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Lichens in the environment as a laboratory for environmental and science education

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Abstract

Teachers are confronted with many issues regarding teaching and learning science. Currently Malaysian schools are facing difficulties in encouraging student to take up science in upper secondary. Student found science to be difficult and not enjoyable. Realizing this, alternative methods of teaching science have been proposed. Collaborative action research was carried out to work with teachers on how environment awareness and knowledge can be taught which would make students enjoy their learning and be informed about environmental knowledge. LICHEN study was proposed by a group of lecturers in measuring the quality of air by using simple apparatus which can be carried out outdoor. This paper reports as project work which was carried out collaboratively between university lecturers and teachers with their students. A teaching module using LICHEN to measure quality of air in the environment was designed by the science lecturers. Working collaboratively with faculty's lecturers, a group of teachers from 7 schools were selected to bring along 64 of their students to attend a project work and experience the use of LICHEN. Together with the students, school teachers conducted the experiment group. The experiment involved measuring the quality of air, measuring and observing the LICHEN then they have to carry out repeat and conducting three different areas to show the different air quality (near the roadside, pond and open space). Each group would present and display the result. At the end of the experiment the reaction from the teachers and students were very positive. They have gained the knowledge and valuable experimental competencies besides becoming more aware of the need to sustain the environment.

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1. Introduction

Malaysia faces a problem to develop a science literate society as there is a lack of quality and quantity of students in the field of Science at the school level. Data reported by Mohd Salleh et al. (2011) showed that the target set by the government for a ratio of Science to Arts students as much as 60:40 was not achieved; instead the percentage enrolment of upper secondary schools is slowly decreasing.

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As a result, the objective of obtaining 33% human resource in Science and technology in Malaysia is still far to achieve. Among the problems identified for the lack of interest among the students are the teaching and learning of science are not active, lack of enquiry involvement and the irrelevance of Science in daily life. Thus, various efforts were made in the aspect of improvement in curriculum and the approach to teaching and learning Science.

In this study, the learning of Science outside the classroom is proposed as a step to encourage interest in the student to learn science. In the context of learning, the environment is made the laboratory for the student to investigate the environment as well as science simultaneously. This approach is selected as it is believed that the student will be inspired and enjoy learning through active hands-on and minds-on exploration of knowledge in a learning environment.

In addition, the learning outside the classroom is believed to value-add science education as it will be an opportunity for interaction with the environment (Emmon 1997). Teaching and learning Science through environment will not only develop communication skills, understanding and knowledge, but students will have the opportunity to self-reflect on their concern about environment literacy as a whole (Palmer 1998). Indirectly, the proposed approach towards teaching and learning will not only overcome the problem of Science learning, but is believed will solve other problems related to environmental education among the students.

In Malaysia, environmental education is implemented across curriculum. The across curriculum approach refers to the integration of content and additional skills on the current curriculum to give more focus but without any negative effect on the integrity of the original curriculum of a specific subject. (Hungerford et al. 1994). Although Nillson (2008) is of the opinion that this approach have advantages for the autonomous power of the teacher to decide whether the learning of the environment can be carried out independently and integrated at the end of the teaching and learning session, the packed curriculum and the time constraint for the purpose of teaching and learning is feared to be the obstacle to the implementation. This in turn will be the source of the problem on the level of knowledge, attitude and reaction of the student towards environment which will be at a low or moderate level. (Norlila2007; Mageswary et al. 2006; Santha2008).

Based on the analysis of the environmental education curriculum documented in 'Buku Panduan Guru Pendidikan Alam Sekitar Merentas Kurikulum KBSM', it was found that the goals of presenting environmental education across curriculum is carried out holistically, i.e. to encompass the knowledge, awareness, attitude, competencies, behaviour aspects and involvement in environment. However, analysis towards activities showed that environmental issues rose was inserted repeatedly in the content of the subject. Besides that, the relevance of the learning content with concepts associated with environment is not clear resulting in the difficulty of implementing environmental education which often happens in the classroom.

This article will discuss the learning outcome of Science and Environment using the real environment as a learning laboratory through the implementation of an education program. The main material for the experiment is lichen. Lichen is a symbiotic organism composed of a fungus with a partner, usually a green alga or a bacteria. Lichens can be a biological indicator to determine the air quality at a certain location. As such the project selected for the programme was based on this special property of the lichen. The assessment and discussion of the study will be based on the following questions:-

- i. Will there be a change in the level of the students' knowledge on the concept of lichens from learning through the lichen module which uses environment as the learning laboratory?
- ii. Will there be a change in the level of Science Process competency from learning through the lichen module which uses environment as the learning laboratory?
- iii. What are the strength and weaknesses of the Science learning programme which was organised based on the use of the lichen module from the teachers' and students' perspective?

2. Methodology

This study uses collaborative action research design and programmed assessment study. The study sample consists of 64 Form 4 students from the Science Stream who will be involved as programmed participants. The selections of students were made by the teachers of eight secondary schools. Six secondary schools were from the from the Hulu Langat district, Selangor, a school from the Federal Territory, Putra Jaya and a school from Nilai district, Negeri Sembilan.

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