How are the contributions of mathematics resilience for developing attitude rubric to assess mathematics learning?

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Abstract. Attitude assessment is one of important things that can help teacher to know how the development of students attitude in learning process. This study aims to present the implementation of attitude assessment by mathematics teacher at school. This study was qualitative descriptive research. The data were collected by using observation and conducting an interview to one of teachers of 8th grade in Cimahi. The result shows that the teacher was still difficult to implement attitude assessment. It caused the teacher had some obstacles in developing attitude rubric. In the end, students had negative attitude toward mathematics in classroom. To cope with this problem, the teacher needs to establish their own mathematical resilience so that they can have values, struggles, and growths that can help them in developing the attitude rubric. At the end of this article, it is also presented the contributions of mathematical resilience to develop rubric of attitude assessment in mathematics learning.

1. Introduction
Attitude assessment is one of the important points of assessment in the implementation of the curriculum in Indonesia today, namely the 2013 curriculum. Attitude assessment is intended to detect the character in students who may be underachieved through learning that has been followed [1, 2]. The lack of student achievement in schools is closely related to the psychological factors of the students themselves, namely low academic self-perceptions, negative attitudes toward school, negative attitudes toward teachers and classes, low motivation and self-regulation, and low goal valuation [3-5]. Character formation cannot be formed in a short time, but behavioral indicators can be detected early by each teacher. Student character development is just as important as developing student knowledge. It is expected that from each learning activity that has been carried out, it can develop students' attitudes, especially achievements in mathematics. The technique of assessing student attitudes or character can be done by making an assessment format first. This format can be developed according to the character to be assessed, and the type of assessment used [6]. Attitude assessment is related to student attitudes toward the teacher, student attitudes toward the learning process, and attitudes related to values or norms related to learning material [7].

Positive attitudes towards mathematics are positively correlated with student achievement in school [8]. However, in most countries has a negative attitude towards mathematics [9]. This can be seen in mathematics education research, students experience obstacles, difficulties, fears, and anxiety in learning mathematics, which makes students dislike mathematics [10-14]. This causes students to avoid learning and doing mathematics. Mathematical resilience is needed to describe a student's
attitude towards mathematics which enables students to continue learning even though they find difficulties and challenges in the learning process taking place [15].

In general resilience is the ability of humans to face and respond positively to unpleasant experiences and to utilize these conditions to re-energize [16-18]. Resilience is a trait that we have and can be developed from other parties as external factors [19,20]. External factors that influence achievement of mathematical resilience are characteristics of family, school, community and peer groups that develop resilience: having a strong relationship with the surrounding environment, namely the school environment and home environment, the surrounding environment considers that higher education is important, has a non-judgmental style of interaction.

Positive attitudes in learning mathematics contained in self-confidence, self-ability (self efficacy), self-concept (self concept), diligent and resilient to face challenges or difficulties in learning mathematics. Johnston-Wilder and Lee named this positive attitude with mathematical resilience.

Specifically in mathematics, there are four correlating factors for building mathematical resilience, namely: (1) value: belief that mathematics is a valuable subject and more motivated in learning mathematics; (2) struggle: struggling through problems and not assuming that in learning mathematics only for those who have high-level mathematical abilities; (3) growth: the belief to develop mathematical abilities and willing to discuss to find other solutions, and (4) resilience: students realize that struggle and failure are part of learning mathematics, knowing and being able to utilize support from the surrounding environment to study mathematics, knowing that he did not himself struggle in learning mathematics [21].

From the various descriptions above, the author uses mathematical resilience in making attitude assessment rubrics on more specific mathematics subjects and describes the four indicators students have in mathematical resilience are as follows: (1) believing that learning mathematics is important in achieving their current or future goals, and the conditions for achieving success; (2) never give up in learning mathematics, even though there are obstacles and difficulties; (3) conviction that they are able to develop mathematical skills based on their experience, and (4) realizing that struggle and failure are part of learning mathematics, knowing and being able to utilize support from the surrounding environment to learn mathematics.

2. Methods
The study was conducted at a High School in Cimahi for 2018/2019 school year. This research is a descriptive qualitative research because this study describes attitude assessment in mathematics learning. Mathematics teachers were selected based on their agreement, and there were two respondents chosen for this study.

Two instruments were used in collecting data, namely interviews and documents. Interviews were conducted to obtain data directly from the teachers. Questions were about both implementation and problems faced by teachers in conducting attitude assessments. The data were also obtained through documents which were the assessment of student attitudes compiled by mathematics teachers during the teaching and learning process. From the data, we were able to obtain information regarding the format of the attitude assessment carried out by the teachers during learning activities.

The process of analyzing data was using the Miles and Huberman model, it is suggested that the activities in qualitative data analysis are carried out interactively and take place continuously until complete, so that the data is saturated [22]. Activities carried out in data analysis were data reduction, data display and conclusion drawing/verification [23]. To check the validity of the data, triangulation techniques were done. The technique was used so that the obtained data got degrees and certainty.

3. Result and Discussion
The results of the study through interviews and documents toward attitude assessment planning carried out by mathematics teachers showed that teachers in grades VII and VIII both prepared an attitude assessment instrument before learning activities. The two teachers also convey attitude indicators that must be achieved by students.
Table 1 shows that the attitude assessment rubric used by the two teachers is in the form of a school format and uses indicators that are still general and suitable to be implemented in Sivic education subject and Religion lessons. For mathematics subjects it feels less suitable because it cannot change students’ attitudes in learning mathematics. As we know that there are many students who are not interested in learning mathematics and thinking negatively about mathematics. This makes students become less enthusiastic in learning mathematics. The implementation of attitude assessment must be carried out by the teacher every day and can see the development of the attitude of each student especially in mathematics. However, it can be seen that the assessment rubric used by the teacher in the attitude assessment needs improvement because in the assessment there are still shortcomings in determining the indicators used in each instrument. Based on this, researchers are interested in using dimensions in mathematical resilience in making attitude assessment rubrics.

The dimensions used in making attitude assessment rubrics in mathematics are: There are four factors that correlate with resilience, namely: (1) value; (2) struggle; (3) growth; and (4) recruit support. In the first dimension of value [24], it is argued in the context of academic achievement, that students will be more interested and more motivated to learn mathematics if they believe that mathematics is valuable. In this context, value is determined by students’ perceptions of the importance of mathematics for their lives and their world. The more valuable students understand mathematics, the greater the motivation to learn it, and the more likely they are to survive in the face of difficulties. Value refers to the degree to which students understand that learning mathematics is important in achieving their current or future goals, and the conditions for achieving success [25].

In the second dimension is a struggle, where students must realize that making mistakes while working on a problem is part of learning mathematics. During group discussions, there were students who incorrectly answer the questions given by the teacher and mocked by their friends. So, some students experience trauma and feel reluctant to answer questions from the teacher for fear of being mocked by their friends. So, at that time the teacher conveyed to students that making mistakes while learning mathematics was natural. In accordance with Johnston-Wilder & Lee argues that mathematical resilience is an important concept in education, because there are still many students experiencing difficulties and failures in learning mathematics.

In the third dimension namely growth is the belief that everyone can develop mathematical skills and distrust that some people are born with or without learning ability. Growth refers to the belief that mathematical knowledge is not fixed and at times knowledge may develop.

In the fourth dimension, namely resilience, which means students realize that struggle and failure are part of learning mathematics, knowing and being able to utilize support from the surrounding environment to study mathematics [26]. If they experience obstacles when working on math problems, they will be disappointed and anxious so they cannot solve the problem given. Therefore, a high curiosity attitude is needed and can reflect itself to build self motivation.

| Num | Name | Pray Before and After Learning | Mutual cooperation | Thorough |
|-----|------|-------------------------------|-------------------|---------|
| 1   |      | 1 2 3                         | 1 2 3             | 1 2 3   |
| 2   |      |                               |                   |         |
Table 2. The following is an example of some indicators of mathematical resilience items for making students’ attitude assessment rubrics

| Dimensions | Indicator                                                                 |
|------------|---------------------------------------------------------------------------|
| Value      | Know the benefits of learning mathematics                                 |
|            | Believing that everyone can learn mathematics                             |
| Growth     | Dare to face challenges in learning mathematics                           |
|            | Believing that everyone can learn mathematics                             |
| Struggle   | Hard work                                                                 |
|            | Diligent                                                                  |
|            | Knowing that making mistakes while working on a problem is part of learning mathematics |
| Resilience | Realizing that mathematics learning support can be obtained from various sources such as teachers, friends, internet, ICT (mathematical software) |
|            | Having high curiosity and reflecting themselves to build self motivation   |

Table 2 shows that this indicator of mathematical resilience is directly directed at mathematics, so that it changes its views on mathematics and at the time of learning students experience changing attitudes to be more enthusiastic in learning mathematics. Students with good mathematical resilience will have an impact on both mathematics learning in school and in conditions that are less favored. They can adapt to the environment, be able to face challenges, solve problems logically, find solutions to challenges, are curious and learn from experience, have an awareness in controlling themselves, and have a good and easy social network to provide assistance [27].

The development of mathematical resilience requires a learning approach that can foster attitudes that have been described and create a positive mathematical classroom atmosphere so as to overcome difficulties in understanding mathematical concepts. In addition, to develop mathematical resilience suggests three factors: (a) choose and determine what he will do while in class; (b) train themselves as part of their environment; and (c) feel themselves involved in the learning process, both in attitudes and values [28].

In such an environment, students are motivated to be diligent and persistent in challenging and able to work together with peers, improve mathematical abilities and increase strong confidence to push harder in achieving goals. A positive attitude that supports such as above will support students to encourage diligent and persistent, while students who have a negative attitude towards mathematics then they will resist diligent attitude and quickly complete compilation of difficulties. Thus, the resilience of mathematics can provide a positive response to students in mathematics learning.

4. Conclusion
The mathematics teacher concerned in carrying out the attitude assessment using observation techniques. However, the observation technique on the assessment made by teacher only containing indicators that were still general. The indicators used so far by the teacher did not make students’ attitudes to mathematics change, because there were no indicators that can motivate students to learn mathematics.

Attitude assessment is intended to detect the character formed in students through the learning that students have been followed. Character building cannot be formed in a short time, but behavioral indicators can be detected early by each teacher. To detect the character that is formed in the student is defined as being able to apply indicators from mathematical resilience. Therefore, based on the explanation, the researcher hypothesizes that theoretically mathematical resilience can contribute to the making of attitude rubric in mathematics learning.
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