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Implementation Authentic Task to Enhance Problem Solving and Self-Management for Physics College Students

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Abstract. The purpose of this study is to enhance the problem solving and self-management abilities of student teachers through individual and group authentic task. Preliminary results showed that the learning outcomes in high category, nevertheless problem solving and self-management abilities are still low and average categories (scattered at interval $40 \leq N \leq 65$). Initiative to improve this condition is needed. Action research is the alternative solution for that condition through planning, acting, evaluating, and reflecting. This study is allowed in 4 cycles. The acting step result with integrated discuss method, case study, and presentation including self-assessment for individual and group. This method was effective to enhance problem solving and self-management abilities. The final learning outcomes seen from the correlation between student self-assessment and lecture-assessment ($r=0.19$). Its means there are unidirectional relationship between the result of self-assessment and lecture- assessment. The Conclusion of the research was effective to enhance problem solving and self-management ability.

1. Introduction

Learning in higher education preferred to offer subject that can stimulate developing critical thinking skills in problem solving, collaboration, and communication [1]. Physics evaluating development subject have been taken by graduate physical education teacher training college Padang (Now UNP). On This course there are the main points of discussion were very useful for the assessment of the future of learning physics, students who attend this course are expected to have sufficient provision to carry out the duty as educators in assessing Physics learning. The lectures learning model that had been done was by discussion and presentations method. Discussion method is an effective method for creating a conductive learning either in small groups or large group in the education involving lecture [2]. Research results on the two classes of teaching spread at intervals ($66 \leq N100$), but for the assessment process of problem-solving and self-management ability on average is in the category of low to medium or is in the interval $45 \leq N \leq 65$ [3].

Based on these findings it is possible to find an effective learning approach so as to improve the ability of students because some study materials have learned while at the undergraduate level. The hypotheses of the causes of not been optimal of the problem-solving and self-management connected to the task and assessment system in which the lecturers have not stimulate the student's ability.



The theory of learning identifies five dimensions of learning that are essential for the success of the learning process. Implementation self-assessment at least refers to the dimensions above [4]. Self-assessment is a powerful technique for self-improvement [5]. The literature on self-assessment uses the term 'self-assessment', 'Self-reflection' and 'self-evaluation' [6]. A contribution of self-assessment is the improvement of behaviour and student achievement [7]. Learning through self-assessment is developed based on critical thinking skills. The ability aspects, namely: the ability to think critically in terms of problem solving and self-management ability [8][9][10]. The Indicator of self-management consisted of: a sense of responsibility for the actions taken, making work plans systematically, implemented the work planning consistently, stay calm in the stressful situations, perform a self-evaluation and to seek improvements in order to improve performance, have confidence in the ability to complete the work, and manage various resources owned to produce the best work [11].

The Indicators of problem solving ability consisted of: identifying the problems and gather relevant information to the issues, define the problems that will be addressed, evaluated various alternative solutions as well as sort, make decisions or take action based on pre-set criteria, the consequences of the decision taken, apply the solution decided upon and examine the results, and solve problems independently. Stimulation of the problem solving and self-management required authentic learning and also authentic assessment.

2. Method

Action research can be seen as a powerful methodology for reforming education. Research is very effective measures implemented to apply theory and practice [12]. Research carried out consists of four stages, namely planning, acting, observing, and reflecting.

The subjects of this research were a student teacher from the graduate of the Physics Education program in Universitas Negeri Padang. Data was analyzed by a reflective and evaluative. The result of this action that further be used as input to determine further action. The outcomes of action level indicated in the number using a scale of 1 - 5. Score 1 showed no performance, it followed by lower levels of learning outcomes or very incompetent, while a score of 5 indicates a excellent performance indicated the outcome level is very competent.

Furthermore, the correlation test to determine the effect of learning outcomes of observations and authentic assessment, reflection on the results of self-assessment is made by students. Correlation tests conducted with product moment correlation formula. States [13] the product moment correlation formula as follows:

$$r = \frac{n\sum XY - (\sum X)(\sum Y)}{\sqrt{\{n\sum X^2 - (\sum X)^2\}\{n\sum Y^2 - (\sum Y)^2\}}} \quad (1)$$

3. Results

The results of the research can be divided into four stages: preparation, implementation, observation and reflection. The results of problem solving ability can be seen from Figure 1. Effects action to self-management ability showed in Figure 2. The Results relationship self-assessment and lecture assessment in last cycle, such as Figure 3. Based on Figure 3 showed that the correlation between self-assessment (X) and lecturer assessment (Y) is obtained coefficient value is 0.19 and a coefficient of determination (r^2 is 0.034). Based on the results of the analysis, it is known that there is a very strong and positive values among the learning outcomes of the observations and the value of reflection and self-assessment results [14].

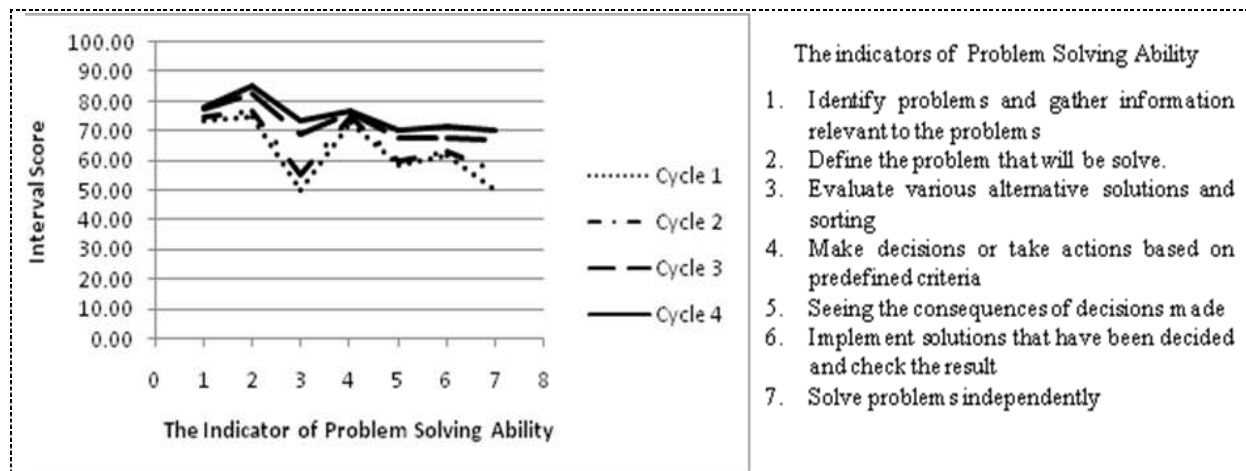


Figure 1. The Average Score of Problem Solving Ability Per Cycle.

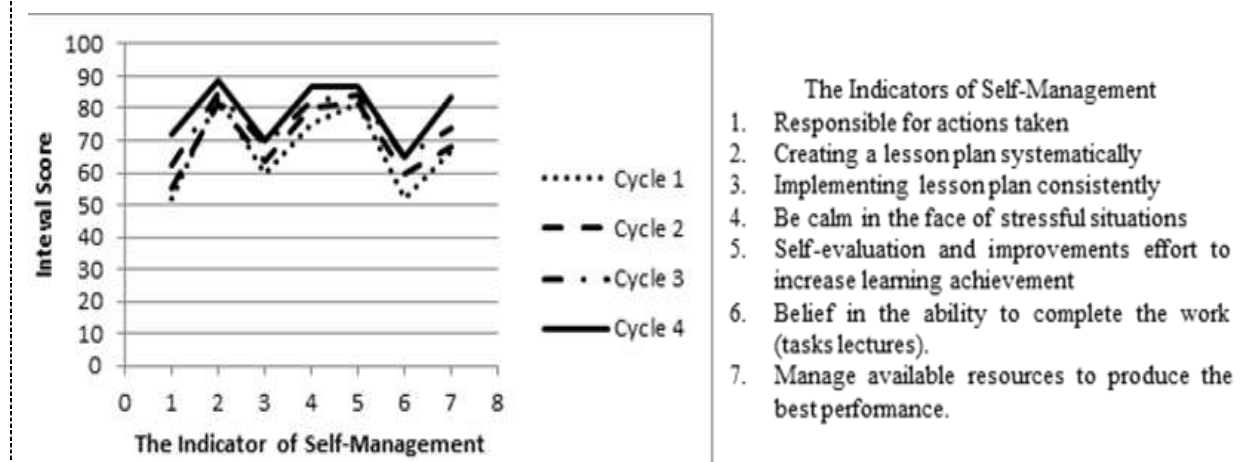


Figure 2. The Achievement of Self-management ability

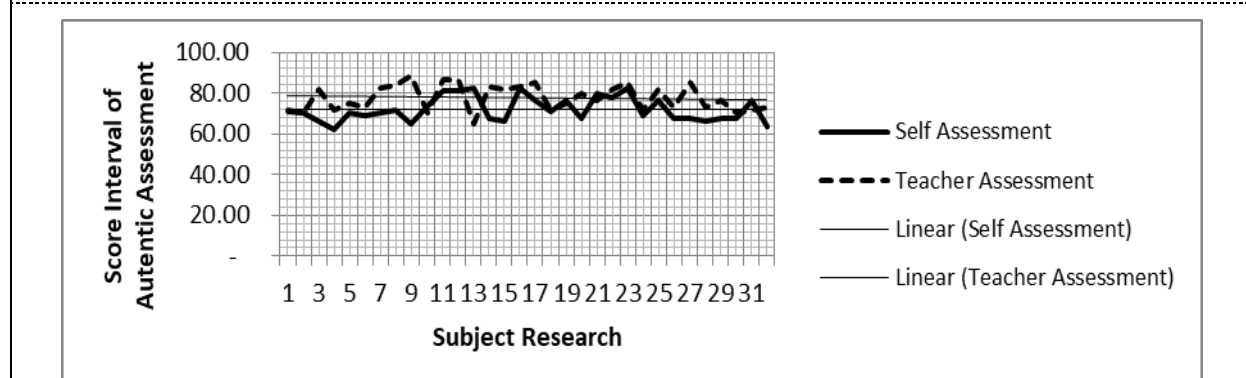


Figure 3. The relationship between learning outcomes based on self-assessment and lecture assessment

4. Discussion

The Learning approach to enhance the problem solving and self-management of student teachers through the development of authentic tasks for individuals and groups and assessment with emphasis on self-assessment, and effective for all indicators. The increase in the indicators is because students are trained to find their selves root of the problem and seek developing alternative forms of problem solving the weaknesses of the previous task to produce the best work the next.

Self-assessment requires the direct involvement of students in integrating knowledge, skills and attitudes. Because of they can control of their learning, they can decide how to use the learning resources available to them inside or outside the classroom. Parallel with the opinion of [15] which states in the self-assessment, individuals were asked to rate their skill by themselves in different domain. Authentic assessment can provide more valid data about the student teacher competence [16][17]. The analysis result showed, as many as 68.5% of students demonstrated in the problem-solving ability in the high category once, and as much as 80.0% of the students demonstrated the self-management in the high and very high category. On average, these results can be interpreted as an indication of the ability of employability skills of students in both categories. Through self-assessment, students can see the advantages and disadvantages, to further these shortcomings become improvement goals[18].

5. Conclusions

Based on the results concluded that the reflective of problem solving and self-management ability both categories. This study should be continued with the implications of implementation of authentic learning and assessment using control class, therefore the result can be differentiated. Learning outcomes seen from the end of the correlation results of student self-assessment with the assessment of the lecturers obtained $r = 0.19$ meaning that the linear relationship between self -assessment of students with the lecture assessment. It can be concluded learning approach through authentic tasks as well as individual and group self-assessment effectively to improve problem solving skills and self-management of student teachers.

6. References

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