

Conference Paper

Improving Students' Higher Order-thinking Skills Through Problem-based Learning in Introduction to Microeconomics Course

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Abstract

Student achievements and learning outcomes are not just about grades but also their skills and ability to think critically in solving various problems individually, cooperatively, and creatively. These are known as higher-order thinking skills. Higher-order thinking skills should be an integral part of teaching and learning curriculum at the higher education level. One of the learning model that can improve students' higher-order thinking skills is problem-based learning (PBL). PBL is a learning model that presents a variety of authentic and meaningful problematic situations for students, which can be used to conduct research and investigations. This study aims to analyze the improvement of students' higher-order thinking skills through the implementation of PBL in introduction to microeconomics course at the Faculty of Economics, Universitas Negeri Padang. This study uses a classroom action research approach. Data were analyzed by quantitative and qualitative analysis. The results of this study show that PBL is effective in improving students' higher-order thinking skills. Based on the results, it is suggested that the instructional design developed should facilitate students to develop their higher-order thinking skills and encourage them to construct their own knowledge by using PBL or other relevant learning models.

Keywords: higher-order thinking skills, problem-based learning, microeconomics course

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1. Introduction

Learning is the human's effort to acquire knowledge, skills and other capabilities. The learning process is carried out in a formal setting in various educational institutions; one of which is the university. In this type of institution, the learning process is done through lectures.

There are two important variables in the teaching and learning process, namely the lecture materials and the methods of lecture delivery. The extent to which a lecturer masters the lecture material is as important as the extent to which the lecturer masters the methods of conveying the material, that she/has mastered, to the students. The

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current situation in education indicates that the learning process often disregards the practices that adhere to the stages of development of the students.

Recent developments in education have started to take into account the development of students in classroom practice. The learning process is no longer limited to the transformation of knowledge from lecturers to students but also leads to the development of students' potential and the application of knowledge in other situations. In fact, the learning process must emphasize the formation of knowledge and not just the aspects of knowledge, which make it necessary to develop applicable teaching methods.

Learning and lecture condition strongly affect the success or the failure of the designed learning process. The ability and creativity of lecturers as teaching staff are required so that lectures can run effectively and efficiently. With this new paradigm, learning is considered a failure if the students only succeed in understanding what is taught or if their knowledge is only a replication of the lecturers' ideas. On the contrary, the effectiveness of learning will be achieved if students acquire the necessary competencies and are able to apply and transform these competencies in new situations or places.

Educational institutions, especially universities, are still in the spotlight of the public. This is in line with Green's statement (2014) that:

Higher education is under attack. Well-publicized evidence indicates that students are learning less than the previous generation and perhaps not learning anything at all. Meanwhile, a combination of tight budgets, burgeoning student debt and a weak job market have increased pressure on colleges and universities to both keep costs down and provide solid evidence of the value of a college education.

This opinion implies that students need to learn and acquire 'value' from their education in the college.

The lecture method is a dominant method used today. With this method, the lecturer acts as the main character in the lecture and explains the materials to students. From the student's point of view, there are various weaknesses of this type of lecture where the learning remains dominated by lecturers. Students' creativity is not improved because the students are stuck in a routine of taking notes, listening and doing assignments based on the instructions given. Students lose the opportunity to see science as a reality and to understand the connection between theory and its application in the field because the explanation given is very abstract. When students are faced with cases of the real condition in the field, they are not able to analyze and apply the concepts and

theories they have learned to solve them. This is because the learning process only reaches the level of memorizing.

In addition, students are less trained in speaking and communicating their ideas. In fact, this ability is quite important considering that students are candidates for professionals in their fields. They are expected to present their abilities while interacting actively and positively with others. The lecture method that is centered on the lecturer is also an ineffective learning atmosphere. The learning process forces students to enter rigid learning atmosphere that is different from the pleasant life they normally go through every day. As a result, lectures become boring, not interesting to the students, and they sit in the class because of the tyranny and the indoctrination of numbers, This is contrary to Ellison's belief in Dryden (2004: 304) that the brain cannot pay attention to all things, and lessons that are not interesting, boring or not emotionally challenging, will certainly not be remembered.

The Introduction to Microeconomics course is a basic course and a prerequisite for the students to take the next course. Besides, this lecture provides the basic concepts of economics that are important for students of the Economic Education Study Program as prospective future economic teachers. As a prerequisite and a basic course, the students' mastery of this course material is quite important so that students can follow the advanced courses properly.

During the lectures, the researchers perceived that several important components in the teaching process have not been performed well. Lectures were conducted in a lecture method, and assignments are in the form of lecture notes and class discussions. However, there are still many weaknesses. First, the authors found that most students did not actively participate in the lectures. Their participation was limited to taking notes on the material presented by the lecture with the lecture method without a strong understanding of the topic. Learning activities are centered on the lecturer so that it forms the habit of copying lecture material although it is not fully understood by students.

Second, the researchers observed that the students lack the initiative to ask questions, to provide answers and to give opinions. There were a few who asked questions, but the person is usually the same student. When the researchers attempted to ask students' opinions on current issues related to micro-economics topics, students were not able to analyze and answer the phenomenon based on the existing theoretical basis. Even during the comprehensive exam on their mini-thesis, students seem to have difficulties in answering the questions asked by the thesis examiners on the basic economic concepts they learned in the introductory classes in Micro and Macro Economics.

Students were not able to explain the concept of the market, demand, supply, let alone present the graph and the functions and its analysis.

Third, the students lack the interest to read the provided lecture materials. Students tend to read only when they are given assignments. All this time, students are asked to write lecture notes. However, apparently, there are still many who do not submit the notes to the lecturer. In addition, when making a lecture note, the thought process that is happening is in the lowest level because students tend to rewrite what is in their handbook without understanding the material first. This is evident at the beginning of the lecture when students are given questions related to the contents of their notes, and they usually find it difficult to provide answers.

Some of the factors stated earlier are the causes of the gap in the learning process of the Introduction to Microeconomics course. If this condition continues in the future, the main implication is that the objective of the course will not be achieved, including the institutional objectives to produce scholars who are academically and professionally capable, who will contribute to the community; a superior generation who have high morale, strong work ethic and are independent.

To anticipate this phenomenon, it is necessary to develop appropriate teaching and learning strategies, encourage active participation from the students, stimulate reading interest and the spirit of learning that is fun and educational at the same time. Teaching strategies will determine the extent to which the students acquire knowledge and skills. The lecturers' mastery of different teaching methods is one of the guarantees that will help students to take an interest in the course subject and learn from it.

The current teaching trend does not perceive the learning outcomes in the form of a GPA score as the sole purpose of learning, especially in the university level. The students' tendency to memorize the material and answer the exam questions based on what they have memorized leads to a habit of memorizing everything. On the other hand, there are a lot of materials that they need to learn and it is impossible to memorize everything. The human brain has its limitations. Thus, what should be improved is the ability to think critically. This is supported by Yi et al. (2013), who stated that "the main problem of learning economic is the conceptual understanding. The skills need critical thinking." This is also in line with the concept of high order thinking proposed by the Central Board of Secondary Education (CBSE) in Ramos et al. (2013) that:

The concept of high order thinking skill or HOT is a fundamental shift in evaluation reform that aims at promoting thinking skills in learners and taking them away from rote learning. Higher level mental abilities of the learners such as

to analyze, interpret, reason out, synthesize or evaluate the given information are likely to enable them to transfer learning to totally different situations.

This definition describes HOT as a reform in learning assessment that eliminates the habit of memorizing. Students are expected to be able to analyze, interpret, synthesize and evaluate. Students are expected to have the conceptual understanding so that they can apply this understanding to the real world, such as through problem-solving.

According to Wardani (2006), the 1975 curriculum has since referred to the cognitive dimension in formulating the educational objectives; however, the main focus of the implementation is in memorizing and comprehension, and the higher-order thinking process has almost been unexplored. The impact of this condition is very clear, which is the lack of developing thinking skills of the students. The ability to think is categorized in Bloom's Taxonomy into knowledge, understanding, application, analysis, synthesis, and evaluation. The Bloom's Taxonomy was then modified by Anderson and Krathwohl into memory, understanding, application, analysis, evaluation, and creativity (Wardhani, 2006).

Higher-order thinking (HOT) is defined as a higher thinking process in the hierarchy of thinking abilities in accordance with Bloom's Taxonomy. According to Ramos et al. (2013), the HOT includes the ability to think critically and creatively, to analyze, solve problems and visualization. HOT includes grouping, comparing, contrasting ideas and theories and being able to solve problems. In the learning process, the HOT ability is a critical thinking ability that goes hand in hand with the discussion of the facts learned, including the ability to evaluate and find, the ability to search for information and to apply the problem-solving skill to problems in the real world.

The C4, C5, and C6 cognitive levels are the categories of HOT ability. This is because the cognitive level requires an ability to explain a cause and effect, prove a concept, compile, and decide a problem-solving technique that requires HOT. High-level thinking ability/ HOT ability is different in each student because the HOT ability is a mental process that develops differently in each individual. There needs to be different activities/circumstances that support its growth. Through observations and experiments, students are trained to think in high-order thinking because they must examine, analyze, experiment with their ideas until they come to a conclusion and are able to communicate it to other students.

One learning approach that can improve student learning activities, increase their high-level thinking skills and connect the knowledge they have learned with the real world problem is problem-based learning (PBL). Arends (2008) states that problem-based learning supports high-level thinking. PBL is designed to help students to develop

thinking skills, problem-solving skills and intellectual skills, to learn the role of adults by experiencing it through a various real-life situation or simulated situation, then become independent and autonomous students.

The use of PBL to improve the quality of the Introduction to Microeconomics course is expected to give results. Thus, an empirical testing is needed to support this hypothesis. For this reason, this research was carried out using a classroom action research approach. The purpose of this study is to analyze the application of problem-based learning in increasing the HOT skills of students in the Introduction to Microeconomics course.

2. Methods

This study is classroom action research. It involved 3 lecturers of Economic Education Study Program who taught the Introduction to Microeconomics course. The research design was a spiral model from Kemmis and Toggart which consists of several cycles. Kemmis and Toggart in Wiriaatmadja (2005: 66) explain the stages of the classroom action research, which include planning, acting, observing and reflecting.

The data analysis technique in this research was a quantitative analysis in the form of percentage and a descriptive analysis that describes and analyzes the collected data in descriptions of words. The qualitative data analysis employed the qualitative analysis model by Miles & Huberman (2007) which suggests that data analysis in qualitative research is carried out continuously and interactively until it is complete and the data are saturated. Activities in data analysis include data reduction, data display and conclusion drawing/verification.

3. Result and Discussion

This research was performed in two cycles. The research implementation in each cycle is explained as follows.

3.1. Cycle 1

The first stage is planning. At this stage, a syllabus, reference books, student assignments and case studies for problem-based learning were prepared. Students were divided into 7 groups, where each group consists of 4 people. The total number of students in this class is 28 people. Group division was done randomly. Observation

sheets were also prepared to observe student activities when presenting the material and group discussions when they were discussing problems, as well as other data collection instruments.

The second stage is acting. At the beginning of the lecture, the researcher explained the teaching methods that were going to be implemented to the students. Then, the syllabus and reference books were disclosed to the students. The topics covered in Cycle I were: demand, supply, price balance, elasticity, consumer behavior, and producer behavior. In the beginning, the lecturer explained the outline of the topic in the form of a lecture. This was done to provide students with the basic knowledge and concepts related to the topic to be discussed. This kind of understanding is needed because based on the experience of the researchers, the Introduction to Microeconomics course is a difficult course to students, especially when the topic includes mathematical functions and curves.

After that, the learning process was done using the problem-based learning model. The steps taken include a) providing an initial explanation of a case study to be completed by students. Case studies were provided through e-learning; b) facilitating students to conduct simple research to complete the case study individually and in groups; c) facilitating students to conduct independent and group investigations. Students completed the individual case study then discussed in groups so they can compare and discussed their answers in groups; d) presenting the results of the case study in front of the class, and e) analyzing and evaluating the process of solving the problem. After the group presentation was concluded, students and the lecturer discussed the case study. The lecturer provided feedback on their answers, such as by correcting misunderstandings on the case study. At the end of the first cycle, an evaluation was designed in accordance with the HOT skills in the form of a mid-semester exam.

The third stage is observing. Observations were made by the entire research team, especially by two team members who act as observers. Observations were carried out in each meeting. The data instrument is in the form of observation sheets and field notes.

The last stage is reflecting. After the lecture process in Cycle I was complete, the research team collected available data. Data were in the form of observation sheets and field notes, students' answers to the questionnaire given and learning outcomes data in the first cycle. The average student learning outcomes at the end of the Cycle I were obtained from the average score of the students' mid-semester test, which is 73. The highest score is 95 and the lowest is 50. Students who received scores below 60 are 3 students or it amounts to 11%. Based on the answers of students to the questions given, students still have difficulty in answering question number 1 and number 4. The first

question is a complex case and question number four is curve analysis. The rest two questions were answered correctly by students because the cases were simpler.

The results of field notes and student answers to the open questionnaires can be seen in the table below.

TABLE 1: Description of open questionnaire data and field research notes.

No.	Aspect	Notes
1.	Student responses on the effectiveness of learning	1. Effective: 19 people (68%) 2. Not Effective: 6 people (21%) 3. Undecided: 3 people (11%)
2.	The strengths of the method according to the students	a. Train the ability of students to speak through the process of discussion and their attendance b. Provide the opportunities and encouragement for the students to cooperate because there is a discussion process and the questions given are relatively challenging. c. Students who like to speak in front of the class enjoy this method. d. Discussion of individual cases before the lecture starts motivates the students to read the material and prepare themselves before the lecture takes place in the following week. e. The method encourages students to find references from books and the Internet. f. The case provided encourages students to read. g. Train students to become independent learners h. Encourage students to work together and discuss outside the class/outside lecture hours. i. Train students to make reading as a habit and to understand what is read. j. The questions given are quite challenging so that the students must study hard. k. Train students to think critically. l. Observe the practice of economics study in the real world.
3.	The weaknesses of the method according to the students	a. Students who are less talkative are unlikely to like this method. b. Students who are from the science department do not understand the application of this method because they do not have the basic knowledge in economics c. Students stated that they still prefer the learning process in which the lecturer explains all the material in detail. d. Students do not understand the curves learned when they are only shown on PowerPoint slides. e. Students can cheat on other students' work during the individual tasks.
4.	The researcher's observation/field notes	a. The process of explaining material went well but the explanation of the lecturer was still too fast. b. Lecturer needs to re-emphasize the discussion of curves because it is difficult to understand. c. Lecturer needs to walk around the class during the discussion process to observe the group discussion.

Based on the results of the first cycle, improvements for the second cycle are formulated, namely by a) encouraging the students' motivation to study, especially those who

are from non-social science major in senior high school, in order to catch up with other students who have learned the basic economics before; b) providing better explanation of curves and students are asked to make curves on the board instead of just seeing curves on the PowerPoint slides; c) the presentation is carried out by all team members, not just by one presenter; and d) providing individual score for the cases that are done individually so that students are responsible for solving cases individually before discussing them in groups.

3.2. Cycle 2

The second cycle of this study was carried out on the tenth to the fourteenth meeting. On the fifteenth meeting, students were given a test as an assessment of learning outcomes in the second cycle. Research steps include planning, acting, observing and reflecting stages as performed in the first cycle. The second cycle applied the improvements recommended in the results of the first cycle reflection. The material covered includes the theory of production costs, perfect competition market, and imperfect competition market. The problem-based learning model was carried out in the same steps in the form of a) providing an initial explanation of a case study to be completed by students. Case studies are provided through e-learning; b) facilitating students to conduct simple research to complete the case study individually and in groups; c) facilitating students to conduct independent and group investigation; d) presenting the results of the case study in front of the class; and e) analyzing and evaluating the process of the problem solving. In Cycle II, the assessment of the answers to each case was carried out in the form of individual assessments and group assessments. Group scores are the accumulated scores of the individual score and the score of the group presentation. Observations were made by the entire research team, especially by two team members who act as observers. Observations were carried out in each meeting. The data instrument is in the form of observation sheets and field notes.

The average student learning outcome at the end of the second cycle is 80. The highest score obtained is 95 and the lowest score is 60. There is an increase in student learning outcomes in the second cycle and students received a minimum score of C+ in accordance with the predetermined success indicators.

4. Discussion

As seen in the first cycle and the second cycle, there is an increase in student learning outcomes in this class action research. The answers given by students on the second cycle test are also more complex and comprehensive. This shows that the students' ability increases. Students begin to provide answers using their own ideas, not based on what is written word by word on the book, and they can also provide comprehensive answers. This is the benefit of learning using the problem-based learning model.

This result is supported by Arends (2008) who states that PBL is a learning model that presents a variety of authentic and meaningful problematic situations to students, which can serve as a 'stepping stone' in the investigation. PBL helps students to develop critical thinking skills and problem-solving skills. Problem-based learning is designed around a problem, with the instructor as a meta-cognitive coach, to achieve that. There are six points that must be considered in the implementation of the problem-based learning, namely: (1) Start by presenting the problem; (2) Problems should be related to the students' world (real problems); (3) Organization of learning material should be in accordance with the problem; (4) Give students the responsibility to shape and direct their own learning; (5) Use small groups in the learning process; and (6) Encourage students to show what they have learned (Savoi & Andrew in Gunantara: 2014).

The learning process that uses the PBL model has two core stages, namely the analysis of collaborative problem solving and independent learning (Paulina et al., 2001). Barrows (1996) suggests several characteristics of problem-based learning, which include (1) the learning process is student-centered; (2) the learning process is in small groups; (3) the teacher acts as a facilitator or a mentor; (4) the problems presented in learning settings are organized in a particular form and focus and are learning stimuli; (5) new information is obtained through independent learning (self-directed learning); and (6) problems are a means for developing clinical problem-solving skills.

5. Conclusion

It can be concluded that the application of PBL has been able to improve the ability of HOT skills of the students in introductory microeconomics courses. Lecturers need to increase students' confidence to speak and argue because many students do not want to appear because they lack confidence and are accustomed to learning by just accepting what the teacher says. The use of case study could improve student creativity and reduced the habit of memorizing without adequate understanding and answering

questions according to the text in the book. PBL model gets positive responses from students during the introductory microeconomics process so this model can also be applied to other courses.

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