

Development of problem-based learning module in economics to increase students' critical thinking

Lailatul Maghfiroh^{*}, Endang Mulyani

Department of Economics Education, Universitas Negeri Yogyakarta, Jalan Colombo 1, Yogyakarta, Indonesia
**Corresponding author: lailatulmaghfiroh08@gmail.com*

Abstract

Module is a teaching material as an important component in the learning process. This research aims to produce economic learning modules with a problem based learning approach for students of class XI IPS that are feasible and effective to improve critical thinking skills. This type of research is research and development developed by Borg and Gall with the following stages: (1) preliminary study, (2) planning, (3) initial product development, (4) initial field test, (5) revision of main products, (6) test of main products, (7) revision of operational products, (8) test of operational fields, (9) revision of final products, (10) distribution. The economic learning module with the problem based learning approach was tested in the control and experimental classes, each of the 35 X-IPS students in MAN 2 Jombang. The result of research are: 1) Economic Learning Modules with Problem Based Learning Approaches which is feasible based on the material and media experts in the category of "Good", the response students get a "Very good" category, 2) results Economic learning modules with an effective problem based learning approach to improve critical thinking skills.

Keywords: *economic learning modules; problem based learning; critical thinking; research and development*

Introduction

Problem based learning (PBL) is a process of training students to have the skills to think logically, analytically, systematically, critically, independently and creatively in solving problems. PBL was effective to increase students' skill in questioning, teamwork, and problem solving (Stanley & Marsden, 2012). In secondary education, PBL increased the class atmosphere (Witte & Rogge, 2012) and the students showed better communication skills and teamwork than those with conventional learning (Abdullah, Tarmizi, & Abu, 2010). The problem solving activities also stimulated the teachers (Mohd Zabit, 2010) and affected their perceptions of problem solving (Temel, 2014).

However, previous studies reported that there was no difference between PBL and no PBL, statistically (Applin, Williams, Day, & Buro, 2011). Even, integrating technology into PBL would not help the learning process unless the technology would be discussed (Walker et al., 2012). Hung (2011) emphasized that PBL studies may be confounded by the method used and the PBL implementation, specifically the students' performance. Learning using problem solving activities would be increased significantly if the teachers understood constructivism and situated cognition (Marra, Jonassen, Palmer, & Luft, 2014). Therefore, not only the teachers, but the students are also the key in PBL implementation.

In Indonesia, problems are found in the learning process. Students and teachers use one textbook thus the knowledge gained by students is not deep and limited. The lack of procurement of supporting economic teaching materials in accordance with the needs of students who were rich in case resolution relevant contextual and applicative aspects of the 2013 curriculum learning, when the teacher conducts daily practice questions or tests related to analyzing, evaluating, and creating many students get scores under the minimum requirement because teachers rarely provide problem training which relates to real life (contextual).

One effort that can be done to increase learning resources is the need to develop additional teaching materials that can increase students' knowledge and help facilitate the task of teachers in delivering knowledge. The main task of a teacher in the world of education is to carry out the learning process in the form of the process of delivering information carried out in an effective, efficient, and professional manner in order to achieve learning goals for students (Daryanto & Raharjo, 2012). The process of delivering knowledge that is ineffective and lacks the attention of students will hinder the process of receiving knowledge or not achieving the competencies that are the goals in the learning process. The teacher is expected to have the ability to develop teaching materials independently thus the learning process can run effectively and attractively. Therefore, the objective of this research was to develop learning materials in PBL model to increase students' critical thinking.

Materials and Methods

This research produced learning modules with a problem based learning approach in economics. We followed the research and development model developed by Borg and Gall which has 10 stages, namely 1) preliminary study, 2) planning, 3) initial product development, 4) initial field test, 5) main product revision, 6) main product test, 7) operational product revision, 8) operational field test, 9) final product revision, 10) deployment.

The subjects in this study were 70 students in class XI IPS MAN 2 Jombang. Product feasibility tests are carried out by content experts, media experts, and teacher and students responses. Data was collected by interview, questionnaire, observation and exam. The feasibility of the learning modules was analyzed using conversion scores into 5 quantitative categories (Table 1). Product effectiveness was analyzed using N-gain score and paired sample t-test.

Table 1. Feasibility criteria for the learning module

Interval	Criteria
$X < Xi + 1.8 \times Sbi$	Very good
$X + 0.6 \times Sbi < X \leq Xi - 1.8 \times Sbi$	Good
$X - 0.6 \times Sbi < X \leq Xi + 0.6 \times Sbi$	Good enough
$X - 1.8 \times Sbi < X \leq Xi - 0.6 \times Sbi$	Bad
$X < Xi - 1.8 \times Sbi$	Very bad

Results and Discussion

Preliminary Study

At this step, we conducted literature studies and field studies. Literature studies were carried out by collecting information to support research such as studying books, national and international journals, and research reports. The material learned was about the use of modules in learning, problem based learning, material problems in employment in economic development, students' critical thinking skills. Meanwhile, the field study was carried out through observation and interviews with students and economic teachers in MAN 2 Jombang. The results of observations conducted by researchers were (1) teachers and students used one source of learning only, (2) students used textbooks as a reference in learning thus the knowledge gained by students is less profound and limited, (3) when the teacher conducted daily practice questions or tests with the problem categories analyzing, evaluating, and creating many students scored under the minimum requirement.

Planning

At this step, the activities carried out were identifying the material included in the economic learning module with the PBL approach and adapted to the 2013 curriculum. The material learned in this module was labor issues in economic development.

Early Product Development

The draft product was prepared based on the results of the preliminary study and research plan. At this stage the researcher prepared an initial draft of the product of economic learning modules with the PBL approach based on the 2013 curriculum. The draft modules included: cover, preface, table of contents, introduction, concept map, problem, material description, group activity, summary, evaluation, glossary, reflection, and bibliography.

The economic learning module with the PBL approach presented concrete problems that occur in the student environment. This problem was displayed in the form of questions and illustrated images with several problems that must be solved by students.

Module Validation

The following was the result of validating economic learning modules with a problem based learning approach according to several experts:

a. Product validation learning media by experts

Validation conducted by media experts includes four aspects of assessment, namely cover, introduction page, main section, and closing section. Table 2 implied that the total score was higher than the minimum value (72.8) thus the learning media was valid and categorized “good”.

Table 2. Media experts' validation

No	Aspect	Score	Value	Category
1	Cover	32	A	Very good
2	Introduction page	12	B	Good
3	Main page	32	B	Good
4	Closing page	12	B	Good
TOTAL		88	B	Good

b. Product validation by content expert

Validation by content experts included three aspects of assessment, namely material assessment, construction, and language. Table 3 implied that the total score was higher than the minimum value (68) thus the content was valid and categorized as "good".

Table 3. Content experts' validation

No	Aspect	Score	Value	Category
1	Content	33	B	Good
2	Construction	34	A	Very good
3	Language	16	B	Good
TOTAL		83	B	Good

Product Revision

Based on the validation, there were some suggestions in improving the economic learning module with a problem based learning approach before being tested on a limited scale, i.e.:

a. Revision according to media experts

Revisions included: 1) the writing color and background should be contrast to make it more readable, 2) the size of the image needed to be enlarged, 3) added an

illustration of the example of labor, 4) changed the color of the letters on the population scheme.

b. Revision according to content experts

Revisions included: 1) replaced evaluation questions with high order thinking oriented questions, 2) sentences should be shorter and simpler less than 20 words to make it easier for students to learn, 3) words "so " should not be in the beginning of a sentence, 4) corrected each command word and punctuation.

Main Product Test Result

The limited trial was conducted on 9 students who were given a response questionnaire to provide an assessment related to the economic learning module with a problem based learning approach. The assessment carried out covered several aspects, namely: material, presentation, language, and benefits. Students responded "very good" with the score of 119.6, much higher than the minimum score of 56.

Table 4. Students' response in problem based learning

No	Aspect	Score	Value	Category
1	Content	19.6	B	Good
2	Presentation	20.9	A	Very good
3	Language	10.5	A	Very good
4	Advantage	17.7	A	Very good
TOTAL		119.6	A	Very good

Operational Product Revision

After a limited trial, there were some inputs and suggestions from students. Suggestions and improvements made are to simplify a few sentences on the material thus it was easier for students to understand and correct sentences that are typos.

Operational Field Test Results

At this stage a trial was conducted on two classes, namely one control class and one experimental class. The control class and experimental class were 35 students. In the learning control class trials were conducted using power point media, while the learning experiment class used the economic learning module with a problem based learning approach.

The data on the operational field trials are in the form of the results of tests of critical thinking skills through pretest and posttest activities during learning activities. From the

results of the critical thinking ability test, we found an increase in the average value of the experimental class by 17.89 with a gain of 57.28 while the increase in the average value for the control class was 11.48 with a gain of 26.94. Thus it can be concluded that the ability of students in critical thinking in the experimental class has a greater increase compared to the control class and the economic learning module can be declared effective to improve the ability of students in critical thinking with moderate effectiveness.

Table 5. Results of pretest and posttest

No.	Class	Average		Average Gain score	Criteria
		Pretest	Posttest		
1.	Experiment	68.54	86.43	57.28	Moderate
2.	Control	58.86	70.94	26.94	Low

After calculating the gain value, the normality test and homogeneity test are carried out. From the two tests it is known that the data are normally distributed and homogeneous (Table 6 and Table 7).

Table 6. Results of normality test

No.	Class	p-value kolmogorov smirnov	Asymp.	Interpretation
1	Pretest control class	.200*	p>0.05	Normal
2	Posttest control class	.200*	p>0.05	Normal
3	Pretest experiment class	.200*	p>0.05	Normal
4	Posttest experiment class	.163	p>0.05	Normal

Table 7. Results of homogeneity test

	Levene Statistic	df1	df2	Sig.
pretest	.007	1	68	.932
posttest	.000	1	68	.995

After the normality test and homogeneity test, paired samples were conducted using paired samples t test to test the differences in critical thinking skills before and after the use of economic learning modules. The test results show that there are differences in students' critical thinking skills after using economic learning modules (Table 8).

Table 8. Results of paired sample t-test

Class	Sig. (2-tailed)	Asymp.	Interpretation
Control class	.000	sig > 0.05	Difference
Experiment class	.000	sig > 0.05	Difference

The application of economic learning modules to the problem based learning approach in the experimental class has a significant influence on students. The implementation of learning with a problem based learning approach with the steps of learning makes students able to help them in implementing fun learning. This is reinforced by the Arkinoglu & Tandogan (2007) problem-based learning model that can transform teaching into learning, change students who can only receive information passively to be active, independent and can solve problems given. Similar research was also revealed by Sihaloho & Sahyar (2017). At the end of learning the problem based learning model can be seen if students can identify, solve problems with their own abilities by developing creative thinking, one of which is in high-level thinking skills.

Dissemination

This stage of dissemination can be done by disseminating the results of research in the form of theses and scientific journals in order to provide benefits especially for educational institutions. At this stage mass production of economic learning modules can be carried out which will be used in the learning process in MAN 2 Jombang.

Conclusion

Economic learning modules that are oriented to the problem based learning approach meet the eligibility criteria based on the results of media expert validation with 88 "good" categories and material experts with 83 "good" categories, and students get 119, 6 with the category "very good". The results of the trial show that the economic learning module which is using the problem based learning approach is effective for improving critical thinking skills. This is based on the results of field trials found that $p < 0.05$, which means there are significant differences in students who take learning using modules and do not use modules for critical thinking skills.

References

- Abdullah, N. I., Tarmizi, R. A., & Abu, R. (2010). The effects of Problem Based Learning on mathematics performance and affective attributes in learning statistics at form four secondary level. *Procedia - Social and Behavioral Sciences*, 8(5), 370–376. <https://doi.org/10.1016/j.sbspro.2010.12.052>
- Andi, P. (2014). Pengembangan Bahan Ajar Tematik Tinjauan Teoritis dan Praktis. *Jakarta: Kencana Prenadamedia Group*.
- Applin, H., Williams, B., Day, R., & Buro, K. (2011). A comparison of competencies between problem-based learning and non-problem-based graduate nurses. *Nurse Education Today*, 31(2), 129–134. <https://doi.org/10.1016/j.nedt.2010.05.003>
- Arkinoglu, O., & Tandogan, O., & R. (2007). The Effects of Based Active Learning in Science Education on Students' academic achievement, attitude, and concept learning. *International journal of biological macromolecules*, 40(3), 217-223. <https://doi.org/10.1016/j.ijbiomac.2006.07.006>
- Daryanto & Raharjo. (2012). Model Pembelajaran Inovatif. *Yogyakarta: Gava Media*.
- Hung, W. (2011). Theory to reality: A few issues in implementing problem-based learning. *Educational Technology Research and Development*, 59(4), 529–552. <https://doi.org/10.1007/s11423-011-9198-1>
- Lin, C. & Wu, R. (2016). Effects of Web-Based Creative Thinking Teaching on Students' Creativity and Learning Outcome, *Eurasia Journal of mathematics, science, and technology education*, 12(6), 1675-1684. <https://doi.org/10.12973/eurasia.2016.1558a>.
- Marra, R., Jonassen, D., Palmer, B., & Luft, S. (2014). Why Problem-Based Learning Works: Theoretical Foundations. *Journal on Excellence in College Teaching*, 25, 221–238.
- Mohd Zabit, M. N. (2010). Critical Thinking Skills In Teaching Business Education In Malaysia : A Literature Review. *American Journal of Business Education*, 3(6), 19–32.
- Sihaloho, R. R., & Sahyar, E. M. G. (2017). The Effect of Problem Based Learning (PBL) Model toward Student's Creative Thinking and Problem Solving Ability in Senior High School. *Journal of Research & Method in Education State University of Medan*, 7(4), 11-18.

- Stanley, T., & Marsden, S. (2012). Problem-based learning: Does accounting education need it? *Journal of Accounting Education*, 30(3–4), 267–289. <https://doi.org/10.1016/j.jaccedu.2012.08.005>
- Temel, S. (2014). The effects of problem-based learning on pre-service teachers' critical thinking dispositions and perceptions of problem-solving ability. *South African Journal of Education*, 34(1), 1–20. <https://doi.org/10.15700/201412120936>
- Walker, A., Recker, M., Robertshaw, M. B., Osen, J., Leary, H., Ye, L., & Sellers, L. (2012). Integrating Technology and Problem-based Learning: A Mixed Methods Study of Two Teacher Professional Development Designs. *Interdisciplinary Journal of Problem-Based Learning*, 5(2), 9–27. <https://doi.org/10.7771/1541-5015.1255>
- Witte, K. De, & Rogge, N. (2012). Problem-based learning in secondary education : Evaluation by a randomized experiment randomized experiment. *Education Economics*, 24(1), 58–82. <https://doi.org/10.1080/09645292.2014.966061>