

# Improving Students' Critical Thinking and Self-Efficacy by Learning Higher Order Thinking Skills Through Problem Based Learning Models

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## Abstract

Higher-order thinking skills critical to being applied and developed in learning. Because the learning activity is focused on the higher-order thinking skills development, then learning activities will be more influential, effective, and efficient, so that the intellectual abilities of teachers and students become more skilled, it positively will affect the increase in the quality of education. There is a gap in students' critical thinking ability based on the pre-research survey results. The basic level of thinking is in the poor category, and self-efficacy is still lacking. This study aims to determine the extent to which the application of higher-order thinking skills learning through the problem-based learning (PBL) model improves student's critical thinking and self-efficacy. This study uses a quasi-experimental design and data collection techniques in tests, questionnaires, and observation sheets. This study's population was 123 students, sampling using a convenience sampling technique so that the sample used was 62 students. Based on the research results, there are differences. There is an increase between students' critical thinking skills and self-efficacy who use the PBL model rather than the conventional model. The research result implies that the PBL model is highly recommended for economics teachers. Still, it is necessary to provide innovation in the learning model so that in the learning process, it uses one model and innovates with other models.

**Keywords:** Critical Thinking, HOTS, Problem-Based Learning, Self-Efficacy

## 1. Introduction

Higher-order thinking skills critical to being applied and developed in learning. Because the learning activity is focused on the higher-order thinking skills development, then learning activities will be more influential, effective, and efficient, so that the intellectual abilities of teachers and students become more skilled, it positively will affect the increase in the quality of education (Antara et al., 2020; Hanifah, 2019). Higher-order thinking skills consist of three categories, namely HOTS as a transfer, HOTS as critical thinking, HOTS as solving a problem, the thinking skills of male and female students appear to increase if using attractive learning models (Brookhart, 2010). Educators should plan HOTS learning (H. S. Han & Brown, 2013; Sari et al., 2020). Students need to have critical thinking skills because it is for class success and the skills to deal with lifelong problems. These skills relate to identifying, analyzing, and solving problems creatively and logically to produce the right decision. These people believe critically tend to think before they act, and it's not easy to believe in something before they prove it themselves. (Harahap et al., 2020). High-level thinking in the learning process includes analyzing, problem-solving, evaluating, investigating, and decision-making (Khasanah et al., 2019). Critical thinking is an essential capability students need to have because one of the education goals is for students can think critically (Preus, 2012). Previous study reported that 99% of the institutions support teach critical thinking (Amaral et al., 2013; Huber & Kuncel, 2016). But in fact, the students' thinking skills in Indonesia are still low; it is known as 403 and was ranked 62 out of 70 countries (PISA). It shows that the critical thinking skills of students in Indonesia are still low.

The results of observations regarding students' critical thinking abilities, which were distributed to class X AP students at SMK Lab Business School Tangerang to show the

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actual condition of students' critical thinking abilities shows that the number of students who answered "always" was 8%, while those who answered "often" were 17%, then those who answered "rarely" were 30%, and the last who answered "never" was 45%. This shows that the critical thinking skills of students of SMK Lab Business School Tangerang are still low. This indicates that there is a gap between expectations and reality in the field. The result of observations regarding self-efficacy X AP grade students in SMK Lab Business School Tangerang shows that the number of students who answered "very confident" was 6%, while those who answered "sure" were 17%, then those who answered "not sure" were 30% and the last one who answered "very unsure" was 48%. This shows that the self-efficacy of students of SMK Lab Business School Tangerang is still low. This indicates that there is a gap between expectations and reality in the field.

The student becomes one of the problems in education by the lack of critical thinking skills and self-efficacy. Based on that, improving critical thinking skills and self-efficacy students requires one model or learning tactic to involve students directly in the process of fact-finding or information taught by teachers. The previous study that assesses critical thinking skills showed an effective way to improve students' understanding of learning concepts with critical thinking skills (Chukwuyenum, 2013). To enhance necessary thinking skills, the teacher as a facilitator to choose a model for effective learning, because with learning models that can effectively create a whole atmosphere of active learning, interactive, and creative so it can facilitate students in the mastery of the material, during the learning process students become more critical thinking in addressing the issue, social skills and learning outcomes are optimal. So an appropriate learning process must be used to make a successful learning process. To overcome these problems, we need a proper learning model. Problem-based learning can improve students' learning attitudes, critical thinking in decision-making, and assessment of sub-field problem-solving skills (Park, S & Choi, 2015). Problem-based learning is an excellent approach to focusing on long-life education because it stimulates constructive, collaborative, and self-directed learning of the exact problem relevant to professional practice, thus facilitating knowledge transfer (de Jong et al., 2014). The application of PBL methods can improve learning outcomes. Problem-based learning promotes meaningful learning because most of its power stimulates critical, reflective, and creative thinking (Blackburn, 2015).

Based on interviews with one of the teachers of economics and business subjects in class X in SMK Lab Business School in the year 2018/2019 is known that in the learning process of teachers still often use conventional learning models, teachers rarely use an innovative teaching model because teachers have not mastered a wide range of innovative learning models, learning model problem-based learning rarely applied because there is rarely coaching, teachers have difficulty in formulating the problem and the solution, limited time and lack of student participation in learning activities. So the ability to think critically and self-efficacy Lab Business School vocational students Tangerang still low. The effectiveness of HOTS learning increases self-efficacy (Sabur et al., 2021). The purpose of the activity problem-based learning model has been achieved: students learn the research concept, engage in discussions with peers, and actively engage with and are motivated by authentic activities (Elder, 2015). Thus problem-based learning model may be an attractive option to make students more been actively involved in the classroom. Applying the problem-based learning model can enhance your faced problem-solving skills when learning and self-efficacy students (Rokhmawati & Djatmika, 2016). This indicates that the students have developed the skills to adapt to their environment and can have self-control. It can be seen from students' courage to give an opinion, the ability to think positively, and high self-efficacy. The center of problem-based learning is the effectiveness of students' ability to solve the problem, so the problem-based learning model can be designed to facilitate collaborative learning students, similar to the results of research conducted by (Khusaini et al., (2018) the application of the PBL method can improve learning outcomes, in line with several research results (Malmia et al., 2019; Pu et al., 2019; Rezkillah, 2020; Saputra et al., 2019; Seibert, 2021). Not all research has shown that problem problem-based models can improve students' critical thinking skills.

Based on the analytical above, there is a research gap regarding the application of the Problem Based Learning model, so that the novelty in this study, in theory, there are still many imbalances in the results of previous studies and seeing the results of the pre-research survey students, the level of critical thinking and student self-efficacy. Thus the researcher interested in researching the application of a problem-based learning model, but a study conducted by the researcher differs from some previous research on the learning problem-based learning model that will be applied in SMK X AP grade on the economic subject of the documentary training business at home and abroad material, because of the scarcity of learning models probe-based learning material applied in the economy, the former researcher of problem-based learning model used in science material as an example of some of the above research conducted on the subjects of science material and mathematics to high school. The research result implies that the PBL model is highly recommended for economics teachers. Still, it is necessary to provide innovation in the learning model so that in the learning process, it is not only using one model but also innovating with other models. Using problem-based learning models in business economics learning, students are expected to create an active learning process, interactive and creative, develop students' critical thinking skills, and have high confidence (self-efficacy) to solve problems in the learning process. Based on the description above, the research on the "application of higher-order thinking skill learning through problem-based learning model for improving critical thinking and self-efficacy" is held. The purpose of this research is to find out the extent of the application of problem-based learning models to improve student's critical thinking and self-efficacy skills

## 2. Method

This study is included in the quantitative research. The location of his research is in vocational Lab Business School Tangerang. Methods that researchers use in this study in the experimental process. The experiment used is a quasi-experimental design. The population in this study was 123 students. Sample decision uses a convenience sampling technique, so the sample used is 62 students. The research was conducted by taking two classes. Experiment class treatment is given higher-order thinking skills learning through problem-based learning models, and control class uses conventional models. Data collection techniques used in this study, with pretest and post-test in the form of essay questions used to measure students' critical thinking, a questionnaire was used to measure self-efficacy students' optional answers that respondents only answered following the existing optional, observation and documentation. The test totals 12 questions, then after the validity test, and valid questions amounted to 9. The questionnaire amounted to 25 questions, then after the validity test was done, the total question were 19 questions, quiz and question used were also tested reliability, and the results were reliable. The hypothesis proposed to determine whether accepted or rejected. The test used is t-test correlation testing to determine whether there is a difference between the data compared. Those are critical thinking and self-efficacy students in experiment class, and control class was analyzed using statistical methods to test the average of two independent groups. The purpose of this research is to find out the extent of the application of problem-based learning models to improve student's critical thinking and self-efficacy skills.

## 3. Result and Discussion

### Results

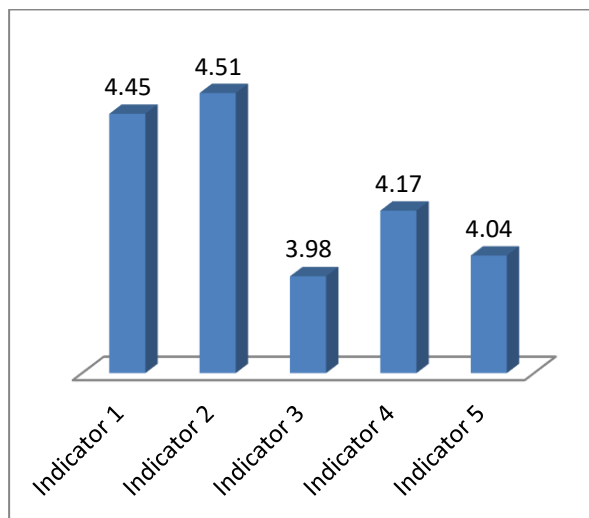
#### Critical Thinking Skills

Students are easy to understand in an experimental class's learning process because students in the learning process are emphasized to discuss and solve problems. Students examine the issues given by the teacher. The discussion process makes students exchange ideas or information. Furthermore, students present the results of discussions in front of the class, then the other students are welcome to ask questions. So that the learning process in

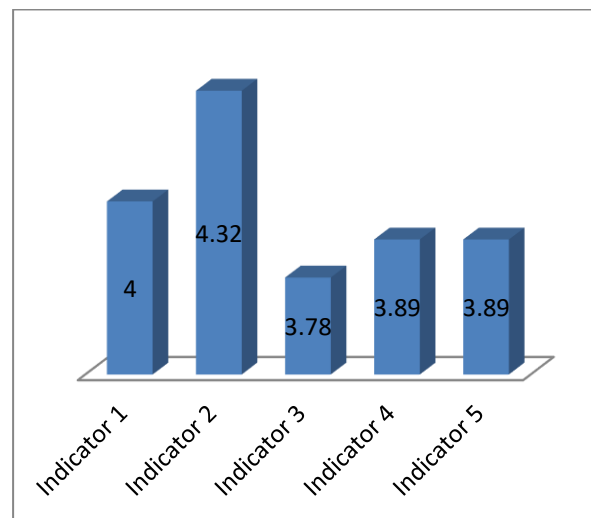
the experimental becomes active. The lowest post-test scores for students of the practical class research are 73, while the highest post-test score is 91. Many students get a score of 80-91 because they can understand and answer the questions correctly in answer post-tests in answering post-test questions. So students get low scores when the post-test question was given. Meanwhile, students' score after treatment is increased. Data from the students' critical thinking skills were obtained from a test given in the experimental class with the trade documents at home and abroad material with 9 points. Each question contains indicators of critical thinking skills in the classroom experiment was 21.15. The average score of critical thinking skills indicator in the experimental class can be seen in Figure 1.

Figure 1 explains that the score of each indicator of the ability to think critically is not different. The third indicator to questions 3 and 4 had the lowest average score. At the same time, the highest average score is in hand 2 to ask 9.

Control class students do not understand the material. Because the learning process using the conventional model / so that students only pay attention to the teacher, and students become more quickly bored. A student in the learning process quieter so that the action is not the students' lowest teacher. Based on research that has been conducted on students in the control class, students gain a post-test score was 69, while the highest post-test score was 89. Many students get 69-80 because teachers concentrate on the learning process; teachers explain, give assignments, and answer questions only. Students' critical thinking skills were obtained from a test score given to the control class with trade documents at home and abroad. Whichever 9 number question each question contains an indicator of the ability to think critically observed, the overall number of hands of students' critical thinking in the control class is 19.88. The average score of each indicator of the ability to think critically in the control class can be seen in Figure 2.



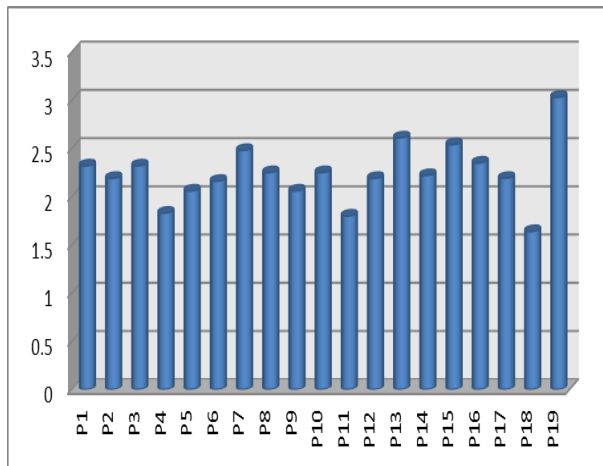
**Figure 1.** Diagram average score of each indicator of the ability to think the experimental class critically.



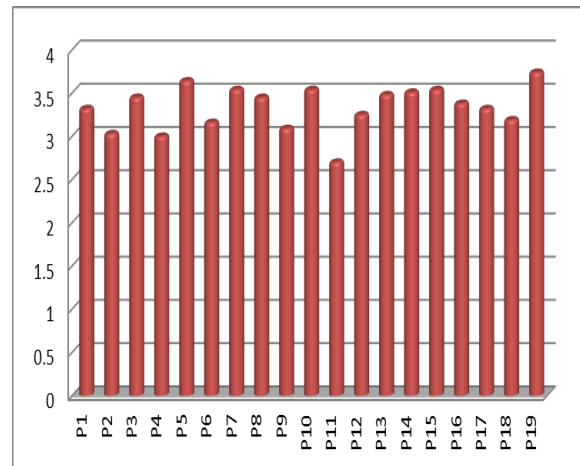
**Figure 2.** Diagram of each indicator's average score of the ability to think critically thinking on the control class.

Figure 2 identifies that each average each indicator of the ability to think critically is not different. The third indicator to questions 3 and 4 had the lowest average score. At the same time, the highest average score in the first indicator to question 5. The questionnaire was given to students in class experiments aimed to determine students' self-efficacy before given treatment. After giving learning treatment higher-order thinking skills through problem-based learning models, there is an increase. The results from the average score of self-efficacy students learning before delivering higher-order thinking skills through model problem-based learning presented in Figure 3. Based on Figure 3, can be seen that the average score of each questionnaire self-efficacy before being given treatment study higher-

order thinking skills through problem-based learning model not different each other, in question number 18 obtained the lowest average score is 1,64 while the question number 19 the highest score is 3,03 and the average overall results of the questionnaire self-efficacy before being given treatment that is 2,23. The results from the average value self-efficacy students are given after learning higher-order thinking skills learning through model problem-based learning presented in Figure 4.



**Figure 3.** Diagram of the average score self-efficacy of students before given treatment



**Figure 4.** Diagram of the average score self-efficacy of students after being given treatment

Based on Figure 4, the average score of each questionnaire self-efficacy given treatment after higher-order thinking skills learning through a problem-based learning model is not different. Question number 11 obtained 2,7, which is the and question number 19, with the highest score is 3,74 and the average overall result of self-efficacy questionnaire after being given treatment that is 3,32. Based on the above analysis, self-efficacy experimental class students use learning higher-order thinking skills through problem-based learning models. It can be seen based on the overall average score of 2,23 before being given treatment while being given the treatment of 3,32. It can be concluded that higher-order thinking skills learning through a problem-based learning model can improve students' self-efficacy.

The mean is the average score that can represent the data from the experimental class and control class. The average score pretest in the control class is 41,64, while the average score of the post-test in the control class is 78,61, while the difference score between the pretest and post-test average score is 36,97. This study has the purpose of comparing two different scores of pretest and post-test between experiments class with higher-order thinking skills learning through problem-based learning and control class using conventional models. Whether the test scores between the two categories are different or not. Testing to see this difference is applied only to the two scores' average only using the t-test. The results of t-test analysis is presented in Table 1.

Based on data obtained from the results of hypothesis testing can be seen, t-count is 2,670. Table statistic t-table can be in the 0,05:  $2 = 0,025$  with df 60 is equal to 2,000  $t\text{-count} > t\text{-table}$  ( $2,670 > 2,000$ ) so that  $H_0$  is rejected so it can be concluded that there is a difference between critical thinking skills and self-efficacy students who use higher-order thinking skills through problem-based learning model with conventional models in the business of economic subject in grade X SMK AP Lab Business School Tangerang.

## Discussion

Problem-based learning is carried out in experimental class, in students' initial activities, and teachers are reading prayers and led by the class leader. The teacher conducts attendance to students and provides learning motivation until delivering teaching

materials following the PBL model's rules, followed by evaluating learning using instruments following critical thinking indicators. 21st-century learning demands learning innovation skills that emphasize problem-solving as a means of knowing students' critical thinking skills so that the learning process becomes meaningful (Faqiroh, 2020; Haji et al., 2015; S. Han et al., 2016; Jalani & Sern, 2015; Nurtanto et al., 2020). Through the Problem Based Learning model, students are trained to work together as a group to know problem solving and most importantly can improve their ability to solve the issues and make conclusions and decisions. PBL is an active learning model, starting from a particular problem (De Witte & Rogge, 2016). Through group discussions, students can find their way of learning so that they can solve problems together. The implementation of Higher Order Thinking Skill learning through a problem-based learning model in class X AP at SMK Lab Business School Tangerang can be carried out very well. This can be seen from teachers' assessment in the business economics study of accompanying teachers or supervisors by 92. The PBL model is implemented in a learning process associated with complex real-life and involves interdisciplinary content involved in collaborative teaching to manage the diversity students have in the classroom, where students acquire problem-solving skills in a student-centered learning environment that reflects active learning and constructivist philosophy (Caesar et al., 2016; Guilherme et al., 2016; Kang et al., 2015; Loucky, 2017).

Problem Based Learning model is applied in the experimental class X AP 3, students at the time of the learning process become more active, creative, critical thinking in solving a problem. In this model, the teacher gives issues to discuss the group and then presents the discussion results in front of the class. Learning with Problem Based Learning model is one form of learning model developed from the theory of learning constructivism Piaget and Vygotsky (Rahmayanti, 2017; Syamiya, 2013). PBL learning model, when done well following the stages, can be critical thinking ability of students, especially in indicators of strategy and tactics development (Rahmat et al., 2020). Posttest results after being given a different treatment in the learning process, obtaining an excellent post-test score to improve student's critical thinking, according to indicators can already identify and solve problems, students in answering questions have been comprehensive, students have responded to questions correctly even though not concluding answers, as a large number of students in answering questions have sufficient material understanding to provide a complete explanation, students identify and solve many problems that are thorough and answer correctly and clearly. Students who often ask open questions practice to induce, deduce information, and then conduct evaluations to have better critical thinking skills (Almulla, 2018; Irawati et al., 2016). This is because the effective environment that supports the learning process can facilitate students' critical thinking skills and problem-solve (Gregory & Lodge, 2015; Saputro et al., 2019). This study confirms previous research, which says that the PBL model affects students' critical thinking skills (Kamil et al., 2019; Kumullah et al., 2018; Munandar et al., 2018). PBL models in practical classes of students are more critical thinking than in control classes (Lapuz & Fulgencio, 2020; Rahmatika et al., 2020). However, many studies have good results in improving students' critical thinking through the PBL model. However, the weakness of the PBL Model is the lack of discipline of students in the learning process and the lack of research time is not able to answer authentic problems that are more challenging (Green-Thompson et al., 2012).

Higher-Order Thinking Skill learning through the Problem Based Learning model in this study also focuses on improving student Self-efficacy measured using questionnaires to determine students' self-efficacy in the experimental class before treatment and treatment. The results of the questionnaire given to students after-treatment of the overall score averaged 3.32. So it can be said that Higher Order Thinking Skill through the Problem Based Learning model can increase students' self-efficacy. A learning environment that provides authentic experiences to students and provides greater responsibility for their learning is considered to improve self-efficacy (Mataka & Kowalske, 2015). Based on the results of this study, it confirms the results of previous research stated that PBL improves self-efficacy and student learning outcomes (Amini et al., 2019; Masitoh & Fitriyani, 2018; Saputro et al., 2020; van Rooij et al., 2017). In contrast to the research results stated that PBL learning model run

to pre-office chemistry teachers provides a low level of self-efficacy (Rusmansyah et al., 2019). So, in this study, the researchers concluded that the PBL learning model confirms previous research that states that PBL increases students' self-efficacy. This study's products contribute to the learning process recommended for educators to use the PBL model. Considering that this study's results are still straightforward, what is obtained from this study results is not the final result. All the limitations of this study can be used as reference material for further research by considering other possibilities. The PBL model needs to be maintained and improved again for the classroom's learning process with an active, creative, and innovative learning model. The learning process not only uses one model but also innovates with other models.

#### 4. Conclusions and Suggestions

There is a difference between critical thinking and self-efficacy students who use higher-order thinking skills learning through problem-based learning model and conventional models on the subject of business economics. Given the research is expected as input for teachers in the learning process using higher-order thinking skills to enhance students' thinking skills. Guidance to researchers is then expected to add other variables, as many others may affect students' critical thinking skills and self-efficacy. The researchers then eagerly awaited future researchers using analytic techniques different from those used by the authors. And it is also recommended to the following researchers when conducting research should be planned in detail and systematic and carried out as well as possible so that the results obtained become better and more optimal than what has been done before.

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