

The Importance of Appropriate Instructional Methods for Training Students' Thinking Skill on Environmental Learning

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ABSTRACT

Instructional method is an important aspect of teaching and learning to determine the activities of teachers and students. Appropriate instructional methods influence many motivational variables of learners such as a tendency to think critically. This research aims to determine the effects of usage of instructional methods for training students' thinking skill on environmental learning. This study is the quasi-experimental design of post-test only. Two equivalent student groups in secondary school were offered a topic on environmental learning with different instructional methods. The instructional methods were laboratory method and discussion method. The teacher was given to the first group using laboratory method, while the second group was given using discussion method. The effectiveness of different instructional methods was measured quantitatively by an achievement test. The analysis result of post-test showed that there was significantly different between the first group and the second group at a significance level of 0.05 for the interest of the first group. According to these findings, we suggest applying laboratory method instead of discussion method for training students' thinking skill on environmental learning.

Keywords: instructional methods; thinking skill; environmental learning

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INTRODUCTION

Developing students' thinking skill is a major educational goal in societies around the world (Larsson, 2017). Thinking skill involves making judicious purposeful judgments as a result of engaging in a process of analysis, interpretation evaluation, inference, explanation, and reflection (Facione, 2013). Students who have good thinking skill will be finding a new experience of study to apply the information they got (Heong, 2011). Students could think systematically to express their taught/ideas, to analyze issues, and enhance their understanding skill. The teaching of thinking skill is important for all students in all subjects. Different disciplines are characterized by particular approaches to thinking skill, and a large part of studying those disciplines means learning to think like an expert of that discipline (Forawi, 2016).

Environmental learning often involved nature study and the development of an understanding and appreciation of natural environment through experiential learning (Sutherland & Swayze, 2012). Environmental learning is a learning that needs students' participation with the environment that includes; Water and air quality, population growth, natural resources, educated citizens who are aware of the environment and its problems and know how to solve them and are motivated them to realize the strategies for environmental sustainability (Omran, 2014). Environmental-related learning helps students individually and in groups to acquire the knowledge, values, attitudes, and skills to participate responsibly and effectively in anticipating and solving environmental problems (Jeronen, Jeronen & Raustia, 2009).

Environmental materials have characteristics related to the daily life of students that enable the implementation of field learning by visiting learning resources. Another characteristic is the abstract nature because it could not be described using the sense of sight. For example in environmental sub-material that is environmental pollution can use the laboratory to test environmental quality. The implementation of environmental learning can be held in classroom and outdoor, depending on what the concepts that students learn.

Teacher's correct perception of teaching methods has a key role in students' disposition to thinking skill (Karami, Pakmehr & Aghili, 2009). Instructional method is a way of teacher does to reach the goals of instruction and it is an important aspect of teaching and learning: determine the activities of teachers and students, the quality of the teaching process, implicitly sending a message about what teaching is, how students learn, and what is knowledge. The instructional methods that teacher choose are depending on level students that teacher is dealing with, aims of instruction, and characteristics of subject matter. The use of the instructional method is important to convey material to students regardless of students' comprehension of the material.

There are many instructional methods that can be used for teaching environmental learning, for examples: presentations of students, discussion, small group work, homework studies, debating, observation, experiment (laboratory), and ecological experiment (field work) (Kastova & Atasoy, 2008). However, many teachers preferred using the lecture method does not challenge students' thinking skill

(Ahmad et al., 2015). Students merely listen what teacher explain and don't engage in process of getting new concepts. Based on the characteristics of environmental materials, discussion and laboratory method tend to be better instructional methods for teaching it.

Discussion and laboratory methods are student-centered teaching that can help students to understand different perspectives and think more critically and reflectively about their own assumptions and values in relation to doing research (Barraket, 2015). Discussion method is small group instruction where students work together to solve problems has been defined as cooperative learning. It is perceived effective if they are clinically relevant and include cases that promote thinking and problem-solving (Steinert, 2004). Laboratory method is considered important because they provide the opportunity for students to perform various hands-on activities and examine their hypotheses of concepts.

This research generally aims to determine the effects of usage of instructional methods for training students' thinking skill on environmental learning. This analysis is very useful in giving real-representatives portrait and the impact of appropriate instructional methods (discussion and laboratory method) toward students' thinking skill.

METHOD

This study is quasi-experimental and designed with post-test only which are expressed with below symbols.

Table 1 Experimental Design

Experimental Group	Intervention	Post-test
1	X ₁	O ₁
2	X ₂	O ₂

Key:

X₁: Treatment 1 (using laboratory method)

X₂: Treatment 2 (using discussion method)

O₁: Post-test group 1

O₂: Post-test group 2

The population for this research includes all the grade seven students in the secondary school of SMP 13 Magelang, one of developing secondary schools in Indonesia. Sampling was done by cluster random sampling method. The participants were 65 students, aged 12-15 years, from two classes of that school. The first and second classroom consists of 32 students and 33 students. Both groups were taught with the same contents about environmental learning. The teacher was given to the first group using laboratory method, while the second group was given using discussion method. The work was attempted to establish empirically whether the appropriate instructional methods was important for training students' thinking skill on environmental learning. The efficiency was determined quantitatively by instruments (written test and archives of student's outcome). The written test was used to measure students' thinking skill after learning activity. It contained 6 questions that were matched up by indicators of critical thinking by Facione (2013): interpretation, analysis, evaluation, inference,

explanation, and self-regulation. The instruments were developed to assess the research finding claims. The content of its instruments was validated by two educational experts at Sebelas Maret University.

RESULT

The validated instruments were examined on main field testing of the experimental groups in SMP 13 Magelang to determine the effects of usage of instructional methods for training students' thinking skill on environmental learning. The data is the post-test of student's performance after learning activity using laboratory method for the first group and discussion method for the second group. Normality and homogeneity test is needed to determine the type of comparative test statistics that will be used. If the data are normally distributed and homogeneous, we use parametric statistics to analyze it and otherwise. The data were called normally distributed and homogeneous if the probability value or significance value calculation data is greater than 0.05 (Sig.> 0.05). Summary of the results of normality and homogeneity test are presented in Table 2 and Table 3.

Table 2. Results of Normality Test

Research group	Kolmogorov-Smirnov		α	Conclusion
	N	Sig.		
1	32	0,152	0,05	Normally distributed
2	33	0,108	0,05	Normally distributed

Table 3. Results of Homogeneity Test

c	Levene's test			α	Conclusion
	Statistic	df	Sig.		
65	2,279	63	0,136	0,05	Homogeneous

Based on normality and homogeneity test, the type of statistics used in this research is parametric statistical with independent sample t-test analysis. The data were called having significantly different between the first group and the second group on students' thinking skill if the value of the calculation of significance (sig.) is smaller than the significance level used in this research is $\alpha = 5\%$ (0.05). Summary of the results of independent t-test is presented in Table 4.

Table 4. Results of Independent T-Test

Research groups	N	Mean	Sig.	α	Conclusion
1	32	76,03	0,021	0,05	It is significantly different between the first group and the second group on students' thinking skill
2	33	69,18			

DISCUSSION

Based on the finding, found that students in the first group who used laboratory method showed a significantly higher posttest scores when compared to those of

the second group who used discussion method. It happened because the use of different methods of teaching will influence student outcomes (Stirling). Environmental learning suggests being taught with learning by doing to improve students' performance (Ahmad et al., 2015).

A laboratory setting is a more conducive learning environment than lecture halls (especially for large classes) as it provides students with real-life situations and a chance to exercise thinking skills (Vaselinovska et al., 2011). Integration and student cohesiveness dimensions of laboratory learning could be relied upon in enhancing students' attitude and academic performance (Olubu, 2015). Students who learned with laboratory method had opportunities to set hypothesis, identify variables, design, and conduct experiment as well as collecting data whereas students who learned with discussion method did not have chances to do a hands-on activity. There have been many studies reporting on the effectiveness of the laboratory instructional on students' understanding of science concepts (Özmen et al., 2009). Laboratory method provides students with opportunities to engage in processes of investigation and inquiry which is believed to enhance quality education (Hamidu et al., 2014). Discussion method has the possibility to dominate the collectivist features of the classroom learning and it could be preventing the individuals from practicing critical thinking at the class level, and what is more, will provide little opportunity for students to observe critical thinking behaviors in the classroom (Fabian, 2015).

The teachers' correct understanding of appropriate teaching methods and effective factors is an important thing on learning activity because that will influence performance and many motivational variables of learners such as a tendency to think critically (Karami et al., 2012). The appropriate instructional methods can help students think critically because they will understand the how things are connected, why certain interventions and action and it brings together past concepts of learning to current situations, engaging student learning (Jones, 2017).

Students' thinking skill should be learned with appropriate instructional methods to achieve a balanced development of it with some learning activities such as questions were provided to encourage the students to explicitly discuss the subject content and to use ten skills of critical thinking, such as distinguishing between findings and conclusions, drawing valid conclusions from data, and identifying and evaluating control (Cheng & Wang, 2017). With students' thinking skills, which are essential for absorbing knowledge as well as for work performance, students will become effective communicators, critical and dynamic thinkers, competent problem solvers and career experts (Živkovic, 2016).

CONCLUSION

This research showed that the appropriate instructional method for training students' thinking skill on environmental learning is laboratory method over discussion method. It is referred the finding of this research, students who used laboratory method showed significantly higher posttest scores when compared to students who used discussion method. This research is limited by the setting and the small sample size, and various issues, i.e., students' prior knowledge,

students' learning style, students' learning process, number of students in the class, time limitation, etc. have to be concerned for successful implementation. Also, implementation in a longer period would be satisfied.

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