

# Mathematics Resilience Of Pre-Service Mathematics Teacher

Muntazhimah M, Syafika Ulfah

**Abstract:** The objective of this research was to study in depth Mathematical resilience of pre-service teacher in one of study program of Mathematics Education in Jakarta. This research previously studied Mathematics resilience ability of pre-service teacher in general descriptively and quantitatively. Then in depth study was conducted qualitatively by applying snowball sampling technique. The subjects of this research were the second semester students of Mathematics Education. The instrument used in this research was non-test instrument namely mathematical resilience scale. The result of the research showed that, the mathematical resilience of the pre-service teacher was generally still low. The mathematical resilience indicator with the lowest score was the second indicator namely desire to socialize, ease of offering help, discussion with their coeval and ability to adapt the environment. The highest score was indicator of diligence, confidence, hard worker, sturdy problem solving, failure and uncertainty. The conclusion was mathematics resilience of pre-service mathematics teacher need to be improved.

**Index Terms:** Mathematics Resilience, Pre-service Teacher.

## 1 INTRODUCTION

We often find that not many students consider Mathematics as one of their favorite subjects. Of course, there are so many reasons for that. Some studies describes clearly that many students feel difficult and dislike learning Mathematics. For example, the students avoid doing activities needing mathematic reasoning, they also feel anxious to learn Mathematics (Johnston-Wilder, Lee, 2010: 1). Offirston in Sumarmo (2012:102) states the same perspective that middle school students still get difficulty in solving mathematical problem. Indeed, pre-service teacher of Mathematics experience difficulties which are not so different from the middle school do. Zanthly (2018:86) stated that there are many students of Mathematics education feel difficult to solve the problems given by their lecturer. In fact, according to the interview done with some Mathematics education lecturer at one of higher education institution in Jakarta, that the mid semester test score of the students was not very good. The same problems and difficulties experienced by Mathematics learners seem to be experienced by the students at elementary school, junior high school, senior high school, and even university though. Whereas, according to Johnston-Wilder, S., Lee, C., Brindley, J., & Garton, E. (2015) that when a learner experiences failure repeatedly, there are two alternative consequences, namely determination enhancement directed to performance improvement, or the harmfulness of emotion and powerlessness, anxiety, inactivity, fear reducing their performance. To avoid the consequence of point two, Mathematics learners must have positive manners towards Mathematics itself. Mathematics learners are expected to possess a fine struggling rate in solving all kinds of problems they face in Mathematics learning. Besides, students must also be realize the meaningfulness of Mathematics in their daily life such as attention, interest, enthusiasm in learning Mathematics, and diligence as well as confidence in solving mathematical problems.

One attitude affecting someone's success in Mathematics learning is called mathematical resilience (Hidayat, 2017; Nurmasari, Kusmayadi, & Riyadi, 2014:17). Mathematics resilience is mathematical soft skill need to be possessed by the students, as a quality attitude in Mathematics learning including confidence through hardworking, diligence on facing difficulty, desire to have discussion, reflection, and research ability (Dilla, Hidayat, & Rohaeti, 2018: 130). With those resilience, Mathematics learner will have more opportunities to solve problems in Mathematics learning caused by their anxiety on learning Mathematics, and lack of confidence they have (Komala, 2017; Kusumawati & Nayazik, 2017). Kookan, J. Welsh, M.E., Mccoach, D.B., Johnson-Wilder, S and Lee (2013) define mathematical resilience as a positive behavior on Mathematics providing the students opportunities to continue learning Mathematics even though they get difficulties in learning it. There are four factors correlated to resilience, they are: (1) Value: that Mathematics is a precious subject and deserved to be learnt, this theory imply that students will be more interested and motivated to learn Mathematics if they believe in its worth. The bigger appreciation understood by students to learn Mathematics, the higher their motivation to learn it and the more possible they survive every difficulty; (2) Struggle: it is known that struggle on Mathematics learning is universal even for people with high mathematic ability. The higher level of success a group have, the higher motivation they have to do effort. The stronger the endurance in facing obstacle and setback, the greater the performance achievement they have; (3) Growth: belief that everyone can develop his/her skill of Mathematics and it is a doubt that some people are born with or without learning ability. Students who relate their success and their internal factors have objective orientation, they seek challenge and develop strategy to face difficulties and vice versa; and (4) Resilience: orientation towards situation or negative difficulties in learning Mathematics resulting positive response. Referring to the literature of psychological resilience involving explanation of threat followed by positive response towards Mathematics learning. These factors combine two components, they are; someone's experience in facing difficulties and someone's positive response to solve the problem. There are no many related researches to mathematical resilience of the pre-service teacher of Mathematics. Based on this fact and the explanation above, the researcher thinks that it is important to do research and in-

- Muntazhimah M, Universitas Muhammadiyah Prof. DR. Hamka, Indonesia, PH-+6285297364445. E-mail: muntazhimah@uhamka.ac.id
- Syafika Ulfah, Universitas Muhammadiyah Prof. DR. Hamka, Indonesia, PH-+6287886794415. E-mail: syafika.ulfah@uhamka.ac.id

depth study on mathematical resilience to pre-service teacher of Mathematics. He took several indicators of mathematical resilience as suggested by Sumarmo (2017), they are; a) expressing diligent attitude, confident, hard working, and strong in facing failure or uncertainty; b) expressing desire to socialize, helpful, having discussion with friends, and adapt the environments; c) bringing up ideas/new way and looking for creative solution to face challenge; d) using failure experience to build self-motivation; e) be enthusiastic, reflective, willing to do research and utilizing various sources; f) possess ability of self-control, realize the emotion and feeling.

## 2 RESEARCH METHOD

Method used in conducting this research was survey given to the second semester students in one of the study programs of Mathematics Education in Jakarta. This research was aimed at studying deeply how mathematical resilience of the pre-school teacher of Mathematics. The population of this research is all second semester students of Mathematics Education Study Program at Universitas Muhammadiyah Prof. Dr. Hamka (UHAMKA). The sample was taken by using convenience sampling technique, the sample subject are 30 students of Mathematics Education Study program of one of universities in Jakarta. The instrument used in this research was non test. The non test instrument in this research was mathematical resilience scale consisting of derivative statement from indicator of mathematical resilience and equipped with five options of answer, they are; strongly agree (SS), agree (S), neutral (N), disagree (TS) strongly disagree (STS). The answers from the respondent were measured by using Lykert Scale where the values was 1 to 5 from each item. Next, each scale of the students' mathematical resilience was analyzed descriptively quantitative. According to Sugiono (2003: 21), descriptive statistic which is functioned to describe or provide description towards the object being researched. Moreover, the researcher conducted snowball sampling technique to determine sampling for in depth study qualitatively.

## 3 RESULT AND DISCUSSION

After conducting the research to the sample taken, the researcher gained data of the students' mathematical resilience in table 1. The result of the research was pursued into four indicators of mathematical resilience stated in 30 statements in the test instrument in form of mathematical resilience scale. It can be seen in the table that all of the pre-service teacher students' mathematical resilience was only 43.28 % or can be categorized low. Especially, if we look at each indicator, found that there were three indicators from four available, but those were still categorized low; they are indicator of desire to socialize, easily help others, doing discussion with friends, and adapt the environment 34.60%, expressing enthusiasm, doing reflection, doing research, utilizing various sources 42.30 %, and has language ability, self control and realization of mood 45.26%. There was only one indicator with small percentage above 50 %, they are; indicator of diligent attitude, confidence, hardworking, strong motivation to solve problems, failure and uncertainty. Generally, the result of the research showed that the mathematical resilience of pre-service teacher student was still low.

**Table 1**  
*Descriptive Analysis of Mathematical Resilience*  
Pre-Service Teacher of Mathematics

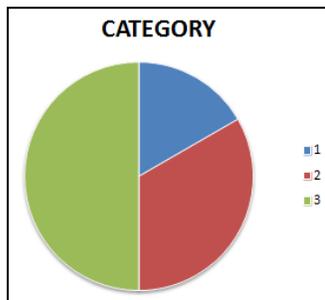
No.	Indicator	SS	S	N	TS	STS	
1	Diligent attitude, self confidence, hard working, strong to face difficulties, failure and uncertainty.	14	104	1	35	1	50.95%
		9.02	67.1	0.64	22.6	0.64	
2	Desire to socialize, ease of helping others, doing discussion with other friends, adapt the environment	6	27	0	23	6	34.60%
		9.52	42.86	0	38.1	9.52	
3	Expressing enthusiasm, doing reflection, doing research, utilizing various sources.	5	49	2	35	2	42.30%
		5.38	52.69	2.15	37.63	2.15	
4	Possess language competence, self control and realize the mood	3	53	2	33	2	45.26%
		3.23	56.99	2.15	35.48	2.15	
							43.28%

The next research finding showed that, based on the mathematical resilience individual score of the students was in range 55.38% up to 78.46% with the majority of them were in range of 60% - 70%. The highest score gained was 78.46% only by one student. On the other hand, the lowest was 55.38% also gained by one student. Furthermore, When in-depth study was done through interview with several students, found that the students were actually collaborative and cooperative to their friends. They also want to help their friends and want to do discussion with them. However, what happens in the real situation that many student are not collaborative and cooperative maximally. Then, the most important point that the majority of students feel difficult to adapt their environment, in particular circumstance when they get difficult Mathematics material. Students feel difficult to compromise and to adapt with the surrounding environment and situation. When they find their friends who cannot collaborate well, most of other students become skeptical and feel lazy to keep on discussing. While the indicator with the highest score was the first indicator namely diligent attitude, confidence, hardworking, strong in facing troubles and problems, failure and uncertainty. The good news was, most of pre-service teacher of Mathematics have diligent attitude and they are not weak of facing difficulties in learning Mathematics. This was caused by the consciousness of the prospective teacher of Mathematics that they will always face mathematical problems in lecture. So, they are forced not to give up when they face failure and uncertainty in Mathematics learning. However, a few students provided answers that bad

time management becomes one obstacle to be consistently diligent to learn Mathematics. Sometimes, because of too many tasks given in a limited time lose their confidence to complete their Mathematics Task. Overall, the students' scores were divided into three groups as following:

1. Category of individual mathematical resilience score were 55.38 % - 60% gained by 5 students.
2. Category of individual mathematical resilience score were 60.01 % - 70% gained by 15 students.
3. Category of individual mathematical resilience score were 70.01% - 78.46% gained by 11 students.

For more details, the acquisition of scores can be seen in the following figure:



**Fig 1.** Overall Student's score of mathematics resilience

It can be seen that the majority of students score from 60 to 70. This shows that the mathematical resilience of pre-service mathematics teacher students does need to be improved and facilitated their development. Based on the students' individual mathematical resilience score, the researcher conducted in-depth investigation qualitatively. Based on the interview with some students, there were four students with high mathematical competence and four students with low mathematical competence. Then, the researcher studied the mathematical resiliencies of the eight students. The scores were as following:

1. Student A with high mathematical competence gained the highest mathematical resilience too.
2. Student B with high mathematical competence gained medium mathematical resilience (67.69%).
3. Student C with high mathematical competence tended to gain low mathematical resilience (58.46%).
4. Student D with high mathematical competence tended to gain low mathematical resilience (58.46%).
5. Student E with low mathematical competence tended to gain high mathematical resilience (76.92%).
6. Student F with low mathematical competence tended to gain high mathematical resilience (73.84%).
7. Student G with low mathematical competence tended to gain low mathematical resilience (60%).
8. Student H with high mathematical competence gained the lowest mathematical resilience (55.38%).

It was found that students having good grades do not guarantee that they have good mathematical resilience grade as well. It turns out that mathematical resilience is indeed not an instant thing to change. This is because mathematical resilience is a matter relating to resilience in mathematics, which arises from within the individual himself. Hence, the environment that facilitates the development of mathematical

resilience must be carried out continuously for mathematical resilience in students is there consistently in their lives.

## 4 CONCLUSION

Mathematical resilience is one important aspect in Mathematics learning success with many problems, obstacles, and challenges in it. A good mathematics resilience is needed so that the Mathematics learners are readier in facing obstacles, and to be success in Mathematics learning. It can be concluded from the research result that the mathematical resilience of the pre-service teacher is generally still low. The indicator for mathematical resilience with the lowest score was the second indicator namely desire to socialize, ease of helping, doing discussion, and adapt the environment.

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