

# Critical Thinking Skills in Economic's Learning using Teaching Material based Problem Based Learning and Predict Observe Explain (TM-PBLPOE)

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## Abstract

The aim of this research is to determine the effectiveness of Teaching Materials based on Problem Based Learning Predict, Observe and Explain (TM-PBLPOE) on the development of students' critical thinking skills in economics learning. The research was conducted in SMA Muhammadiyah 1 Surakarta. The Research method was quasi-experimental and pretest-posttest control group design. The population of this research is the tenth years students of SMA Muhammadiyah 1 Surakarta in the academic year of 2021/2022. The writer used purposive sampling to get sample. The sample consists of 70 students which are divided into two classes. The first class consisting 36 students as an experimental class, and the other 34 students as a control class. The instrument used to collect the data was test to get scores of critical thinking skill. Data analyst using inferential statistics. The results showed that TM-PBLPOE were effective in improving critical thinking skills in economics learning. This is supported by the results of the independent sample t-test with the acquisition of a p-value of  $0.000 < 0.05$  and a Normalized gain (N-gain) of 76.80 which is included in the effective category. The use of TM-PBLPOE can be an alternative to economics learning teaching materials to improve critical thinking skills.

**Keywords:** Economic Learning, Critical Thinking Skill, TM-PBLPOE.

## INTRODUCTION

The development of Science and Technology has brought human beings to great changes in the life of society. Humans must always strive to improve their quality so that they are in line with these changes so that they are able to survive and fulfill various basic needs in accordance with the context of the current era. (Oktafiana, Jaya, Nursaban, Supardi, & Satria, 2020). Economics is a branch of science that focuses on discussing human efforts in order to survive and is one of the core

lessons in 21st century learning (Boyer & Crippen, 2014: 345) and directs students to analyze and apply critical thinking skills (Arsaythamby & Julinamary, 2015).

In 2022, education in Indonesia provides three curriculum options that can be used as alternative choices by the Education Unit in the context of independent learning, in which schools are free to choose according to the conditions of their schools, these choices include the 2013 curriculum, the Emergency curriculum and the Independent Curriculum.

The Independent Curriculum is one of the first steps in supporting the realization of the goal of national education, namely the intellectual life of the nation. The presence of a new curriculum, namely the independent curriculum, is used as an initial step to recover learning caused by Covid-19. It aims to reduce the consequences of losing learning recovery. The independent curriculum is directed to create a profile of Pancasila students who have six dimensions of character and abilities as lifelong learners, one of which is critical thinking skill.

Critical thinking skills are higher order thinking skills that enable a person to make decisions and do things (Ennis, 2018). Maynes (2015:184) also argues that one of the thinking skills that must be developed as well as a pedagogical goal of education is critical thinking. Teaching materials are one of the factors that support learning activities so that students are able to understand the material and apply it in everyday life (Perdanasari, Sudiyanto, & Sangka, 2021). Prastowo (2012) emphasizes that interesting, effective, and efficient learning requires innovative teaching materials. Teaching materials are a collection of materials/substances that are arranged systematically, which displays a complete picture of the competencies that students must master in learning activities (Dick, Carey & Carey, 2005). The teaching materials themselves need to be compiled using the syntax of certain learning models in order to be able to improve critical thinking skills. The learning model that is widely used is Problem Based Learning (PBL) and is suitable for use in social science subjects (Leary, Walker Shelton & Fitt, 2013). PBL has the advantage of connecting students directly to real-world problems that can optimize critical thinking skills and provide opportunities to apply knowledge in solving problems (Arends, 2012). But, Fitriani, Zubaidah, Susilo, & Al Muhdhar (2020) found that there were weaknesses in PBL, especially in its learning syntax, there was no direct predicting activity for investigation activities. Whereas prediction activities need to be carried out by students so that they can compare answers before and after participating in learning activities in teaching

materials (Fitriani Fitriani, Zubaidah, Susilo, & Al Muhdhar, 2020a). In addition, according to Adebayo & Olufunke (2015) prediction activities in the syntax allow students to explore curiosity about a problem and generate ideas based on experience. Therefore, the preparation of teaching materials in the form of modules with the PBL learning model syntax will be combined with the Predict, Observe and Explain (POE) learning model syntax to overcome these problems (Haysom & Bowen, 2014). POE consists of three activities, namely predicting, observing, and explaining. Furthermore, prediction activities that are accommodated in POE can help improve PBL syntax by comparing observations with previous predictions so as to increase the accuracy, understanding, and rationality of an object (Bilen Ozel, & Kose, 2016). In line with that, the findings from Fitriani, Zubaidah, Susilo, & Al Muhdhar (2020a) show that PBLPOE can be used in teaching materials to improve students' critical thinking skills in the classroom and has a significant effect.

Based on this, the purpose of this research is to determine the effectiveness of TM-PBLPOE in improving students' critical thinking skills in economics learning.

## LITERATURE REVIEW

### Critical Thinking Skill

Critical thinking ability is a higher order thinking ability that allows a person to make decisions and take actions to reach the highest cognitive level (Ennis, 2018). If students have this ability, they will be able to objectively process information both qualitatively and quantitatively, build linkages with various information, analyze information, evaluate and conclude (Arsaythamby & Julinamary, 2015). The ability to think critically is very important to be mastered by students (Wilson, 2019) as a consequence of globalization, the information revolution, modernization that comes quickly and connectivity that brings new ways of building a mindset in presenting various knowledge. Anderson & Krathwohl (2001) suggested that critical thinking skills lead to the

cognitive level, namely analyzing, evaluating and creating. The explanation of each level that has been adapted and used as a guide for

learning and assessment in Indonesia is as follows:

Table 1. knowledge competencies based on Bloom's revised Taxonomy

Level		Learning Outcome Verbs
1	Remember	cite, define, describe, identify, label, list, match, name, outline, quote, recall, report, reproduce, retrieve, show, state, tabulate, and tell.
2	Understand	abstract, arrange, articulate, associate, categorize, clarify, classify, compare, compute, conclude, contrast, defend, diagram, differentiate, discuss, distinguish, estimate, exemplify, explain, extend, extrapolate, generalize, give examples of, illustrate, infer, interpolate, interpret, match, outline, paraphrase, predict, rearrange, reorder, rephrase, represent, restate, summarize, transform, and translate..
3	Apply	apply, calculate, carry out, classify, complete, compute, demonstrate, dramatize, employ, examine, execute, experiment, generalize, illustrate, implement, infer, interpret, manipulate, modify, operate, organize, outline, predict, solve, transfer, translate, and use.
4	Analyze	analyze, arrange, break down, categorize, classify, compare, connect, contrast, deconstruct, detect, diagram, differentiate, discriminate, distinguish, divide, explain, identify, integrate, inventory, order, organize, relate, separate, and structure.
5	Evaluate	appraise, apprise, argue, assess, compare, conclude, consider, contrast, convince, criticize, critique, decide, determine, discriminate, evaluate, grade, judge, justify, measure, rank, rate, recommend, review, score, select, standardize, support, test, and validate.
6	Create	rrange, assemble, build, collect, combine, compile, compose, constitute, construct, create, design, develop, devise, formulate, generate, hypothesize, integrate, invent, make, manage, modify, organize, perform, plan, prepare, produce, propose, rearrange, reconstruct, reorganize, revise, rewrite, specify, synthesize, and write.

(Sumber: Anderson & Krathwohl, 2001)

Based on the description above, the indicators that will be used in this study according to Anderson & Krathwohl are in the evaluation category with each sub-category that will be adjusted to the learning objectives in economics subjects.

#### Teaching Material

Dick, Carey & Carey (2005) suggest the notion of teaching materials is a collection of materials/substances arranged systematically, which displays a complete picture of competencies that must be mastered by students in learning activities. Another opinion expressed by Daryanto and Dwicahyono (2014), teaching materials are a set of materials

that are systematically arranged both written and unwritten so as to create an atmosphere that allows students to learn. Slavin (2003) reveals the importance of using teaching materials to influence students' cognitive and metacognitive thinking skills. Prastowo (2013) suggests various forms of teaching materials that can be used in learning, one of which is in the form of modules. The module has a complete component structure compared to other forms of printed teaching materials consisting of seven components, namely (1) titles, (2) basic instructions, (3) basic competencies or subject matter, (4) supporting information, (5) exercises, (6 ) tasks or work steps and (7) assessment. Meyer (Kiong, Yunos, Mohanmmad, Otham, Heong & Mohamad, 2012) further emphasized that the

module in the form of teaching materials contains a series of carefully planned learning activities to help student learning achieve specific goals, not just worksheets or work units. lam or book chapter with additional questions. Furthermore, the preparation of teaching materials in the form of modules needs to be combined with the syntax of certain learning models, one of which is the combination of PBL and POE learning models. The PBLPOE model can be used to improve critical thinking skills (Fitriani Zubaidah, Susilo, & Al Muhdha, 2020a).

### Economics Learning

Learning is a process of interaction between students and teachers and learning resources in a learning environment. Winkel (2014) explains the notion of learning is a set of actions designed to support the learning process of students to be able to hone skills in problem solving. Economics is one of the social sciences and humanities cluster subjects at the secondary education level with a focus on studying human efforts to meet needs with limited means of satisfying (Oktafiana, Jaya, Nursa'ban, Supardi, & Satria, 2020). Economics subjects are subjects that have very complex material and have high relevance in everyday life (Amir, 2016). The learning achievements of economic subjects have been regulated in the Decree of the Head of the Educational Standards, Curriculum and Assessment Agency of the Ministry of Education, Culture, Research, and Technology Number 088/H/KR/2022 by describing learning outcomes in general and specifically related to understanding the concepts and processes involved. must be achieved by students.

## METHODS

### Research Design

This type of research is research and development with a quasi-experimental method. The research design is pretest and posttest in the control and experimental classes. The independent variable in this study is PBLPOE-based teaching materials, while the

dependent variable is students' critical thinking skills in economics learning. The research design is described in table 2.

Table 2. Pretest and Posttest Control Class Design

Class	Pretest	Treatment	Posttest
Experimental	P1	E	P3
Control	P2	C	P4

(Source: Data processed, 2022)

### Research Sample

The population of this research is the X grade students of SMA Muhammadiyah 1 Surakarta in the second semester of the 2021/2022 academic year. Sampling using purposive random sampling method and selected 2 classes, namely X-1 and X-4 because they have the same academic ability seen from the average value of the class. Class X-1 as the experimental class and X-4 as the control class.

### Data Collection Instrument

The instrument used to measure students' critical thinking skills is in the form of an essay test consisting of 5 questions with a score ranging from 0 to 20. The test instrument has first been tested for validity, reliability, differentiating power and the level of difficulty of the questions. The grid of test questions can be described in table 3.

Table 3. Critical Thinking Skills Test Grid

	Indicator	Σ Questions
Evaluate	Students are able to make decisions related to case studies of payment system problems that occur in Indonesia	1
	Students are able to assess the authenticity of money by examining the security elements on banknotes.	1
	Students are able to make decisions from economic actors regarding problems in the choice of payment systems in e-commerce companies	1
	Students are able to assess the best actions that are wise to be carried out by traders related to economic problems	1
	Students are able to make the best decisions that are chosen by consumers in meeting their needs regarding the use of money	1

(Source: Data processed, 2022)

## Data Analysis

The analytical technique used to determine the effectiveness of teaching materials in the form of PBLPOE-based modules on critical thinking skills in economic learning uses inferential statistics with the T-test (Independent Sample T-test) and Normalize gain (N-gain) but first a prerequisite test has been carried out, namely the normality and homogeneity. The table used as the categorization of the n-gain value is as follows:

Table 4. Categorization of Interpretation of Effectiveness

N-gain (%)	Categories
< 40	Ineffective
40 -55	Less effective
56 – 75	Quite Effective
> 76	Effective

## RESULT

The study was conducted in two groups by giving different treatments. The experimental group was given treatment using PBLPOE-based teaching materials, while the control group did not use development products. The teaching materials used previously have been tested by experts in their fields. The implementation of learning in research has been carried out in four meetings, with the following details:

Table 5. Action Implementation in Experiment and Control Group

Meeting	Activities
First	Pre-test
Second	Learning Activities 1
Third	Learning Activities II
Forth	Post-Test

(Source: Data processed, 2022)

The results of the pretest and posttest scores obtained are used to determine the effectiveness of PBLPOE-based teaching materials in economic learning. Before carrying out statistical tests to determine the effectiveness of the product, pre-requisite tests were carried out including tests for normality and homogeneity. The test results can be seen in tables 6 and 7.

Table 6. The result of Normality Test

Data	Kolmogorov Smirnov		
	Statistic	Df	Sig
P1	0,139	34	0,093
P3	0,166	34	0,190
P2	0,153	36	0,033
P3	0,140	36	0,072

(Source: Data processed, 2022)

Table 7. The Result of Homogeneity Test

Test of Homogeneity of Variance						
			Levene	df1	df2	Sig
			Statistic			
P3	&	Based on Mean	2,782	1	68	0,100
P4		Based on Median	2,210	1	68	0,142
		Based on Median and with adjusted df	2,210	1	62,360	0,142
		Based on trimmed mean	2,890	1	68	0,094

(Source: Data processed, 2022)

After the pretest and posttest data meet the prerequisite tests, then the data is then used for statistical tests to determine the effectiveness of the product. The effectiveness test in this study can be interpreted as a hypothesis test. This test is carried out using a T-Test (independent sample t-test) and an N-gain score assisted by SPSS 22. The test results can be seen in tables 8 and 9.

Table 8. Result of T-test (Independent Sample T-test)

		T-test for Equality of Means						
		T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
P3	Equal variances & assumed	7,924	68	0,000	7,755	0,979	5,802	9,708
P4	Equal variances not assumed	7,998	63,570	0,000	7,755	0,970	5,818	9,692

(Source: Data processed, 2022)

Table 9. Results of N-gain Value

Class	Max <i>n-gain</i>	Min <i>n-gain</i>	Mean <i>n-gain</i>
E	93,33	60,00	76,80
C	76,00	26,00	56,49

(Source: Data processed, 2022)

## DISCUSSION

The teaching materials developed are based on constructivism theory which emphasizes the involvement of students in the search for knowledge (Fitriani, Zubaidah, Susilo, & Al Muhdhar, 2020). Constructivism-based learning provides meaningful and useful learning in improving students' higher-order thinking (Qarareh, 2016). Therefore, the development of teaching materials is directed at improving students' critical thinking skills. Critical thinking skills are needed in real life because this thinking process will be used to make decisions through the ability to analyze various evidence, methods, criteria, context, conceptual, and relevant sources of information to be applied in real life (Setyowati, Sari & Habibah, 2020).

The development of the teaching materials that will be selected is in the form of modules because they have a more complex component structure compared to other forms of teaching materials (Prastowo, 2013). In addition, teachers are also expected to compile teaching materials used to support learning activities. The preparation of teaching materials in the form of modules will be arranged using a learning model syntax approach so as to improve critical

thinking skills. PBLPOE is an option in the learning model approach for conducting module preparation. This is based on the results of research by Fitriani, Zubaidah, Susilo, & Al Muhdhar (2020) that the syntax of the two learning models complement each other so as to improve critical thinking skills.

PBLPOE-based teaching materials consist of three information, namely general, core and supporting information with six activities in learning activities, namely: (1) orientation; (2) prediction; (3) organizing; (4) investigation; (5) presentation; and (6) evaluation. The experimental class gets action by implementing the six activities in accordance with the instructions that have been described in the teaching materials so that learning activities. The application of TM-PBLPOE in the experimental class makes the class atmosphere conducive and comfortable and is able to improve students' critical thinking skills through activities during learning.

The effectiveness of PBLPOE-based teaching material products to improve students' critical thinking skills in economics learning can be seen from the results of parametric statistical tests, namely the Independent Sample T-Test and the N-gain value. However, before carrying out the test, the pretest and posttest data first passed the prerequisite tests, namely normality and homogeneity tests.

Prerequisite test results can be seen in tables 6 and 7. The normality test calculated with the help of the SPSS application shows that the significance value (Sig) for both pretest and posttest data in the control and experimental classes shows that the value is greater than (Sig > 0.05), then  $H_0$  is accepted so that the data can

be declared normally distributed. Then, the results of the posttest data homogeneity test for the experimental and control classes obtained a significance value of  $0.100 > 0.05$ . This shows that the sample used is a homogeneous variance. After the prerequisite test is met, it can proceed to the product effectiveness test stage.

Statistical testing to determine the effectiveness of the product can be seen from the Independent Sample T-Test and N-gain. The results of the Independent Sample T-Test can be seen in table 8, it is known that the significance value (Sig) of the t-test is  $0.000 < 0.05$ . This shows that  $H_0$  is rejected and  $H_a$  is accepted, so it can be seen that there is a significant difference in the average learning outcomes of the experimental and control groups. Then it can be continued to do the N-gain score test. This test is used to determine how effective the PBLPOE-based teaching materials are in improving students' critical thinking skills. The results of the n-gain calculation can be seen in table 9. The results of the calculation of the N-gain can be seen that the average value of N-gain for the experimental class is 76.80%, which is included in the effective category, while the control class is 56.49%, which is included in the quite effective category.

## CONCLUSION AND RECOMMENDATIONS

Based on the results and discussions that have been carried out, it can be concluded that TM-PBLPOE are effective for improving students' critical thinking skills in economics learning. This is shown from the results of the statistical test of the pretest and posttest data with the Independent Sample T-Test, it is known that the significance value (Sig) of the t-test is  $0.000 < 0.05$ , indicating that there is a difference in the average value of the experimental and control classes and the calculation of N-gain with a value the average N-gain for the experimental class is 76.80%, which is included in the effective category.

The suggestions that can be used as constructive input in order to improve the quality of learning through learning in schools are as follows: (1) Students are expected to actively explore knowledge related to learning materials through various sources, one of which can be through TM-PBLPOE; (2) Teachers are expected to be able to develop their profession so that they can acquire knowledge and learning practices that are able to meet the needs and potential of students; (3) schools are expected to facilitate and support the professional development of teachers through seminars, workshops, workshops and ect; and (4) other researchers are expected to be able to develop the results of this study in a wider scope which can produce even better research by not only taking a sample of the population in one school.

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