

Student's Self-Efficacy Based on Mathematics Achievement and School Accreditation

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Abstract— Character education in the formal school can be implemented by developing the important skills of students, including their self-efficacy. The present study aimed to examine the impact of learning achievement and schools' accreditation toward the students' self-efficacy, especially the students in junior high school level. The population was all junior high school students in West Lombok Regency, Indonesia. Samples were taken from five schools in Lombok Barat Regency, with total 129 students. The schools were varied to cover A, B and C accredited schools. The data were gathered through self-efficacy questionnaire. The collected data were analyzed qualitatively using Two-Way ANOVA. From the analysis, it can be concluded that: (1) there was an interaction effect of mathematics' achievement and school's accreditation on students' self-efficacy, (2) the schools' accreditation did not influence students' self-efficacy and (3) mathematics' achievement influenced students' self-efficacy. In this case, the students with higher mathematics achievements were having better self-efficacy compared to those with lower achievement. The result if this study can be used as a reference for making a framework for process and content in learning mathematics.

Keywords—self-efficacy, mathematics achievement, school accreditation

I. INTRODUCTION

Character education closely related to the habit of person that gradually conducted in daily life. As it comes from daily routines, the character building should be started as early as possible. Parents should aware to teach their children the essential values in characters education. Having a good character will enable a person to fully develop in their adolescence, the most important phase in the human's development [1]. Adolescence is a rough time for many people, but much easier for others. It impacts how an individual can positively look at themselves, seeing the opportunities to grow and have a healthy mindset. Everything happened in this phase will impact their point of view about oneself, specifically the self-efficacy level.

Self-efficacy is a person believes or confidences toward the ability that he/she can recognize, manage and solve a certain problem effectively. In a basic characteristics, naturally human is a conscious living thing that can drive his/herself to achieve the goal [2]. A person with high self-efficacy has a commitment in solving the problems in live while the one with less self-efficacy tend to give up when their initial plan did not successfully work. People may fail, do mistakes and incorrectly judge which leads them to a poor decision or disadvantage condition. However, self-efficacy will enable them to survive and learn from their failures.

Self-efficacy will support the development of a person to look the chances over the obstacles.

One of the various aspects that contribute to the self-efficacy of a person is achievement. A study found a significant relation between self-efficacy and learning achievement [3]. Specifically, in mathematics, which is considered as not an easy subject for many students [4]&[5], it was revealed that self-efficacy impact mathematics learning achievement [6]. It was found that a student with higher self-efficacy tend to perform better in mathematics. This is due to the fact that they have a valuable resilience to face difficulties during learning or failures when they not be able to solve mathematical problems.

Having degree in higher education become an important matter in this era, even though it is not only guaranteed factor that will directly bring any success for the person who has. It enables a person to follow and win the competency in the working places. Therefore, people should aware what kind of school they come in to ensure they get more experiences and credits to higher education as well as in their careers' choices. School can be evaluated from three aspects, i.e. the success of the alumni, achievement of the schools and its accreditation [7].

In a good school, the system will foster the students to conform certain standards. Hence, the students learn in the standards or higher and should be able to outperform the minimum requirement. These standards will enable students to do self-reflection and acknowledge their abilities to achieve the goals. To do this, they need at the same time develop their self-efficacy.

Reflecting on that background, this study aims at examining the effect of mathematics learning achievement and school accreditation toward the students' self-efficacy. We focused on the junior high school as the students in this level are adolescences who need to be guided properly in order to develop in optimum way. The previous studies revealed how self-efficacy influenced learning achievement, while this study focused the reverse direction: does mathematics learning achievement impact the students' self-efficacy? Also, the school's accreditation will be considered in this study as another factor that affect the self-efficacy as it is clear how important the place of learning will be to the learning experiences.

II. METHOD

To answer the research question related to examine the impact of mathematics achievement and school's accreditation toward the students' self-efficacy, a survey

study was conducted. The population of the study were junior high school students in West Lombok Regency distributed in 54-accredited schools. Schools' samples were taken by proportioned stratified random sampling [8]. From the sampling, 5 schools were chosen, i.e. 2 A-accredited, 2 B-accredited and 1 C- accredited schools. From each school, one class was selected randomly to collect the participant. In total, 129 students from 5 sample schools were selected as the sample of the study. The distribution of samples are shown in Table 1.

TABLE 1. DISTRIBUTION OF SAMPLE

| School Accreditation | Mathematics Achievement | | | N |
|--------------------------------|-------------------------|----------------------------|-----------------------|-----|
| | High (P ₁) | Moderate (P ₂) | Low (P ₃) | |
| A-Accredited (S ₁) | 8 | 40 | 5 | 53 |
| B-Accredited (S ₂) | 10 | 35 | 8 | 53 |
| C-Accredited (S ₃) | 6 | 11 | 6 | 23 |
| Total | 24 | 86 | 19 | 129 |

The data were taken from self-efficacy questionnaire consists of 30 questions with 4-point Likert scale and 5 essay problems in mathematics achievement test. The questions were formulated based on the dimension of self-efficacy, i.e. (1) generality, do the student has a general and stable efficacy in every activities and conditions, or only in certain domain, (2) strength, how confidence the student in solving the problem encountered in learning and (3) level, how they really cope and solve the problem [9]. In mathematics' achievement test, the students worked to solve the problem taken from national examination for junior high school in 2018. The topics for mathematics test were Pythagoras theorem and circle.

The data were analyzed using Two-Way ANOVA. Before testing the hypothesis, pre-requirement test had been conducted to examine the normality of data (Kolmogorov-Smirnov Test) and the homogeneity of variance (Levene's Test). Furthermore, if the analysis from Two-Way ANOVA showed the interaction pattern between two factors in this study (mathematics achievement and school's accreditation), the hypothesis test will be continued to the Post-Hoc Test.

III. RESULTS AND DISCUSSION

Two-way ANOVA is a parametric test in statistics. Hence, before performing Two-way ANOVA, it is compulsory to evaluate the normality of data and the homogeneity of variance for each sample groups. Consider the results of normality and homogeneity testing in the following Table 2.

TABLE 2. NORMALITY & HOMOGENEITY TEST

| Self-efficacy Data | Normality | | Homogeneity | |
|--------------------|-----------|-------|-------------|-------|
| | Statistic | Sig. | Levene test | Sig. |
| | 0,052 | 0,200 | 1,787 | 0,172 |

According to the data in Table 2 with significant level more than 0.05, it can be concluded that the data come from a population which its distribution was normal and its variance was homogeneous. As the basic requirement fulfilled, the analysis of Two-way ANOVA can be applied. The following Table 3 showed the output.

TABLE 3. TWO-WAY ANOVA OUTPUT

| Source | Sum of Squares | df | Mean Square | F | Sig. | Sum of Squares |
|----------------------------|----------------|-----|-------------|-------|-------|----------------|
| Accreditation | 206,88 | 2 | 103,440 | 1,495 | 0,228 | 206,88 |
| Achievement | 746,23 | 2 | 373,115 | 5,393 | 0,006 | 746,23 |
| Accreditation* Achievement | 1808,29 | 4 | 452,073 | 6,535 | 0,000 | 1808,29 |
| Error | 8301,83 | 120 | 69,182 | | | 8301,83 |
| Total | 853169,31 | 129 | | | | 853169,31 |

Based on Table 3 in the interaction factor field, the F_{stat} equals 6.535 while F_{table} equals 2.45. Therefore, the alternative hypothesis (H_1) which is "there is an interaction between the mathematics learning achievement and school accreditation" approved in significant level 0.05. Accordingly, there are interaction between learning achievement and school accreditation toward the junior high school students' self-efficacy.

The evaluation of mathematics achievement factor showed that F_{stat} equals 5.393 while F_{table} equals 3.07. Therefore, the alternative hypothesis (H_1) which is "there is an effect from students' mathematics learning achievement" approved in significant level 0.05. By that, the students' mathematics learning achievement affect their self-efficacy.

The evaluation of school's accreditation factor showed that F_{stat} equals 1.495 while F_{table} equals 3.07. Hence, the alternative hypothesis (H_1) which is "there is an effect from school's accreditation" rejected in significant level 0.05. By that, the school's accreditation does not impact the students' self-efficacy. To provide better interaction among the information related to the relation between students' learning achievement, school's accreditation and self-efficacy, consider the following interaction plot in Fig.1.

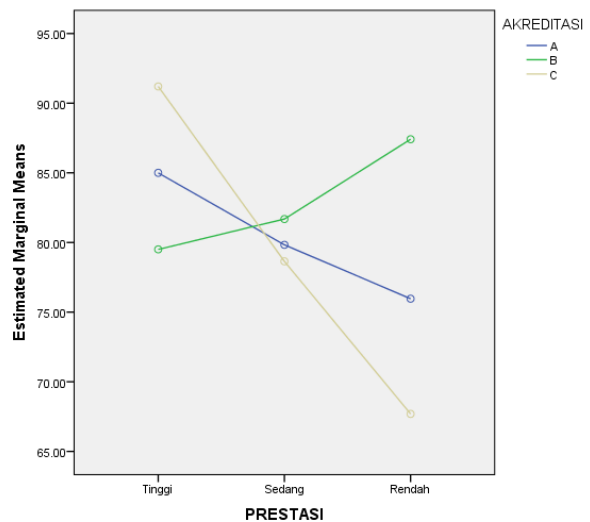


Fig.1. Students' self-efficacy based on PRESTASI (achievement) and AKREDITASI (accreditation) categories

The plot in Fig.1. shows the interaction between mathematic learning achievement and the school's accreditation toward the junior high school students' self-efficacy. Also, it can be observed that the self-efficacy tends to be decreased when the achievement increased in the A and C accredited schools; while it was in direct proportion in the B accredited schools.

Based on the mathematics learning achievement factor, further analysis is needed to figure out the differences between the categories of P1 (high), P2 (mediocre) and P3 (low). The evaluation was done through LSD Post-Hoc test that can be seen in Table 4.

TABLE 4. POST-HOC TEST OUTPUT

| Paired Groups | Mean Difference | Sig. | Description |
|-----------------------------------|-----------------|-------|--------------|
| P ₁ dan P ₂ | 3,8273 | 0,049 | Different |
| P ₁ dan P ₃ | 6,0888 | 0,019 | Different |
| P ₂ dan P ₃ | 2,2616 | 0,286 | No Different |

The results of Table 4 showed that the self-efficacy of the students with high achievement in mathematics differ from those with mediocre and low achievement levels (significant values $0.049 < 0.05$ and $0.019 < 0.05$). Moreover, the self-efficacy of students with high mathematics achievement is better than those in other categories since we have a positive Mean Difference. This finding is in line with the previous study that reveal the relation between self-efficacy and mathematics learning achievement [3] & [9].

In addition, based on the mathematics learning achievement factor, further analysis is performed to reveal the differences between the categories of S1 (A-accredited schools), S2 (B-accredited schools) and S3 (C-accredited school). The evaluation was done using LSD Post-Hoc test that can be seen in Table 5.

TABLE 5. ONE-WAY ANOVA FOR SCHOOLS' ACCREDITATION

| Groups | F | Sig. | Description |
|----------------|--------|-------|--------------|
| S ₁ | 2,021 | 0,143 | No Different |
| S ₂ | 2,112 | 0,132 | No Different |
| S ₃ | 17,740 | 0,000 | Different |

The summary in Table 5 shows there were no difference between the students' self-efficacy of students in A-accredited and B-accredited schools (significant values $0.143 > 0.05$ and $0.132 > 0.05$). It implies that the students' self-efficacy in those schools was equal in term of their mathematics learning achievement. The result is different in C-accredited school in which the students' self-efficacy was varied depend on their learning achievement. Consider the following Table 6.

TABLE 6. POST-HOC TEST OUTPUT OF C-ACCREDITED SCHOOL

| Paired Groups | Mean Difference | Sig. | Description |
|-----------------------------------|-----------------|-------|-------------|
| P ₁ dan P ₂ | 12,558 | 0,006 | Different |
| P ₁ dan P ₃ | 23,512 | 0,000 | Different |
| P ₂ dan P ₃ | 10,954 | 0,015 | Different |

According to Table 6, self-efficacy of the students with high learning achievement in C-accredited school was differ from those in mediocre and low (significant values $0.006 < 0,05$; $0.000 < 0.05$; $0.015 < 0.05$). Therefore, we can conclude that the self-efficacy of the students with high mathematics achievement is better than the students whose mathematics achievement were mediocre and low in the C-accredited school (positive Mean Difference was attained). Also, in the C-accredited school, self-efficacy of students

with mediocre mathematics achievement is higher than those in low category (positive Mean Difference was attained).

These findings is in line with the previous study that self-efficacy improved the students' learning outcome in mathematics. Here, students with high self-efficacy will have better result in mathematics [6]. This is due to the students' hard work and persistence to learn, try and overcome the obstacles in learning mathematics.

According to Bandura, self-efficacy constructed from the information source of people's experiences, such as success experience [3]. When a person is able to solve certain problem, the self-efficacy will be strength. In contrary, when a person encounter failure, especially when the self-efficacy was not fully established, it will be decreased. This case usually happened in adolescence phase, as it is the transition from children to adult. The junior high school students tend to explore their self-identity as they occupied the transition phase. Therefore, the teachers should be aware of how the students self-efficacy will be impacted through the experiences they got in schools.

As the present study found the impact of the mathematics achievement towards the students' self-efficacy, teacher should concern on how to support students' in performing better in mathematics. Some previous studies attempted to answer this challenge by conducting a student-centered learning where teacher plays significant role to provide scaffolding and limited guidance through questions [10], [11], [12] & [13].

Besides that, teacher should aware to provide the meaningful context from the lesson, i.e. using real-life problem, ethnomathematics or STEM as the setting to start the class [14], [15] & [16]. A visual model support such as the use of illustration [17] and educational game [18] will also beneficial to enhance the students' conceptual understanding. The good mastery in the mathematical concepts leads to a better learning outcome for the students.

IV. CONCLUSION

Based on the results of the study, it can be concluded that there are interaction effect of mathematics' achievement and school's accreditation on students' self-efficacy. However, it is also shown that the school's accreditation was not impacting the students' self-efficacy, while the mathematics' achievement did. Here, the students with higher achievement in mathematics performed better self-efficacy compare to others. The results of the present study will be a good consideration for teachers to choose the focus on learning mathematics. In this case, to enhance students' self-efficacy, teacher should support their improvement in mathematics performance first.

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