



Mathematics Problem Solving Skill in ARIAS Learning with Scaffolding Strategy Viewed from Adversity Quotient based on Gender

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Abstract

This research aims to describe mathematics problem solving skill seen from *adversity quotient* based on *gender* of VIII graders. This *mixed – method* used sequential explanatory design. The population was taken from VIII graders of 11 Semarang, consisting of seven classes. The techniques of collecting data was *purposive sampling*. The findings showed that *adversity quotient* of the students were varied. They were shown from 10 high *adversity quotient* students consisting of 6 high mathematics problem solving skilled students and 4 moderate skilled students. From 17 students with moderate *adversity quotient*, 6 of them had high mathematics problem solving skills, 9 moderate skilled students, and 2 poor skilled students. From 5 students with poor *adversity quotient*, one of them had high mathematics problem solving skill, 2 moderate skill, and 2 poor skill students. Female students had higher mathematics problem solving skill than the male students. Female students also could re-check again their answers with different ways while male students could re-check with the same ways on high problem solving skill category.

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INTRODUCTION

Mathematics is an important lesson to develop mathematics problem solving skill. Many daily life problems which need mathematics to solve (Permatasari *et al*, 2015). Mathematics cannot be separated from problem solving (Ulya, 2015). It is in line with *National Council of Teachers of Mathematics'* (NCTM) formulation as quoted by Cahyaningrum & Sukestiyarno (2016). They stated that learning mathematics has purpose to learn communicating, reasoning, solving problem, connecting ideas, and presenting ideas. Based on Rules of Education and Culture Minister No. 21 Year 2016 about content standard of Junior and High level education, one of competencies to achieve in learning mathematics is problem solving skill (Prabawa & Zaenuri, 2017). Problem solving skill becomes the general purpose and core process in learning mathematics (Susilo *et al*, 2012). It shows that problem solving skill is needed by students.

One of mathematics material to use is spatial sides of cubic and rectangular figures. The importance of problem solving skill was also stated by Misu (2014). He stated that problem solving skill is part of an important mathematics curriculum because in learning and solving process, students use their knowledge and the already owned skill to be implemented into problem solving skill. An individual could solve a problem well when it is supported by good problem solving skill (Rosita & Rochmad, 2016).

Many hindrances in implementing problem solving skill which lead to poor problem solving skill of students. It is caused by teacher could not teach to develop students' problem solving skill in which heuristic and types of the problems are emphasized than problem solving skill (Lee *et al*, 2014).

Dealing with poor problem solving skill of students, there is a need of learning change. This change could be done by implementing certain learning model, strategy, method, and approach. A study about poor problem solving skill was from Novriani & Surya (2017), telling that percentage of

problem solving skill of student reached 54.48% and was categorized insufficient.

One of applicable stages to solve mathematics problem solving skill test is Polya's stages. The Polya's stages (2000) consisted of understanding problem, planning solution, solving problem, and rechecking.

Considering the difficulties of the students in learning mathematics, the researcher was interested in finding solution to assist them by giving *scaffolding*. Anghileri in Ismawati *et al* (2017), the given *scaffolding* by teacher/more capable peer to students with problems through assistance in initial stage and is gradually decreased and keeps decreased until the students could do it alone.

A learning model which could be collaborated by *scaffolding* is ARIAS. Rahman and Amri as quoted by Mustafa & Sabirin (2017) stated that ARIAS is first effort in learning to internalize belief to students. The learning activity is relevant to students' lives and it attracts students' attentions.

One of influential attitudes to mathematics problem solving skill is *adversity quotient*. Nikam & Uplane (Ardiansyah *et al*, 2018) stated that *adversity quotient* is an individual's intelligence in facing difficulties. Stoltz in Rosita & Rochmad (2016) stated that AQ has three categories: poor (*quitter*), moderate (*camper*), and high (*climber*). Other things related to problem solving skill and *adversity quotient* is gender. Another term of *gender* is genital type. *Gender* is used to find out differences of mathematics problem solving skills between male and female students.

This research aims to (1) find out quality of ARIAS with *scaffolding* to mathematics problem solving skill of the students and (2) find out problem solving skill of the students taught by ARIAS with *scaffolding* seen from *adversity quotient* with *quitter*, *camper*, and *climber* categories based on the gender.

METHOD

This *mixed method* research with *sequential explanatory* design combined both quantitative and qualitative methods (Cresswell, 2014). This research was started by preliminary study, quantitative and qualitative data collections, and data analysis and interpretation.

This research was done at SMP N 11 Semarang with VIII graders in academic year 2018/2019 as the population. The subjects were 32 students taught by ARIAS with *scaffolding* and 32 students taught by *discovery learning*.

The data source was from mathematics problem solving skill tset (MPSS), *adversity quotient*, interview result of mathematics problem solving, and observational sheet of teacher activity during learning process. The result of the test functioned as quantitative data source while MPSS, *adversity quotient* questionnaire result, and the interview result were used as qualitative data source. The quantitative data was tested by normality, homogeneity, equality of two variance, passing grade achievement, classical achievement, proportional difference, and variance tests. The qualitative tests were done by data validation, verbal data transcription, data presentation, and data verification.

FINDINGS AND DISCUSSION

The quantitative research was done to analyze effectiveness of ARIAS learning with scaffolding. The preparatoin was done by having series of learning instrument validations. Based on the assessment of learning instruments by validators, the average score was categorized good. Here is the detail of learning instrument and research instrument validations as shown in Table 1.

Table 1. Results of Learning and Research Instrument Validations.

Instruments/Research Instruments	Ave	Categories
Syllabus	83%	Good
Lesson Plan	82%	Good
Worksheet	80%	Good
Adversity Quotient	83%	Good
Questionnaire		
MPSS questions	81,5 %	Good
Observational Sheet of Learning Quality	3,75	Good
Result of Learning Implementation	4.31	Very Good

Before conducting the research, initial MPSS test was given to find out the minimum criteria of the students. Then, the sample was taken by *cluster random sampling*. The test was given by having 5 questions of MPSS and the initial material requirement was rectangular figure.

Based on the intial MPSS test of all VIII graders of the population, it was obtained (1) the average score of the students' mathematics problem solving skill (\bar{x}) was 63 with standard deviation (s) 8.81. Therefore, the minimum passing grade criterion was $\bar{x} + \frac{1}{4} s = 65$; (2) score of Sig. normality and its homogeneity respectively were $0.081 > 0.05$ dan $0.468 > 0.05$ so that it could be concluded the data was normally distributed and homogeneous. Then, the samples were taken randomly and resulted into VIII G as experimental group and VIII F as control group. After that, equality of intial skill average test was done. The results showed that Sig $0.227 > 0.05$. It showed that mathematics problem solving skill of both groups were not significantly different.

After conducting the research and analyzing the data, it was obtained that (1) based on calculation of average completeness test, $t_{count}=5.28 > t_{table} = 1.69$ then H_0 was denied. It meant the average of problem solving skill of experimental group was 75, higher than the minimum passing grade 65; (2) based on calculation by using classical achievement test,

$z_{count} = 2.09 > z_{table} = 1.64$ then H_0 was denied. It meant there was more than 75% final test result of experimental group reached the classical minimum passing grade; (3) based on proportional difference test, $z_{count} = 2,18 > z_{tabel} = 1.64$, then H_0 was denied. It meant the proportion of problem solving skill of experimental group was better; (4) based on calculation of variance test, $t_{count} = 1.92 > t_{table} = 1.67$ then H_0 was denied. It meant problem solving skill of experimental group was better. Thus, it could be concluded that ARIAS with *scaffolding* was effective.

Then, qualitative analysis about mathematics problem solving skill seen from *adversity quotient* based on gender was done. The experimental group students were given AQ questionnaire to group them into high, moderate, and poor. Here is the result of 32 students as presented in Table 2.

Table 2. Categorization of *Adversity Quotient*.

Categories	Numbers of students
High	10
Moderate	17
Poor	5

The descriptions of the findings about mathematics problem solving skill seen from *adversity quotient* were varied. It was shown from 10 students with high *adversity quotient*, 6 of them categorized high mathematics problem solving skilled students and 4 of them moderate skilled students. From 17 students with moderate *adversity quotient*, 6 of them were categorized high mathematics problem solving skilled students, 9 moderate skilled students, and 2 poor skilled students. From 5 students with *adversity quotient*, one of them categorized into high mathematics problem solving skilled students, 2 moderate skilled students, and 2 poor skilled students.

The findings of mathematics problem solving skill seen from *adversity quotient* showed that high AQ students would not always have high mathematics problem solving skill level. However, there were some students with poor AQ had higher mathematics problem skill level than high AQ students. It was due to the given learning model could stimulate their learnings.

Students with poor mathematics problem solving skill only could reach understanding problem stage of Polya's stage. The moderate skilled students did not check again the answer because they had satisfied with their current answers. The high skilled students could accomplish until re-checking stage of Polya's stages.

Based on the analysis obtained from the students' works, the frequency of poor mathematics problem solving skilled students, between male and female students only could reach understanding level. On the moderate skilled students, between male and female students, they did not recheck again on the answer sheet. The high skilled students, the male students rechecked the answer again by redoing it again while the female students only could do so by having different methods. Furthermore, the average score of female students' mathematics problem solving scores were higher than the male students. It is in line with Jamiah in Anggraeni & Herdiman (2018) stating that female students had better problem solving skill than male students. They were also more careful in writing the problem solving stages than male students. However, on planning stage, male students were better than female students although they still missed several parts. In another hand, Sugiyanti in Anggraeni & herdiman (2018) showed that differences of mathematics problem solving skill was on the subjects with high mathematics problem solving skill. It showed that female subjects mistakenly operated the calculation while the male subjects did not do so. However, female students could reflect their problem solving process.

CONCLUSION

Based on the analysis and discussion, the description of mathematics problem solving skills seen from *adversity quotient* based on gender showed various results. It meant that ARIAS with *scaffolding* was qualified and influenced various mathematics problem solving skill of the students. Therefore, learning quality remained to be the focus of learning activity.

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