

Relationship between Knowledge and Attitudes towards Environmental Education among Secondary School Students in Malaysia

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Abstract

The importance of environmental education is well known globally among societies. The role of environmental education is seen as one that would provide understanding and create opportunities to improve individual knowledge, awareness, and attitudes which are important and highly required to preserve and protect the environment. This study is to review the impact of environmental education available across the school curriculum in Malaysia. Basically, the statistical approach was used to determine and analyse the status of environmental education. This paper explained that student from the science stream has a higher attitude towards the environment compared to non-science stream students. High awareness among these science stream students is due to more exposure towards environmental issues through the scope of educational subjects. In addition, this study also found that environmental education was only able to provide knowledge to the students, but unable to change students' attitude towards environmental care. Knowledge and attitude have a significant relationship but weak. In order to change the attitude of the student towards more positive is a very complex task and includes various factors. However, environmental education tutors must maintain this field so it will become more relevant towards the Malaysia development.

Keywords: Environmental Education, Environmental Awareness, School, Student, Knowledge, and Attitude.

Introduction

The earth is an important source that should be protected even when society is faced with unending social problems, wars, economic crisis, and political issues. The environment today has become increasingly threatened by some irresponsible parties which caused massive pollution such as air pollution, water pollution, toxic waste disposal, open burning and many more (San & Azman, 2011). According to Gardner and Stern (2002), most of the problems involving environmental pollution are attributed to human deeds and the effects of the destruction are the deaths of thousands of people around the world. Hence, the environment should be protected as it will be used for another thousand years. Unfortunately, the perception of some people who assume environmental care is the government's responsibility caused the environmental issues to arise. Nowadays, environmental issues are kept increasing and disturbing, so the need to create a society which is more responsible for environmental issues is very necessary. In order to increase the knowledge and awareness towards the environment, the Malaysia government realized the effort to educate the community is required.

The implementation of environmental education is intended to provide the public with knowledge (Ahmad et al., 2011). The education and knowledge gained can raise the awareness and concern of individuals about environmental issues and thus produce a more environmentally-conscious generation (Kollmuss & Agyeman, 2002). Therefore, in order to create a more ethical Malaysian society, environmental education is the basis for creating a society with a high level of environmental awareness (Jamaluddin, 2001). Knowledge construction is important so the person will realize the consequences, so they will be more aware and calls more attention to their behavior (Uusitalo, 1993). Active participation in educational or activities pertaining to environmental education also will increase the awareness of the society about the importance of environmental protection. This will create an individual sense of responsibility and change of their attitude gradually (Aydin & Kaya, 2011). Therefore, the experience gained during the school-age can shape the perception of an individual towards environmental awareness (Shobeiri et al., 2007).

The life experience that began in the early years of life was the most effective education of individual knowledge. Each individual has a different past experience. Every student will receive a different quality of experience even though the standard curriculum is presented using established methods. However, the level of awareness gained also affected by the emotion of the student in daily life. Figure 1 shows the House model which explained the idea of the development of the senses and emotions is crucial in environmental education (Jeronen & Kaikkonen, 2002). Assessment based on the house model stated, not only educators, but parents and students should also engage in the evaluation process. The main objectives of environmental education are to improve environmental understanding, tolerance, sensitivity and expertise in order to become prepared and responsible for solving environmental problems. This means that teachers should emphasize sensitive learning, especially with younger learners. Gradually, they will put more and more focus on understanding, information, and accountability with older learners.



Figure 1. The house model (Jeronen & Kaikkonen, 2002)

In particular, the main focus is on children and youth. Crohn and Birnbaum (2010), believes in order to create positive relationships between children and youth with nature is to increase knowledge-based on environmental education. In this study, we can examine the impact of education at schools by influencing individual knowledge and attitudes towards environmental issues in Malaysia. Education is seen to be the best way to create a generation with high knowledge and awareness of the environment (Ahmad et al., 2011). Through the issuance of the Environmental Education Teacher's Guidebook across the curriculum for primary and secondary schools by the Malaysian education ministry, environmental education was officially introduced. However, the level of study is different in each school. Lack of subjects and specific studies related to the environment, unable to achieve environmental awareness and skills (Yaghoobi, 2003). Therefore, the aims of this study are to measure the level of knowledge and attitudes about the environmental components based on education framework delivered to students in Malaysia.

Methodology

This paper is based on several articles covering knowledge and attitudes related to environmental awareness. Most of these researchers used a quantitative method which is through a survey using a questionnaire. The respondents were secondary school students which are selected from several schools in Malaysia. Respondents were asked questions related to environmental issues to reflect their knowledge and attitude towards environmental awareness. Figure 2 shows the behavioural change system which demonstrates the importance to increase individual knowledge and attitudes towards environmental awareness (Hungerford & Volk, 1990).

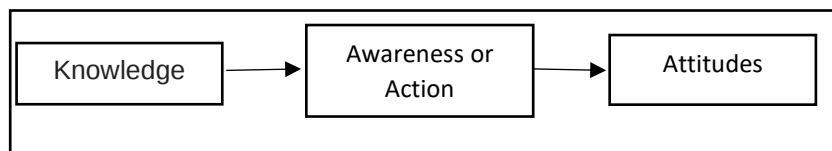


Figure 2. Behavioral Change System. Source from (Hungerford & Volk, 1990)

Results and Discussion

Environmental Education in Malaysia

The education system in Malaysia has a strong movement from the past years towards extraordinary quality. This education system starts from a primary level to a tertiary level. Where in this phase begins with the first six years, five years of secondary school and two

years of the pre-university level before students are eligible to apply for further study at university level (Aminrad et al., 2012).

Schools are an effective learning institution to create a knowledgeable and skilled individual. Therefore, the education delivered at school is the main medium to shape the positive attitudes and behaviours of individuals towards environmental care. According to traditional thinking, the attitude of individuals about environmental issues can be changed by making them more knowledgeable through environmental education. These thoughts are linked to the assumption, if we make someone more knowledgeable then they will be more aware of the current environmental issues or problems and they will also feel more responsible to improve the cause of pollution.

According to Filho (1997), in order to encourage people to use environmental resources in a more sustainable manner, environmental education is the best process to convey the understanding and relevance of environmental sources. Education in the school plays an important role to produce highly knowledgeable students. Schools are the main institutions that are targeted to improve students' environmental knowledge. This environmental education needs to be educated from the early life of the school to build a sense of responsibility within the individual. However, the level of effectiveness of environmental education is still uneven between one school to another and still limited (Pudin et al., 2004).

The main obstacle is due to the lack of more specific subjects related to the environment in the academic measure of the study, causing the students not receiving the same knowledge of environmental awareness (Choudhary et al., 2019). This is because secondary schools in Malaysia are divided into several class stream. Each class stream has its own scope of education so that the student can focus on specific subjects related.

According to a previous study from UKM, science stream students gain a higher level of environmental awareness in the concept of sustainable development (Hassan et al., 2011). Table 1 shows results from (Hassan et al., 2011), research, 57.6% (196) of the respondents were science stream students, while 42.4% (144) is the art stream students. The t-test showed that there was a significant difference between science stream students (min = 3.86; sd = 0.49) compared to art stream students (min = 3.71, sd = 0.40).

This study is supported by Ai Lin (2004), which found that the level of knowledge, attitudes, and behaviours of science stream students is higher than non-science stream. Similarly, research from Yusuf et al., (2003), based on their research paper entitled 'Knowledge and awareness towards environmental education among students', found that students from science stream had a higher attitude towards the environment. High environmental awareness among science students is most likely caused by more exposure through the science stream subjects (Misbahul et al., 2013).

Table 1

T-test on the level of environmental awareness in the concept of sustainable development based on class streaming.

Respondent	N	Mean	Std Dev	Df	t	Sig. p
Science stream	196	3.86	0.49	338	2.92	0.004
Art stream	144	3.71	0.40			

Source: (Hassan et al., 2011)

The Knowledge and Attitude of High School Students towards the Environment

Individual knowledge and attitudes towards the environment are the major and essential components tools to enhance individual perceptions of the environment. Because of that, environmental education is essential to build student knowledge on environmental protection. With a high knowledge of environmental awareness, it can indirectly alter the behavior of students to act positively. Generally, students' knowledge is high while students' awareness and sensitivity to the environment is low. This study is similar to Aroff and Kasa (1987), mentioned that the way to learn more effectively were based on psychological concepts such as observation, learning, emotion, and integration.

Knowledge gained through classroom session only is not sufficient to shape the sense and responsibility of the student towards environmental awareness. Thus, the teacher plays an important role in educating and promoting the student to do the right attitude and responsible towards the environment (Alsagoff, 1992).

Based on the statistical analysis conducted by Aminrad et al., (2013), the relationship between awareness, knowledge, and attitude found that knowledge and attitude have weak relationships. Table 2 shows a significant relationship between knowledge and awareness but weak ($r = 0.165$, $\text{sig} = 0.001$), the relation between consciousness and attitude shows a high correlation coefficient 'r' ($r = 0.990$, $\text{sig} = 0.000$), while the statistical test between knowledge and attitude relationship also shows negligible relationships ($r = 0.174$, $\text{sig} = 0.000$).

This result explained that students with a high value of awareness have a high attitude towards the environment, while the student with a high value of knowledge does not affect students' awareness and attitude. The results of this study may indicate inconsistencies elsewhere because the student might get knowledge from different sources such as parents, friends, teachers, and media (Courtenay & Rogers, 2002).

Table 2

The relationship between level of awareness, knowledge and attitude among secondary school. Level of significance ($p < 0.05$)

No	Result relationship	Correlation 'r'	p-value
1	Awareness and Knowledge	0.165	0.001** ($p > 0.05$)
2	Awareness and Attitude	0.990	0.000** ($p > 0.05$)
3	Knowledge and Attitude	0.174	0.000** ($p > 0.05$)

(Source: Aminrad et al., 2013)

The result also was in disagreement with Chen et al., (2011), stated that the relationships between knowledge and attitude are related. When the knowledge of the environment improves, the students' attitude towards the environment will also increase. Knowledge and attitude towards the environment are two elements that clearly indicate a significant relationship through research findings (Hassan et al., 2011). Through knowledge and attitude gained, will positively change the student behavior towards the environment. However, the predictions of an individual's attitude and practice towards environmental protection are a complex task that influenced by various factors (Cottrell & Graefe, 1997). Table 3 shows the study of UKM students showing significant relationship between knowledge ($r = 0.328$, $p = 0.008$), awareness ($r = 0.362$, $p = 0.000$) and attitude ($r = 0.345$, $p = 0.005$) towards the environment. However, these three elements have a low relationship.

Table 3

Relationship between Knowledge, Awareness, Attitudes and Practices.

Relations Variables	Practices	Level of Significant
Knowledge	$r = 0.328^{**}$	0.008
Awareness	$r = 0.362^{**}$	0.000
Attitudes	$r = 0.345^{**}$	0.005

Source: Hassan et al., 2011

Generally, there is a relationship between the level of knowledge and the attitudes of students towards environmental awareness among secondary student. However, to build a noble value within a student is a complex process and takes a long time. Most definitely, there may be a strong correlation between attitudes and awareness due to some demographic variables such as education, age, sex, employment, and many more. For example, according to previous studies among secondary school students in Malaysia found that girls are much more concerned about the environment but they are not committed to being responsible towards environmental care (Sulaiman et al., 2004). Therefore, the relationship between knowledge and attitude are weak. The environmental education presented at the school will give the student a high knowledge about environmental development but it is unable to change student attitude positively towards environmental protection. Besides, student daily life also surrounded by many sources of environmental information such as newspapers, magazines, televisions, and internet. Most of these nature-related activities performed by students are based on indoor activities.

According to previous studies by Said et al., (2007), most of the students gained nature-related knowledge by watching a documentary film on television and the participation of the student involve with the environmental activities such as outdoor activities, community projects, and campaign was rather controversial among students. The environmental knowledge gained primarily through the media also will produce the participants with low environmental experience. However, the Malaysian societies believe that television was the most effective source to gain environmental information (Nurizan et al., 2004). This study is similar to the research conducted by Nagel (2004), where more than 50% of students aged twelve and thirteen years old believed that television was the main source to receive environmental information. Hence, the media will therefore be beneficial by improving its use through the formal education in schools (Aini et al., 2003). Overall, this study explained that most of the students only gained high knowledge related to environmental issues but less exposure to environmental care activities. Hence, the students' responsibility for environmental care will be poor. So, this will clearly be explained why knowledge has a weak relationship with students' attitude towards the environment.

Environmental Education in Other Countries

Palmer and Neal (1994) define environmental education as an education process related to environment which builds higher knowledge, attitude, and skills necessary to obtain the understanding. Also, he stated that the learning process must occur outside of the classroom and has objective related to nature conservation and sustainable development. However, every country has their own technique or method in delivering education to the students to match the needs of each community. The effectiveness of environmental education delivered will produce highly responsible community towards maintaining cleanliness around them. Detail about the school students' knowledge and attitudes towards environmental development on the nationwide scale have been collected in several countries. For example, Bechtel et al., (2006) reviewed four such nation-wide studies in Mexico, United States, Japan, and Peru explained about the knowledge and Cross-cultural analysis of ecological belief structures.

The aim of environmental education is to promote awareness and accountability on economic and environmental interdependence, incorporating skills that are necessary for the conservation of the environment (Hoerisch, 2002). Several schools have formally classified their student into a different major of education. Different education that has been given to the students will affect the equality of knowledge gained. Based on the research by Choudhary et al., (2019) at the University of Delhi, India, majority of the non-science stream students answered half of the questions related to the environmental issues wrongly, this study clearly shows that non-science stream student have low knowledge about various environmental issues compared to science stream students. However, both science and non-science background assumed that the individual is primarily responsible for preserving environmental care, while the secondarily responsible lies to the government, industry and environmental groups. Study in China also, explained that the environmental education has become an elective course in secondary school and the extra-curricular activities related to environment will be sponsored by the State Education Commission (McBeath & McBeath, 2009).

Henderson (1984) and Priest (1986) indicates that environmental education is often associated with literature that defines outdoor experiential education. In Canada, the tendency to combine the school curricular concept within outdoor activities, school-based programs, and camp programs at all levels makes this relationship reasonable (Henderson & Potter, 2001). This is similar to an educational school system in Japan, where there is no specific subject for environmental education but the ecological viewpoint gain from the entire curriculum is included in each subject (Kodama, 2017). The school education system in Japan also focuses on outdoor project that will provide children with regional values and challenges through hands-on learning to improve student's knowledge and awareness. Such activities were encouraged by the idea of "links" as a term, primarily by connecting student life with environmental issues, challenge, and experience. This activity aims to expose personal learning into environmental education for a changing society by improving their behaviour towards the environment (Kodama, 2017).

According to Loughland et al., (2003), environmental education is not based on assumption of what children know and believe, but the strategy development needs to be based on children's understanding. In Turkey, Tuncer et al., (2005) explained that the school type as one of the concerns for the community because there is a dissimilar school implementation in a different school. His research explained that private school students were more knowledgeable towards environmental issues, more accountable for regional environmental problems, and also shows a good response in solving the problems compared to public school students. This research revealed that students from private schools had parents who were more educated and tended to be employed, compared to students from public schools and this effect can be evaluated by the parents' educational level. This study also explained that the school plays an important role based on the competence and experience of the team of teachers, the quality of instruction, the curricular offering and the social climate (Gamoran & Nystrand, 1994). This showed that education gained other than school hours also important to improve students' knowledge and behaviour towards the environment.

Generally, the environment works as a natural lab for planned investigation which can be used to gain environmental knowledge and awareness which work as one element for environmental education (Paul & Nolan, 1999; Kamarudin et al., 2013; Azid et al., 2015; Wahab et al., 2016). However, students' knowledge towards environmental issues nowadays not only can be obtained only from school but also from various other sources such as television, newspapers, the internet and many more. Normally, students' daily life is surrounded by this kind of sources which works as both entertainment and education materials. According to surveyed in Singapore, the students' perceptions of the highest source of knowledge gained are from newspapers, magazines and books (Ivy et al., 1998). Table 4 presents the result of Students' perception of sources of knowledge. Most of the students claimed that the primary source to gain knowledge was by reading books, magazines, and newspaper (37.5%), followed by 'general education at school' (30.7%) and 'television and radio' (16.2%). The result showed that the majority of the students received their environmental knowledge mainly from out-of-school, especially through the media as opposed to within school sources.

Table 4

Most important source of environmental knowledge (shown as a percentage, and in rank order respectively).

Source	Total sample		Secondary three		JCI	
	%	rank	%	rank	%	rank
Reading of newspapers, magazines and books	37.5	1	34.1	1	46.0	1
General education at school	30.7	2	31.2	2	29.7	2
Radio and television	16.2	3	17.7	3	12.4	3

Source: (Ivy et al., 1998)

Television, radio, magazine and newspaper coverage about the environmental problems has increased significantly over the past few years. According to research from The Ohio State University in the United State, examines that television program about the environmental issues had increased significantly the public's knowledge level of the environment and hence concluded that the media format can be an effective way to educate the public about the environment (Brothers et al., 1991). This research is also supported by Hausbeck et al., (1992) which explained that the main source of environmental knowledge gained by the majority of the eleventh-grade students in New York State is through electronic media and print media. This clearly explained that the media works as an active medium to deliver and share information related to environmental issues. Overall, there is a various factor that can affect students' knowledge and attitude towards the environment and this study will require all aspect of students' life. This is important because the effectiveness of environmental education will shape individuals who are sensitive to environmental issues and can take appropriate action on every environmental problem encountered.

Conclusion

The study from the several articles proved that environmental education does not influence positive attitudes towards environmental awareness. Although the students have knowledge based on what they learned, it does not make them more responsible to maintain the well-being of the environment. Therefore, education with the outdoor concept has a better effect compared to knowledge-based education. Besides, the media also found as the main source to gain environmental knowledge in many countries. This could be made used by the policymakers to develop a comprehensive environmental education towards this medium, since both educators and students had a similar source of environmental knowledge. However, the school remains as the main institution to deliver education and knowledge related to the environment for students. Therefore, the teacher needs to play an important role by showing a good example and always apply the noble value towards the environmental protection. Overall, the developments of the environmental education field still show positive hope and have a good opportunity to move forward. Environmental education tutors must ensure to maintain this field so it will become more relevant towards Malaysia development.

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References

- Ahmad, J. H., Mustafa, H., Hamid, H. A., & Wahab, J. A. (2011). Pengetahuan, sikap dan amalan masyarakat Malaysia terhadap isu alam sekitar (knowledge, attitude and practices of Malaysian society regarding environmental issues). *Akademika*, 81(3), 103-115.
- Lin, A. E. (2004). A study of environmental awareness knowledge and attitude towards tropical rainforest issues among Melaka secondary school students. Unpublished Doctoral Thesis. University of Malaya. 77-154.
- Aini, M. S., Fakhru'l-Razi, A., Paim, L., & Masud, J. (2003) Environmental concerns, knowledge and practices gap among Malaysian teachers. *International Journal of Sustainability in Higher Education*, 4(4), 305–313.
- AlSagoff, S. A. (1992). *Falsafah Pendidikan*. Selangor: Longman Malaysia Sdn. Bhd.
- Aminrad, Z., Zakariya, S. Z. B. S., Hadi, A. S., & Sakari, M. (2012). Environmental education in Malaysia, progresses and challenges Ahead. *Life Science Journal*, 9(2), 1149-1154.
- Aminrad, Z., Zakariya, S. Z. B. S., Hadi, A. S., & Sakari, M. (2013). Relationship between awareness, knowledge and attitudes towards environmental education among secondary school students in Malaysia. *World Applied Sciences Journal*, 22(9), 1326-1333.
- Aroff, A. R., & Kasa, Z. (1987). *Falsafah dan Konsep Pendidikan*. Kuala Lumpur, Malaysia: Penerbit Fajar Bakti.
- Aydin, F., & Kaya, H. (2011). Evaluation of social sciences high school students' sensitivity towards environment. *Marmara Geographical Review*, 24 (2), 229-257.
- Azid, A., Juahir, H., Toriman, M. E., Endut, A., Kamarudin, M. K. A., Rahman, A., & Nordin, M. (2015). Source apportionment of air pollution: A case study in Malaysia. *Jurnal Teknologi*, 72(1), 83-88.
- Bechtel, R. B., Corral-Verdugo, V., Asai, M., & Riesle, A. G. (2006). A cross-cultural study of environmental belief structures in USA, Japan, Mexico, and Peru. *International Journal of Psychology*, 41(2), 145-151.
- Brothers, C. C., Fortner, R. W., & Mayer, V. J. (1991). The impact of television news on public environmental knowledge. *Journal of Environmental Education*, 22 (4), 22–29.
- Chen, X., Peterson, M. N., Hull, V., Lu, C., Lee, G. D., Hong, D., & Liu, J. (2011). Effects of attitudinal and socio-demographic factors on pro-environmental behaviour in urban China. *Environmental Conservation*, 38(1), 45-52.
- Choudhary, S., Saha, A. R., & Tiwary, N. K. (2019). The role of compulsory environmental education in higher learning: A study in the University of Delhi. *Applied Environmental Education & Communication*, 1-13.
- Cottrell, S. T., & Graefe, A. R. (1997). Testing a conceptual framework of responsible environmental behavior. *The Journal of Environmental Education*, 29 (1), 17-27.
- Courtenay-Hall, P., & Rogers, L. (2002). Gaps in mind: Problems in environmental knowledge-behavior modeling research. *Environmental Education Research*, 8, 283-297.
- Crohn, K., & Birnbaum, M. (2010). Environmental education evaluation: Time to reflect, time for change. *Evaluation and Program Planning*, 33, 155-158.
- Filho, W. L. (1997) Integrating environmental education and environmental management. *Environmental Management and Health*, 8(4), 80–82.
- Gamoran A., & Nystrand, M. (1994) Tracking, instruction and achievement. *International Journal of Educational Research*, 21, 217–231.
- Gardner, G. T., & Stern, P.C. (2002). *Environmental problems and human behavior* (2nd ed.). Boston, MA: Pearson Custom Publishing.

- Hassan, A., Rahman, N. A., & Abdullah, S. I. S. S. (2011). The level of environmental knowledge, awareness, attitudes and practices among UKM students. *University Kebangsaan, Malaysia*, 13, 5–8.
- Hausbeck, K. W., Milbrath, L. W. & Enright, S. M. (1992) Environmental knowledge, awareness and concern among 11th-grade students: New York State. *Journal of Environmental Education*, 24 (1), 27–34.
- Henderson, B. (1984). Outdoor education page: A cultural imperative. *Canadian Association of Health, Physical Education and Recreation Journal*, 50(6), 28 & 32.
- Henderson, B., & Potter, T. G. (2001). Outdoor adventure education in Canada: Seeking the Country Way In. *Canadian Journal of Environmental Education*, 6, 225-242.
- Hoerisch, H. (2002). A comparative study on environmental awareness and environmentally beneficial behavior in India. Retrieved from www.cmsindia.org/cmsenviscentre/.pdf
- Hungerford, H. R., & Volk, T. L. (1990). Changing learner behavior through environmental education. *The Journal of Environmental Education*, 21(3), 8-21.
- Ivy, T. G. C., Road, K. S., Lee, C. K. E., & Chuan, G. K. (1998). A survey of environmental knowledge, attitudes and behaviour of students in Singapore. *International Research in Geographical and Environmental Education*, 7(3), 181-202.
- Jamaluddin, M. J. (2001). *Pengurusan alam sekitar di Malaysia*. Bangi, Malaysia: Penerbit Universiti Kebangsaan Malaysia.
- Jeronen, E., & Kaikkonen, M. (2002). Thoughts of children and adults about the environment and environmental education. *International Research in Geographical and Environmental Education*, 11(4), 341–363.
- Kamarudin, M. K. A., Idris, M., & Toriman, M. E. (2013) Analysis of *Leptobarbus hoevenii* in control environment at natural lakes. *American Journal of Agricultural and Biological Sciences*, 8(2), 142-148.
- Kodama, T. (2017). Environmental education in formal education in Japan. *Japanese Journal of Environmental Education*, 26(4), 4_21-26.
- Kollmuss, A., & Agyeman, J. (2002). Mind the gap: why do people act environmentally and what are the barriers to prp-environmental behavior? *Environmental Education Research*, 8(3), 239-260.
- Loughland, T., Reid, A., Walker, K., & Petocz, P. (2003). Factors influencing young people's conceptions of environment. *Environmental Education Research*, 9(1), 3–17.
- McBeath, J., & McBeath, J. (2009). Environmental education in China: A preliminary comparative assessment. In *American Association for Chinese studies 51st annual conference*, Rollins College, Winter Park, FL.
- Misbahul, J., Lilia, H., Meerah, T., S. M., & Muhammad, F. (2013). Impact of environmental education kit on students' environmental literacy. *Asian Social Science*, 9(12), 1-12.
- Nagel, M. C. (2004) Lend them an ear: The significance of listening to children's experiences of environmental education. *International Research in Geographical and Environmental Education*, 13(2), 115–127.
- Nurizan, Y., Laily, P., Sharifah Azizah, H., Norhasmah, S., Aini, M. S., Othman, M. N., & Naimah, S. (2004) Sustainable consumption: understanding of main concept and knowledge of environment. *Malaysian Journal of Consumer and Family Economics*, 7, 1–15.
- Palmer, J., & Neal, P. (1994). *The handbook of environmental education*. London: Routledge
- Paul, H., & Nolan, K. (1999). A critical analysis of research in environmental education. *Studies in Science Education*, 34(1), 1–69.

- Priest, S. (1986). Outdoor education: A matter of many relationships. *Journal of Environmental Education*, 17(3), 3-6.
- Pudin, S., Tagi, K., & Periasamy, A. (2004). Environmental education in Malaysia and Japan: A comparative assessment. Retrieved 3 March 2009, from <http://www.ceeindia.org/esf/download/paper20.pdf>.
- Said, A. M., Yahaya, N., & Ahmadun, F. L. R. (2007). Environmental comprehension and participation of Malaysian secondary school students. *Environmental Education Research*, 13(1), 17-31.
- San, T. P., & Azman, N. (2011). Hubungan antara komitmen terhadap alam sekitar dengan tingkah laku mesra alam sekitar dalam kalangan pelajar universiti. *Jurnal Pesonalia Pelajar*, 14, 11-22.
- Shobeiri, S. M., Omidvar, B., & Prohallada, N. N. (2007). A comparative study of environmental awareness among secondary school students in Iran and India. *International Journal of Environmental Research*, 1(1), 28-34.
- Sulaiman, M., & Nazli, N. A. N. (2004). Environment disclosure in Malaysia annual reports: A legitimacy theory perspective. *International Journal of Commerce and Management*, 14(1), 44-58.
- Tuncer, G., Ertepinar, H., Tekkaya, C., & Sungur, S. (2005). Environmental attitudes of young people in Turkey: Effects of school type and gender. *Environmental Education Research*, 11(2), 215-233.
- Uusitalo, L. (1993). Asenteiden ja käyttäytymisen ristiriita – Haaste ympäristökasvatukselle. (Conflict between attitudes and behaviour.) In A. Kajanto (Ed.), *Ympäristökasvatus* (pp. 62–63). Helsinki: Kirjastopalvelu.
- Wahab, N. A., Kamarudin, M. K. A., Gasim, M. B., Umar, R., Ata, F. M., & Sulaiman, N. H. (2016). Assessment of total suspended sediment and bed sediment grains in upstream areas of Lata Berangan, Terengganu. *International Journal on Advanced Science, Engineering and Information Technology*, 6(5), 757-763.
- Yaghoobi, J. (2003). Determination of public education on environment concept. *Proceeding of the National Gathering on Environmental Education in Tehran, Iran*. Department of Environment Publications, Dec. 4-7, 2003.
- Yusof, M. M., Muda, A., Abdullah, A. M., Samah, B. A., Basri, R., & Rashid, N. A. (2013). Faktor-faktor yang mempengaruhi efikasi-kendiri guru sekolah menengah di malaysia dalam pelaksanaan pendidikan alam sekitar. *Journal of Educators & Education/Jurnal Pendidik dan Pendidikan*, 28, 131- 153.