PRO-ENVIRONMENTAL BEHAVIOUR AMONG PRIMARY SCHOOL CHILDREN IN THE WEST COAST OF SABAH, MALAYSIA

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By

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Environmental Education has been part of the primary school curriculum for over thirty years. The aim of Environmental Education is to develop students who are environmentally literate and ultimately behave pro-environmentally. To date, studies among primary school students which include all four components of the environmental literacy domain has not been carried out in Sabah. Therefore there is an urgent need to assess the state of pro-environmental behaviour among primary school students, as well as the factors which affect pro-environmental behaviour of students. The purpose of this study was to analyse the pro-environmental behaviour of primary school children in the West Coast of Sabah, based on the Theory of Planned Behaviour (Ajzen, 1985), and the components of the domains of EL (McBeth et al., 2011). The factors measured in this study included ecological knowledge, disposition towards the environment, competencies in identifying environmental issues and action strategy skills possessed by the primary school children. Furthermore, the influence of various student characteristics upon the pro-environmental behaviour of primary school children was also determined. These student characteristics included gender, race, pre-school attendance, involvement in after school clubs, and leadership roles.

The design of this study was a quantitative survey among primary school students within six districts in the West Coast of Sabah. The factors affecting pro-environmental behaviour among 1025 Year 5 students from 17 national primary schools along the West Coast of Sabah, was determined using a primary School Environmental Literacy Instrument (PSELI) that was completed by the Year 5 students of each school. Interviews with key personnel involved in environmental education in the school, as well as on site observation of evidence promoting pro-environmental behaviour were also carried out.

The Primary School Environmental Literacy Instrument was adapted and modified to suit the local Year 5 students, and included eight parts with a total of 68 items. These questions included multiple choice, as well as 5 point Likert scale items. The data collected was analyzed using SPSS (Statistical Package for Social Sciences v.22). An Exploratory Factor Analysis was used to determine the disposition dimensions of the primary school students. A Multiple Linear Regression was carried out to determine the significant factors influencing pro-environmental behaviour of students.

The findings revealed that the students had a moderate level of environmental literacy and ecological knowledge, while the level of competency in issue identification and action strategy planning was low, whereas their disposition and pro-environmental behaviour scores ranged between moderate to high. Furthermore, the findings from the Multiple Linear Regression analysis indicated that 8 predictor variables significantly influence the pro-environmental behaviour of primary school students in the West Coast of Sabah. These included 6 disposition related variables, competency in action strategy planning, and gender variables.

The findings of this study have contributed to research and literature in environmental education, and environmental literacy, in particular as existing research often exclude environmental issue investigation, and pro-environmental behaviour among younger students. Research findings will also help environmental education providers, policy and curriculum developers to gauge the extent to which the current environmental education program in Sabah has met the aims of the Malaysian Education Ministry, in creating environmentally literate students. Consequently, understanding the factors affecting students' pro-environmental behaviour will allow them to better provide for the environmental literacy needs of different groups of students.

This study has highlighted the urgent need to improve the competency level among primary school students, as well as to provide meaningful and effective environmental education programs for boys. Furthermore, this study has also contributed to current practice in the implementation of environmental education across the curriculum, by highlighting the importance of hands-on gardening and environmental activities in natural settings, in the development of pro-environmental behaviour.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

KELAKUAN PRO-ALAM SEKITAR DI KALANGAN KANAK-KANAK SEKOLAH RENDAH DI KAWASAN PANTAI BARAT SABAH, MALAYSIA

Oleh

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Pendidikan alam sekitar merupakan sebahagian daripada kurikulum sekolah rendah sejak tiga puluh tahun yang lepas. Tujuan pendidikan alam sekitar diterapkan ke dalam kurikulum sekolah rendah adalah untuk mewujudkan para pelajar yang mempunyai literasi alam sekitar dan mampu bersikap pro-alam sekitar. Kajian-kajian di kalangan para pelajar sekolah rendah yang merangkumi keempat-empat komponen literasi alam sekitar belum lagi dijalankan di Sabah. Oleh itu, kelakuan pro-alam sekitar perlu dijalankan untuk menentukan tahap kelakuan pro-alam sekitar di kalangan para pelajar sekolah rendah, serta factor-faktor yang mempengaruhi kelakuan pro-alam sekitar para pelajar. Kajian ini bertujuan untuk menganalisa kelakuan pro-alam sekitar di kalangan para pelajar Sekolah Rendah di kawasan Pantai Barat Sabah. Faktor-faktor yang dipertimbangkan termasuklah, komponen-komponen literasi alam sekitar yang merangkumi: pengetahuan ekologi; kecenderungan terhadap alam sekitar; kecekapan dalam mengenalpasti isu-isu dan strategi tindakan; dan seterusnya, ciri-ciri para pelajar: jantina; keturunan; pendidikan pra-sekolah; penglibatan dalam kelab-kelab sekolah; dan peranan kepimpinan para pelajar.

Kajian ini merupakan suatu tinjauan kuantitatif di kalangan para pelajar Sekolah Rendah yang merangkumi enam daerah di Pantai Barat Sabah. Faktor-faktor yang mempengaruhi kelakuan pro-alam sekitar di kalangan 1025 orang pelajar Tahun 5, daripada 17 buah Sekolah Rendah Kebangsaan, telah ditentukan dengan menggunakan Instrumen Literasi Alam Persekitaran Sekolah Rendah, yang telah dijawab oleh para pelajar Tahun 5 masing-

masing. Temubual bersama Guru Besar, atau guru pembimbing yang terlibat dalam pendidikan alam sekitar, serta pemerhatian di sekitar sekolah telah dijalankan untuk memerhati keadaan sekolah yang mungkin menggalakkan kelakuan pro-alam sekitar.

Instrumen Literasi Alam Persekitaran Sekolah Rendah telah diadaptasi dan diubahsuai untuk para pelajar tempatan yang berada di Tahun 5. Instrumen ini termasuklah lapan bahagian yang mengandungi 68 buah soalan yang berbentuk soalan anika pilihan, dan soalan skala Likert 5 peringkat. Data yang diperolehi dianalisis dengan menggunakan pakej statistik untuk sains sosial, *Statistical Package for Social Sciences* (SPSS) versi ke-22. Analysis Peninjauan Faktor (Exploratory Factor Analysis) telah digunakan untuk menentukan dimensi kecenderungan para pelajar. *Multiple Linear Regression* telah dijalankan untuk menentukan faktor-faktor penting yang mempengaruhi kelakuan pro-alam sekitar para pelajar.

Dapatan kajian menunjukkan bahawa, para pelajar mempunyai literasi alam sekitar dan pengetahuan ekologi pada tahap sederhana, manakala tahap kecekapan dalam mengenalpasti isu-isu dan strategi tindakan para pelajar adalah rendah. Seterusnya, skor kecenderungan terhadap alam sekitar serta kelakuan pro-alam sekitar berada di antara skor sederhana dan tinggi. Analysis *Multiple Linear Regression* menunjukkan bahawa terdapat 8 pembolehubah peramal yang mempengaruhi kelakuan pro-alam sekitar para pelajar di Sabah. Ini termasuklah 6 pembolehuban kecenderungan terhadap alam sekitar, kecekapan dalam strategi tindakan, serta jantina responden.

Kajian ini telah memberi sumbangan dalam bidang pendidikan alam sekitar, serta literasi alam sekitar, terutamanya kerana kajian ini merangkumi aspek kecekapan dalam mengenalpasti isu-isu dan strategi tindakan serta kelakuan pro-alam sekitar di kalangan para pelajar sekolah rendah. Kajian ini juga akan dapat membantu para penyedia program pendidikan alam sekitar serta penggubal kurikulum menganggar tahap pencapaian program pendidikan alam sekitar di Sabah, dalam mencapai matlamat Kementerian Pendidikan Malaysia dalam membangunkan generasi pelajar yang berliterasi alam sekitar. Seterusnya, pemahaman terhadap faktor-faktor terhadap kelakuan pro-alam sekitar para pelajar akan membolehkan mereka penyediakan program literasi alam sekitar yang lebih baik berdasarkan keperluan para pelajar. Kajian ini telah menitikberatkan keperluan untuk memperbaiki tahap kecekapan para pelajar sekolah rendah, serta penyediaan program-program pendidikan alam sekitar yang lebih bermakna dan efektif untuk para pelajar lelaki. Seterusnya, kajian ini juga telah menyumbang kepada implimentasi pendidikan alam sekitar merentasi kurikulum, dengan menitikberatkan kepentingan penglibatan para pelajar dalam aktiviti penanaman tumbuhan serta melakukan aktiviti alam sekitar di kawasan semulajadi, untuk melahirkan para pelajar yang berkelakuan pro-alam sekitar.

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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Doctor of Philosophy. The members of the Supervisory Committee were as follows:

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LIST OF ABBREVIATIONS

UPM	Universiti Putra Malaysia
EE	Environmental Education
EL	Environmental Literacy
PEB	Pro-environmental Behaviour
MSELI	Middle School Environmental Literacy Instrument
PSELI	Primary School Environmental Literacy Instrument
IEEIA	Investigating and Evaluating Environmental Issues and Actions
TPB	Theory of Planned Behaviour
ERB	EnvironmentallyResponsible Behaviour
MOE	Ministry of Education
SEEN	Sabah Environmental Education Network
SIDP	Semporna Island Darwin Project
HOTS	Higher Order Thinking Skills

CHAPTER 1

INTRODUCTION

Environmental issues are common knowledge to most students and adults alike. Environmental Education has made global warming and the effects of deforestation known to both primary and secondary school children. Campaigns on how to reduce, reuse and recycle have long been introduced in schools and through the mass media. It is apparent that environmental issues and challenges are global in nature, requiring efforts and cooperation from environmentally literate individuals and groups throughout the world.

In Sabah, on going programs such as the conservation of orangutans in Sepilok, Sandakan, have created opportunities for the public to become more aware of efforts to care for the flora and fauna closer to home. However, with regards to waste production and disposal, it was reported that the daily solid wastes production per person had increased to 0.8 kg in 2005 by 130 grams per person in 2001 (EPU, 2006). 800 tonnes of rubbish was reported to be collected daily from the districts of Kota Kinabalu, Putatan, Penampang, Turaran and Kota Belud, with Kota Kinabalu being the main contributor. Even more troubling is that RM2.1 million was spent monthly on waste management in Kota Kinabalu, of which 80% could have been recycled (Borneo Post online September 10, 2017). Furthermore, reports have highlighted that eight of the 68 rivers in Sabah are polluted (The Star online, 22 September, 2017). In the West Coast Division of Sabah, Sungai Likas, Sungai Inanam and Sungai Darau near Kota Kinabalu have been identified as three of the severely polluted rivers. Researchers continue to highlight the negative effects rising waste production would have upon the environment should drastic measures not be taken in Sabah (Fatma, Latifah, Mariani, and Sabrina, 2013). In view of the escalating environmental issues within the country, the 11th Malaysian Plan was developed to create a green community among Malaysians (EPU, 2015). Citizens who practise strong pro-environmental behaviour would undoubtedly help their nation to reduce unnecessary expenditure on waste management, decrease the need for more landfill areas, and ultimately create a cleaner and healthier environment.

The importance of caring for the environment and practicing environmentally responsible behaviour are even more crucial in countries that rely heavily on their eco-tourism sector as their source of income. The state of Sabah recognizes that its tourism sector depends heavily on the natural biodiversity of the state and that it plays a crucial role in its human and economic development. The Sabah State Development Agenda has highlighted tourism as one of the three priorities (Lydia Teh and Cabanban, 2007). To ensure the sustainability of this industry and the biodiversity, the government of Sabah has been working together with non-profit organizations such as WWF (World Wide Fund for Nature), UNDP (United Nations Development Plan) and Danish Co-operation (Kim, 2011). However, while tourism is poised for rapid expansion, scholars have highlighted that sustaining this industry may be a problem if major

environmental aspects are not looked into (Ali, 2010; Praveena, Siraj, and Aris, 2012). Through education and awareness on the ecosystem, host region and culture, informing the tourist on the consequence of their actions, can in return enhance the visitors' experience and encourage them to engage in sustainable behaviour (Siow, Ramachandran, Shuib, and Afandi, 2014).

On the other hand, while tourism could result in the reduction of poverty among the rural poor various unsustainable practices have brought about the destruction of the environment, flora and fauna. Fien (1993) stated that the economic wellbeing and the environmental protection in many developing countries are on two ends of a continuum. As such, the development in the country's economy and improvement in the community's livelihood is often conflicting with efforts to protect and conserve the natural environment. This seems to be evident among many rural communities in Sabah. Several scholars have stressed the importance of environmental sustainability that will ensure holistic development (Prabhakaran, Nair and Ramachandran, 2016; Ng, Chia, Ho, and Ramachandran, 2017).

Maintaining the quality of the environment is especially vital to Sabah, as nature tourism is an important source of income to rural communities. Fresh and clean mountain and river air of Sabah have been used as an attraction for potential tourists seeking a reprieve from their polluted homeland. The chairman of Sabah Tourism Board explained that Tourists from China, Japan and South Korea are important contributors to the economy of local communities. Rural tourism has resulted in substantial income for communities such as the community in Kampung Talugan, were 30,000 visitors brought in RM 100,000 in earning (The Star Online 3 August, 2017).

Nevertheless, other areas in Sabah conserving the natural environment continue to be challenging. In spite of various projects carried out to educate the local communities, such as The Semporna Island Darwin Project (SIDP), involvement of The Marine Conservation Society, as well as other various policies, conservation enactments, legislations and efforts to conserve the environment, recent studies have shown that it is still evident that the concerns regarding the protection and conservation of these areas remain a topic amongst scholars (Corpuz, 2008; Jakobsen et al., 2007; Praveena et al., 2012; L Teh et al., 2005; Lydia Teh and Cabanban, 2007).

In an effort to create environmentally literate citizens, various forms of environmental education (EE) have been introduced throughout the world. Based on its initial definition by the World Conservation Union (IUCN) in 1970, environmental education (EE) or conservation education aims; to provide learners with the opportunity to gain an awareness or sensitivity to the environment, knowledge and experience of the problems surrounding the

environment, to acquire a set of values and positive attitudes, to obtain the skills required to identify and solve environmental problems and, the motivation and ability to participate in nature activities (Jacobson et al., 2006).

The primary goal of EE is environmental literacy (Culen, 2001). Environmental literacy (EL) can be defined as the capacity to perceive and interpret the relative health of environmental systems and take appropriate action to maintain, restore or improve the health of those systems (Disinger, 1992). An environmentally literate person is thus one who has the knowledge and skills required to analyze environmental issues, which would enable the individual to act in an environmentally responsible manner. Hence, the measurement of environmental literacy is ones responsible environmental behaviour or pro-environmental behaviour (PEB).

Environmental awareness and concern is widespread throughout most industrialized and developing nations (Dunlap, Gallup and Gallup, 1993). Based on this perspective, EE efforts have reaped favourable results and EE providers have been successful in fostering greater awareness and concern for the environment. However, Chawla (1988) has expressed concern that while environmental concern has increased, it has yet to be followed by a corresponding increase in pro-environmental behaviour. Similarly, Aini, Nurizan and Fakhru'l- Razi (2007) reported that while EE had successfully increased the environmental awareness of students, it had been unable to change their behaviour.

It is apparent that EE has succeeded to create awareness of the environmental problems and the various types of pollution being faced daily throughout the world, however, Connell et al (1999) explained that most people experience 'action paralysis' in that they hold the belief that they are incapable of making a difference other that small efforts such as recycling their wastes products. In a study carried out by the Malaysian Economic Planning Unit (1996) it was reported that only 22% of respondents participated in environmental conservation efforts, although it reported that 90% or nine in every ten Malaysians were aware of environmental pollution.

In their research with students, Chawla and Cushing (2007) highlighted that in order to produce students who are truly pro-environmental, whose behaviour are able to bring about the largest potential benefits for the environment, students need to have a personal sense of competence, as well as a sense of collective competence in their ability to achieve goals. EE at our present age in time needs to prepare students for active involvement by helping them develop the skills required to bring about global change.

The Malaysian Education Ministry (1996a) states that environmental education aims to create students who are sensitive and aware of environmental issues, acquire knowledge, skills, values and attitudes to sincerely work as individuals or a group towards solving environmental issues. Based on these aims, our current EE provisions need to create students who not only possess knowledge of ecological concepts, and are aware of environmental issues, but also have the skills to analyze issues, and know how to take appropriate actions to solve them and prevent future environmental issues from occurring. As such, it is vital for students to be aware of current issues and to be trained on how to act as an individual as well as in groups, in order to make a positive change to resolve the issue concerned.

1.1 Environmental Literacy as the Goal of Environmental Education

The ultimate aim of EE is the development of environmentally literate individuals who are able to maintain and improve the condition of the environment (Disinger, 1992). The Belgrade Charter states that the goal of EE is to develop a global population that is aware and concerned about the environment and the problems facing it, and ultimately result in the birth of environmentally literate citizens who based on the Tbilisi conference, would behave pro-environmentally (Hungerford and Peyton, 1976; UNESCO,1980).

Environmental Literacy has been defined through a wide array of components by various researchers. Simmons (1995) included seven elements of environmental literacy including: affect, ecological knowledge, socio-political knowledge, knowledge on environmental issues, skills, determinants of PEB, and behaviour. Wilke (1995) identified four clusters of EL components: cognitive dimensions, affective dimensions, other determinants of PEB, and personal and/or group involvement in PEB. However, environmental literacy is more commonly defined by four components: knowledge, disposition, competencies and PEB (Hungerford and Volk, 1990; Stern, 2000; Hollweg, Taylor, Bybee, Marcinkowski, McBeth, and Zoido, 2011). For the purpose of this study, the definition of EL will encompass four domains: ecological knowledge, disposition, competencies and PEB.

1.1.1 Environmental Knowledge Domain

In their definition of the knowledge component, Hollweg et al (2011) include physical, ecological, social, cultural and political systems. In this study, the environmental knowledge domain included knowledge of the earth's physical and ecological systems. The Primary School Environmental Literacy Instrument (PSELI) was used to measure the environmental knowledge of Year 5 students

under Section II: Ecological Foundations. This section consisted of multiple choice items with four alternative answers.

1.1.2 Disposition Domain

Environmental dispositions that can be either positive or negative are important determinants of behaviour (Hollweg et al., 2011). Dispositions have been included in major EE documents (e.g., Hungerford et al., 1980; NAAEE, 2004a; UNESCO, 1977, 1978). Hollweg et al. (2011) explain that a student's dispositions are perceived to be of influence on the perspectives, and motivation to participate in efforts related to environmental issues. In this study, Year 5 students' disposition was measured through their sensitivity, attitudes and concern, motivation and intention to act in response to environmental issues. The Primary School Environmental Literacy Instrument (PSELI) was used to measure the environmental dispositions of students, under Section IV: How I Think about the Environmental, Section VI: Your Positive Feelings Towards the Environment, and Section VII: Your Feelings about the Environment. These sections were answered by the students using a 5 point Likert scale.

1.1.3 Competencies Domain

Competencies are defined by Hollweg et al. (2011) as the skills and abilities that may be used in real-world and assessment settings. They explain that a competent person is one who can repeatedly do something at a certain precision level. In this study, the competencies domain included the Year 5 students' skills and abilities to identify environmental issues, and to select the most effective action plans to be taken, to resolve the environmental issues. The Primary School Environmental Literacy Instrument (PSELI) was used to measure the environmental competencies of students, under Section VIII: Evaluation of Issue Analysis and Action Skills. This section consisted of multiple choice items with alternative answers.

1.1.4 Pro-environmental Behaviour Domain

Environmentally responsible behaviour, ecological behaviour or pro-environmental behaviour includes practices in eco-management, persuasion, consumer/economic action, political action and legal action (Hollweg et al., 2011). Pro-environmental behaviour is behaviour that has a positive impact on the environment, by targeting problems and issues, including behaviour that have a positive environmental consequence (Marcinkowski, 1989; Stern 2000).

For the purpose of this study, pro-environmental behaviour refers to involvement in intentional and habitual behaviours, individually or as a member of a group, that work towards solving current problems and preventing new ones. The Primary School Environmental Literacy Instrument (PSELI) was used to measure Pro-environmental Behaviour of students under Section V: What I Do for the Environment. This section was answered by the students using a 5 point Likert scale.

1.2 Pro-environmental Behaviour

Pro Environmental Behaviour (PEB) is explained by Kollmuss and Agyeman (2002) as behaviour that consciously seeks to minimize the negative impact of one's actions on the natural and built work; that include resource and energy consumption minimization, the use of non-toxic substances, and the reduction of waste production. However, over the past three decades, EE research has mostly focused on changes in the cognitive and affective attributes brought about by EE interventions. Assumptions that changes in knowledge, awareness, attitudes, environmental sensitivities and self-reported changes in responsible environmental behaviour might lead to better environmental practice and thus improved environmental quality, strongly underline research (Short et al, 2006).

Environmental educators have shown growing effort to develop a citizenry that behave responsibly, as well as work actively to protect the environment. A study of EE efforts by the State Education and Environment Roundtable, reported that research on the development of environmentally responsible behaviour or PEB and active citizens has become the ultimate goal of EE (Hoody, 1995). Furthermore, the study also reported that overt environmental behaviour and the development of action skills have become the underlying themes in recent EE articles.

PEB is behaviour that promotes active care for the environment. Recent research on how to promote active care for the environment in children and youth has highlighted the fact that most environmental activists and educators were greatly influenced by formative childhood experiences with nature. Between 50 to 80 percent of all respondents around the world attribute their PEB to nature related experiences such as free play, hiking, camping, fishing and berry picking. Equal or second in importance was the influence of family members, or other role models. Other influences include, experiences in organizations like scouts or environmental groups, witnessing the destruction or pollution of a valued place and reading books about nature and the environment (Chawla and Cushing, 2007). In Wisconsin, Sivek (2002) reported similar findings as did Bogeholz (1999) in Germany. In both these studies, secondary students who were actively involved in environmental clubs reported similar formative experiences. These studies suggest that two main variables that

predispose people to PEB are childhood nature activities, and positive role modeling by parents, teachers and other influential people.

Activities that provide opportunities for students to gain knowledge, form positive attitudes about the environment, and practice action skills would help foster PEB among children. Most effective programs are those that run over an extended duration of time (Zelezny, 1999; Rickinson, 2001; rickinson et al., 2004), provide opportunities to learn and practice action skills (Jordan et al., 1986; Hanson, 1993; Culen, 1994; Bogner, 1999), and experience success in achieving some valued goals (Bull, 1992). On the other hand, short term EE programs were reported to be less effective after a fortnight, in spite of being successful in enhancing environmental knowledge and altering attitudes initially (Chong, Noor Azlin and Manohar, 2006). In Malaysia, EE programs often involve short term activities carried out during environmental campaigns or during environmental awareness week in schools, consequently, these programs are often reported to be less effective in inculcating long-term behavioural change and PEB among students.

Based on "Environmental Citizenship: A Report on Emerging Perspectives in Malaysia" (EC Report) by WWF-Malaysia (2008), 96% of the educators and 89.3% of the teacher trainees indicated the need for Environmental Education (EE), while almost all participants realized the need to educate young children on environmental issues. Furthermore, WWF has commented that although the Ministry of Education (MOE) has advocated EE through several commendable initiatives since 1986, there still seems to be a gap between what has been advocated and the actual practices in schools and other educational institutions (WWF). The existence of this gap was also mentioned by Thiagarajan (2005), who reported that although EE has been infused in textbooks in both primary and secondary schools, the holistic approach to EE is relatively superficial. Furthermore, it was noted that, EE in schools is rather sporadic and often thought to be an extra curricular activity involving occasional visits to forest and marine areas, instead of a Whole School concept.

1.3 Problem Statement

EE has been a part of the formal curriculum in local schools since the Malaysian Ministry of Education first introduced Alam dan Manusia (Man and Environment) in the primary school curriculum in 1982. Since then, students have been exposed to EE through formal school curriculum as well as non-formal EE, in the form of various co-curricular clubs and activities.

Recognising the need for EE, various programs have been organised by the government, NGOs and other organisations. These EE activities provide more opportunities for students to participate actively outside of school. Likewise, parents also have more options to provide exposure to their school going children through involvement in these activities. In Sabah, parents who want to play a more active role in the development of environmental knowledge and awareness in their children, have a wide array of local places to visit such as nature centres, marine parks, highland parks, wetland parks, agricultural related parks, or urban centres such as Green Connection, and Lok Kawi Zoo.

After over three decades of effort to create environmentally literate individuals, it is crucial that the MOE ascertains to what extent has the current EE curriculum and programs, have succeeded to create environmentally literate students; ones who have the ecological knowledge, disposition, and competencies, all of which would allow them to behave pro-environmentally. Furthermore, EE providers need to have a better understanding of the factors that influence the pro-environmental behaviour of students. However, there is an apparent lack of available evidence regarding the status of environmental literacy among primary school children. This concern reflects the fact that there have not been any surveys of this population comparable to those conducted among adults, teachers and secondary students within Sabah and Malaysia.

About four decades ago, research to test the effectiveness of EE programs by assessing their effect on behaviour rather than attitude change was reported to be greatly needed (Lucas, 1980). Two decades later, Volk and McBeth (1998) reported that less than 50% of research measure environmentally responsible behaviour or ecological knowledge, while none measured cognitive skills related to environmental literacy or additional determinants of environmentally responsible behaviour. However, more recently, research by scholars has highlighted various concerns regarding student participation in environmental activities and PEB. In her study, Aini et al. (2007) discovered that the secondary school students who had poor concept of the environment and sustainable development also reported meagre involvement in environmental activities. Similar findings among 17 year olds in Sarawak, Melaka and Klang Valley were reported by Othman et al, (2004). Furthermore, while formal and non-formal EE has managed to make students (Aini et al., 2007), educators and families (Othman, 2004; Aini et al., 2002) more aware of the environment, it has failed to make them more pro-environmental in their behaviour, thus future research is needed to better comprehend the factors that prevent PEB (Aini et al., 2007).

Others have reported the existence of gaps existing between positive environmental feelings and actual commitment and participation in conservation efforts. Lim (1999) reported that despite strong feelings with regards to environmental issues, secondary school students lacked commitment to environmental matters, while research by Aini, Nurizan and Fakhru'l- Razi (2007)

highlighted their findings that student involvement in conservation efforts was limited to information acquisition through the mass media instead of active participation in outdoor EE activities.

Existing literature highlight numerous studies on EE, EL and PEB carried out in various parts of the world. These include studies on responsible environmental behaviour (Hines, Hungerford, and Tomera, 1986\1987), EE programs (Stern, Powell, and Hill, 2014), EL components (Volk and McBeth, 1998), antecedents to PEB (Bamberg and Möser, 2007), PEB interventions (Osbaldiston and Schott, 2012), as well as research on behavioural change (Kollmuss and Agyeman, 2002), and factors hindering pro-environmental attitudes (Clover, 2002).

In comparison, very limited research has been carried out in Malaysia, and lesser still in Sabah. To date, no national assessment on environmental literacy has been carried out in Sabah, Malaysia. Whereas nation wide assessment studies on EL that consisted of the four main categories; knowledge, affect (disposition), cognitive skills (competency), and behaviour (pro-environmental behaviour), have been carried out in Turkey (Erdogan, 2009), USA (McBeth, 2006), Israel (Negev et al., 2006) and South Korea (Shin et al., 2005). Most of the studies that have been conducted involve secondary and tertiary students, student teachers and teachers. Moreover, there is inadequate research addressing EL among primary school students, because EE and EL research that have been conducted in Malaysia have mainly focused on secondary students (Lay and Sirisena, 2014; Aini, Nurizan, and Fakhru'l-Razi, 2007; Mahat and Idrus, 2016; Yacob, Esa, and Yunus, 2012; Aminrad, Zakariya, Hadi, and Sakari, 2013), tertiary students (Joseph, Nichol, Janggu, and Madi, 2013; Shamuganathan and Karpudewan, 2015; Ahmad, Noor, and Ismail, 2015), teachers (Mustam and Daniel, 2016; Trendell Nation, 2017) and students teachers (Aini and Laily, 2010; Muda, Ismail, Suandi and Rashid, 2011; Ismail, Suandi, Muda, Rashid, and Yusof, 2012; Mahat and Idrus, 2016, Esa, 2010).

Furthermore, existing literature on EE and EL research focuses on either environmental knowledge (Carmi, Arnon, and Orion, 2015; Ahmad et al., 2015), concern or attitude of respondents (Aminrad et al., 2013; Aminrad, Zakariya, Hadi and Sakari, 2012), rather than all four domains of EL namely: environmental knowledge, disposition, environmental issue investigation skills (competency), and PEB, which is the ultimate aim of EE. Therefore, research which encompasses all four EL components on a large sample size of primary school students have not been done in Sabah.

Based on personal observation carried out in national schools in Kota Kinabalu, it was noted that some students behave pro-environmentally, while others do not. Vast discrepancies also exist within the school environment in terms of the effort put into creating an environment that promotes PEB within each school.

The presence of recycle bins, rubbish separation practices at canteens, compost making, as well as the upkeep of school gardens, vary from school to school.

Personal communication with various heads of school, parents and teachers of local primary schools in the West Coast of Sabah have highlighted the fact that although effort has been given to increase the environmental knowledge and awareness of students, changing their attitude and behaviour towards the environment have been very challenging and problematic. Diverse demography, upbringing and culture among the students seem to be a challenge faced by teachers in their efforts to change the attitudes and behaviour of multi-ethnic groups of students. This has lead to discouragement on the part of those involved in efforts to change the negative environmental behaviour of students. (L.A. Bakar, personal communication, August 5, 2015)

After over three decades of effort to create environmentally literate individuals, through both formal and non-formal means, the MOE needs to ascertain whether it has succeeded in achieving its goals and objectives. Hence, there is a pressing need to address the question to what extent has the current EE program in Sabah, met the aims of the Malaysian Education Ministry, to create environmentally literate students; ones who have the ecological knowledge, disposition, and competencies, all of which would allow them to behave pro-environmentally. Furthermore, EE providers need to have a better understanding of the factors that influence the pro-environmental behaviour of students.

1.4 Aim and Purpose of the Study

The purpose of this study was to analyse the environmental behaviour of Year 5 students in the West Coast of Sabah. Based on the Theory of Planned Behaviour (Ajzen, 1985), and the components of the domains of EL (McBeth et al., 2011), the factors measured in this study included ecological knowledge, disposition towards the environment, competencies in identifying environmental issues and action strategy skills possessed by the primary school children. Furthermore, the influence of various student characteristics upon the pro-environmental behaviour of primary school children was also determined. These student characteristics included gender, race, pre-school attendance, involvement in after school clubs, and leadership roles. Pro-environmental behaviour of primary school children were measured based on the actual commitment reported by the students.

1.4.1 Research Objectives

The following four objectives have guided this study.

1. To identify the students' characteristics in the West Coast of Sabah.
2. To determine the level of the environmental literacy domains to the students.
3. To determine the moderating effect of competency.
4. To determine the influence of ecological knowledge, environmental disposition, and socio-demography on the pro-environmental behaviour of students.

1.4.2 Research Hypotheses

The following hypotheses were formulated to guide the research.

H01. Ecological knowledge does not influence pro-environmental behaviour

HA1. Ecological knowledge influences pro-environmental behaviour

H02. Competency is not a moderator

HA2. Competency is a moderator

H03. Disposition does not influence pro-environmental behaviour

HA3. Disposition influences pro-environmental behaviour

H04. Socio-demography does not influence pro-environmental behaviour

HA4. Socio-demography influences pro-environmental behaviour

1.5 Background of Study Site

The state of Sabah which covers an area of over 73,000 square kilometres, consists of five divisions (Figure 1). These five divisions include: Tawau, Sandakan, Kudat, West Coast, and Interior, within which a total of 23 subdivisions known as administrative districts exist.

Figure 1: Five divisions of Sabah

(Source: http://www.sabah.com.my/borneotrade/a8.htm)

Within the five divisions, the West Coast Division, which encompasses a total area of 7,588 square Kilometres, has a population of approximately 32% of the total population of Sabah (Table 1).

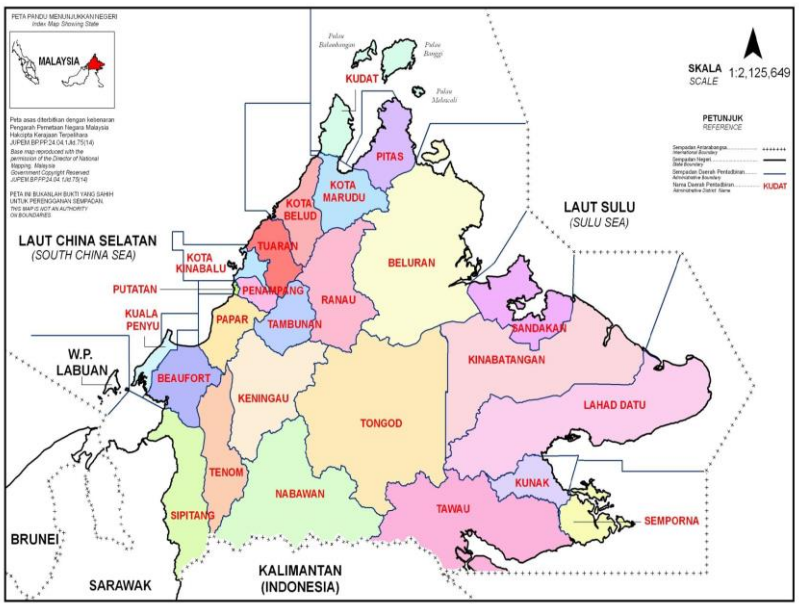
Table 1: Area, Distribution and Population of the West Coast by Division

Division	Area (Sq. Km)	Distribution (%)	Population (%)
Interior	18298	24.9	14.7
Kudat	4623	6.3	7
Sandakan	28205	38.3	19.4
Tawau	14905	20.0	26
West Coast	7588	10.3	32
Total	73619	99.8	99.1

(Source: 1991 census, Sabah Yearbook of Statistics, 1998 and Department of Statistics, Malaysia, 2010)

The West Coast Division of Sabah, ranges from north to Kota Belud, south to Kimanis and interior to Ranau region, occupies 10.3% of Sabah territory (Figure 2).

Figure 2: Administrative District Boundary of Sabah



(Source: Department of Statistics, Malaysia, 2010)

The West Coast Division covers a few main towns such as the State capital Kota Kinabalu, Ranau, Kota Belud, Tuaran, Penampang and Papar. For the purpose of this study, the West Coast Division of Sabah was selected due to the fact that its population comprises an estimated 32% of Sabah's total population (Department of Statistics, Malaysia 2010).

The population of this study was all Year 5 primary school students in the West Coast Division of Sabah. As this area encompasses the State capital, Kota Kinabalu, most schools in this district would have better opportunity and access to EE programs and activities organised for school children. Furthermore, where non-formal EE activities are used to supplement formal curriculum, schools in this area would have greater access to utilise and visit the various EE related activity sites around Kota Kinabalu.

Table 2: Number of National Schools, Area and Population in each District

Division/District	Area (sq Km)	No. of Population	No. of Schools
Kota Kinabalu	350	452 058	81
Ranau	2978	94 092	71
Kota Belud	1386	91 272	56
Tuaran	1165	102 411	53
Penampang	466	121 934	27
Papar	1234	124 420	51
West Coast Division	7588	986 187	339

(Source: www.sabah.com.my/borneotrade/a3.htm#01 and Department of Statistics, Malaysia 2010)

Initially, a minimum of 2 schools from each district were invited to participate in this study, based on the condition that the school had a population of at least 80 Year 5 students registered in the school. However, as the number of Year 5 students in each school varied greatly between rural and urban schools, data was collected from all schools that were willing to participate, regardless of its number of students. The total number of schools involved in this study was 17, with 5 schools from the Kota Kinabalu district, and 4 schools from the Penampang district.

The rationale behind selecting Year 5 students was firstly, because the Ministry of Education (ERAS, 2011) stipulates that students involved in major government examinations are not allowed to participate in research which may disrupt their studies. As such, Year 6 students preparing for UPSR Examinations could not be involved in this study, although they would have had the greatest exposure to the current EE curriculum in local schools.

Secondly, Piaget's Cognitive Development Theory (Piaget, 1976) states that children between 10 to 11 years of age, can be assumed to be literate in science. Furthermore, in local schools, co-curricular activities such as Scouts, Sabah Nature Club and other environmental related clubs, which supplement the EE taught in formal curriculum, only begin in Year 3 or 4. Therefore, Year 5 students would have had at least a year of co-curricular activities.

Other than this, Year 5 students would have already undergone over four years of the current environmental education across the curriculum program in school. Thus, the effect of the program will be more evident among Year 5 students as compared to lower grade students.

1.6 Research Design

Data was collected from 17 national primary schools within the 6 districts along the West Coast of Sabah. At each school, quantitative data was collected through an environmental literacy questionnaire, which was completed by the Year 5 students of the school. Interviews with key personnel involved in EE in the school and on site observation of evidence promoting PEB were also carried out. Information collected from the interviews and observation was used to explain the possible reasons for the results obtained from the Year 5 students' environmental literacy survey.

Based on existing environmental literacy instruments that have been developed and used to assess environmental literacy, a Primary School Environmental Literacy Instrument (PSELI) was adapted and modified to suit the local Year 5 students (Appendix 2). The data collected through PSELI was used firstly to determine the characteristics of the students. Secondly, the environmental literacy level of students in terms of the components of four environmental literacy (EL) domains: knowledge; dispositions; competencies; and pro-environmental behaviour was assessed. Thirdly, the disposition dimensions of the students were determined. Next, the level of ecological knowledge and competencies of primary school students were assessed, after which the

factors affecting Pro-environmental Behaviour among primary school students in the West Coast of Sabah was determined.

Interviews with key personnel at each school included the head teachers, EE or Science teachers, as well as teacher advisor to environmental related clubs in each school. These interviews were used to gain a clearer perspective of the main issues and challenges faced by the school, in the implementation of EE across the curriculum. Moreover, significant practices and factors that contribute to PEB in the schools were also probed through the interviews. On site observations provided evidence that further supported information gathered from interviews, as well as provided explanations to the results from the environmental literacy instrument completed by the Year 5 students.

1.7 Significance of the Study

This study on pro-environmental behaviour among primary school children in the West Coast of Sabah is important for several reasons. Firstly, the natural environment is being exploited more and more to support the increasing population and its unending demands. In order to enjoy better quality of life and the modern lifestyles of today, nature is being destroyed in the name of development resulting in global environmental problems (Tung, Huang and Kawata, 2002). Due to this, environmental education has been introduced to children with the ultimate aim of creating an environmentally literate generation that demonstrate pro-environmental behaviour.

Likewise, in Malaysia numerous efforts to develop a nation that is environmentally literate have been on going. Within national primary schools, both formal and informal programs and activities have been carried out since the early 1980s. The current formal curriculum in national primary schools which was introduced in 1996 is the Environmental Education across curriculum. After almost two decades, it is timely that assessments be carried out to evaluate, to what extent the current EE program in Sabah, has met the aims of the Malaysian Education Ministry, in creating environmentally literate students.

This study provides the EL level of students from 17 schools long the West Coast of Sabah which is the first EL study carried out among primary school students in Sabah, Malaysia. Existing literature indicates numerous studies that have been carried out throughout the world, these include studies by Hines et al., 1986\1987; Stern et al., 2014; Volk and McBeth, 1998; Bamberg and

Möser, 2007; Osbaldiston and Schott, 2012 . However, such research in Malaysia is still limited in comparison. Furthermore, EE and EL research in Malaysia is more focused on teachers (Othman, 2004; Aini et al., 2002; Aini et al., 2002; Mustam and Daniel, 2016; Trendell Nation, 2017), secondary students (Aini et al. , 2007; Othman et al.,2004; Lim, 1999; Lay and Sirisena, 2014; Mahat and Idrus, 2016; Yacob et al., 2012; Aminrad et al., 2013) and tertiary students (Joseph et al., 2013; Shamuganathan and Karpudewan, 2015; Ahmad et al., 2015). Thus, researchers in EE have not adequately addressed the issues of EL among younger students.

Secondly, unlike previous studies which focused on certain components of EL, this study includes all four EL components: ecological knowledge, disposition, competencies, and PEB. Hence, although this study does not represent the student population in Sabah, the EL level will be able to serve as a benchmark for future studies on EL among primary school students in Malaysia. Information on pro-environmental behaviour among primary students, with regards ecological knowledge, disposition towards the environment, competencies in identifying environmental issues and action strategy skills possessed by the primary school children will help EE providers and curriculum developers better understand both the strengths and weaknesses of the current provisions in developing environmentally literate students. Moreover, this study will also allow EE providers to anticipate opportunities to better cater for the EL needs of different groups of students.

Thirdly, results from each of these four components are also analysed individually so as to allow EE providers to understand which EL components require strengthening. This would enable both policy makers and EE providers to plan and design EE programs that would bridge the gaps that presently exist in the EE programs provided. Another important point concerning existing literature on research in EE and EL is that most research focuses on environmental knowledge, concern and attitude of respondents, rather than environmental issue investigation, and pro-environmental behaviour, which is the ultimate aim of EE. Hence, this study will add to the limited research in this area in general, and in Malaysia particularly. It is hoped that this study will also initiate further research in this area, in the near future.

Fourthly, in order to improve and enhance the current EE provisions for students, it is vital to understand the factors affecting PEB of students, as well as the issues and challenges faced by schools, in the implementation of EE. This study looks into these vital aspects, because efficient implementation of effective EE programs would undoubtedly improve and strengthen the PEB of students. The factors affecting PEB among primary school students will have implications on the policy and practice of EE within schools, as well as within

the community. Removing barriers to PEB, while providing students with the support needed to enhance their PEB, would ultimately result in greater PEB among the younger generation. The effects of their PEB would result in better practises, care and sustainability of the natural environment. This would be beneficial not only to schools, community and the society at large. As funding for EE is often limited and sporadic, the findings of this study can allow more effective use of available resources.

1.8 Definition of the Terms

Environmental Education:

The Belgrade Charter states that environmental education aims to develop a world population that is aware of and concerned about the environment and its problems, and possess the knowledge, skills, attitudes, motivations and commitment to work towards solutions to current problems, as well as to prevent future ones (UNESCO-UNEP, 1976). In this study, EE refers to the formal and non-formal curriculum, programs and activities carried out by national schools to provide students with the knowledge, skills, attitudes, motivations and commitment to work towards solutions to current problems around them, as well as to prevent future ones.

Environmental literacy:

Disinger (1992) defined environmental literacy as "the capacity to perceive and interpret the relative health of environmental systems and take appropriate action to maintain, restore, or improve the health of those systems". In this study, environmental literacy (EL) encompasses knowledge of environmental concepts and issues; the attitudinal dispositions; competency; and appropriate behaviours in order to make effective decisions in a range of environmental contexts. Individuals demonstrating degrees of environmental literacy are willing to act on goals that improve the well-being of other individuals, societies, and the global environment, and are able to participate in civic life.

Environmental knowledge domain:

The environmental knowledge domain covered in this study includes knowledge of the earth's physical and ecological systems. The Primary School

Environmental Literacy Instrument (PSELI) was used to measure the environmental knowledge of Year 5 students under Section II: Ecological Foundations, which consisted of multiple choice items with four alternative answers.

Disposition Domain:

Environmental dispositions in this study, was measured through primary school students' sensitivity, attitudes and concern, motivation and intention to act in response to environmental issues. Under Section IV: How I Think about the Environmental, Section VI: Your Positive Feelings Towards the Environment, and Section VII: Your Feelings about the Environment, the Primary School Environmental Literacy Instrument (PSELI) measured the environmental dispositions of students.

Competencies Domain:

Competencies in this study, included the skills and abilities to identify environmental issues, and to select the most effective action plans to be taken, as well as the ability to resolve the environmental issues. The Primary School Environmental Literacy Instrument (PSELI) was used to measure the environmental competencies of students, under Section VIII: Evaluation of Issue Analysis and Action Skills.

Pro-environmental Behaviour:

Pro-environmental behaviour is defined by Marcinkowski (1989) and Stern (2000) as behaviour that has a positive impact on the environment, by targeting problems and issues, including behaviour that have a positive environmental consequence. Pro-environmental behaviour in this study refers to intentional and habitual behaviour of an individual or group, that work towards solving current problems and preventing new ones. PEB was measured in the Primary School Environmental Literacy Instrument (PSELI) under Section V: What I Do for the Environment.

Environmental Attitude:

Environmental Attitude is defined as helping social groups and individual acquire a set of value and feeling of concern for the environment and motivation for actively participating in environmental improvement and problems (UNESCO, 1977).

Environmental Sensitivity:

Hungerford et al. (2000), state that environmental sensitivity is an apathetic view of the environment, and has often been equated with significant life experiences (Sward and Marcinkowski, 2001).

Intention to Act:

Fishbein and Ajzen (1975, p.289), view intention to act as the conative component of attitude and it has usually been assumed that this conative component is related to attitude's affective component. This conceptualization has led to the assumption of a strong relation between attitudes and intentions.

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