The Influence of Self Efficacy on Understanding of Physics Materials at Senior High School

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Abstract. This investigation delves into the prevalent phenomenon of diminished self-efficacy observed among students within the context of their educational trajectory. This decrement in self-efficacy frequently manifests alongside a hesitancy to actively participate in classroom activities. The aim of this study is to ascertain the substantive influence of students' self-efficacy on their comprehension and mastery of physics concepts among senior high school students in the central region of Aceh. Employing a quantitative descriptive research design, this study adopts the linear regression test method as its analytical framework. The entire population is encompassed in the study, with data collection instruments comprising self-efficacy questionnaires and documentation of physics examination scores. To elucidate the relationship between student self-efficacy and academic execution, a linear regression analysis is conducted, and distinctions in self-efficacy across student subgroups are evaluated using the t-test. The findings derived from the data analysis unequivocally substantiate a significant and discernible influence of self-efficacy on students' inclination to comprehend physics material. Accordingly, these findings serve as a compelling recommendation for educators to proactively enhance students' self-efficacy, thereby influencing their problem-solving abilities.

Keywords: Self-efficacy, Learning processes, Understanding of material physics

1   Introduction

The deliberate pursuit of education is the development of human resources' (HR) potential in determining the destiny of a nation that aims to produce intelligent and quality human resources. Increased self-efficacy can also lead to the development of students' skills that can later help them in their future lives and careers [1]. With more research and understanding of student self-efficacy, we can take more effective steps in increasing student motivation, academic achievement, and development.

The issue of diminished self-efficacy among senior high school students poses a multifaceted challenge within the educational landscape. One significant problem is the negative impact of low self-efficacy on students' willingness to actively participate in classroom activities. Students experiencing reduced confidence in their abilities may exhibit a reluctance to engage in discussions, ask questions, or contribute to collaborative learning environments. This lack of active participation can impede the development of critical thinking skills, hinder peer-to-peer knowledge exchange, and ultimately hinder the overall learning experience.

Lack of ability to deal with problems during the learning process will affect students' understanding of the material. According to [2] Banduras' Learning theory is a social or cognitive social learning theory that emphasizes self-efficacy and highlights the value of emulating and studying other people's actions, attitudes, and feelings. This is also in line with the statement of [3] stating that to face and solve social problems, students must have self-confidence (self-efficacy). The importance of this process for students, academic performance will be impacted, particularly for students with poor self-efficacy. This is in accordance with the statement of [4] Research demonstrated that students' learning outcomes are influenced by their sense of self-efficacy because confident students are less likely to give up and are more likely to look for focused solutions. This is consistent with the viewpoint of [5] which asserts that learning outcomes in physics are influenced by self-efficacy.

Low self-efficacy students typically lack confidence and give up easily. Furthermore, students with high self-efficacy believe that failure results from a lack

of effort, whereas people those who have low self-efficacy think that their incapacity is the cause of their failure. This is in accordance with the statement put forward by [6] stating that students who have positive self-efficacy will always be optimistic in thinking, motivating and behaving, so that they do not give up easily and feel capable of solving the problems they will face. . Students who have good self-efficacy can solve problems mathematically given by the teacher during learning so that they succeed in finding solutions independently. Students with high self-efficacy will always be active in class and have a high chance of success in learning and be able to complete the tasks and problems they face [7].

Self-efficacy is a matter of subjective perception, which means that it is linked to a person's beliefs about his or her capacity to perform tasks or actions required to accomplish specific goals rather than always describing actual abilities[8]. According to [9] Self-efficacy is the conviction that one is capable of performing the duties or taking the necessary actions to bring about the desired outcomes. In the meantime, Self-efficacy, in general, is the confidence in oneself to handle actions in a variety of situations [10]. According to [11] Self-efficacy is the conviction that one can accomplish a task and that one is able to take action to address challenges in his life. Self-efficacy will also motivate individuals to assess their own abilities which are used to prepare for facing problems.

Furthermore, diminished self-efficacy among senior high school students is often associated with diminished motivation to tackle academic challenges. When students perceive a lack of competence in specific subjects, such as physics, they may become discouraged and adopt a passive approach to learning. This, in turn, can result in decreased academic performance and a reduced likelihood of pursuing advanced coursework in related fields.

The problem of low self-efficacy also extends to its impact on students' academic aspirations and career choices. Students with diminished confidence in their academic abilities may be less inclined to pursue careers in science, thereby limiting their future opportunities. Senior high school students' self-efficacy is a critical issue that must be addressed for both immediate academic success and the development of a positive outlook on education and future career paths.

2   Method

This kind of research employs a linear regression test methodology and is qua ntitative descriptive in nature. A closed questionnaire was employed as the dat a gathering method, and it was distributed to senior high school students. The re are 20 questions on the self-efficacy questionnaire. The questionnaire has b een used and validated by previous researchers. According to the purposes of this study, the questionnaire was re-validated by a team of experts from the Ph ysics education department. The indicator of self-efficacy questionnaire consist s of six scales. The scales are persistent working on physics questions; completi ng tasks; personal experiences; ability to finish the task; ability to face various p roblems; and consistency in duty.

The participants are 125 students at senior high schools in central Aceh. The value of understanding physics material was measured from the final physics e xam score for the even semester. Simple linear regression is the data analysis m ethod that is employed, provided that the data are linear and meaningful. The t-test statistics and product-moment correlation are then computed.

3   Results and Discussion

The purpose of the study was to investigate the relationship between the inde pendent variable physics understanding and the dependent variable, self-effica cy. Before carrying out regression analysis, the basic assumptions that must be obtained must first be tested.

The linearity test aims to find out whether a variable has a linear relationshi p or not significantly. For regression linearity, the value of F = 1.16 and the pric e of F table (0.05) (41.82) = 1.54. The data revealed Fcount < Ftable, the regres sion is linear or there is a linear relationship between variable X and variable Y. For the test significance, the value of Fcount = 98.31 and the price of Ftable (0.

05) (1.123) = 3.92, thus Fcount > Ftable then reject H0 and accept Ha then there is a significant linear relationship between variable X and variable Y. After testing the regression conditions simple linear, then to construct a simple linear regression equation Y ˆ = a + bX. From the results of the analysis of the simple linear regression equation, the value of a = 18.09 and the value of b = 0.63 so that the simple linear regression equation obtained from the self-efficacy questionnaire score on students' understanding of physics material can be seen from the regression graph at Fig. 1.
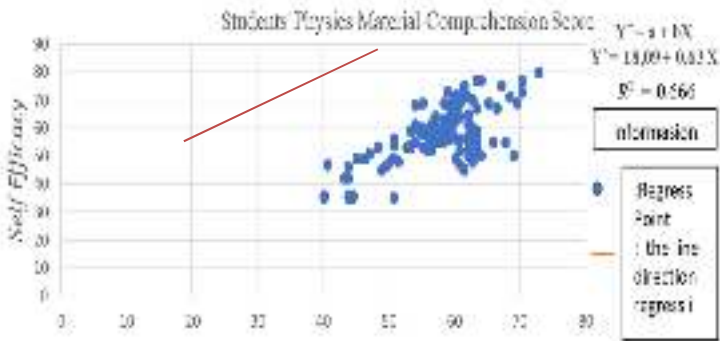
Fig. 1. Linear regression graph of self-efficacy questionnaire scores on students' understanding of physics material.

The product-moment correlation coefficient test aims to find the relationship between the two variables using statistical analysis. From the calculations performed, the value of rxy = 0.666 because the price of rxy is positive, there is a positive influence between students' self-efficacy on students' understanding of physics material with a strong interpretation of the correlation coefficient, which is between 0.60 - 0.799. This means that the higher the student's self-efficacy, the higher the student's understanding of physics material. Because self-efficacy has a very important role in actualizing students' potential, especially during the learning process.

Testing the hypothesis of two variables was tested using the t-test statistic which obtained the price of Tcount = 9.90 with the price of Ttable with a signif

icant level a = 0.05 and degrees of freedom = n-2 = 125-2 = 123 is 1.65734. B ecause tcount > ttable, namely 9.90 > 1.65734, it can be concluded that there i s a positive and significant influence between students' self-efficacy on studen ts' understanding of physics material. In exploring the magnitude of the influe nce of the independent variable on the dependent variable by calculating the c oefficient of determination. The coefficient of determination which is $(r^2) = 44$ %. So the magnitude of the influence of student self-efficacy on students' und erstanding of physics material is 44%. Meanwhile, the other 56% is influenced by other factors.

According to the data analysis's findings, student self-efficacy does have an impact on their comprehension of physics material. According to [8], one thing that influences self-efficacy is cognitive processes. If the self-efficacy score obt ained from the simple linear regression equation is greater, then the student's understanding of physics material is higher, while the student's self-efficacy sc ore is lower, then the student's understanding of physics material is lower. A g ood understanding of the material provides a basis for believing that students have the ability to cope with tasks related to the materia [12]. Therefore when students understand a material, self-efficacy will increase. This is in accordance with the opinion of [4]. The importance of this process for students, especially students who have low self-efficacy, will have an impact on their academics. Th is is consistent with the view that self-efficacy is a matter of subjective percepti on, which holds that beliefs about one's own capacity to carry out tasks or take actions necessary to accomplish specific goals are what determine one's level o f self-efficacy rather than real abilities [8]. Therefore, a student's sense of self-e fficacy plays a crucial role in realizing their ability to accomplish specific goals, particularly during the learning process in order to improve learning outcomes .

Based on the self-efficacy questionnaire the percentage of each aspect was presented at Fig. 2.
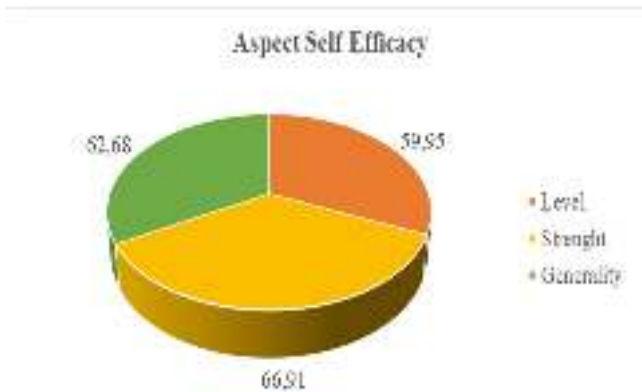
Fig. 2. Aspects of self-efficacy

Based on the self-efficacy questionnaire score above, which has the highest to lowest percentage dimensions, namely the Strength aspect of 66.91%, the g enerality aspect of 62.68%, and the level aspect of 59.95%. [8]. Says that the th ree dimensions of measuring someone's self-efficacy are: the level of ability th at the person believes to be completed (called by level); the strength or weakn ess of the person's belief about the competence he perceives (called by streng th); and whether the person believes that self-efficacy will occur in a specific d omain or apply in a variety of activities and situations (called by generality).

The strength component in question pertains to those who, in spite of seve ral obstacles and challenges, have a strong degree of confidence in their capac ity to solve problems and will persevere in their business [13]. The high percen tage in the strength aspect is due to students' persistence when working on ph ysics questions and the influence of individual experience, in this case students get good grades thereby increasing their self-confidence to complete assignm ents optimally. Initial observations revealed that when the teacher asked pupils to respond to questions, the kids attempted to persuade themselves to respon d. This becomes the basis for students to make great efforts, even when encou ntering obstacles [8].

The level aspect in question, the assessment of individual abilities in the tas k at hand refers to the level of difficulty of a problem which is perceived differe ntly by each individual [13]. The low percentage in the level aspect is because s

tudents have not been able to complete assignments from easy to difficult and students have not been able to complete assignments beyond their abilities. B ased on initial observations, it was found that many students still lack confiden ce in their abilities and they even consider other people to be more capable th an themselves. This is consistent with [14] a declaration that claims students' lo w self-efficacy in the level aspect is due to difficulties in completing high level mathematics assignments.

According to self-efficacy indicators, the scores obtained can be seen in the Fig.3.
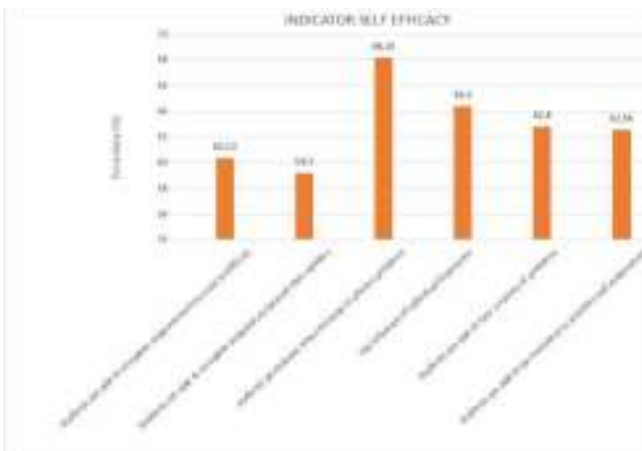

Fig. 3. Diagram of self-efficacy indicators

Based on the score results for each indicator obtained from the self-efficacy questionnaire, it was found that the highest percentage was in the indicator w here students were persistent when working on physics questions with a perce ntage of 68.16%. The result reflected students tried with their own abilities wh en solving every physics question given by the teacher even though the stude nts had not yet understanding this well is in line with when students put effort and perseverance. Students tend to attribute success to their own efforts, whic h can strengthen the belief that they have control over their achievements with racial self-efficacy [15].

Meanwhile, the score with the lowest percentage is the indicator that stude nts are able to complete tasks beyond their abilities with a percentage of 59.20

%. This indicates that a large number of students are still unwilling to work on physics problems that have never been demonstrated or even to attempt to answer them using only their own skills. The students can only work on physics questions according to their abilities and do not want to try to solve questions that they have not mastered. This is in line with [16] who stated that students' low ability to complete assignments can affect their self-efficacy, which in turn can affect motivation, self-confidence, and overall learning outcomes.

4   Conclusion

The discussion's outcomes and the data analysis that was done led to the conclusion that there is a considerable influence between self-efficacy on understanding physics material at senior high school. Increased self-efficacy can also lead to the development of students' skills that can later help them in their future lives and careers. With more research and understanding of student self-efficacy, we can take more effective steps in increasing student motivation, academic achievement, and development.

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