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The Relationship of Self-Efficacy Towards High Level of Thinking Ability of USK Physics Education Student in Basic Physics I Course

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Abstract. The high-order thinking ability of students is currently a problem that is so difficult to improve because it must be extra developed in teaching and learning activities. This can happen because students do not often improve their higher order thinking in everyday life and in the learning process. Most students tend to have difficulty solving problems when the lecturer gives problems with a higher level of difficulty than usual. The cause of this problem needs to be investigated. This study aims to determine the relationship between self-efficacy and higher-order thinking skills of students of the Department of Physics Education, FKIP USK. The approach used is a quantitative approach with a descriptive correlational type of research. The sample of this study was the 2019 USK FKIP Physics Education students which consisted of 71 students. Data collection techniques used are questionnaires and tests. Questionnaire and test data were analyzed by descriptive analysis and Product Moment correlation analysis. The results showed that self-efficacy had a relationship with higher-order thinking skills (Sig. (2-tailed) = 0.001 < 0.05). It is recommended that future studies use more samples so that the results of the analysis obtained will be more accurate.
Keywords: Self-efficacy, Higher-order Thinking Skills

Introduction

The journey of the world is now in the 21st century, where there are rapid changes in various fields of human life. Technology and science are also growing rapidly and this in itself raises various demands for the creation of quality human resources. One of these demands can be met by improving the quality of education. The development of technology and science can help students improve learning motivation and their skills, educators face the challenge to identify, evaluate, and choose the best technology to achieve the educational goals to be achieved to improve the quality of education (McGovern, et al., 2019). This has resulted in every country competing to develop a good education system, including Indonesia. Higher education is one of the highest educational institutions in Indonesia which has an important role in producing qualified and qualified graduates in their fields to enter the world of work. The world of work today is filled with various demands of the 21st century, which require high quality and good ability to work together, think and communicate. Over the last few decades, the higher education system has gained a dynamic vision, which aims to reflect and support the diversity of

interests of the student population and the community at large. The cornerstone of the reform of higher education today is to improve efficiency and align with the growing needs and social challenges while adapting to the current trends related to competitiveness and accountability (Vlachopoulos, 2021).

As we already know, critical and creative thinking skills are classified as higher-order thinking skills in Bloom's cognitive domain, so that students' thinking skills should already be in the realm of higher-order thinking. Erfan & Ratu (2018) stated, higher-order thinking skills in Bloom's cognitive domain include students' ability to analyze (C4), evaluate (C5), and create (C6), all of which are advanced stages of lower-level thinking skills consisting of skills students in remembering (C1), understanding (C2), and applying it (C3). Thinking skills high-level need to be trained by the students. Test your skills of thinking at a high level is expected to train students in critical and creative in solving problems so that students are ready to face a bigger issue in everyday life (Hartini & Martin, 2020). High-level thinking can further develop oneself in taking a decision or giving a judgment against a thing so that someone can solve a problem (Misbahudin, 2019).

Based on the results of initial observations made, data were obtained that the results of lessons in the Basic Physics I course for Physics Education FKIP USK students class 2019 were still relatively low, as evidenced by the average final score of BC (60-68), which showed a lower average the average final score of the 2019 USK FKIP Physics Education students in the Basic Physics I course compared to other courses in the first semester. On the other hand, it is also based on experience in the field that the researcher has observed while carrying out duties as a lab assistant and during lecture activities. Most students only memorize formulas or theories without understanding more deeply the meaning of these formulas and theories. So that when the lecturer gives a problem with a higher level of difficulty than the examples of questions that have been given during lectures, students tend to have difficulty solving the problem. The low-value courses in basic I physics this is in accordance with research conducted by Melinda (2019), which states that student mastery of concepts of the material in a course in basic I physics is still low and reinforced by the low learning outcomes obtained by students.

The Higher Education Curriculum (K-DIKTI) (2014) which is based on the Indonesian National Qualifications Framework (KKNI) also implicitly includes self-efficacy in learning outcomes in higher education for undergraduate programs. Some of the learning achievements include working together, respecting the opinions of others, being independent, having confidence in making decisions, and actively participating in the planning, developing, and evaluating learning. These things are indirect aspects of self-efficacy (Dewi, 2017). Self-Efficacy can give you an idea about how big the business is to be conducted individual about the situation the problems they face. Beliefs of self-efficacy determine the thoughts, feelings, behavior, and motivation of the individual. High self-efficacy beliefs from students can increase their motivation and thinking skills which affect their academic life positively (Akturk & Ozturk, 2019). In the learning of science and education self-efficacy is one of the main factors related to student confidence about their ability to perform well in a particular domain. Self-efficacy can affect the process of self-regulation of students, such as goal setting, thinking skills, and self-assessment. Students with efficacy high become more task-centered and are more likely to exhibit follow-up learning strategies such as self-monitoring and self-regulation. The role of the efficacy of self becomes very prominent when students tackle difficult problems. During problem-solving, the students with the efficacy of the higher self interpret the struggle as an opportunity to develop their skills (Kalender, et al., 2020).

This study aims to determine the relationship between self-efficacy and higher-order thinking skills of Physics Education FKIP students at Syiah Kuala University. Many studies have been researched to determine the relationship between self-efficacy and

higher-order thinking skills, but not much has been done in the realm of higher education.

Methods

The approach used in this research is a quantitative and qualitative approach. This research is in the form of descriptive correlation, which is one type of research to collect information about the related status of an existing symptom, namely symptoms according to what they are at the time of carrying out the research. The research subjects were students of the 2019 batch of Physics Education FKIP Syiah Kuala University with 71 respondents. The object of research is the relationship between self-efficacy and higher-order thinking skills. The research sample was taken using the purposive sampling technique. Sugiyono (2017) purposive sampling is a sampling technique with certain considerations.

The instrument for collecting data used a self-efficacy questionnaire adapted from Hanny Isthifa (2011) and has been validated with the Product Moment correlation technique using SPSS version 17 and Measurement of self-efficacy in this study using Ralf Schwarzer's (1996). Based on his research there are 21 items on the self-efficacy scale but only 14 items are valid, while the remaining 7 items are declared invalid. The grid is as follows:

Table 1. Questionnaire Grid Self-Efficacy

Dimension	Indicator	Amount Item		Amount
		F	UF	
Level	Individual belief in ability to level task difficulty.	11*, 18*	15	3
	Behavioral selection based on obstacle or difficulty level of a task or activity.	12*	14	2
Strength	The level of strength of the individual's belief or expectation of his abilities.	20, 21*		2
Generality	Individual's belief in his ability to carry out tasks in various activities.	16*, 19*	17	3
Total				10

(Sumber: Hanny, 2011)

Higher-order thinking ability test in the form of a description consisting of 8 questions based on indicators of higher-order thinking skills, namely analyzing, evaluating, and creating. The tests used have the following grid:

Table 2. Distribution of Higher Order Thinking Ability Test

No	Thinking Level	Aspect	Number of Questions
1.	Analyze	Differentiate	1
2.		Organize	1
3.		Connect	1
4.	Evaluate	Inspect	1
5.		Criticize	1
6.	Create	bring up	1
7.		Plan	1
8.		Produce	1

(Source: Nurhayati et al., 2017)

Data were analyzed quantitatively with descriptive analysis and product-moment correlation test. The product-moment correlation test formula (Yusrizal, 2016):

$$r_{XY} = \frac{N\sum XY - (\sum X)(\sum Y)}{\sqrt{\left[N\sum X^2 - (\sum X)^2\right]\left\{\left[N\sum Y^2 - (Y)^2\right]\right.}} \quad (1)$$

With

r_{xy} = coefficient of product-moment correlation
X = score for each question/item
Y = total score
N = number of respondent

Then after the research results are obtained based on the formula, the percentage will be determined based on the category of higher-order thinking skills.

Table 3. Higher Order Thinking Ability Category

Score (%)	Category
81-100	Very good
61-80	Good
41-60	Enough
21-40	Nnot enough
0-20	Very less

Results and Discussion

Questionnaire of Self-Efficacy

The self-efficacy data used the IBM SPSS Statistics 22 For Windows program. Based on data obtained from questionnaires distributed to 71 respondents, it shows that the self-efficacy variable obtained the highest score of 55 from the highest score and the lowest score of 33 from the lowest score. The results of the analysis obtained a mean value (mean) of 41,8 and a standard deviation of 3,7. The data obtained can be classified into three levels of self-efficacy categories, namely high, medium and low with the calculation of the ideal Mean (Mi) = 1/2 (50 + 33) = 41.5 and the ideal Standard Deviation (SDi) = 1/6 (50 - 33) = 2,83.

The following are the results of the classification of self-efficacy scores in Table 4.

Table 4. The Classification Of Self-Efficacy Score

Category	Score Range	Respondent	Percentage of Students in Classification (%)
Low	X < 38,7	16	22
Medium	38,7≤ X< 44,3	43	61
High	X ≥44,3	12	17
Total		71	100

Based on the Table 4, it can be seen that the percentage of students with a low level of self-efficacy is 22% (16 people), students with a moderate level of self-efficacy have a percentage of 61% (43 people), and students with a high level of self-efficacy. The high percentage is 17% (12 people) of the total sample.

The results of descriptive data processing show that the self-efficacy of the 2019 Physics Education FKIP USK students is classified as moderate. Based on the data, it was found that a medium level of self-efficacy of students, it is caused by most of students who also have a medium effort or as much as 61% of them which means that the physics education students of FKIP USK aren't too capable of returning their self-efficacy when getting a failure, lack of efficacy to able heighten the effort when facing difficulty or failure, and lack of effort to prevent failure by increasing knowledge. Hyytinen, et al (2018) stated that universities should pay attention to increasing the efficacy of the students because the efficacy of self-predict and mediate achievement, motivation, and student learning. One of the suggested solutions that can improve the self-efficacy of the students is to give them authentic tasks, which will require them to apply knowledge and skills in different situations. According to Prifti (2020) Self Efficacy can be enhanced during learning through the feedback from positive feedback and experience using technology and the positive feedback of increased learning capacity and also mastery experience is the most influential factor on self-efficacy (Geitz, et al., 2016).

Higher-Order Thinking Skills Test

Descriptive data on higher order thinking skills using the IBM SPSS Statistics 22 For Windows program. Based on data obtained from the tests distributed to 71 respondents, it shows that Higher Order Thinking Skills variable obtained the highest score of 29 from the highest score and the lowest score of 7 from the lowest score. The results of the analysis obtained a mean value (mean) of 16,7 and a standard deviation of 5,5.

Determination of high and low variables used categorical respondents. The data obtained can be classified using the Higher-order thinking skills category table in the article by Nurhayati et al., (2017).

Table 5. The Classification of Higher-Order Thinking Skills Score

Category	Score Range(%)	Respondent	Percentage of Students in Classification (%)
Excellent	81-100	0	0
Good	61-80	5	7
Enough	41-60	17	24
Deficient	21-40	44	62
Less	0-20	5	7
Total		71	100

Based on the table above, it can be seen that the percentage of students with an excellent level of higher-order thinking skills is 0% (0 people), students with a good level of higher-order thinking skills are 7% (5 people), students with enough level of higher-order thinking skills are 24% (17 people), students with a deficient level of higher-order thinking skills are 62% (44 people), and students with a less level of higher-order thinking skills are 7% (5 people) of the total sample.

Thus indicating that the category of students' higher-order thinking skills is still in the poor or low category. Low high-level thinking skills of students can be caused by learning in class that does not support students to think at higher levels or think in a complex manner, for example, such as the lack of giving varied contextual questions so that sometimes students can only solve the same questions given by the lecturer and unable to solve problems with different forms. Higher-order thinking skills has emphasized the process of thinking through analysis (C4), evaluation (C5), and creativity (C6). HOTS can train high level thinking skills of students on the ability to analyze, evaluate and create all problems, not just repeating material or knowing existing facts to build concepts through collaboration and composition of what is known to stimulate the ability to think into levels or higher levels. This is confirmed by (Rondan-Cataluña et al., 2015) showing that creative activity can increase HOTs.

This is in line with research by Henni Juliarti and Widiarti (2019) which states that the low level of higher-order thinking skills of students is caused by several factors including the learning model in the classroom cannot train and hone higher-order thinking skills, so students are not accustomed to solving complex problems. The lecturer has an important role to plan, perform and evaluate the learning process to improve the thinking skills of high-level students (Cahyaningtyas, et al., 2020).

This study uses Product Moment correlation analysis to find the relationship between self-efficacy and higher-order thinking skills using IBM SPSS Statistics 22 For Windows. This correlation analysis shows that the correlation between self-efficacy and higher-order thinking skills is 0.371 ($r = 0.371$), which is positive. This shows that there is a relationship between self-efficacy on higher-order thinking skills and it can be interpreted that the correlation or relationship between the two variables is weak or low. The results of this study are in accordance with the research conducted by Gurcay, et al., (2018) who found that there is a relationship level that is positive and significant between the skills of high-level thinking and self-efficacy physics students. Based on the value of $r = 0.371$, it can be seen that the determination of the correlation coefficient of the two variables is only 13.76%. This can be caused by students who have high self-efficacy who have sufficient or less higher-order thinking skills. On the other hand, students who have low or moderate self-efficacy have good higher-order thinking skills. The results of the comparison of the two variables can be seen in the following graph:

Picture 1 The Comparison of Self-Efficacy and Higher-Order Thinking Skills Results

Table 6. Correlation Test Results Product Moment

Correlations

		Self Efficacy	HOTS
Self Efficacy	Pearson Correlation	1	,371**
	Sig. (2-tailed)		,001
	N	71	71
HOTS	Pearson Correlation	,371**	1
	Sig. (2-tailed)	,001	
	N	71	71

**. Correlation is significant at the 0.01 level (2-tailed).

Based on the significance number (Sig.(2-tailed)) on the self-efficacy variable is 0.001 < 0.05. Based on this comparison, H_0 is rejected and H_a is accepted or it means that the self-efficacy variable has a relationship with the higher-order thinking ability variable. Thus, the higher the self-efficacy perceived by students, the higher the higher-order thinking skills they have. This is in line with previous research, such as research by Daryati, et al., (2018) which states that "There is a relationship between self-efficacy and students' higher-order thinking skills". Similar results were also obtained in Hadi Warsito's research (2012) which concluded that "There is a positive and significant causal relationship between Self-Efficacy and academic achievement". Priatna, et al.,(2021) stated that based on literature, self-efficacy has relationship with critical thinking skills, and that is one of the part of higher-order thinking skills. However, in this study, students of the class of 2019 Physics Education FKIP USK had moderate self-efficacy so that although there was a positive relationship between self-efficacy and higher-order thinking skills, the relationship was not significant. Self-efficacy is a critical factor for high-level thinking. Critical thinkers need to have confidence in their ability to solve the problem, decide on actions, find the answers to the questions given to reach a reasonable conclusion (Hyytinen et al, 2018). Prifti (2020) stated that the Self-Efficacy of the students affects the attitude and the ability to acquire the skills, the choice of activities, and the willingness to continue the action. People with higher self-efficacy beliefs are

more likely to attempt more difficult tasks than their peers with lower self-efficacy (Ramnarain, et al., 2017).

Based on the calculation of the coefficient of determination (r^2), the magnitude of the relationship between self-efficacy and higher-order thinking skills is only 13.76%, while the other 86.24% is influenced by other factors. Such as internal factors, namely the individual's motivation or willingness to study harder to increase and hone their higher-order thinking skills, or external factors, namely the environment, the influence of the application of learning, as revealed by Budsankom (2005) in his research revealed that the classroom environment factors, students' psychological and intellectual characteristics of students can directly affect students' HOTS and the data on the influence of these factors is 96.8%. Other factors such as exam questions that apply the category of higher-order thinking skills also influence the relationship between self-efficacy and higher-order thinking skills.

Self-efficacy is a subjective perception problem, meaning that self-efficacy does not always describe actual abilities, but is related to individual beliefs (Albert Bandura, 1986). Yolantia, et al (2021) stated that students with high self-efficacy believe that their abilities can change and are determined by effort, in contrast to students who have low self-efficacy who tend to assume that their abilities are fixed and consider the tasks assigned as tasks. Based on this, the researcher concludes that because self-efficacy can be categorized as subjective perception so that self-efficacy can change at any time according to the dimensions of self-efficacy, namely magnitude (level of task difficulty), strength (degree of stability, belief, or expectation) and generality (broad area of behavior).

Based on the data it appears that not all of students who have low level of self-efficacy is accompanied by high level of thinking ability, there are still students who have a low level of self-efficacy, also have low level of thinking ability. Besides, there are also students who have high order thinking skills, have a high level of self-efficacy.This means that the self-efficacy variable not the only one factor which related with students' higher order thinking skills. Priatna, et al (2021) stated that specific self-efficacy for context and must be measured appropriately, and cannot be generalized to other subjects. Students' beliefs about their ability in mathematics cannot be generalized in all grade levels or other subjects (Usher, et al, 2009).

Conclusion

Based on the results of the study, it showed that self-efficacy was in the medium category, while the high level of thinking ability category less or low. This study also shows that there is a low correlation of self-efficacy towards high level of thinking ability of usk physics education student in basic physics I course, the higher self-efficacy then the higher of higher-order thinking skills.

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