

# Learning Approach of Problem Solving for Increase Learning Achievement of the Civil Engineering Evaluation Program

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**Abstract** Objective of This study aims to obtain empirical data on the application of problem solving to improve learning achievement of the subject civil engineering evaluation program. The method used in this research is a classroom action research method is performed in two cycles, each cycle consisting of four phases: 1) planning, 2) action 3). Observation and 4) reflection. The sample was 40 students of educational civil engineering, in State University of Jakarta, conducted by two cycles used to measure cognitive assessment test results and observation for affective domain. The terms of the plan to prepare teacher learning, quiz, student worksheets, observation sheet. Results collaborators response data, the activity of students, in Cycle I 56.72; Cycle II 79.56. At each cycle was carried out as a form of reflection and triangulation of data verification on each cycle. Based on the results, it can be concluded that with the implementation of problem solving approach, was able to improve learning achievement of students in the subject of civil engineering evaluation program.

**Keywords:** *classroom action research, problem solving, civil engineering evaluation program*

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## 1. Introduction

We known that one of the factors of success in learning is the ability to plan execute and evaluate instructional learning. Successful and conducive learning is usually measured by the level of mastery learning through tests and participation of students during the learning process. One of the obstacles in the learning process of the subject "civil engineering evaluation program" is less inconsistency in planning and implementing the learning process that is still much less aware of the importance of lecturers planning before starting the learning process. Designing and implementing a plan of active learning, creative, effective, and fun are a must in the learning process to explore the potential of students.

One indication of that is very often seen on students during the learning process civil engineering evaluation program is most students assume that the civil engineering evaluation program is a very tough lesson, so very few students who like it, the low interest of students towards subjects of this civil engineering evaluation program causing fear because of their inability to master and understand the basic concepts of subject "civil engineering evaluation program". As a result of the fact mentioned above, each held test results are not as expected. Based on the author's experience as a teacher, often seen on the ground that in completing both training exercises in class

and homework are many students who cannot complete properly, as well as homework most of the students are less willing to try solve on their own.

Based on the above facts writers as teacher compelled to address and resolve the problems in the learning process, thus participation student achievement and learning can be improved. The above description provides the inspiration for the author to commit an act of improvement in the learning process through action research approach.

Result of learning achievement in general is influenced by intelligence, personality, achievement motivation, family environment, school environment. One of the factors that have affected the study results is that the learning approach used by a teacher in teaching. Problem Solving implies attitudes and behaviors as a collective work or assist in amongst the regular structure of cooperation in groups of two or more people, which is strongly influenced by the success of the work involved in each of the group itself.

Problem solving approach into three different senses. First, teaching via problem solving, focused on how to teach the content or materials. Second, teaching about problem solving, this involves learning strategy and approach to problem solving, in general. Third, teaching for problem solving, intended as a way of how to provide the widest possible opportunity to students to solve problems.

The importance of problem solving in the learning activities visible from the recommendations issued by the NCTM for learning. Problem solving is a recommendation

in the first place. For more details about the contents of solving these recommendations: (1) the mathematics curriculum should be organized around problem solving, (2) the definition and language of problem solving in mathematics should be developed, (3) mathematics teachers should create classroom environment in which problem solving can flourish, (4) Appropriate curricular materials to teach problem solving should be developed [7].

The core of the NCTM recommendations on solving the above, that problem solving as a goal, processes and skills. This is in line with the opinion that there are three interpretations Branca overview of problem solving, namely (1) problem solving as a destination (goal) that emphasizes the aspects of why it is taught in schools. This means that the problem solving is free of special materials and targets to be achieved is how to solve the problem. (2) Problem solving as a process (process) is defined as active operations. In this case the main emphasis lies in the method, strategy or procedure used by the students in handling the problem until they find the answer, and (3) as problem solving skills (basic skills) involves two things, namely: (a) general skills a must-have by students for evaluation purposes, and (b) the minimum skills needed for students to be able to apply it in everyday life.

In the interpretation of problem solving as a process, for the material and students at various levels of schools there are similarities steps or problem solving strategies. Polya, put forward four main steps in problem solving, namely: (1) understand the problem, (2) planning solution or settlement, (3) execute the plan, and (4) verify the process and find the answer itself [8]. Some of the criteria that must be owned by a student, so it is categorized as good problem solver in learning as proposed Suydam, the student is able to: (1) understand the concepts and terminology, (2) examine the relationship, differences and analogies, (3) the selection procedures and variables that is true, (4) understand the concept inconsistencies, (5) make estimates and analysis, (6) to visualize and interpret the data, (7) make generalizations, (8) using a variety of strategies, (9) reaches a high score and a good relationship with other students, and (10) have a low score on the test anxiety [13].

Problem solving is intended in this study, is a process that emphasizes the importance of procedures, measures and strategies taken by students in the troubleshooting process to find a solution.

Specifically this study conducted to improve learning achievement and other aspects of teaching and to obtain empirical evidence about the effect of the application problem solving on teaching subject "evaluation civil engineering program" is oriented to the achievement of learning objectives evaluation civil engineering program in particular and the national education goals in general, so that this research can be used as the basis for the application of learning approach civil engineering evaluation program for lecture.

## 2. Methodology

The research method used was action research model of Kemmis and taggart pictured in the cycle (I, and II) include in each cycle of planning, action, observation, and reflection. The purpose of this class is action research to

improve learning achievement "civil engineering evaluation program" through the application learning approach of Problem Solving. The timing of the March - April 2014, in Faculty of engineering The State University of Jakarta. Subjects were students 6th semester. The beginning conditions studied subject, general teaching civil engineering evaluation program is not optimal, the interaction of teachers and students are less active and the average value of daily tests is low (56.72). Classroom Action Research instruments include: 1) Learning achievement civil engineering evaluation program (about through the grille, instrument validation, the results of the mean), 2) Observation sheet Questionnaire. Triangulation is done at the end of each cycle to verify. Data collection techniques, since the pre-study, baseline, and end of the study include: (1) Quantitative data (value of student learning achievement) that can be analyzed descriptively. In this case the researchers used a descriptive statistical analysis. For example, look for average value, the percentage of success in learning, and others. (2) Qualitative data is data that contains information on the form of the sentence that gives an idea of the level of expression of the students' understanding of a subject cognitive), views or attitudes of the students towards the new learning method (affective), students follow the lesson activity, attention enthusiasm in learning, self-confidence, motivation and the like, and analyzed qualitatively. Analysis data method in this research is descriptive methods that describes / explain the research process from beginning to end. The data is calculated by the following steps: (1) Calculating the value of daily tests before action is taken and the value of the test cycle I, and II, (2) calculate the average value or percentage of student learning outcomes prior to action on the cycle I, and II, to investigate the improvement of learning achievement.

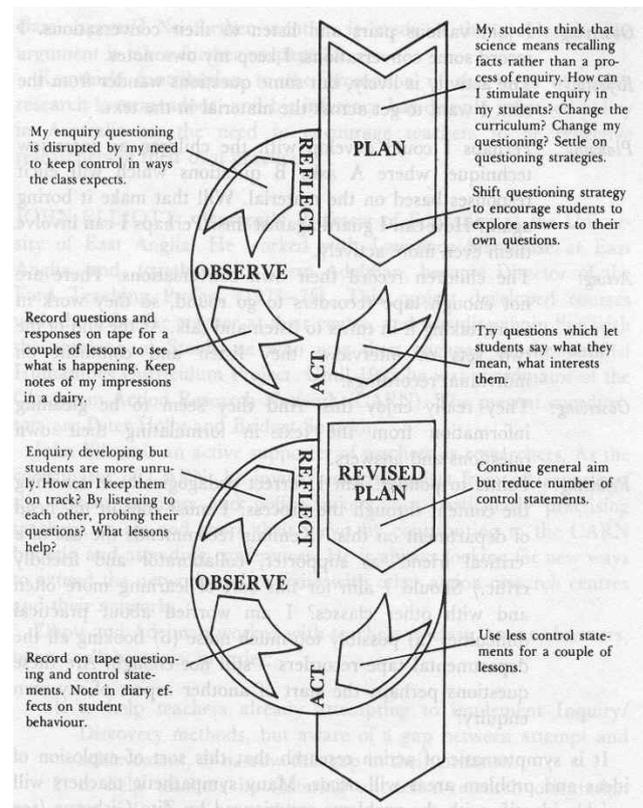


Figure 1. Model Action research

### 3. Result of Research

Learning civil engineering program evaluation conducted through two cycles. The first cycle is an improvement of early learning, because learning outcomes of students in pre-test does not meet expectations. While in the second cycle is an improvement from the first cycle to improving student learning outcomes so in line with expectations. Based on data from the research that has been done, the results of any learning cycle indicates a change of attitude and learning outcomes. To know the development per cycle, can be explained through a description of the descriptions below.

Based on the results of this action research is done into two cycles, assisted by Mr. Arris Maulana collaborators, test results at cycle I showed an average value of 56.72, Cycle II of 79.56.

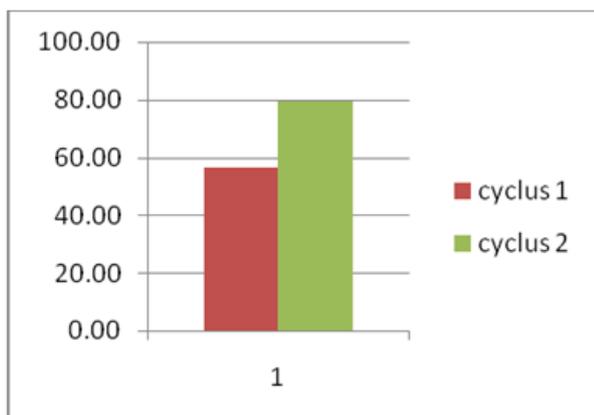
**Table 1. Descriptive statistical of learning achievement**

Statistics			
		c.one	c.two
N	Valid	39	39
	Missing	0	0
Mean		56,72	79,56
Median		58,50 <sup>a</sup>	80,67 <sup>a</sup>
Mode		65	80
Std. Deviation		11,341	11,564
Variance		128,629	133,726
Skewness		-1,181	-2,114
Std. Error of Skewness		,378	,378
Kurtosis		1,981	7,941
Std. Error of Kurtosis		,741	,741
Range		55	65
Minimum		20	30
Maximum		75	95
Percentiles	25	50,83 <sup>b</sup>	74,25 <sup>b</sup>
	50	58,50	80,67
	75	64,70	86,50

a. Calculated from grouped data.

b. Percentiles are calculated from grouped data.

From the above data, it can be seen that in the implementation of improvement activities learning civil engineering program evaluation cycle 1 with an average value of 56.72 and there are 16 students or 41.03% from 39 students who have not attained the minimum grade (55). Based on these data, the researchers assisted by colleagues decided to organize the learning improvements at a later stage (cycle 2).



**Figure 2. Result of Cyclus (learning achievement)**

Based on observations of collaborators on this first cycle, it can be seen that aspects of attitudes and student activity is still far from expectations. Most students simply stunned with the problem without trying to find alternative solutions when problems are filing failure. Students sooner give up than to continue his search. This can be illustrated by the values or scores obtained by students in cycle 1 is the aspect of attitude and liveliness that is still fairly low at 58.66 to 58.36 for the liveliness and attitude aspects

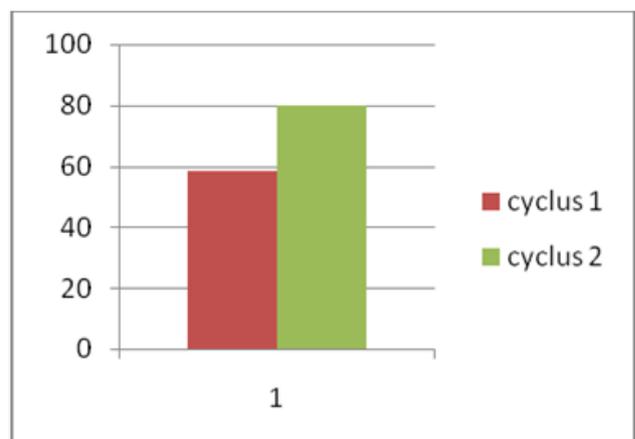
**Table 2. Descriptive statistical of Student Activity**

Statistics			
		c.one	c.two
N	Valid	39	39
	Missing	0	0
Mean		58,19	80,07
Median		55,91 <sup>a</sup>	80,50 <sup>a</sup>
Mode		70	80
Std. Deviation		9,992	7,466
Variance		99,837	55,748
Skewness		,297	-,809
Std. Error of Skewness		,378	,378
Kurtosis		-1,077	1,000
Std. Error of Kurtosis		,741	,741
Range		40	30
Minimum		40	60
Maximum		80	90
Percentiles	25	50,07 <sup>b</sup>	76,00 <sup>b</sup>
	50	55,91	80,50
	75	69,46	85,54

a. Calculated from grouped data.

b. Percentiles are calculated from grouped data.

While the results of the response data collaborators student activity cycle I 58.66, Cycle II 80.21.



**Figure 3. Score result of student activity**

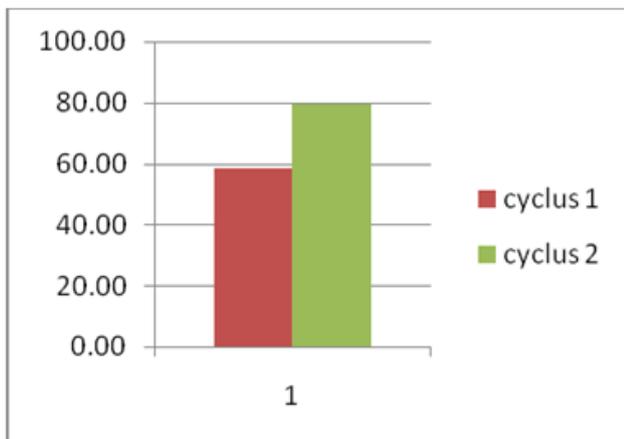
Similarly to the results of cycle I the affective value of 58.36; Cycle II 79.42. In addition to improved student learning achievement can also be seen in the teaching behavior such as an increase in active learners, group collaboration, discussion and attitudes of students in lerning.

**Table 3. Descriptive statistical of Student affective**

Statistics		c.one	c.two
N	Valid	39	39
	Missing	0	0
Mean		58,36	79,42
Median		59,57 <sup>a</sup>	80,75 <sup>a</sup>
Mode		55	80
Std. Deviation		11,437	11,685
Variance		130,815	136,528
Skewness		-1,273	-2,045
Std. Error of Skewness		,378	,378
Kurtosis		2,802	7,426
Std. Error of Kurtosis		,741	,741
Range		60	65
Minimum		20	30
Maximum		80	95
Percentiles	25	54,00 <sup>b</sup>	74,25 <sup>b</sup>
	50	59,57	80,75
	75	65,96	86,50

a. Calculated from grouped data.

b. Percentiles are calculated from grouped data.

**Figure 4.** Score result of Student affective

## 4. Discussion

Based on the results of data analysis indicate that: (1) The application of the Problem Solving Approach learning can improve learning achievement (Civil Engineering Evaluation Program Subject) students, although the increase is not too high percentage. (2) The ability to discuss the rate has increased; this indicates that there has been a very positive change in the study group. (3) Students are individuals who did not complete the first cycle and second cycle turns in group discussions is able to gain value over the minimum grade (score 55). This is in accordance opinion that teachers serve as facilitators of learning to develop the competence and ability of the

students indicated that the Problem Solving Approach learning able to explore the potential of students. (4) The results of this study indicate that by applying the method on teaching is the interaction between the student goes on, as well as teachers' interactions with students, learning objectives achieved so that needs to be developed in the social studies learning.

## 5. Conclusion

Based on the results obtained during the teaching Problem Solving Approach learning, the student of civil engineering the state university of jakarta it can be concluded that (1) learning approach was shown to improve student learning achievement. Scores obtained include individual and affective, meaning the application of this approach learning to improve learning achievement for individuals. (2) With this model untapped potential students, with the advent of the ability to discuss, responsibility and other skills that observed collaborator. (3) Problem Solving Approach learning in civil engineering program evaluation, can make students learn independently and responsibly.

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