Correlation Between Attitude and Self-Efficacy with High-Order Thinking Skills of Grade 7 Students at SMP Negeri 2 Parepare in Science Subjects for the Even Semester

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Abstract

This study aims to determine the attitudes, self-efficacy, and high-order thinking skills (HOTS) of seventh-grade students at SMPN 2 Parepare in science subjects in the even semester, as well as to analyze the extent of the relationship between these variables. This study is quantitative research with a correlational approach. Data were obtained through attitude and self-efficacy questionnaires that had been tested for validity and reliability, as well as science learning achievement tests taken from students' final exam results, which had been categorized according to HOTS indicators. The research sample consisted of 115 students. Data analysis includes validity and reliability tests, descriptive analysis, prerequisite tests (normality, linearity, and heteroscedasticity), as well as simple Pearson correlation tests and multiple correlation tests. The results of the descriptive analysis show that the majority of students' attitudes are in the moderate category (66.96%), the majority of students' self-efficacy is also in the moderate category (67.83%), while the majority of students' high-order thinking skills are in the low category, with the analysis aspect being in the high category (40.9%), the evaluation aspect being in the very low category (40%) and the creation aspect being in the very low category (51.3%). The results of the correlation test show that there is a negative and significant correlation between attitudes and high-order thinking skills ($r = -0.463$; $p < 0.05$) with a moderate level of relationship, there is a positive and significant correlation between self-efficacy and high-order thinking skills ($r = 0.309$; $p < 0.05$) with a low level of relationship, and attitudes and self-efficacy simultaneously have a very high correlation with high-order thinking skills ($r^2 = 0.848$; $p < 0.05$).

Keywords: Attitude; self-efficacy; high-order thinking skills.

Introduction

Education is a learning process that all humans engage in so that they can understand, become more mature, and think more critically (Rahman et al., 2022). Education cannot function without a curriculum, which is an integral part of the educational process (Sumarsih et al., 2022). The curriculum serves as a tool for achieving educational goals (Firmansyah, 2023). The latest curriculum currently in use is the independent learning curriculum, which leans more towards the use of technology in an effort to develop all knowledge, attitudes, and skills of individuals (Sari et al., 2023). The independent curriculum encourages student-based learning and offers flexibility for the development of basic skills and character (Mutia & Admawati, 2024). The independent curriculum gives students more opportunities to learn independently and actively engage in the educational process. This curriculum aims to improve students' critical thinking skills and creativity (Hasbi et al., 2024). One of the most important competencies for students to develop is high-order thinking skills.

High-Order Thinking Skills (HOTS) refer to the ability to solve problems through analytical, evaluative, and creative thinking (Saraswati & Agustika, 2020). These skills enable students to think more deeply than simply memorizing facts or conveying information to others (Purbaningrum, 2017). In the context of science learning, HOTS are essential because they help students understand and apply scientific concepts through observation, experimentation, and reasoning (Nurafipah et al., 2022). For this reason, students are expected not only to memorize concepts but also to connect, evaluate, and apply knowledge in various real-world situations.

The learning process at SMP Negeri 2 Parepare, especially in science subjects in grade VII, has implemented the HOTS approach. This implementation is carried out by presenting HOTS questions to students. This is based on the results of interviews conducted with science teachers in grade VII at SMP Negeri 2 Parepare, who stated that learning at this school has implemented a HOTS-based learning approach. However, despite the implementation of a HOTS-based learning approach, it turns out that students at SMP Negeri 2 Parepare have varying levels of high-order thinking skills, ranging from high, moderate, and low. This is evident from the data on the results of formative assessments given by teachers, where the questions in the tests have been classified based on the HOTS cognitive level. This is supported by research Rofia et al. (2023), which states that current data from schools shows that students' HOTS in science subjects are still not optimal. This is evidenced by survey data from the 2022 Program for International Students Assessment (PISA), which shows that Indonesia has experienced a decline in learning achievement. From 2000 to 2022, Indonesia has been ranked in the bottom 10 in science literacy in the PISA assessments. This proves that students' HOTS abilities are still not optimal (Wandari et al., 2024).

The causes of students' varying or uneven high-order thinking skills in science subjects are influenced by various psychological factors (Parni, 2017). Psychological factors such as self-concept, motivation, and self-efficacy are known to have a positive influence on learning outcomes (Anugra et al., 2022). One of the key psychological elements that influences learning success is attitude. Attitude is defined as the degree of liking or disliking towards something, a topic, or an event, which comes from beneficial experiences in life and is not innate (Budiarti et al., 2023). Attitude is a factor that influences student learning outcomes. A student's attitude greatly influences their willingness to learn (Marissa, 2022). A positive attitude toward learning is characterized by a cheerful mood and greater perseverance in class, yielding satisfactory results. Conversely, a negative attitude makes students unhappy and hinders their ability to learn. Children's positive attitudes toward learning, such as joy or pleasure, can be powerful motivators, encouraging them to work harder and think critically. Students' critical thinking skills can also be undermined by the negative attitudes they develop toward the classroom, such as hatred or dissatisfaction (Anggraini & Perdana, 2019).

Another factor, besides student attitude, that can influence learning outcomes and also plays an important role is self-confidence, often referred to as student self-efficacy. Self-efficacy is an aspect of self-knowledge that can influence a person's life in carrying out daily

activities (Yasa et al., 2020). Self-efficacy is the belief that one can perform activities, achieve goals, and overcome challenges. High performance is expected from students who demonstrate high self-efficacy (Putri & Zulhelmi, 2024). A person with high self-efficacy can easily complete their work alone even if the task is very challenging. In this case, students have excellent cognitive abilities. Conversely, if a person lacks confidence in their ability to complete a challenging task, they will view it as a danger that can cause them to give up easily and potentially interfere with their critical thinking skills (Syamsiyah & Iswinarti, 2022). Confidence in doing science tasks requires high self-efficacy in order to achieve the expected conceptual understanding (Novanto et al., 2024). By instilling self-efficacy in students, they will be able to produce more innovative products, because students who demonstrate high self-efficacy will be able to use their imagination to overcome various difficulties and challenges (Kunayah & Fauziah, 2023).

Based on research conducted by Basito et al. (2018), namely, the relationship between self-efficacy and students' higher-order thinking skills, it is suggested that future researchers pay attention to other variables that may influence vocational high school students' higher-order thinking skills. Similarly, in research conducted by Hidayat (2020) regarding the relationship between curiosity and students' higher-order thinking skills, it is suggested that further research is needed to identify variables that significantly influence elementary school students' higher-order thinking skills. Therefore, this study presents a novel approach by examining the correlation between three variables: attitude, self-efficacy, and higher-order thinking skills in the context of science learning in junior high schools. Unlike previous research that focused on vocational high school and elementary school students, this study provides new empirical evidence at the junior high school level, highlighting how psychological and cognitive factors interact in a real-life classroom environment.

Based on the descriptions described above, the purpose of this study is to analyze students' attitudes, self-efficacy, and higher-order thinking skills and determine the extent to which these variables correlate, both individually and simultaneously. Therefore, the researcher raised this research with the title "Correlation Between Attitude and Self-Efficacy with High-Order Thinking Skills of Students of SMP Negeri 2 Parepare Grade VII in Science Subjects in Even Semester Material". This research is expected to provide insight into how positive attitudes and high self-efficacy can influence students' higher-order thinking skills, which in turn can improve learning outcomes, especially in science subjects.

Research Method

This study used a quantitative approach with a correlational research design, which allows the study of relationships between variables without experimental manipulation (Muhajirin et al., 2024). The focus was to determine the correlation between students' attitudes, self-efficacy, and higher-order thinking skills in the context of science education. The sampling technique used was saturated sampling, namely all 115 students of grade 7 of SMP Negeri 2 Parepare. Data collection was conducted in several stages, starting with interviews and document review, followed by distributing the questionnaire via Google Forms and HOTS test taken from the final exam results, because the final semester exam questions were valid and compiled by teachers according to the curriculum and learning conditions there, which were then classified into HOTS questions. The attitude instrument contained 24 valid items, while the self-efficacy questionnaire consisted of 26 items, both of which demonstrated high reliability with Cronbach's alpha scores of 0.955 and 0.949, respectively. Higher-order thinking skills were measured using an assessment designed based on the competencies of analysis (C4), evaluation (C5), and creation (C6), which are calculated based on the number of correct questions for each aspect, according to the assessment rubric used. These are then converted into a percentage using the formula:

$$Percentage\ Score = \frac{Total\ Scor}{Maximum\ Score} \times 100$$

. To process the data obtained, descriptive statistical techniques, assumption tests (including normality, linearity, and heteroscedasticity), and Pearson correlation analysis (simple and multiple) were used with the help of the IBM SPSS version 26 program. The decision-making level for the correlation relationship was based on the table below:

Table 1. Guidelines for the Level of Correlation Coefficient

Coefficient Interval	Description
0,00 – 0,199	Very Low
0,20 – 0,399	Low
0, 40 – 0,599	Moderate
0,60 – 0,799	High
0,80 – 1,000	Very High

(Sugiyono, 2013)

Result and Discussion

Descriptive Analysis Results

This descriptive analysis was conducted to examine the general characteristics of the variables, such as the minimum and maximum values, variance, mean (average value), standard deviation, and frequency of each variable: Attitude (X_1), Self-efficacy (X_2), and Higher-order thinking skills (Y). The results of the descriptive analysis in this study are as follows:

Students' attitudes toward science subjects

Attitude data from 115 students in science subjects showed an average of 96.88, a standard deviation of 13.260, a variance of 175.827, a minimum score of 52, and a maximum of 120.

Table 2. Result of Descriptive Analysis of Attitude Questionnaire

No.	Score	Frequency	Presentation(%)	Category
1	$X < 83.61828$	18	15,65	Low
2	$83.61828 \leq X < 110.1382$	77	66,96	Moderate
3	$110.1382 \leq X$	20	17,39	High
	Total	**115**	**100**	
Mean	**Std. Deviation**	**Variance**	**Minimum**	**Maximum**
96,88	13,260	175,827	52	120

As presented in Table 2, 18 students were classified in the low category. The majority of students, 77 individuals, belonged to the medium category, while 20 students were in the high category. This indicates that most of the seventh-grade students at SMP Negeri 2 Parepare have attitudes in the moderate category, which means that the students' attitudes toward science subjects are quite positive. However, there are still students with low attitudes who need further guidance, as well as students with high attitudes who can be used as role models.

Students' self-efficacy in science subjects

Self-efficacy data from 115 students in science subjects showed an average of 95.68, a standard deviation of 17.033, a variance of 290.115, a minimum score of 47, and a maximum of 130.

Table 3. Results of Descriptive Analysis of Self-Efficacy Questionnaire

No.	Score	Frequency	Presentation(%)	Category
1	$X < 78.6455$	16	13,91	Low

No.	Score	Frequency	Presentation(%)	Category
2	78.6455 ≤ X < 112.711	78	67,83	Moderate
3	112.711≤ X	21	18,26	High
	Total	115	100	
Mean	**Std. Deviation**	**Variance**	**Minimum**	**Maximum**
95,68	17,033	290,115	47	130

As presented in Table 3, 16 students of the sample were categorized as low. A majority of 78 students were in the medium category, while 21 students were classified as high. This shows that most of the 7th-grade students at SMP Negeri 2 Parepare have moderate self-efficacy, which means that their self-efficacy in science is quite good. However, some students with low self-efficacy need intervention to increase their self-confidence.

Students' high-order thinking skills in science subjects in the even semester

The data on higher-order thinking skills of 115 students in science subjects for the even semester, based on high-order thinking skill indicators, is as follows:

Table 4. Student Analysis Skills Test Results

No.	Score	Frequency	Presentation(%)	Category
1	81 – 100	34	29,6	Very High
2	61 – 80	47	40,9	High
3	41 – 60	27	23,5	Moderate
4	21 – 40	7	6,1	Low
5	0 – 20	0	0	Very Low
	Total	115	100	
Mean	**Std. Deviation**	**Variance**	**Minimum**	**Maximum**
7,34	1,627	2,647	4	11

As indicated in Table 4, 34 students achieved the very high category. A total of 47 students were classified as high, 27 students as moderate, and 7 students as low, while no students fell into the very low category. This indicates that the majority of students are in the high and very high categories, meaning that students have fairly high analytical skills.

Table 5. Student Evaluation Test Results

No.	Score	Frequency	Presentation(%)	Category
1	81 – 100	13	11,3	Very High
2	61 – 80	6	5,2	High
3	41 – 60	18	15,7	Moderate
4	21 – 40	32	27,8	Low
5	0 – 20	46	40,0	Very Low
	Total	115	100	
Mean	**Std. Deviation**	**Variance**	**Minimum**	**Maximum**
8,17	6,159	37,934	1	22

As presented in Table 5, 13 students were classified as very high, while 6 students were rated as high. A total of 18 students as moderate, 32 students as low, and the largest group, 46 students, were classified as very low. This indicates that the majority of students are in the very low and low categories, meaning that students still have low evaluation skills.

Table 6. Student Creativity Test Results

No.	Score	Frequency	Presentation(%)	Category
1	81 – 100	6	5,2	Very High
2	61 – 80	0	0,0	High

3	41 – 60	32	27,8	Moderate
4	21 – 40	18	15,7	Low
5	0 – 20	59	51,3	Very Low
Total		**115**	**100**	
Mean	**Std. Deviation**	**Variance**	**Minimum**	**Maximum**
2,89	2,459	6,049	0	10

As presented in Table 6, only 6 students reached the very high category, and none were placed in the high category. A total of 32 students fell into the moderate category, 18 students into the low category, and more than half of the participants, 59 students, were categorized as very low. This indicates that students' creative abilities are still very low.

Prerequisite Analysis Test Results

Prerequisite tests, such as normality, linearity, and heteroscedasticity tests, were conducted prior to correlation analysis. After transforming the attitude variable data, the normality test results showed that the data were normally distributed with a significance value of 0.200. The linearity test results showed a linear relationship between self-efficacy and higher-order thinking skills (significance value of 0.405) and between attitude and higher-order thinking skills (significance value of 0.146). In addition, the heteroscedasticity test results showed that there were no symptoms of heteroscedasticity, with a correlation coefficient between self-efficacy and higher-order thinking skills of 0.809 and between attitude and higher-order thinking skills of 0.294. Therefore, the data met the prerequisites for basic and multiple Pearson correlation analysis.

Simple Pearson Correlation Test Results

A simple Pearson correlation test was used to determine the degree of relationship between independent variables (attitude and self-efficacy) and dependent variables (higher-order thinking skills), which is expressed by the correlation coefficient (r). Table 7 presents the output of the Pearson correlation test, which illustrates the relationship between the studied variables:

Table 7. Simple Pearson Correlation Test Results

Correlations				
		Attitude	Self-Efficacy	Higher-Order Thinking Skills
Attitude	Pearson Correlation	1	.581**	-.463**
	Sig. (2-tailed)		.000	.000
	N	115	115	115
Self-Efficacy	Pearson Correlation	.581**	1	.309**
	Sig. (2-tailed)	.000		.001
	N	115	115	115
Higher-Order Thinking Skills	Pearson Correlation	-.463**	.309**	1
	Sig. (2-tailed)	.000	.001	
	N	115	115	115

The correlation between attitudes and students' higher-order thinking skills

Table 7 shows the results of a simple Pearson correlation analysis, which indicates that student attitudes have a significant negative relationship with higher-order thinking skills. The SPSS results show a correlation coefficient of -0.463 with a significance value of 0.000 (<0.05). This coefficient indicates a negative relationship with a moderate level of closeness, meaning that the lower a student's attitude, the higher their higher-order thinking skills. Conversely, the higher a student's attitude toward science learning, the lower their higher-order thinking skills.
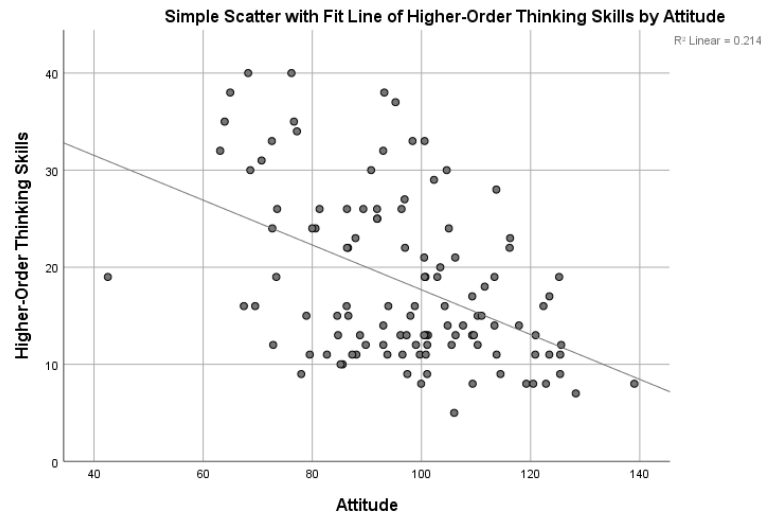
Figure 1. Scatter Plot with Linear Regression Line of Relationship between Attitude and Higher-Order Thinking Skills

Based on Figure 1, it can be seen that the trend line decreases from left to right, which means there is a negative relationship between attitudes and students' higher-order thinking skills. The determination value ($R^2 = 0.214$) shows that 21.4% of the variation in higher-order thinking skills is explained by attitudes, while the rest is influenced by other factors.

The negative correlation value obtained can be influenced by various factors, such as excessive anxiety when facing difficult questions, inappropriate problem-solving techniques, a fixed mindset that tends to avoid challenges, and learning practices that still focus on memorization and lectures. Research Abanto-Ramirez et al. (2024), found a significant negative relationship between critical thinking dispositions and student anxiety ($r = –0.200$), indicating that anxiety can reduce critical thinking potential. Another study by Heyder & Pegels (2025), also stated that a fixed mindset causes students to become easily frustrated and reluctant to learn more deeply when facing difficulties. Research by Ahmed & Ahmad (2017), suggests that memorization-based learning methodologies tend to have an inverse relationship with academic performance, especially in aspects of critical thinking and mastery of deep concepts. When learning practices are still memorization-oriented and assessment models are not aligned with the demands of critical thinking, students can have a positive attitude toward the subject but are not trained to carry out deep thinking processes.

Based on this, it can strengthen the fact that the relationship between attitudes and high-level thinking skills does not always have a positive influence. A similar pattern was also described by Nurindah Sari et al. (2023), in their study of personality and critical thinking in junior high school students, which resulted in a negative correlation of -0.445, reflecting that the more dominant a certain personality is, the lower the critical thinking skills.

These findings play a crucial role in improving HOTS-based science learning. Teachers should design learning activities that balance positive attitudes with cognitive challenges through inquiry-based and problem-based approaches. Implementing reflective learning strategies can also help students manage anxiety when facing HOTS-oriented assessments. Through this approach, science learning can develop students' enthusiasm as well as their analytical, evaluative, and creative thinking skills.

The correlation between self-efficacy and students' higher-order thinking skills

The results of the simple Pearson correlation analysis presented in Table 7 indicate a significant relationship between self-efficacy and students' higher-order thinking skills. This

analysis yielded a Pearson correlation coefficient of 0.309 with a significance value of 0.000 (<0.05), so the relationship can be considered statistically significant. This positive correlation coefficient value indicates a low relationship between self-efficacy and higher-order thinking skills, meaning that the higher the students' self-efficacy level in science learning, the more their higher-order thinking skills will improve.
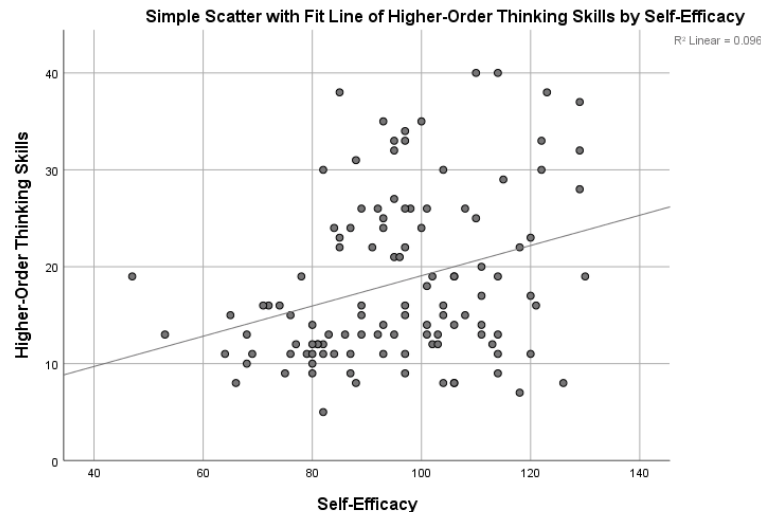

Figure 2. Scatter Plot with Linear Regression Line of the Relationship between Self-Efficacy and Higher-Order Thinking Skills

Based on Figure 2, it can be seen that the linear regression line shows an upward trend, indicating a positive relationship between self-efficacy and students' higher-order thinking skills. The R^2 value of 0.096 indicates that 9.6% of the variation in higher-order thinking skills can be explained by self-efficacy, while the remainder is influenced by other factors.

The analysis shows that self-efficacy and higher-order thinking skills have a significant correlation. This aligns with the findings of studies conducted by Basito et al. (2018) argues that there is a connection between pupils' self-efficacy and their higher-order thinking skills. To enhance pupils' capacity for higher-order thinking, this can be done by increase their confidence in their abilities, namely by increasing their persistence in doing difficult things.

Multiple Correlation Test Results

Multiple correlation tests are used to determine the degree of closeness between the dependent variable and two or more independent variables, which is expressed by the correlation coefficient (r^2). The results of the multiple correlation test are shown in the following table:

Table 8. Multiple Correlation Test Results

Model Summary[b]								
				Std. Error	Change Statistics				
Model	R	R Square	Adjusted R Square	of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.848[a]	.719	.714	4.597	.719	143.286	2	112	.000

Based on the results of the multiple correlation analysis shown in Table 8, it appears that attitudes and self-efficacy simultaneously have a significant relationship with higher-order thinking skills. The correlation analysis conducted using the SPSS application showed a multiple correlation coefficient of $r^2 = 0.848$ with a significance value of 0.000 (<0.05), so the relationship can be said to be statistically significant. This positive coefficient value indicates a

unidirectional relationship, where increasing students' attitudes and self-efficacy simultaneously has the potential to improve their higher-order thinking skills. In addition, the r^2 value of 0.848 (positive) also indicates a very high relationship between attitude and self-efficacy simultaneously with higher-order thinking skills. These results show that the combination of attitude and self-efficacy can contribute significantly to students' thinking skills in solving HOTS questions.
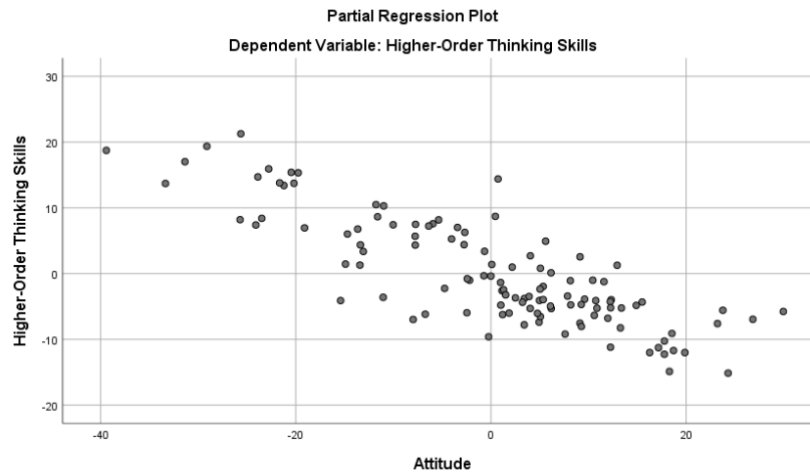
Figure 3. Partial Regression Plot between Attitude and Higher-Order Thinking Ability (with Self-Efficacy controlled)
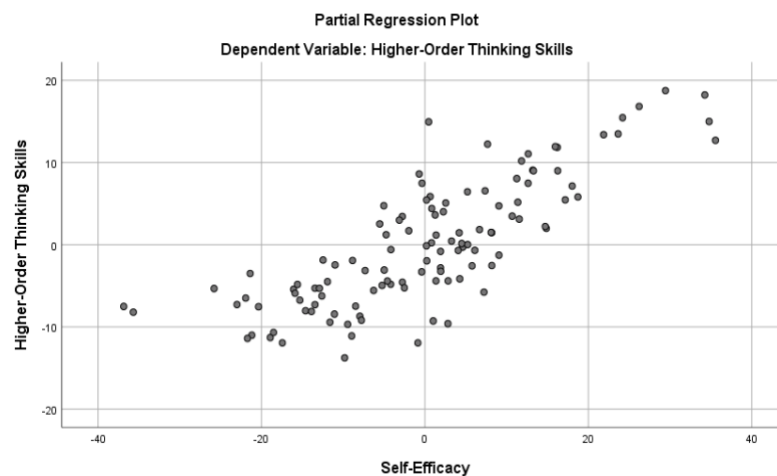
Figure 4. Partial Regression Plot between Self-Efficacy and Higher-Order Thinking Skills (with Attitude controlled)

Figure 3 shows a downward-sloping regression line, indicating a negative relationship between the two variables. Figure 4, on the other hand, shows an upward-sloping regression line, indicating a positive relationship between self-efficacy and higher-order thinking skills. Overall, these two partial graphs demonstrate the results of the multiple correlation test, indicating that attitudes and self-efficacy simultaneously have a significant relationship with students' higher-order thinking skills.

According to Mufit & Wrahatnolo (2020), factors that influence students' higher-order thinking skills include a lack of initiative in learning, a lack of persistence in problem-solving, giving up easily when completing tasks, the learning environment, and so on. Based on this, it can be seen that attitude is one of the factors that has a significant influence on students' thinking skills. The same applies to self-efficacy. For example, if students give up easily when faced with challenges or problems, this can affect their thinking skills.

Conclusion

Based on the results of the study, it can be concluded that the attitudes of 7th-grade students at SMP Negeri 2 Parepare towards science subjects are mostly in the moderate category, as is their self-efficacy, which is mostly at a moderate level. Meanwhile, students' higher-order thinking skills are still relatively low, particularly in the areas of evaluation (C5) and creation (C6), although they show better results in the area of analysis (C4). The correlation analysis results show a significant negative relationship with a moderate level of correlation between attitude and higher-order thinking skills, which means that the higher the students' attitude towards science learning, the higher their higher-order thinking skills are not always in line with. Conversely, self-efficacy has a significant positive relationship with a low level of correlation with higher-order thinking skills, which indicates that the higher the students' self-efficacy, the better their higher-order thinking skills are. Simultaneously, attitude and self-efficacy are significantly related with a very high relationship with high-order thinking skills, indicating that the combination of attitude and self-efficacy can contribute greatly to students' thinking skills in solving HOTS questions.

These findings suggest that science teachers should focus not only on fostering positive attitudes but also on developing students' confidence and problem-solving persistence through inquiry-based and reflective learning approaches. Strengthening self-efficacy and providing cognitive challenges in science lessons can help improve students' analytical, evaluative, and creative abilities. Thus, this study provides important implications for designing HOTS-oriented learning practices that balance affective and cognitive aspects in accordance with the goals of the Independent Learning Curriculum.

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