Profile Analysis of Self Efficacy in Grade 11 Students

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Abstract: The purpose of this study was to determine the self-efficacy profile of Class XI IPA on colloidal material. This research is a descriptive type with a quantitative approach. The data analysis technique in this research is descriptive data analysis. Descriptive analysis was carried out on student self-efficacy questionnaire data after applying the project-based learning model so that the ideal average (Mi) and ideal standard deviation (Sdi) on self-efficacy data. This research was conducted at SMAN 2 South Bengkulu. This research was conducted in the even semester from May to June 2023. The research sample was the entire XI MIPA class of SMA Negeri 2 Bengkulu Selatan which amounted to 131 students. The results of this study indicate that the self-efficacy profile of students in PjBL is dominated by the high and medium categories with a percentage of 31% each. The self-efficacy of students in the PjBL model is dominated by the strength aspect of 41.42%, then the level aspect of 33.33%, and the generality aspect of 25.25%. The indicator of self-efficacy that has the highest score is the belief in being able to solve chemical problems/tasks in various levels of difficulty of 628.

Keywords: Colloids; Project based learning; Self-efficacy

Introduction

Education has an important role in educating the nation's life. Education is an effort to create an atmosphere and effective learning process. Learning is a conscious effort made by individuals in changing their behavior both through experience and practice which involves cognitive, affective and psychomotor aspects to obtain certain goals (Ihsana, 20717). Learning is a complex process that occurs throughout life in all individuals. The learning process is the main activity in leading students to have the expected abilities and skills. The learning process can change the intellectual, attitudinal (skills) and emotional aspects (Maisaroh et al., 2012). The affective aspects of students need to be considered, one of the affective aspects is the self-efficacy of students.

An individual's assessment of his or her ability to perform certain tasks is called self-efficacy. Self-efficacy is an individual's belief in their ability to perform tasks

with a certain level of proficiency. Self-efficacy is the main determinant in measuring learners' confidence. Varon (2015) states that self-efficacy and other cognitive factors are critical to students' vocational and educational behaviors considering careers in engineering and science. The dimensions of self-efficacy in each individual consist of three components, namely: level of magnitude, level of strength and level of generality (Handayani et al., 2019). Self-efficacy is a person's belief to complete tasks that can affect problem solving and cognition. One's ability to regulate one's own behavior to gain experience. A person who has high self-efficacy is more likely to attempt difficult tasks than someone with low self-efficacy (Ramnarain et al., 2018). High self-efficacy of learners makes learners able to face problems, easy to solve tasks or problems, and failure to solve problems is considered a result of a lack of effort made. Learners who have low self-efficacy are more likely to give up facing problems that occur and failure to solve problems is considered a result of a lack of

ability possessed by learners (Subaidi, 2016). Self-efficacy can encourage students' involvement in learning activities, students have higher motivation in learning, so that their learning achievement increases. The self-efficacy in question is self-efficacy in chemistry subjects.

Chemistry is part of science. Chemistry is one of the branches of science related to substances that include composition, properties, structure, changes, dynamics and energy of substances (Chang, 2010). Chemistry is a field of science that is closely related to everyday life. There are many materials in chemistry lessons in high school (SMA), one of which is colloidal material. Colloidal material is a class XI high school chemistry learning material. Colloidal material often uses an inappropriate learning model that makes students feel distant and difficult to understand. Based on the assessment of students' self-efficacy in PISA 2015, it was found that the self-efficacy of students in Indonesia was still below the average of other countries (OECD, 2016). Based on these problems, it is currently important to streamline the chemistry learning process to improve student self-efficacy. The learning process can be effective by using a learning model that is tailored to the material being taught. One of the learning models that can help students interact in investigations to solve problems is project-based learning (PjBL).

PjBL according to contemporary sources is student-centered and directed learning from students' personal experiences and activities (Steenhuis et al., 2018). PjBL is the acquisition of knowledge and skills through real-world application, personal experience, collaboration, and authentic assessment (Graaff et al., 2003; Thomas, 2000). Project-based learning (PjBL) models usually emphasize long-term, learner-centered activities and are integrated with real-world issues (Ngalimun, 2012). Project-based learning (PjBL) is stated as a learning model based on constructivistic theory. The main purpose of constructive learning is to increase learner engagement, support learner motivation, and independent learning in learning subject matter (Nainggolan et al., 2020). The learning process using the PjBL model encourages students to be active in discussions and work on projects (Dari et al., 2021). The PjBL model can create a more enjoyable learning atmosphere and develop students' problem solving skills (Bas, 2011). The PjBL model has the advantage that students are given the freedom to plan learning activities, carry out projects in groups, and present them to other students (Angelyn et al., 2021). The teacher acts as a facilitator, that is, the teacher only supervises students during learning activities (Bell, 2010; Pasaribu et al., 2020). The purpose of project-based learning is for students able to design and make a product with high creativity (Sukmana et al., 2021). Learners learn

independently without depending on their lecturers, they can better understand the material by associating with their real life (Requies et al., 2018), so that it can increase learning motivation because learners can consider their knowledge more meaningful, relevant and useful to be applied in solving problems faced in everyday life (Santyasa et al., 2020). Based on the background of the problem, this study aims to describe the self-efficacy profile of students based on a self-efficacy questionnaire on colloid material in class XI MIPA at SMA Negeri 2 Bengkulu Selatan.

Method

This research is a descriptive type with a quantitative approach. This research was conducted at SMAN 2 South Bengkulu. This research was conducted in the even semester from May to June 2023. The research sample was the entire XI MIPA class of SMA Negeri 2 Bengkulu Selatan which amounted to 131 students.

The data analysis technique in this research is descriptive data analysis. Descriptive analysis was carried out on student self-efficacy questionnaire data after applying the project-based learning model so that the ideal average (Mi) and ideal standard deviation (Sdi) on self-efficacy data:

$Xi = 1/2$ (ideal maximum score + ideal minimum score)
$Sbi = 1/6$ (ideal maximum score-ideal minimum score)

The data was converted into five categories to make it easier to describe the profile of self-efficacy of students presented in the following table (Widoyoko, 2009).

Table 1. Categorization of Students' Self-Efficacy

Interval	Interpretation
X > (Xi + 1.80Sbi)	Very high
(Xi + 0.60Sbi) < X ≤ (Xi + 1.80Sbi)	High
(Xi – 0.60Sbi) < X ≤ (Xi + 0.60Sbi)	Medium
(Xi – 1.80Sbi) < X ≤ (Xi – 0.60Sbi)	Low
X ≤ (Xi – 1.80Sbi)	Very low

Result and Discussion

The analysis of the self-efficacy profile aims to analyze the level of achievement of students' self-efficacy in the application of the PjBL model. Analysis of the students' self-efficacy profile is reviewed from the results of the students' self-efficacy questionnaire. The level of achievement of students' self-efficacy can be seen in the Figure 1.

The description of the picture above is that point a is low, point b is medium, point c is high, and point d is very high. Students' self-efficacy profile is analyzed from the results of students' self-efficacy scores. Self-efficacy data is obtained from a questionnaire instrument filled

out by students after a series of learning processes. Based on the figure above, it is obtained that the level of achievement of students' self-efficacy in the application of the PjBL model consists of a high category of 31%, a medium category of 31%, a low category of 17%, a very high category of 15%, and a very low category of 6%. The self-efficacy of students using PjBL is dominated by the high and medium categories with a percentage of 31% each.
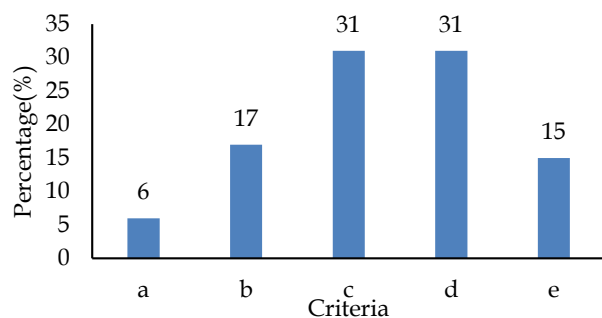

Figure 1. Achievement level of self-efficacy of learners

The aspects of self-efficacy in this study are generality, level, and strength. The generality aspect contains 1 indicator, namely the belief in the ability to deal with various situations with 3 statement items, the level aspect contains 1 indicator, namely the belief in being able to solve chemistry problems/tasks in various levels of difficulty with 4 statement items, and the strength aspect contains 2 indicators, namely confidence in the effort and perseverance possessed and the confidence of students in achieving success (achievement) with 5 statement items. The total statement items in the self-efficacy questionnaire are 12 statement items. The level of achievement of each aspect of self-efficacy can be seen in Figure 2.
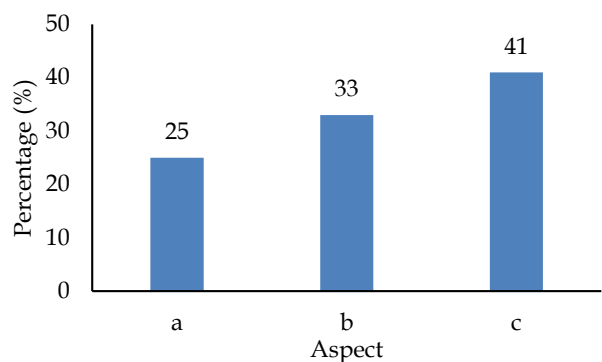

Figure 2. Achievement level of self-efficacy aspects

The description of the picture above is that point a is generality, point b is level, and point c is strength. Figure 2 shows that the self-efficacy of students in the PjBL model is dominated by the strength aspect of

41.42%, then the level aspect of 33.33%, and the generality aspect of 25.25%. The description of the level of achievement of each aspect of self-efficacy can be seen in Figure 3.
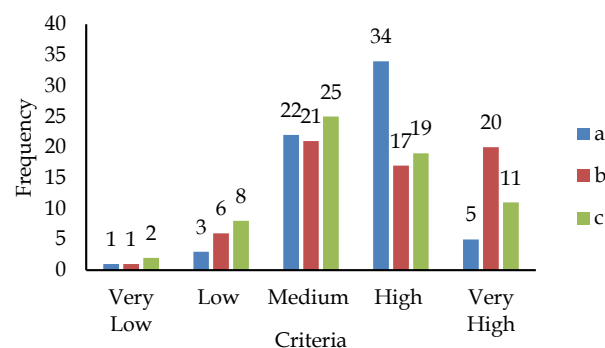

Figure 3. Details of achievement levels of each aspect of self-efficacy

The description of the picture above is that point a is generality, point b is level, and point c is strength. The description of the level of achievement of each aspect of self-efficacy is that the generality aspect is dominated by the high category (34%), followed by the medium category (22%), the very high category (5%), the low category (3%), and the very low category (1%). The level aspect was dominated by the medium category (21%), followed by the very high category (20%), high category (17%), low category (6%), and very low category (1%). The strength aspect is dominated by the medium category (25%), then the high category (19%), very high category (11%), low category (8%), and very low category (2%). The total score of each indicator of student self-efficacy can be seen Figure 4.
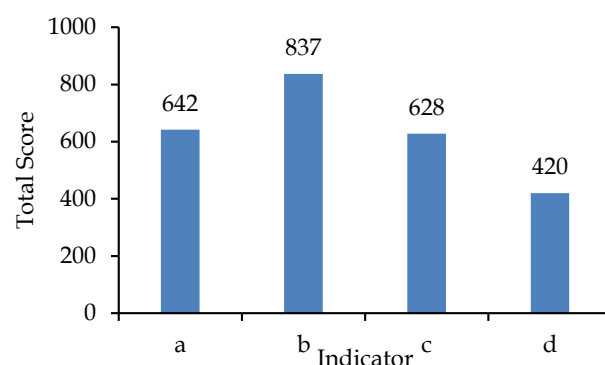

Figure 4. Total score of each self-efficacy indicator

The description of the picture above is that point a is confidence in ability to deal with various situations classify, point b is confidence in being able to solve chemistry problems/tasks in various levels of difficulty, point c is confidence in the effort and perseverance possessed, and point d is Learners' confidence in achieving success (achievement). Based on Figure 4, the

self-efficacy indicator that has the highest score is the belief in being able to solve chemical problems/tasks in various levels of difficulty of 628, the indicator of confidence in the ability to deal with various situations gets a score of 642, the indicator of confidence in the effort and perseverance owned gets a score of 628, and the indicator of students' confidence in achieving success (achievement) gets a score of 420. This shows that students have confidence in being able to solve chemical problems/tasks in various levels of difficulty that are higher than other indicators. This is in contrast to students' confidence in achieving success (achievement) which gets the lowest score. Pajares et al. (1994) state that self-efficacy provides the basis for motivation, acting well, and achieving in all areas of life. One of the aspects that students must have in order to solve a problem is students' confidence (self-efficacy) in their abilities, especially about problem solving a material can determine student success in problems solving (Ulandari et al., 2019). Linnenbrink et al. (2003) state that for meaningful learning and increasing self-efficacy, students must be involved in the learning process both cognitively and behaviorally.

In PjBL, students interact with each other to exchange ideas about the project and the concepts or theories they are using. The process of interaction between fellow students and an environment that supports students in the learning process is influential in increasing student self-efficacy (Schunk et al., 2012). The theoretical foundation of self-efficacy is in line with the constructivism theory of PjBL (Rezvanifar et al., 2020). Project-based learning allows students to discover complex practices and complex problems on their own, plan solutions, and conduct collaborative research and solve problems (Lee et al., 2015). In project-based learning, students solve challenging and authentic problems by working with each other. Therefore, project-based learning not only involves students just applying their knowledge to their experiences, but also allows students to work in teams to solve problems (Solomon, 2003). Project-based learning provides a positive impact contribution when using real media (Seftiani et al., 2021). In the context of PjBL, learners are expected to perform project tasks based on a given project. PjBL is a learning model whose activities are long-term by involving students in designing, making and presenting products to overcome the problems faced so that students can develop the ability to plan, communicate, solve problems and make decisions (Wafula et al., 2016). The use of the PjBL learning model in the learning process is more memorable because it is not just memorizing material, and students are more enthusiastic in learning (Hamidah et al., 2021). Therefore, learning activities using PjBL focus on important concepts, realistic projects, learner-centered learning, constructive inquiry and producing products.

PjBL is an effective tool for students in improving their self-efficacy. The results of this study are consistent with previous studies that show that PjBL can directly improve students' self-efficacy (Schaffer et al., 2012). The PjBL learning model is effective because it encourages students to collaborate and participate directly at various stages of education in groups to complete problem-solving projects (Fitri et al., 2018). Learning activities with PjBL increase because PjBL requires students to play an active role in learning. Increasing students' learning activities has an impact on increasing students' self-efficacy (Desnatalia, 2022). An active learning process with high learner learning activity provides optimal participation so that it makes learners independent and improves their way of thinking. Therefore, learner learning activities are an obligation that must be carried out by students in learning activities so that learning objectives can be achieved (Kompri, 2017).

A study conducted by Barak et al. (2005) on new chemistry students found that the experimental group learning with project-based methods far outperformed the control group taught with traditional textbook methods and chemistry problems. The project-based group then engaged in projects and scored much higher on their final exams due to their improved understanding of chemical concepts, theories, and molecular structures. Bilgin et al. (2015) found an increase in self-efficacy of learners using project-based learning compared to those who studied science with traditional methods.

Conclusion

The self-efficacy profile of students in class XI of SMAN 2 South Bengkulu who follow learning with project-based learning models is dominated by high and medium categories with a percentage of both of 31%. The self-efficacy of students in the PjBL model is dominated by the strength aspect of 41.42%. The indicator of self-efficacy that has the highest score is the belief in being able to solve chemical problems/tasks in various levels of difficulty of 628.

Author Contributions
Conceptualization; DGL.; validation, JI.; formal analysis, DGL.; investigation, DGL.; data curation, DGL.; writing—original draft preparation, DGL.; writing—review and editing, JI;

Supervisior; JI.: visualization. All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest
The authors declare no conflict of interest regarding the publication of this article.

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