



Analysis Of Instructional Methods Used In Secondary School On Environmental Learning

Ayu Lestari¹, Ashadi¹, Maridi¹

¹Science Education Department of Postgraduate Programme Sebelas Maret University, Surakarta, Indonesia

Email : ayoetari99@student.uns.ac.id

ARTICLE INFO

Article History:

Received Date: 15th April 2017

Received in Revised Form Date: 30th April 2017

Accepted Date: 15th May 2017

Published online Date: 01st November 2017

Key Words:

**Instructional Method;
Environmental; Learning**

ABSTRACT

The use of instructional method is very important for education. The Appropriate instructional methods for the characteristics of learning materials will help teachers and students reach the targeted aim of competencies. This research aims to analyze the use of instructional methods used in secondary school on environmental learning. This analysis is very useful in giving real-representatives potrait and the impact of the use of instructional methods toward students' performance. Data were analyzed qualitatively in accordance with the *Miles & Huberman*. The data collection methods are an observation of learning activity, indepth interviews with teachers and student learning outcomes documentation in SMP 13 Magelang, one of developing secondary schools in Indonesia. The results showed that the use of instructional methods has not been suitable for characteristics of the learning materials and students' characteristics. Teachers should choose instructional methods that will make easier for students to understand the concept. Instructional methods that are often used by teachers is lecture and discussion method. The result is poor performance of student learning. The root cause of the mismatch instructional method with the characteristics of material is insufficient time allocation that will affect teacher's teaching and learning strategy.

Copyright © Ayu Lestari et al, 2017, this is an open access article distributed under the terms of the PancaranPendidikan Journal license, which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited

INTRODUCTION

Integrated science learning is a lesson applied in primary and secondary school with the scope of learning that is packed into a whole field of intact study. Implementation of integrated science learning prioritizes the learning process designed in such a way to find science products that include understanding, principles, concepts, theory, and law of

science and interconnectedness and able to use scientific methods based on scientific attitude to solve problems in daily life. Through science learning, students can practice discovering themselves a thoroughly learned concept (holistic), meaningful, authentic, and active . One of the important materials in science that is taught in secondary school is environmental material. Because of continuously progressing insights in environmental sciences, the current insights and methods are likely not to be the ones of tomorrow and we must give students enough elements to be able to fully understand and even lead future developments.

Environment learning includes its natural and built elements as well as its social and cultural aspects. It is air, water, and land. It is plants and animals. It is people, their communities, and their social and cultural values. An understanding of the many factors that influence the environment, particularly the impact of people, is critical to maintaining and improving environmental quality. People have modified the land, introduced plants and animals, and utilised both renewable and finite resources. Understanding and responding to people's impact on the environment therefore requires instructional methods that are tailored to the characteristics of environmental material.

Instructional method 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 are dealing with, aims of instruction, and characteristics of subject matter. Therefore, the teachers' correct understanding of appropriate instructional methods and effective factors influence many motivational variables of learners such as tendency to think better.

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 is described using the sense of sight. For example in environmental sub-material that is environmental pollution can use 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.. However, in Indonesia, the use of the instructional method has not tailored to the characteristics of subject matter yet. Teachers tend to use instructional methods that ease the teachers to convey material to students regardless of students' comprehension of the material. This cause the learning activities that appear are unidirectional and student learning outcomes become less optimal.

This research generally aims to analyze the use of instructional methods used in secondary school on environmental learning. This analysis is very useful in giving real-representatives potrait and the impact of the use of instructional methods toward students' performance.

LITERATURE REVIEW

Environmental learning education often involved nature study and the development of an understanding and appreciation of natural environment through experiential learning (Sutherland & Swayze, 2012). Environmental learning associated with place integrates humans and nature and develops ecosystems knowledge characteristic of sustainable cultures (Chinn, 2007). Environmental learning incorporating place as a deep-ecology principle enhances aesthetic experience of the environment, stimulates sensitivity to nature, and can give children a sense of place in the natural world (Semken and Freeman, 2008). Environmental learning is a learning involving 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 to realize the strategies (Omran, 2014). Environmental material requires contextual aspects in learning, considering the scope of environmental issues is closely related to daily life that involves not only knowledge but also requires the attitude and skills to address and solve existing environmental problems (Subiantiri, Ariyanti, & Sulisty, 2013). 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, 2009). Environmental studies should be more emphasized on the formation of knowledge and attitudes of students to the environment wisely (Hungerford and Volk, 1990).

The importance of environmental learning is a way of helping individuals and societies to resolve fundamental issues relating to the current and future use of the world's resources. However, simply raising awareness of these issues is insufficient to bring about change. Environmental education must strongly promote the need for personal initiatives and social participation to achieve sustainability. There are few reasons why environmental learning for secondary school. Environmental science education is:

- a. Important for students and society;
- b. An opportunity for students to experience an applied science;
- c. A particularly engaging context for learning fundamental science (Edelson, 2007)

National Education Standart stated that the aims of Environmental learning are for students to develop (1) awareness and sensitivity to the environment and related issues, (2) knowledge and understanding of the environment and the impact of people on it, (3) attitudes and values that reflect feelings of concern for the environment, (4) skills involved in identifying, investigating, and problem solving associated with environmental issues, and (5) a sense of responsibility through participation and action as individuals, or members of groups in addressing environmental issues.

Studies on learning environments focus on behavior management, classroom rules and discipline, motivation of students, teaching methods, the set-up of classroom tools (tables, desks, etc.), and even the color of the classroom (Chesebro & McCroskey, 2002; Slavin, 2000; Snowman & Biehler, 2003). Instructional designers cannot design a learning environment that can be applied to every kind of learning. This is not possible

even though the characteristics of learning and the learner are taken into consideration. These experiences can be acquired by interacting with the learning environment (Bolliger, 2004). Studies have shown that learning environments that consider learner characteristics affect academic success in a positive way (Ozerem & Akkoyunlu, 2015).

Instructional methods that can be used on environmental learning presented in Table 1.

Table 1. Insructional methods and learning activity on environmental learning

Instructional Method	Learning activity
Presentations of students, discussion, small group work, homework studies, debating.	Analytical listening to classmates' presentations, critical perception, asking questions, giving answers and objective evaluation, acknowledging achievements, participation with own contribution (preparation), on time clarification of all problems, rewarding partnership in learning, respectful and responsible attitude to others' work, conceptualizing the information, constructive communication.
Observation and experiment	Scientific skills, development of scientific thinking, asking questions, giving opinion, collecting data, constructing supportive evidence, giving answers, partnership, team work, communication, using primary evidence, formulating ideas, creating interest in learning.
Ecological experiment (field work)	Communication and interaction within the group and between groups, making and accepting rules, listening, consensus, respectful attitude to others' contribution, sharing others' success, responsibility, acquiring methods for ecological investigations, data processing, sharing results and opinions, reflection.

(Source: Kostova & Atasoy (2008))

METHODOLOGY

This research is a qualitative descriptive research. The purpose of this research is to describe an object systematically (Sugiyono, 2010). The selected research subjects were science teachers at SMP Negeri 13 Magelang. Data collection method was obtained by observation of science learning process in class, documentation of students' outcomes archive, and in-depth interview to science teacher of SMP Negeri 13 Magelang. Data analysis used the principle of Miles & Huberman (1994) consisting of three stages, namely reduction, data presentation, and conclusions.

The instrument used in this research is self-constructed semistructured interview guide. In the interview guide, questions and prompts used to explore the interviewees' perceptions of learning process and the use of instructional methods on environmental learning. In this study, 2 science teachers (Sci-1 dan Sci-2) participated for being asked about their ideas about instructional methods used on environmental learning. Their participation was voluntary and written consent from the school principals and the interviewees were obtained prior to data collection. Issues of anonymity and confidentiality in handling the data were also clearly explained at the beginning of each interview.

Because a lot of questions were covered in the interview guide, the questions are focused to the following:

1. What are the instructional methods you use on environmental materials?
2. Why do you choose this instructional methods?
3. How is the suitability of instructional methods with environmental material characteristics?
4. What are the constraining factors in the implementation of environmental material learning?

RESULT AND DISCUSSION

This research obtained data collection and data reduction through the process of selecting, focusing, abstracting and converting raw data that appear in written-up field notes. Data reduction occurs continuously throughout the life of any qualitatively oriented project. In this research, data reduction is done by selecting secondary schools and focused observation through student learning outcomes documentation and in-depth interview about learning process with teachers.

Archives of student learning outcomes in one of secondary school in Indonesia, namely SMP N 13 Magelang shows that students' replication value on environmental matter in the academic year 2014/2015 and 2015/2016 has not reached the value of minimum criteria of mastery learning, 75 and classical learning completeness less than 50% presented in Table 2.

Table 2. Archives of Student Learning Results on Environmental Material

Academic Year	Class	Minimum Criteria of Mastery Learning	Average Values	Completeness Pass (%)
2014/2015	A	75	73,9	46,7

2015/2016	B	75	68,7	25
	C	75	74,6	51,7
	D	75	63,5	20

(Source: author)

The low learning outcomes of environmental learning can be influenced by students' thinking ability. Observation of the learning process conducted showed that there isn't enough effort and motivation to encourage learners to think critically in practice. The development of critical thinking as a desirable educational outcome requires teaching methods which help learners improving their ability in critical thinking and increase their tendency to use such skills (Lampert, 2006). The teachers' correct understanding of appropriate teaching methods and effective factors influence many motivational variables of learners (Karami, Pakmehr & Aghili, 2012). Students who learn science should be used to develop teaching strategies that facilitate student learning. With better teaching methods and improvements in science instruction, students will develop deeper understanding of science concepts, which should translate into better performance on assessments (Gallaher, 2007)

Teachers have been forced to alter their methods of instruction to conform to the assessment. Teaching to the test has become more commonplace as pressures mount on teachers to ensure they cover everything that their students need to know in order to succeed on the state test. Effective instructional methods are giving way to quicker, fact-based instruction due to reductions in the amount of time allotted for each topic to be covered (Owens, 2009).

Finding of the semi-structure interviews are shown at tables below with science teachers (Sci-1 dan Sci-2 as showed in table).

Question 1: What are the instructional methods you use on environmental materials?

Table 3. Use of instructional methods on environmental materials

Topic	Teacher's idea	
	Sci-1	Sci-2
Use of instructional methods on environmental materials	Frequently used methods are lecture method and occasional time with practicum activities as well as observations in the school environment.	Frequently used methods are lecture methods and small group discussion of students.

--	--	--

(Source: author)

Question 2: Why do you choose this instructional method?

Table 4. Reasons for Using of Instructional methods.

Topic	Teacher's idea	
	Sci-1	Sci-2
Reasons for Using of Instructional methods.	The method eases teachers to deliver learning materials because of the many environmental materials that require a long time allocation.	The method is able to help students analyze environmental cases that occur around students. The method is also easy to apply in school without incurring additional costs.

(Source: author)

Question 3: How is the suitability of instructional method with environmental material characteristics?

Table 5. Conformity of instructional method and environmental material characteristics

Topic	Teacher's idea	
	Sci-1	Sci-2
Conformity of instructional method and environmental material characteristics	Not appropriate yet, because environmental materials will be better if implemented outside the school to gain hands-on experience.	Some are not suitable because students need to look at the environmental phenomenon that occurs through field studies. Others are appropriate because environmental materials can be visualized through pictures or videos and analyzed by group discussion, considering the safety risk of field studies for students.

(Source:
author)

Question 4: What are the constraining factors in the implementation of environmental material learning?

Table 6. Inhibiting factors on the use of instructional methods in accordance with environmental materials

Topic	Teacher's idea	
	Sci-1	Sci-2
Inhibiting factors on the use of instructional methods in accordance with environmental materials	There are too many materials, the allocation of time is less, and the school environment is less support / in accordance with the material.	Some are not suitable because students need to look at the environmental phenomenon that occurs through field studies.

(Source: author)

Based on the result of indepth interview and observation of learning process, the instructional methods often used by teachers is lecture and discussion method. The both instructional methods ease teachers to deliver learning materials because the scope of environmental material is large. Environmental are topics that need to be taught in a different setting than a regular lectured class (Quesada-Pineda, Adams, & Hammett, 2011). Lecture method is a relatively poor instructional method for maintaining student attention (Bligh, 2000). It means the learning mostly use teacher-centered methods over student-center methods. Discussion method is a good method for environmental learning. The concept of the learning community which is group tutoring and a collaborative learning model will help to build up individual knowledge and be effective for students' outcomes (Au & Chung, 2014). Discussion and listening was also important for students in a variety of learning areas, and occurred during interactions within the organization, and beyond (Moyer, Sinclair, & Diduck, 2014). But students of SMP 13 Magelang only discussed about how to answer the questions from their science book. And actually the answer they can find by looking into material that have been written on the book itself. So, that cannot explore students' thinking skill. Students should discuss environmental problem and give some oppinions solve it.

Environmental learning can be held in classroom and outdoor. Classroom-based learning can use active instructional methods and modern educational technology in environmental education is extremely important, as far as they can be used to provide effective training and professional orientation of students (Derevenskaia, 2014). From a student-centered perspective, learning is an active, participatory, experiential and

cooperative process whereby student and teacher co-create the learning experience (Topçu, 2013). Practical activities of environmental learning is to know and examine the nature with own experience (Sarma, 2012). It means teachers have to choose instructional methods that are oriented to students. An example of the instructional methods is experimental or laboratory learning. Research of Olubu (2015) showed that integration and student cohesiveness dimensions of laboratory learning could be relied upon in enhancing students' attitude and academic performance.

Outdoor-based learning attaches to learn outcomes relating to personal, social and environment (Nicol, 2008). The environment (outdoor) can support learning and can invigorate the achievement of desired educational objectives (Salama, 2009). Cooper (2015) stated that Benefits of outdoor learning for environmental learning are:

1. Improves self-regulation,
2. Improves eyesight,
3. Promotes cognitive development,
4. Improves academic performance,
5. improves concentration Promotes self-confidence,
6. Builds understanding and appreciation of ecosystems, food systems, and environmental processes.

Fien (1993) explained a balanced environmental learning programme addresses all three dimensions.

1. Learning in the environment. Experiences beyond the classroom in both natural and built environments not only provide opportunities for students to gain first-hand experience in the environment but also enhance classroom-based work. These opportunities can be used to develop skills in observation, data collection, practical inquiry and investigation, and the use of specialist technology. Such situations can also require social and co-operative skills, group-work skills, communication skills, and problem-solving skills. Opportunities for such experiences will vary, depending on the local environment, but all national curriculum statements provide opportunities for learning experiences outside the classroom.
2. Learning about the environment. Knowing about and understanding the natural and built environments and appreciating the key social, political, ecological, and economic factors that influence decision making on local, national, and global issues is critical if students are to meet the aims of environmental learning. Cultural awareness, economic activities, political decisions, ecological understandings, and health and safety issues are all factors that influence learning about the environment. The national curriculum statements provide frameworks for knowing about and considering these factors, which will help students to establish their own environmental values and attitudes.
3. Learning for the environment. Education for the environment is intrinsically linked to the "affective" aspects of environmental education as it deals with people's emotions and their willingness to make lifestyle choices that help maintain and improve the quality of the environment. Learning for the environment is based on students' knowledge and understanding about the environment and their practical experiences in the environment. Learning for the environment seeks ways in which people can minimise their impact on the environment. In a society that values freedom and choice and where resources are finite, it is important to develop a sense of responsibility about the social and natural environments of local, national, and

international communities. Environmental education promotes informed concern that enables individuals and groups to take effective action on environmental issues. The root cause of the mismatch instructional method with the characteristics of material is insufficient time allocation that will affect teacher's teaching and learning strategy. Time allocation is important to measure the number of minutes per science learning that student receive. Insufficient time of learning process will effect quality of learning itself and students' performance. The quality of instruction is more of an influence on learning (Wells & Dellinger, 2012). Characteristics of successful education are adequate instructional time, equal access to high-quality Science, Technology, Engineering and Mathematics (STEM) learning opportunities, school conditions and cultures that support learning, school leadership as the driver for change, parent community ties, student-centered learning climate, and instructional guidance (Pea, 2012). Teachers often possess inadequate content knowledge, have inadequate materials and facilities, are caught by competing curricular priorities, lack time and school/administrative support, and exhibit a minimal sense of self-efficacy to teach science (Levy et al, 2016).

CONCLUSION

This study focuses on interview and classroom-based observation where students and teachers interact, because they are not so easy to create, renovate and maintain and the daily schedule of academic activities are shaped by them. The use of instructional methods has not been suitable for characteristics of the learning materials and students' characteristics. Teachers should choose instructional methods depending on level students that teacher are dealing with, aims of instruction, and characteristics of subject matter. An instructional method oriented to students is a good instructional method for environmental learning which can be held in classroom and outdoor. Instructional methods that are often used are lecture and discussion. But based on the research, teachers chose instructional methods that will make easier for them to deliver the teaching materials to their students and they do not mind what the aims of instuction and the characteristics of the subject matter are. The result is poor performance of student learning. The root cause of the mismatch instructional method with the characteristics of material is insufficient time allocation that will affect teacher's teaching and learning strategy.

REFERENCES

- Au, H. & Chung, F. (2014). Case study of the effectiveness of the learning communities program for students in higher diploma in environmental science. *A Springer Open*, 3, p.1-2
- Bligh, D. A. (2000). *What's the use of lectures*. Jossey-Bass, San Francisco
- Chesebro, J. L., & McCroskey, J. C. (2002). *Communication for teachers*. Boston, MA: Allyn & Bacon.

- Chinn, P. (2007). Decolonizing Methodologies and Indigenous Knowledge: The Role of Culture, Place And Personal Experience in Professional Development. *Journal of Research in Science Teaching*, 44(9), 1247–1268.
- Cooper, A. (2015). Nature and the Outdoor Learning Environment: The Forgotten Resource in Early Childhood Education, *International Journal of Early Childhood Environmental Education*, 3(1), p.85-97
- Derevenskaia, O. (2014). Active Learning Methods In Environmental Education Of Students. *Procedia-Social and Behavioral Sciences*, 131, p.101-104
- Edelson, D. C. (2007). Environmental Science for All? Considering Environmental Science for Inclusion in the High School Core Curriculum. *Science Educator*, 16(1), p.42-56
- Fien, J. (1993). *Environmental Education: A Pathway to Sustainability*. Deakin University Press, Geelong
- Gallagher, J.J. (2007). *Teaching science for understanding: A practical guide for middle and high school teachers*. Upper Saddle River, NJ: Pearson Education, Inc.
- Hungerford, H. R. & Volk, T. L. (1990). Changing learner behaviour through environmental education. *Journal of Environmental Education*, 21(3), p.8-12
- Jeronen, E., J. Jeronen & H. Raustia. (2009). Environmental Education in Finland – A Case Study of Environmental Education in Nature Schools. *International Journal of Environmental & Science Education*, 4(1), p.1-23
- Karami. M, Pakmehr, H. & Aghili, A. (2012). Another view to importance of teaching methods in curriculum: collaborative learning and students' critical thinking disposition. *Procedia - Social and Behavioral Sciences*, 46, p.3266 – 3270
- Kastova, Z. & Atasoy, E. (2008). Methods of Successful Learning in Environmental Education. *Journal of Theory and Practice in Education*, 4(1), p.49-78
- Lampert, Nancy (2006). Critical Thinking Dispositions as an Outcome of Art Education. *Journal of Issues and Research*, 47(3), p.215
- Levy, A. J., et al. (2016). Science Specialists or Classroom Teachers: Who Should Teach Elementary Science?. *Science educator*, 25(1), p.10-21
- Miles, M. B. & Huberman, A. M. (1994). *Qualitative Data Analysis (2nd edition)*. Thousand Oaks, CA: Sage Publications
- Moyer, J. M., Siclair, A. J., & Diduck, A. P. (2014). Learning for Sustainability Among Faith-Based Organizations in Kenya. *Environmental Management*, 54, p.360-372

- Nicol, R. (2008). Outdoor education: Research Topic or Universal Value? Part Three. *Journal of Adventure Education & Outdoor Learning*, 3(1), p.11-27
- Olubu, O. M. (2015). Effects of Laboratory Learning Environment on Students' Learning Outcomes in Secondary School Chemistry. *International Journal of Arts & Sciences*, 8(2), p.507-525
- Omran, M. S. (2014). The Effect of Educating Environmental Ethics on Behavior and Attitude to Environment Protection. *European Online Journal of Natural and Social Sciences*, 3(3), p. 141-150
- Owens, T. M. (2009). Improving Science Achievement Through Changes in Education Policy. *Science Educator*, 18(2), p.49-55
- Ozerem, A. & Akkoyunlu, B. (2015). Learning Environments Designed According to Learning Styles and Its Effects on Mathematics Achievement. *Eurasian Journal of Educational Research*, 61, p.61-80
- Pea, C. H. (2012). Inquirv-based Instruction: Does School Environmental Context Matter?. *Science Educator*, 21(1), p.37-43
- Quesada-Pineda, H. J., Adams, E., & Hammett, L. T. (2011). Incorporating Experiential Teaching Methods in Sustainable Natural Resources Curriculum: A Case Study. *Journal of Natural Resources & Life Sciences Education*, 40, p.181-190
- Salama, A. M. (2009). The Users IN Mind: Utilizing Henry Sanoff's Methods in Investigating the Learning Environment, *Open House International*, 34(1), p.35-44
- Sarma, Q. (2012). Designing Effective Course Curriculum for Enhancing Quality of Environmental Education Through Distance Institutions. *Journal of Arts, Science & Commerce*, 3(1), p. 167-174
- Semken, S., & Freeman, C. (2008). Sense of place in the practice and assessment of place-based science teaching. *Science Educatorn*, 92(6), p.1042.
- Slavin, R. (2000). *Educational psychology: Theory and practice*. 6th Edition, Englewood Cliffs, New Jersey, Allyn and Bacon.
- Snowman, J., & Biehler, R. (2003). *Psychology applied to teaching* (10th ed.). New York: Houghton Mifflin.
- Subiantoro, A. W., Ariyanti, N. A., Sulistyo. (2013). Pembelajaran Materi Ekosistem dengan Socio-Scientific Issues dan Pengaruhnya terhadap Reflective Judgment Siswa. *Jurnal Pendidikan IPA Indonesia*, 2(1), p.41-47
- Sugiyono. (2010). *Metode Penelitian Pendidikan Pendekatan Kuantitaif, Kualitatif, dan R&D*. Alfabeta, Bandung

- Sutherland, D. & Swayze, N. (2012). The importance of place in indigenous science education. *Culture Studies of Science Education*, 7, p.83-92
- Topçu, E. U. (2013). Learning and Environmental Design: Softer Learning Spaces. *International Journal of Architectural Research*, 2(2), p.311-217
- Wells, M. I. & Dellinger, A. B. (2012). The Effect of Type of Learning Environment on Perceived LearninG Among Graduate Nursing Students. *Nursing Education Perspectives*, 32(6), p. 406-410.

