two camper subjects with low problem solving skill were not able to carry out until the last problem solving task. Meanwhile, Suryapuspitarini (2018) stated that students with camper category in solving problems, they could understand, plan the solution, and commence the problem solving.

Students with low AQ (*quitter*) showed there was only 1 student with excellent problem solving skill. 3 students were categorized to be sufficient problem solving skill students. The students with good problem solving skill met 3 indicators: (1) understanding the problem good, (2) planning the solution, and (3) being able to solve problem based on the plan. However, they could not achieve the rechecking stage. Students with sufficient problem solving skill consisted of 3 students whom mastered 2 indicators: understanding the problem and planning the solution. On the third problem solving stage and 4 students with sufficient problem solving skill, they had not been able to do it. Thus, low AQ students (quitter) did not always have low problem solving skill.

This ilinierity was in line with Ismawati (2017), Wahyuningsih (2019), and Naimhule (2019). They explained that quitter only reached the third problem solving skill. It was commencing the plan and solution which might occur because of other external factors. Meanwhile, Sunandar (2018) stated that *quitter* students could only understand problems and solve the problems based on the plan.

CONCLUSION

Based on the analysis and discussion, it was obtained that *Problem Based Learning* assisted by *E-*

Comic Math was effective in improving problem solving skill of the students and based on findings, it could be described that problem solving skill of the students seen from *adversity quotient* were varied. Higher *adversity quotient* of the students did not mean the students had high problem solving skill. Lower *adversity quotient* did not mean the students would have lower problem solving skill and this result does not apply to all students because each student has a different personality.

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