Research Article

THE IMPACT OF *PROBLEM BASED* LEARNING ON *PROBLEM SOLVING SKILLS* IN MARINE POLYTECHNIC

Damoyanto Purba, Mustaji, Miftakhul Janah and *Fajar Arianto

Department of Education Technology, Surabaya State University, Surabaya, Indonesia

Abstract

Entering the 21st century education era, the world of education is required to use creative learning methods. In fact, education is not only about theory, but also about applying this knowledge in responding to existing challenges. Problem-based learning is a learning model that can help students actively participate in learning, especially in problem solving. This study aims to determine the impact of the problem based learning on problem solving skills for cadets in Surabaya Marine Polytechnic. This research is an experimental study using the control class. The research subjects were 150 cadets, divided into 75 cadets as an experiment class and 75 cadets as a control class. The data obtained in this study were compared between the experimental class and the control class using statistical tests. The results of data analysis can be concluded that there is a positive effect of problem-based learning on problem solving skills of Surabaya Marine Polytechnic cadets. Cadets who are taught with problem-based learning have better problem solving skills compared to control classes.

Keywords: Problem Solving Skill, Problem Based Learning, Marine Polytechnic.

INTRODUCTION

Entering the 21st century education era, the world of education is required to use creative learning methods. When defining the nature of education, education is a process for humans to recognize themselves with all their potential and understand the reality they face. The concept of education like that refers to the paradigm of "education against problems". The concept of "education against problems" requires students to be active in learning. The active role of students can be useful in the world of work later. At present, the world of work is not determined by only educational certificate, but by individual personal abilities. Generally, people hope that when they can complete their education, they will be immediately accepted into work. In fact, to get a job nowadays you can no longer rely solely on a diploma or bachelor degree, but you are required to have expertise and experience. In other words, at least educational institutions can prepare Human Resources who are able to face challenges and problems that arise in the future. The importance of increasing human resources who are capable of facing challenges and problems in the future is an effort to face increasingly global competition. Focusing on this reality and in the midst of the demands and challenges of the roles and tasks of cadets, cadets education institutions as part of the nation's components always need to review the existing education system in all educational institutions so that education can be in accordance with needs. Education is actually not just studying the outline of a theory, education is intended as a process that allows students to learn to think about the problems faced and apply science and technology and the ability to face existing challenges. According to the concept of Von Glasersfeld (1995), to determine the survival of a person must experiment and how to use knowledge in various contexts of life. Excellent and reliable professionally are the individual achievements of each cadet that must be possessed in their competency standards, for that it requires strong instructions and encouragement in campus environment, especially in classroom learning, laboratory practicums and simulator practice scenarios.

The instructors desire that the cadets be inspired in increasing their confidence, abilities and Academic achievements that will be achieved during the education and training period. Appreciate how they personally construct knowledge and make it meaningful. Barrows (1980) and Barrett (2005) define problem-based learning as "learning resulting from the work process leads to understanding problem solving. The problem was first discovered in the learning process." Meanwhile, Cunningham (2005) states that problem-based learning as "... problem-based learning has been defined as a step in teaching strategies that continuously develop Problem Solving systems, disciplinary knowledge and skills with put students in an active role as problem solvers directed by structured problems that show real world problems". Badden & Wilkie (2004) say that problem-based learning is a system to make students take responsibility for their own learning, so that the benefits they get are broader in scope and they can address and affix their abilities such as communication skills, group work and problem solving. Problem-based learning focuses on the challenge of directing cadets to think on the object of the problem. The subject of collision prevention regulations at sea and the marine guard service is a learning material that discusses rules and standardized operations in rules that are prohibitions, appeals, rights, obligations of humans and ships. So that cadets are faced with what should be done if the rules that have been standardized must be contrary to the actual situation. This section is a complex problem that cadets must seek a solution for at the stage of the process which has been packaged in a problem-based learning and problem-solving learning model. Problem-based learning is recognized as an active learning approach and progressive centered learning, in which cadets do not remain silent in one direction only. The parenting guidelines that have been prepared by the Transportation Human Development Agency and applied in technical implementing units such as the Marine Polytechnic, contain cadets' content that must be responsible to themselves in learning and living together in the dormitory. They are required to solve problems in boarding life, their learning, which is all unstructured, means the complexity of the problem is very real and is used as a starting point and strength for the

*Corresponding Author: *Fajar Arianto*
Department of Education Technology, Surabaya State University, Surabaya, Indonesia.

learning process. The objectives of problem-based learning include the development of problem-solving skills, self-direction, and technical knowledge in the professional field. The achievement of this goal is achieved by asking students to work together to analyze real problems faced in professional practice , In particular, problem-based learning are designed to encourage students through problem-solving steps in unstructured situations. These events include discussion of known facts about the problem, information gaps - what information is needed but not known, hypotheses - a list of possible causes or explanations for the problem, and learning problems - areas where learners lack knowledge. After each group of students independently examined the learning problem in the next session, students used the information they collected independently to criticize the group's hypothesis. The hypothesis is revised according to the new hypothesis generated, and the case analysis continues. Usually, multiple correct hypotheses appear to form appropriate conclusions for this case (Barrows, 1994). Problem solving skill is a person's ability to find solutions through a process that involves obtaining and organizing information, problem solving involves finding a feasible way to achieve goals. As for another opinion from, he said that Problem Solving Skill is a complex cognitive activity which includes obtaining information and organizing it in the form of knowledge structures.

Problem solving skill or problem solving ability is a solution that hits the target with the smallest possible negative impact, both for the individual concerned and with other individual objects (Ling, Catling and Upton, 2011). Some experts also argue that problem solving is an individual's ability to relate concepts or knowledge to existing reality. Skills or abilities are used in many different scenarios every day, whether in scheduling, or in compiling essay plans. This means that someone who lives life will always get various kinds of different problems every day, so that person will also have different skills every day in solving his problems. With these skills and abilities, it is hoped that it can make a person more mature in taking every solution to his problem and then re-applying it to the same problem. Problem Solving Skill in the guard service and Regulations for Prevention of Collisions at Sea course is solving a problem given in a special situation on a voyage so that cadets who are on duty to guard the sea produce a solution to problems faced on the bridge by first identifying the problem based on accurate data and information through learning, intellectual and professional briefing before performing simulator simulations with scenarios that have been tested for validity. Then cadets are given test questions to measure their problem-solving skills, quantitative data from the results of these values are processed and described in an expression to determine which cadets have high and low problem-solving skills that affect the independent and moderator variables. Problem solving is the ability to solve all problems and make difficult decisions. Problem solving itself is one of the soft skills that everyone must have because it is very useful when already working in a company. Even though it's quite easy to say, problem solving will actually be difficult. The reason is, you are required to have positive thoughts in dealing with problems. In addition, problem solving also requires your ability to think logically and systematically when you are facing a problem. Problem solving skill itself is closely related to other abilities that involve the ability to analyze, issue ideas, listen, make decisions, communicate, to teamwork. When you have several abilities as mentioned above, finding a

solution to the problem at hand will be easier. In most pedagogical innovations, problem-based learning is not developed on the basis of learning or psychological theories, although the problem-based learning process involves the use of metacognition and self-regulation. In the dependent variable of the study, there is a language that you want to know is the influence of one variable on other variables. The level of self-confidence can be based on psychological theory, maybe in the discussion or not, depending on how deep the results of self-confidence affect the attitude of the decision maker as a result of the desired competition.

METHODS

This research is a quasi-experimental study using two groups, namely the experimental class and the control class. The subjects of this study were 150 cadets in Surabaya Marine Polytechnics, who were divided into 75 cadets for experimental class and 75 cadets for control class. The experimental class was treated with the Problem Based Learning method, while the control class used the conventional method. The data analysis technique was used to compare problem solving skills in the two groups using statistics.

RESULTS AND DISCUSSION

The results showed that the experimental class that used Problem Based Learning showed better in problem solving skills than the control class. Based on calculations with the t-test, a significant level of 0.000 (<0.05) was obtained, so it can be concluded that there is a positive effect of problem-based learning on the problem-solving skills of cadets. Problem-based learning model in this study shows the impact of problem-solving Skills for cadets of Surabaya Marine Polytechnic. Problem-based learning according to makes cadets more skilled in problem solving. Cadets who are taught with Problem Based Learning will consistently retain their knowledge regarding principles in the long term and transfer problem solving. The implementation of well-structured Problem Based Learning is able to improve problem solving skills, critical thinking and independence. In problem-based learning process, cadets feel treated as professionals in developing their skills and in solving problems related to the work field. Problem-based learning brings cadets to active learning and constructing knowledge, as well as developing skills in research, negotiation and teamwork, reading, writing, and oral communication. In constructivists, problem-based learning is a promising model in critical thinking, effective problem solving and learner independence. In learning process, cadets are faced with real and active situations, there is social interaction between lecturers and cadets where the environment facilitates mutual interaction, evaluation, and cooperation. In this model, cadets carry out research by integrating theory and practice, and applying their knowledge and skills in solving problems. Problem Based Learning is a learning model that emphasizes authentic problem solving where there is a process of knowledge construction, developing inquiry thinking, independent learning and self-confidence. Problem-based learning aims to develop problem-solving skills, where cadets learn content, strategies, and develop independent learning skills by collaboratively solving problems, reflecting on their experiences, and engaging in independent inquiry. Cadets in the application of problem-based learning are faced with real problems that must be solved collaboratively and individually, so that each cadet tries to solve problems.

Table 1. Independent Samples Test

| | | PS_Skill | |
		Equal variances assumed	Equal variances not assumed
Levene's Test for Equality of Variances	F	1.506	
	Sig.	.222	
t-test for Equality of Means	t	-20.912	-20.912
	df	148	145.344
	Sig. (2-tailed)	.000	.000
	Mean Difference	-4.693	-4.693
	Std. Error Difference	.224	.224
	95% Confidence Interval of the Difference Lower	-5.137	-5.137
	Upper	-4.250	-4.250

The activeness of cadets in the problem-solving process, training in critical thinking, in problem-based learning positions the context of complex problem solving which gives cadets the opportunity to consider how the facts are related to the specific problems faced and ask themselves what they need to know. And cadets become reflective and flexible thinkers who can use knowledge to take action. Several methods of assessment that can be used in problem solving assessments are: (1) observation, (2) inventory and checklists, and (3) paper and pencil tests. These three assessment tools can be used together or one of them depends on the purpose of the assessment. This is in line with Krulik & Rudnick (1995) regarding assessment methods for problem solving, namely observation, metacognitive journals, summary paragraphs, tests, and portfolios. The tests carried out can be in the form of multiple choice, open-ended problems, and performance questions to find out whether students can solve the problem completely or not. In this study, researchers focused on the method of observation and interviews using a validated assessment rubric. The results showed that the learning activities of cadets in problem solving method were classified as active criteria, indicated by the average value that reached. It is said to be active because during the problem-solving activities the cadets are aware of the problem seriously, are able to formulate the problem, then formulate hypothesis, able to collect data well. Then able to test hypotheses appropriately, able to write reports in accordance with the systematics of writing, able to liven up the atmosphere in presenting reports actively and well. Lecturer activities when implementing the problem-solving method can be said to be good because the lecturers have implemented it starting from the preparation, implementation and evaluation stages.

Conclusion

Based on observations and interviews conducted by researchers, it can be concluded that problem-based learning model has a positive impact on the problem-solving skills of Surabaya Marine Polytechnic cadets. During the problem-solving process, cadets identify the problems at hand, then carry out the mind mapping method and look for creative ideas for problem solving, and consider solutions. So, it is highly recommended to use the problem-based learning model in marine guard service course.

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