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A Study on Malaysia Primary School Science Education: Foundation for Environmental Knowledge

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Abstract: As a developing nation, Malaysia needs citizens who can contribute to the scientific and technological developments in order to compete and be at par with other developed nations and to be able to achieve this goal by year 2020. Malaysia must not only have a scientifically and technologically literate citizens, but citizens who know and aware of how to sustain the development. This can be accomplish if the children in schools today are prepared and geared towards an education that taught and shaped their thinking and behavior towards the importance of a sustainable development. Thus, the knowledge of science must not only produce good inventors, or creative innovators in the future, but citizens who can, besides contributing to the development of science and technology, must also be aware and conscious of their actions that might give bad or negative influence to the environment. Thus, the objective of this study is to find out what are the elements of environmentally-related subject that is taught in science classes in Malaysian primary schools and to relate its part as a foundation and contribution for sustainable development.

Key words: Malaysia, science education, science syllabus, environmental knowledge, environmental awareness, primary school

INTRODUCTION

Interest in science must be instilled and nurtured since, the early education stage in order to inculcate an interest in science and technology subjects that will be introduced in the later stages of learning experience. A science literate society is a society where to talk about science is as natural as talking about football (Nisbet, 2003). Thus, science literacy is when one knows about science and learns to be appreciative about it. But, do knowing and appreciating science alone are sufficient in assuring that the fruits of the development will not jeopardize the human life and its environment. It has come to the period where, globalization challenges, modernization needs, economic developments and other crucial aspects are demanding more and more than the mother earth can provide.

Malaysia is aiming to become a developed nation by the year 2020. Now that we are competing in the world of Science and Technology with other nations, the government has realized that science subjects and science related subjects are crucial and students at early age must be exposed or made familiar with it so as to prepare them for a more advance study in the future. As a developing country, Malaysia needs to produce graduates who possess relevant skills to participate in the science and technology development in the country. At the same time, it is crucial to realize that the effort to produce more science and technology experts must be accompanied with the nurturing and increasing of environmental awareness. We hope the knowledge that is being taught in schools and learning institutions today will shape the thinking and behavior of the world tomorrow. Thus, instilling environmental awareness at the learning age is the best way, in due course, to protect the environment. Yet, how do we instill this awareness? Do schools have to teach an extra subject purposely to convey this knowledge and awareness? Does the system have to add another extra subject to the now pact curriculum? At present, Malaysia is aware about the issues concerning the environment and necessary steps and measures are taken to educate the learning generations about the environment. For example in the curriculum contents of the school syllabus, knowledge and awareness about the

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environment are instilled across the curriculum' It is not being taught as a subject but as aims or objectives of certain subjects.

Knowledge about the environment: Why does knowledge about the environment or environmental awareness need to be spread? How important and crucial is it to the society and its development? Thus, let us look at the world and environment we are living now. Malaysia is taking the appropriate step to be a developed nation and it still has a long way to go. However, contrary to the success of rapid economic development, the active pursuit of industrialization and the effort to excel in the S and T arena, the country's limited resources and fragile ecosystems are being threatened (Ngai, 1998). The environment is being damaged progressively in the name of modernization and development. Deforestation is happening under the reason that trees are natural resources to accommodate humans' demanding lifestyle. Large areas of trees are cut and these cleared lands are then used as human settlement. Flood and landslide are two other natural disasters that can be connected due to rapid and unsustainable development.

These damages and destructions are happening with extreme speed and are affecting the cycles of all major components of life. How can we not understand that all these development to guarantee humans a comfortable lifestyle will eventually do serious harm to the earth in the near future?

> In their frantic quest for modernization and industrialization, many rapidly developing countries are falling into the same trap as their Western developed counterparts had done in the past, i.e., over-zealous rapid development without stringent environmental protection measures (Ngai, 1998)

What we want to emulate from the developed country are their skills and knowledge for a better world not the skills and knowledge in destroying the world. Thus, we must equipped the learning generations, those in schools today the importance of a sustainable development, which not only can guarantee a safe, healthy and comfortable life for today but will continue for generations to come.

We are hoping that when students have knowledge about the environment they will also, gained awareness about the environment and this will lead to an environmentally significant behavior. According to Stern (2000), there are many types of environmentally-significant behavior.

- Environmental activism-active involvement in environmental organizations and demonstrations
- Non-activist behaviors in the public sphere-petitioning on environmental issues, joining and contributing to environmental organizations, stated approval of environmental regulations, willingness to pay higher taxes for environmental protection
- Private-Sphere environmentalism-purchasing practices that consider the environmental impact of production processes; purchasing, using and disposal of personal and household products that have environmental impact
- Other environmentally significant behaviors-Individuals may significantly affect the environment through other behaviors, such as influencing the actions of organizations to which they belong

For the other environmentally significant behaviors, Stern (2000) gave these examples, engineers may design manufactured products in more or less environmentally benign ways, bankers and developers may use or ignore environmental criteria in their decisions and maintenance workers' actions may reduce or increase the pollution produced by manufacturing plants or commercial buildings. Thus, if science education in schools today can create at least the 4th element (other environmentally significant behaviors) among our future society, the objective of environmental awareness across curriculum that is being implemented in Malaysian school science syllabus has functionally done its job.

Environmental awareness across the curriculum: Science subjects are taught in Malaysian education system. Teaching of science in the primary school is compulsory according to the Schools' Regulations 1967 (Sharifah and Lewin, 1993). Thus in the 60 and 70's science subject was introduced since Year 1 in the primary level. However, in the 80's science subject was not taught as a core subject but students still learn science in subjects like man and environment where science, along with geography and history were one of the integrated elements. Recently, science education has again become one of the core subjects in Malaysia primary schools and since 2003, it has been taught to students as early as year 1 (7 years old).

The contents of science syllabus in the primary schools, consists the knowledge and facts of environmental education-related factors. Every subject especially, science subject must stress the environmental awareness factors in its curriculum contents (Sharifah and Lilia, 2007). Thus, the objective of this study is to find out

and to identify what are the elements of environmentally-related subject in the science syllabus that is taught in the primary school in Malaysia.

To analyze the content of the environmentally-related factors, this research follows the curriculum of a Malaysian primary school science syllabus. The syllabus contents are able to give a significant insight of what and to what extend science education prepared children and taught them about environmental issues. Primary school education does not offer environmental education as a subject but the contents of environmental education-related knowledge and facts can be found throughout its syllabus. Thus, teaching environmental issues through scientific literacy is crucial in contributing the environmental awareness because science courses epitomize the scientific and technological issues surrounding the environmental problems (Gill and Burke, 1999).

In Malaysia, environmental education is not taught as a single subject, but it cuts across the curriculum. In the science syllabus of primary schools, objectives of science education are related to the nurturing of environmental awareness among students. These include:

- Create an awareness on the need to love and care for the environment
- Stimulate pupils' curiosity and develop their interest about the world around them
- Inculcate scientific attitudes and positive values (Lee *et al*., 2004)

To stress these objectives, the syllabus also states the scientific attitudes and noble values that must be acquired by students at the end of each lesson. These attitudes and values were also listed in the syllabus. They include:

- Having an interest and curiosity towards the environment
- Being responsible about the safety of oneself, others and the environment
- Realizing that science is a means to understand nature
- Appreciating and practicing clean and healthy living
- Appreciating the balance of nature (Lee *et al*., 2004)

The learning of science is not limited to classroom teaching only. The syllabus also specifies outdoors activities that could be carried out to make the lessons more interesting and realistic. Outdoor activities are not restricted in the vicinity of the school compound. Field trips to zoo, museums, science centers, research institutes, mangrove swamps and factories are also recommended. Through this real life experience, students are brought into contact with nature and apply the knowledge they learn. This is a good way for students to learn about nature and the environment by placing themselves in the real condition. Through these activities, students became more alert to their environmental surroundings.

MATERIALS AND METHODS

A document analysis of Malaysian primary science education syllabus was done. Primary school education does not offer environmental education as a subject but the contents of environmental education-related knowledge and facts can be found throughout its syllabus.

Twenty scientific attitudes and noble values are also listed in the syllabus and only five are related to the environment as stated:

- Having an interest and curiosity towards the environment
- Being responsible about the safety of oneself, others and the environment
- Realizing that science is a means to understand nature
- Appreciating and practicing clean and healthy living
- Appreciating the balance of nature

The Malaysian science curriculum for primary schools is developed with eight objectives to achieve:

- Stimulate pupils' curiosity and develop their interest about the world around them
- Provide pupils with the opportunities to develop science process skills and thinking skills
- Develop pupils' creativity
- Provide pupils with basic science knowledge and concepts
- To provide learning opportunities for pupils to apply knowledge and skills in a creative and critical manner for problem solving and decision-making
- Inculcate scientific attitudes and positive values
- Foster the appreciation on the contributions of science and technology towards national development and well-being of mankind
- Be aware the need to love and care for the environment (Lee *et al*., 2004)

The 8th objective directly refers to the environment, with the aim to inculcate the love and care for the environment. This signify that the government is showing concern about what is happening to the environment and is hoping that present generation in school will acquire more knowledge about the environment and will than

interact positively with the knowledge. The content of the science syllabus for primary schools is organized around themes. Positive attitudes towards the environment are listed as noble values to be achieved as a science learning experiences along with the scientific values (Hassan, 2009).

RESULTS AND DISCUSSION

When the content of the science syllabus are analyzed, as shown from the Table 1 and 2, the subjects related to environment can only be traced in the themes, which included the topic of living things. In level 1 (year 1-3) two themes are introduced, but as shown in Table 2, only the 1st theme-learning about living Things, contains the environmentally-related knowledge. In the level 2 (year 4-6), the syllabus contents are organized around five themes and only three of the themes do contain the environmentally-related knowledge.

In the syllabus, learning objectives are also stated clearly as the objective to be achieved for every topic learned. Furthermore, suggested learning activities and learning outcomes are also part of the list in the syllabus.

For the purpose of this study, the analysis was only based on the learning objectives because it encompasses the learning activities and learning outcomes. As mentioned before, each syllabus consists various themes, however, only a few of these themes consists the environmentally-related subject as shown in Table 3-8.

Table 1: Themes content in the science syllabus

Levels	Years	Themes
1	1	Learning about living things
	2	Learning about the world around US
	3	-
2	4	Investigating living things
	5	Investigating force and energy
	6	Investigating materials
		Investigating the earth and the universe
		Investigating technology

Table 2: Themes related to environmental knowledge

Years	Themes	Contents
Level 1		
1-3	Learning about living things	The theme introduces pupils to living things and non-living things. Pupils learn about themselves, animals and plants around them. Pupils also learn about senses, good health, good habits and some of the life processes that humans undergo.
Level 2		
4-6	Investigating living things/ environments	The theme introduces pupils to the basic understanding about the basic needs of living things, life processes, interactions among living things and how living things survive and create a balance in nature. This theme also, focuses on life processes in man for pupils to understand themselves. It also, explains why man is special compared to other living things.
	Investigating energy and force	The theme introduces the basic physical quantities through, which pupils are exposed to the principles of measurement, the use of standard units and the importance of using standard units. The theme also includes light, heat, sound, energy, movement and electricity. Pupils are introduced to force and speed too at this level.
	Investigating materials	This theme aims to provide pupils the opportunities to investigate natural materials and man-made materials. Pupils use their knowledge about physical properties of materials and relate them to their use. The theme also includes the study of the formation of clouds and rains. Acid, alkali and neutral substances are also introduced. It also, enables pupils to understand how things around them rust and how food is preserved. Finally an exposure to issues on waste disposal will create an awareness that man needs to play a responsible role in an effort to manage nature wisely.

Lee *et al.* (2004)

Table 3: Learning objectives of environmentally-related topic-year 1

Year	Theme	Topic	Learning objectives
1	Learning about living things	Plants	The names of different plants
			The names of different parts of plants
			That plants need water to grow
			That plants need sunlight to grow
			That plants grow

Table 4: Learning objectives of environmentally-related topic-year 2

Years	Theme	Topic	Learning objectives
2	Learning about living things	Animals	What animals need to live
			The different foods that animals eat
			That animals grow
2	Learning about living things	Plants	That plants need the right amount of water for healthy growth
			That flowering plants produce seeds, which grow into new plants

Table 5: Learning objectives of environmentally-related topic-year 3

Years	Theme	Topic	Learning objectives
3	Learning about living things	Animals	To observe and recognize external features of animals
			That animals can be grouped according to external features
			That animals can be grouped in many ways
3	Learning about living things	Plants	To observe and recognize external features of plants
			That plants can be grouped according to external features
			That plants can be grouped in many ways
3	Learning about living things	Soil	What soil is made up of.
			The flow of water through different types of soil
			That certain soils are more suitable for plant growth

Lee *et al.* (2004)

Table 6: Learning objectives of environmentally-related topic-year 4

Years	Theme	Topic	Learning objectives
4	Investigating living things	Living things have basic needs	Understanding that humans have basic needs Understanding that animals have basic needs Understanding that plants have basic needs
4	Investigating living things	Living things undergo life processes	Analyzing life processes in humans Being aware that certain behavior can disturb life processes Analyzing the life processes in animals Understanding the life processes in plants
4	Investigating living things	Animals and plants protect themselves	Understanding that animals have specific characteristics and behavior to protect themselves from danger. Understanding that animals have specific characteristics and behavior to protect themselves from extreme weather. Understanding that animals have specific characteristics and behavior to enable them to survive Understanding that plants have specific characteristics to protect themselves from enemies

Table 7: Learning objectives of environmentally-related topic year 5

Years	Theme	Topic	Learning objectives
5	Investigating force and energy	Microorganism	Understanding that microorganism is a living thing Understanding that some microorganisms are harmful and some are useful.
5	Investigating force and energy	Survival of the species	Understanding that different animals have their own ways to ensure the survival of their species Understanding that different plants have their own ways to ensure the survival of their species Realizing the importance of survival of the species
5	Investigating force and energy	Food chain and food web	Understanding food chains Synthesizing food chains to construct food web
5	Investigating force and energy	Energy	Understanding the uses of energy Understanding that energy can be transformed from one form to another Understanding renewable and nonrenewable energy
5	Investigating materials	States of matter	Understanding that matter can change from one state to another Understanding the water cycle Appreciating the importance of water resources

Table 8: Learning objectives of environmentally-related topic year 6

Year	Theme	Topic	Learning objectives
6	Investigating Living Things	Interaction among living things	Understanding that some animals live in groups and others live in solitary Understanding that competition is a form of interaction among living things Understanding the responsibility of human beings in protecting endangered species Knowing the impact of human activities on environment
	Investigating materials	Waste management	Understanding the effects of improper disposal of waste on the environment Understanding that some waste can decay

Lee *et al.* (2004)

CONCLUSION AND RECOMMENDATIONS

The above analyzed syllabus was a proof that primary school science syllabus in Malaysia do encompass the knowledge about the environment. Still, whether this is enough to ensure that a positive behavior towards the environment is taking place is up to the teachers own effort, since there is no formal evaluation of assessing whether the students practice and apply what they learn in school to their daily routine life. Science should be taught not only for the sake of passing exams or memorizing facts, but also must include the process of science, which effects the environment directly or indirectly. Base on the brief analysis, Malaysian primary school science syllabus do contains knowledge about the environment. The syllabus in upper classes, year 4-6, (age 10-12) contains a specific topic in environment, investigating the living things/environment. But, it is still not enough to ensure the environmental knowledge can contribute to the desired environmental awareness, which support the sustainable development. Nevertheless, at the early stage it did introduce the elements of knowledge and good values towards the environment.

Maybe the syllabus should also add some more themes and good values that can really make the student link their daily life with the environmental knowledge they acquire in science education. It should exceed the across curriculum aims and goals and should be introduced as a chapter by itself, if not as a single different subject as a whole. So, a syllabus that not only can produce scientifically literate citizens but also environmentally friendly citizens should be the main focus when undertaking policy reform. If the students do not have the proper knowledge and understanding of causes and effects of environmental issues, they will not be able to produce correct decisions in the future when confronted with dilemma occurred because of environmental problems.

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