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Is Science Boring? Self-Efficacy and Science Understanding of PGSD Students

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Abstract: This study aims to examine the correlation between PGSD students' perception (X) of self-efficacy (Y1) and understanding of science (Y2). The problem with this study arises because it is not clear whether students' perception of science learning has an effect on their self-efficacy and conceptual understanding, even though their average comprehension score is quite good (Mean = 71.19). This study uses a correlational quantitative approach involving 21 PGSD UPY students. Perceptions were measured using a questionnaire that had been tested for reliability (α = 0.712), Self-efficacy is measured with its own instruments (α = 0.740), meanwhile, scientific understanding is measured through tests validated through the validity of the content by experts. Data normality test (Shapiro-Wilk, p > 0.05) indicates the data is normally distributed, so Pearson correlation analysis is used. The results showed a significant positive correlation between perception and self-efficacy (r = 0.827; p < 0.01), however, no significant relationship was found between perception and understanding of science (0.297), and between self-efficacy and understanding of science (0.220). These findings indicate that students' positive perceptions are related to self-efficacy, but do not directly affect the conceptual understanding of science.

Keywords: Conceptual understanding of science; Pearson correlation; Perception; Self-efficacy

Introduction

Individual perception is one of the important things that affect how the learning process takes place. According to Marín et al. (2014) the importance of perception of the learning process. Understanding student perceptions is the basis of how a person receives, processes, and responds to information. Perception can affect students' interest in learning, their motivation, their independence, and the way they think critically about ideas. Likewise, the way individuals behave, manage emotions, think, and be motivated is influenced by self-confidence (Rafalina, 2023). Students' perceptions include aspects of the learning climate, self-efficacy, or even their cognitive commitment (Palazón-Herrera & Soria-Vílchez, 2021). Self-efficacy itself is a belief from within a person about his ability to solve tasks or problems (Wardhani, 2015). Perception is relevant in increasing student confidence and motivation, including in science learning (Sheldrake, 2016). Therefore, it is important to know students' perceptions and self-efficacy towards learning, especially in the content of natural sciences.

Negative perceptions of the natural sciences, such as thinking of them as difficult, boring, or irrelevant to everyday life, can hinder the process of learning and understanding. The same thing is also expressed by Milarika et al. (2018) interest in science tends to decline

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because many students find these subjects boring, difficult to understand. Generally, individuals experience low motivation in studying science subjects because there is a general perception that science learning materials are confusing (Mutia, 2022). The majority of individual students have low self-efficacy, thus affecting their ability to solve problems in science learning (Fauziana, 2022). In fact, positive perception and high self-efficacy towards science subjects can strengthen their confidence in their ability to understand and apply science concepts.

Basically, Natural Sciences (IPA) learning is one of the important aspects of education that aims to equip prospective teacher students with a deep understanding of various natural phenomena and scientific principles. This understanding is expected to be applied in the teaching process in elementary schools so that it can inspire and educate students more effectively. Remembering, science is one of the subjects that can stimulate students' critical thinking abilities and skills (Maryani & Mawardi, 2024). Science can assist students in organizing information, understanding the relationships between concepts, and developing critical thinking skills required in the natural sciences (Barta et al., 2022; Hu & Bi, 2025; Hwang et al., 2023). Through science learning, humans can more easily handle economic, social, and environmental problems. Science learning provides benefits in daily life (Kurniawati et al., 2022). Thus, positive perceptions are needed to encourage interest, increase motivation, and increase students' confidence in their ability to learn and apply science concepts.

Research related to student perceptions in science learning provides various relevant findings as the basis for this research. PGSD students often have difficulties in understanding science concepts. These difficulties can be caused by internal factors including physical conditions, learning motivation, and low self-efficacy in understanding science material. Meanwhile, external factors include less interesting learning methods, limited learning resources, and inadequate time allocation (Malahati et al., 2023). In his research, Fitria & Malik (2022) stated that students often experience difficulties in learning science, especially in determining alternative solutions, solving problems, and understanding the material thoroughly. Thus, the majority of students tend to have a negative perception of science learning. This perception is caused by students' inability to understand the material being taught, the use of learning methods that are considered less interesting, and their views on the learning process that are considered less effective (Kesumayodra & Wahyudi, 2024). The higher the individual's self-efficacy, the higher the understanding and learning outcomes (Hairida & Astuti, 2013). The level of student comprehension is mostly at the second level, which is misunderstanding, which is more dominant compared to the level of understanding of other concepts. This is shown by the repetition of incomplete answers, irrelevant answers, and unclear explanations (Devy et al., 2022). This is important, considering that PGSD students are prospective teachers who have a strategic role in children's early education (Yusuf et al., 2025). As a prospective elementary school teacher, you must be able to master all materials, including science (Umardianti et al., 2023).

Thus, understanding the perception of PGSD students of PGRI Yogyakarta University (UPY) towards science learning is very important, considering that they are prospective teachers who will later teach science at the elementary school level. This allows for the creation of a more meaningful learning atmosphere, where students can better understand science concepts and achieve success in learning. However, until now, there have not been many studies that explicitly examine the relationship between these three variables, namely student perception, self-efficacy, and understanding of science. By examining the relationship between these three variables, the results of the study are expected to make a practical contribution to the development of more effective science learning strategies at the primary education level. Therefore, this study aims to examine the relationship between the perception of PGSD UPY students towards science learning and self-efficacy and conceptual understanding of science.

Method

This study uses a correlational quantitative approach that aims to determine the correlation between students' perception of science learning and self-efficacy and understanding of science. The population in this study is students of the PGSD Study Program at the University of PGRI Yogyakarta (UPY) who are taking Basic Science courses. The research sample was taken by purposive sampling technique by considering students who had received Basic Science learning. The sample of this study is PGSD UPY semester 2 students totaling 21 samples.

The variables in this study are in the form of variables X (free) and Y (bound). The independent variables in this study, namely perception (X), and the bound variables are self-efficacy (Y1) and PGSD students' understanding of science (Y2).

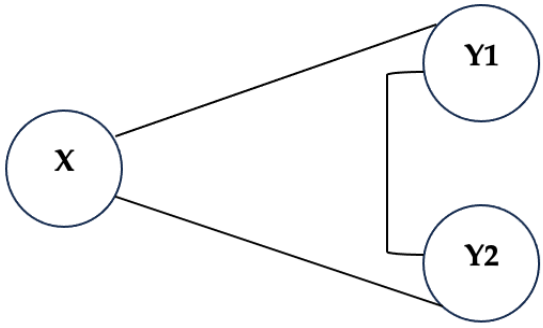

Figure 1. Research design

Data collection was carried out using questionnaires and science comprehension tests. The perception questionnaire instrument was developed based on the interest, difficulty, motivation and relevance of science material, with study reference (Kurniawati et al., 2022). Meanwhile, the self-efficacy questionnaire was compiled with reference to the theory Bandura (1997), which includes aspects of self-confidence in completing tasks, facing obstacles, and mastery of science material. The science comprehension test instrument is in the form of multiple-choice questions arranged based on a grid of human organ system materials, covering dimensions C1 to C6. The validity and reliability test of the instrument is carried out to ensure that the instrument used is feasible and in accordance with the purpose of the research. The validity test was carried out using the content validity test was carried out by expert test, while the reliability of the digitized instrument used the Alpha Cronbach coefficient.

The collected data was analyzed descriptively using averages, standard deviations, and correlation tests to see the relationship between student perception, self-efficacy, and science understanding. Given that the number of samples in this study is relatively small (n = 21), the results of this study need to be interpreted carefully and it is hoped that it will be the basis for further research with a wider sample coverage.

Result and Discussion

The findings of this study are presented starting from the descriptive analysis of the data, followed by the testing of the analysis prerequisites, and then correlation analysis to test the relationship between variables. Descriptive analysis aims to describe the characteristics of the data obtained, while prerequisite tests are performed to ensure that the data meets the statistical assumptions required in inferential analysis. Furthermore, the correlation results will show the extent of the relationship between students' perceptions of self-efficacy, and their understanding of science.

Table 1. Descriptive data questionnaires and tests

	Perception (X)	Self-efficacy (Y1)	Understanding (Y2)
N	21	21	21
Mean	30.29	30.52	71.19
Std. Deviation	2.667	2.943	18.635
Sig. (2-tailed	.396	0.80	.226

Descriptive data showed that perception had an average value of 30.29, with a standard deviation of 2.667. This average score indicates that most students have a positive perception of science learning, with a relatively homogeneous data distribution. Meanwhile, self-efficacy has an average value of 30.52 with a standard deviation of 2.943 which means that the level of student confidence in their ability to understand science is relatively high, as well as a stable distribution of data between respondents. For the science comprehension variable, an average of 71.19 and a standard deviation of 18.635 were obtained, indicating that there was a variation in the achievement of science comprehension between students, although in general it was in the category of being quite good.

Before analyzing the relationship between variables, a pre-trial test was first carried out to ensure that the data met the basic assumptions of inferential statistics. So that the results of the further analysis can be interpreted appropriately.

Table 2. Normality test

	Statistic	df	Sig
Perception (X)	.953	21	.396
Self-Efficacy (Y1)	.910	21	.080
Understanding (Y2)	.941	21	.226

The normality test was carried out using Shapiro-Wilk considering the sample size used was 21 respondents. Based on the test results, the significance value for the perception variable was 0.396, self-efficacy was 0.080, and science understanding was 0.226. All of these significance values are greater than the 0.05 threshold, so it can be concluded that the data from the three variables are normally distributed.

Table 3. Instrument reliability test

Variable	Number of items	Cronbach's Alpha
Perception (X)	10	.712
Self-Efficacy (Y1)	10	.740
Understanding (Y2)	20	.806

Reliability testing was carried out separately for each research instrument. The test results showed a

Cronbach's Alpha value of 0.712 for perception, 0.740 for self-efficacy and 0.806 for science understanding. All of these reliability values are above the minimum limit of 0.70, according to Nunally (1978) in Almeida et al. (2016). So that each instrument is declared reliable. Thus, the instruments used in this study are feasible and trustworthy to be used in data collection.

All prerequisite assumptions have been met, both in terms of normality and reliability of the instrument, so the analysis is carried out on testing the relationship between variables using correlation tests.

Based on the results of the analysis carried out through the Pearson correlation test, the data in Table 4 presents an overview of the relationships between the variables studied. The analysis aims to find out the extent of the strength of the relationship and significance between these variables in the context of science learning in PGSD students.

Table 4. Pearson correlation test

Correlation	Sig.	r	Correlation Information
X - Y1	< 0.001	.872	Very strong
X - Y2	.297	.239	No correlation
Y1 -Y2	.220	.280	No correlation

The Correlation between Perception and Self-Efficacy

The results of Pearson's correlation analysis revealed a significant and strong relationship between PGSD students' perception of science learning and their self-efficacy ($r = 0.827$; $p < 0.001$). This indicates that students who have a positive view of the material tend to have high confidence in their ability to master and complete academic tasks related to learning. These findings support research Efendi (2013) Individuals who lack self-efficacy tend to be unable to achieve optimal work performance and show limitations in understanding the demands of learning and classroom dynamics, which has an impact on emotional exhaustion. Further, Mulyono & Saskia (2020) adding that high confidence plays an important role in increasing motivation and commitment to learning. Positive perceptions are closely related to an individual's level of self-confidence (Canaslan et al., 2025; Chong et al., 2018). The level of an individual's perception of himself, whether he feels capable or not will directly affect his or her confidence (Küry & Fischer, 2025). Thus, the positive perception of students directly contributes to strengthening their self-efficacy.

The Correlation between Perception and Understanding

Further data analysis showed that the relationship between students' perception of science learning and understanding of science concepts was not statistically significant ($r = 0.239$; $p = 0.297$). This shows that although students have a positive perception of high self-confidence, it is not automatically proportional to their ability to understand science material in depth. This phenomenon underscores the difference between affective aspects and cognitive learning outcomes, which indicates that perceptual factors alone do not guarantee success in understanding scientific concepts. Self-efficacy contributes to an individual's motivation and involvement in learning, but an individual's understanding is also influenced by the learning strategies applied, the quality of the material, and the significant interaction between the individual and the subject matter (Panadero, 2017). To stimulate understanding, the right strategy is needed (Hasnan et al., 2025; Sari et al., 2025). In addition, other factors such as academic background and learning strategies applied also affect learning outcomes (Taufik, 2024). The right method helps students improve understanding, confidence, and critical thinking skills (Damayanti et al., 2023; Kawuwung & Mamahit, 2023). This shows that the success of understanding scientific concepts is not only determined by affective aspects, but also influenced by the learning strategies used, the quality of the material, learning interactions, and individual factors such as academic background and applied learning strategies.

The Correlation between Self-Efficacy and Understanding

Testing the correlation between self-efficacy and understanding of science also showed insignificant results ($r = 0.280$; $p = 0.220$). Despite the positive direction of the relationship, the strength of the correlation is relatively low. This indicates that students' confidence level in science learning ability does not necessarily have a direct impact on their level of conceptual understanding of the material. These findings reinforce the view that self-efficacy functions more as a driver of motivation and engagement in the learning process, as well as the quality of interaction in the academic environment (Nota et al., 2004; Panadero, 2017). Individuals with high self-efficacy have high motivation (Devi & Ula, 2022; Lestari & Ikhsan, 2024; Raja et al., 2025). In line with this, Schweder & Raufelder (2022) saying that a key component of motivation is self-confidence. Thus, in addition to self-efficacy, the management of learning strategies and self-regulation also greatly determines the achievement of effective understanding.

The results of this study are in line with previous findings that emphasize the relationship between positive perception and self-efficacy in the context of education. Research by Gati et al. (2021) Individuals who have a positive perception of the lesson tend to have high self-efficacy which also affects the learning process. Positive perception and high confidence have a positive influence on the learning process (Dumaini et al., 2022;

Otu & Budiningsih, 2023). In the context of science learning, positive perceptions play an important role in shaping an individual's learning attitude (Sa'adah et al., 2022). However, this study found that positive perceptions do not necessarily guarantee the achievement of high cognitive outcomes, especially if they are not accompanied by effective learning strategies. These results identify that perception plays a greater role as a supporting factor for learning motivation and learning engagement, but is not necessarily a major determinant in achieving academic outcomes. These findings clarify that although perception and self-efficacy are closely related, they are not the main determinants of conceptual understanding of science, which adds to the literature on the relationship between affective variables and cognitive learning outcomes in the context of science education for PGSD students.

Methodologically, the author realizes that this study has several limitations that need to be considered. First, the number of 21 samples used is relatively small, so the results cannot be generalized widely. Second, this study only focuses on correlational relationships without examining the possibility of mediation or moderation influences from other factors that may be more complex in influencing the conceptual understanding of science. Therefore, follow-up research with a mixed methods or experimental approach is recommended to provide a deeper and more comprehensive understanding.

Conclusion

This study found that there was a significant and strong relationship between PGSD students' perception of science learning and their self-efficacy. However, neither perception nor self-efficacy showed a significant relationship with the understanding of the concepts of science. These findings suggest that affective factors such as positive perception and self-edification do play a role in increasing motivation and learning engagement, but do not directly improve their understanding of science. Therefore, the development of effective learning strategies, the presentation of appropriate materials, and the strengthening of learning interactions are important factors in improving students' cognitive understanding. Further research is suggested to explore more deeply other factors that may mediate the relationship between affective variables and cognitive learning outcomes, such as self-regulation, learning strategies, learning experiences, or engagement.

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Author's Contributions

Conceptualization, methodology, investigation, Draft Preparation- Writing, E.M.; validation, W.K. and S.; data curation, I.A.N. and E.M.; Visualization, W.K., I.A.N., and S.

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Conflict of Interest

All authors ensure that there is no conflict of interest in this study.

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