

Primary School Children and Teachers' Perceptions of Environmental Education in Surabaya, Indonesia

**Victor S. Kuwahara, Kaoru Kubo, Tatsuki Toda,
Agus Slamet & Yulinah Trihadiningrum**

『教育学論集』第68号

(2017年3月)

Primary School Children and Teachers' Perceptions of Environmental Education in Surabaya, Indonesia

Victor S. Kuwahara^{a,c}, Kaoru Kubo^b, Tatsuki Toda^c,
Agus Slamet^d & Yulinah Trihadiningrum^e

^aFaculty of Education, Soka University, Tokyo, Japan

^bGraduate School of Teacher Education, Soka University, Tokyo, Japan

^cGraduate School of Engineering, Soka University, Tokyo, Japan

^dFaculty of Civil Engineering and Planning, Institut of Teknologi Sepuluh Nopember, Surabaya, Indonesia

^eDepartment of Environmental Engineering, Institut of Teknologi Sepuluh Nopember, Surabaya, Indonesia

Abstract

Progress of environmental education in primary schools in emerging economies has become increasingly important in recent years. This qualitative study surveyed 6th grade children and teachers from 11 public and private primary educational institutions in Surabaya, Indonesia to determine their respective conceptions towards environmental education. The results suggest that children are highly motivated to learn mathematics, science and environmental education, but are limited in practical skills and participation opportunities. Teachers also showed strong interest in environmental education and concern for regional environmental issues, but are primarily focused on an awareness and knowledge-centered approaches with low emphasis on participation and practical skills in this region.

Introduction

In recent years, there have been monumental developments in the advancement of environmental education (EE) in response to escalating worldwide environmental problems and consciousness (Farmer et al. 2007; Scott 2009). In order for individuals and society to perceive environmental issues as personal

concerns in their respective regions, an education initiative was propelled at the Intergovernmental Conference on Environmental Education in 1977 where five fundamental objectives were recommended: to develop individual (1) awareness, (2) knowledge, (3) attitudes, (4) skills, and (5) participation through education (UNESCO 1978; NIEPRJ 2007). Efforts towards the acquisition of these principles are especially important during the early years of education, particularly primary education, since this is the stage of growth for children when they have heightened sensitivity, imagination and creativity; when their desire to learn and absorb is at its height (Havighurst 1972; Stern et al. 1995; Ikeda 2002; Flogaitis et al. 2006).

Prior research suggests that EE should start at early stages in respective geographical regions and that it is an educational process that notably advances the comprehensive development of children (Tilbury 1994; Wilson 1996; Davis 2009; Ridgers et al. 2012; Feinstein et al. 2013). One of the rationales for this is based on two premises: that children must develop a sense of respect and caring for their immediate environment, and that positive exposures to the natural environment are an important part of healthy child's development (Bunting and Cousins 1985; Birnbaum 1989; Horwitz 1996; Wilson 1996; Chawla 2002). However, the capacity of children to comprehend certain sustainability concepts and ideas at an early age remains a challenge, which is further confounded by diverse socioeconomic conditions, culture and geographical situations (Stern et al. 1995; Oreg and Katz-Gerro 2006; Campbell et al. 2013). The influence of broad social contexts can be strong and long-term, because values are generally developed early in life and remain throughout a child's lifetime (Bruni et al. 2012; Strife 2012). Furthermore, particular socioeconomic conditions will provide opportunities or constraints to particular environmentally conscious actions, ultimately affecting children's sustainability behaviour (Adams and Savahl 2013). The strong influence of social, cultural and geographical contexts on the formation of environmental values, beliefs, and behaviour has also been discussed in other studies (Corraliza and Berenguer 2000; Oreg and Katz-Gerro 2006).

Over the past few decades a number of studies in advanced economies have been conducted to determine how children perceive environment-related issues and what their teachers think about EE in general (Boyes and Stanisstreet 1998; Agelidou et al. 2000; Flogaitis et al. 2006; Littledyke 1997, 2004, 2008). For

example, studies have suggested that children's conception towards environmental issues is limited to their experiences within various subject matters in school (Kruger and Summers 2000; Lianne 2005), and teachers' dominant conception towards EE is basically a restricted, obsolete and/or a knowledge-centered view (Summers et al. 2000; Moseley and Utley 2008). Furthermore, many of the studies suggest that EE is perceived as only an extension of basic science and social studies which are taught in schools. Thus, there is a precedence to understand and develop the contextual situation in classrooms, and expand sustainability studies that address these issues to earlier years of education (Davis 2009). In recent years, research focus in EE has expanded to emerging economies as well (Petegem et al. 2007; Said et al. 2007; Mueller and Bentley 2009).

Emerging economies are generally defined by low per-capita real income and economies based heavily on a primary-products industry structure. Although most emerging economies give higher priorities towards economic growth than environmental awareness, the importance of EE is much more critical since these populations are growing at faster rates (increased consumption), and because technological and social infrastructure to manage environmental issues and develop education for sustainable development are still limited (Hosoda 2003; Nomura 2009; Koprina 2012). Therefore, many of the countries suffer from increased pollution, and are commonly struggle with managing environmental issues and implementing EE.

Indonesia is the most populous country among the Association of South-East Asian Nations (ASEAN), and is considered an emerging economy. With regards to EE, the country of Indonesia is of particular interest due to expansive natural resources and robust economic development. Primary school in Indonesia is considered the most important period for education because the net attendance percentage (94.3%) is the highest, followed by junior high school (67.4%) and senior high school (45.1%) (Statistics Indonesia 2009; JICA 2011). Primary school teachers' role for the successful implementation of EE is also vitally important since the country implemented decentralized education (Behrman et al. 2002; Nomura 2009). The decentralization system will effectively allow educational institutions to meet the regional needs of its residents which can vary greatly.

Within this context, the general aim of the present study was to

qualitatively explore primary school children and teachers' conceptions of environmental education at accessible primary schools in Surabaya, Indonesia. The rationale for the pilot study was developed in the interest of Indonesian civil engineering colleagues and a primary education undergraduate student's curiosity towards (1) identifying the current EE needs and capacity of children in Surabaya, and (2) developing a context to which successful implementation of EE in primary schools could be achieved in the region. The underlying motive of this report is to contribute a unique dataset towards a better understanding of EE in a select emerging economy, and assist the future curriculum design for primary school education in the region.

Research Approach & Methodology

The city of Surabaya, located in East Java, is the second most populous city in Indonesia with heavy industrial output responsibilities. In recent years, the increase in population coupled with high industrial development has caused significant degradation of both the terrestrial and aquatic environments. In 2006, an engineering research collaboration was developed between Soka University, Faculty of Engineering and the Institut Teknologi Sepuluh Nopember (ITS), Faculty of Civil Engineering and Planning to resolve waste water treatment issues, particularly leachate originating from an open landfill dump site in the region (Kawai et al. 2012). Due to the unique science initiative to research landfill sites in the region, an *ad hoc* window of opportunity to dispatch an undergraduate primary education student to survey elementary schools was developed. In conjunction with the engineering project, two separate exploratory pilot surveys were conducted in 2007 and 2009 at both public and private primary schools in the general area of central Surabaya City, Indonesia. The two surveys were conducted separately due to logistical limitations of the larger research project.

Planning and procedure of research. The first survey was conducted at six public and private primary schools (Appendix 1) from 30-Jul to 22-Aug in 2007 focusing on Indonesian children's perception of environmental issues. Note: two of the six public schools were physically adjacent to two other separately administered primary schools and were counted as one school. The second was carried out at the same elementary schools plus five more from February 8 –

25, 2009 (Appendix 1) focusing on primary school teachers' conceptions and practice of EE. Selection of schools and participants was based on availability and recommendations of collaborating researchers from ITS, while both public and private institutions were included assuming that school resources and demographics might reveal differing results. Since language was a major hurdle in the study, ITS colleagues acted as interpreters and paper instruments were utilized, particularly for the children who could not speak English (or Japanese). All of the instruments were administered by personal visits to the primary schools, where initial contact, explanation of the objectives and permission from the headmaster was conducted. Informed consent was also obtained from the parents/guardians and participants with the insurance of confidentiality and the right to withdraw from the study. Personal greetings by the undergraduate student to the individual classes and explanations of the survey were also conducted. No pre-testing of either instrument was conducted, and questions were derived from general interests initiated from collaborating engineers from ITS and the undergraduate student. Only one of the eleven schools surveyed had verbally suggested some basic EE awareness instruction was being conducted in the school whereas the other ten schools had no particular EE program at the time of survey.

Children's Survey: 2007. In the first survey, a total of 409 children (212 boys and 197 girls) from the 6th grade (ages 11 – 12) participated. The 6th grade student body was selected to assess the total integration of primary school education. Children of the fifth and sixth grade are characterized as the formal operational stage where young thinkers can handle hypothetical problems such as scientific reasoning, logical thinking and understand symbolic abstractions and literary criticism, as well as develop tasks and concepts which are necessary for everyday living (Inhelder and Piaget 1958) which are critical for the sound development of applicable environmentally conscious behaviour.

All participating children were asked to choose the answers that best describe their interests, awareness and knowledge in environment-related issues. The Likert-type questionnaire consisted of fourteen closed-ended and multiple choice questions grouped into three general categories relating to, (1) what are children's general interests, (2) children's thoughts about environmental issues and EE, (3) children's views of waste issues and (4) children's reflection in a social

context (Appendix 2).

Teachers' Survey: 2009. In the second study, a total of 211 teachers (57 men and 154 women) from the 6th grade participated. The survey translated into the Indonesian language, due to more open-ended questions, explores teachers' conceptions about EE as well as its practice. All participants were asked to choose or rank in order the answer that best describes their thoughts towards EE and related matters. Multiple choice questions utilized a Likert-type scale for answers. The questionnaire can be categorized into two general topics, (1) perceptions of EE and (2) practicality of implementing EE in primary education (Appendix 2). In the case of open-ended questions, collected answers were divided into similar categories and the characterization of each category was conducted by employing key-words or phrases that summarize the contents of each category (Summers et al. 2000; Flogaitis et al. 2006; Sato and James 1999).

Survey Evaluations. Immediately after collecting the questionnaires, the organization of the data and careful reading of the open-ended answers given by the participants followed for both surveys. The surveys were first evaluated based on whether primary schools were private or public, and also based on gender. Since there were no statistically significant differences ($p > 0.05$) in the answers between public and private schools, gender or the one school with informal EE, the results are shown as survey participant totals rather than sample-specific. Questions that asked teachers to rank the order of importance were sometimes coupled or summarized into two categories to simplify the evaluation of the answers. For example, when teachers were asked to rank twelve traditional primary school subjects which could best implement some form of EE into the curriculum, rank-order 1-6 and 7-12 were summarized together. In both open and Likert-type questions, the frequency (%) with which each response category appeared and average Likert-type score was calculated.

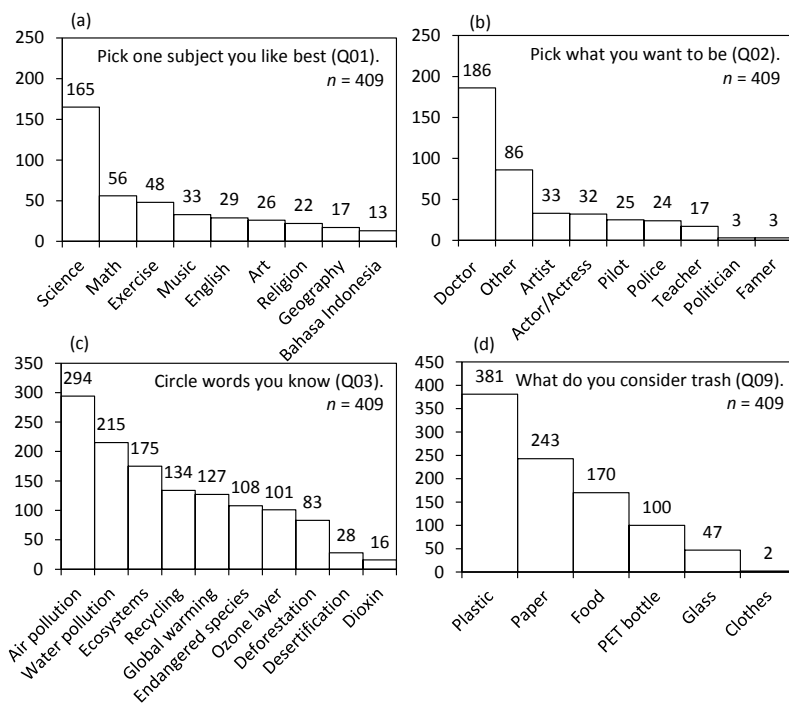


Figure 1. Survey of 409 primary school children (6th grade; 212 boys & 197 girls) from Surabaya, Indonesia. Children were asked to (a) select their favorite study subject, (b) select a future profession, (c) select concepts they understood, and (d) select what they considered to be waste/trash.

Results

Children's results. The results from the children of Surabaya show they are generally interested in science, environmental issues and concerned about waste problems in their community. However, the survey also suggests that children lack confidence which might lead to participation in environment-related activities.

When children were asked which subject they enjoyed most, 40.3% and 13.6% of the children responded to science and math, respectively (Figure 1a). In contrast, social science courses were less popular when given a choice. The next question showed 45.4% of children are interested in becoming doctors followed

by 21% interested in other professions (Figure 1b). When asked to circle as many environment-related concepts that they knew, the most frequently circled words were air pollution (71.8%), water pollution (52.5%) and ecosystems (42.7%) (Figure 1c). Question 09 asked children to circle items they considered as waste where the three most commonly circled items were plastic (93.1%), paper (59.4%) and food (41.5%) (Figure 1d).

When children were asked if they were concerned, enjoy, interested and would like to participate in environment-related topics, 89.0, 71.9, 85.4 and 81.2% answered positively, respectively (Table 1). Questions 08 – 12 asked children about waste-related issues. Although 93.4% of the children agreed that waste disposal is a problem and that recycling is good behaviour, 36.4% of them are unconfident (uncertain – not at all) how to reduce waste, and 65% (uncertain – not at all) had never separated waste before (Table 1). Nearly two-fifth of the children (37.1%) talk about environmental problems with their family, while 95.1% associate themselves to the world as global citizens (Table 1).

Table 1. Select survey results (%), Likert-type scale averages, standard deviations (S. D.) and coefficient of variance (C. V. %) from 409 primary school children (6th grade; 212 boys and 197 girls) from Surabaya, Indonesia.

Question Category	Survey Question (Q)	Very Much (Strongly Agree)	Somewhat (Agree)	Uncertain (%)	Not Really (Disagree)	Not at All (Strongly Disagree)	Average	S. D.	C. V. (%)
2	(Q04) Are you concerned about environmental problems?	60.4	28.6	8.80	0.24	1.96	4.45	0.82	18.4
	(Q05) Do you like to study topics about environmental problems?	34.2	37.7	25.4	1.00	1.70	3.97	0.89	22.4
	(Q06) Would you like to learn more about environmental problems?	46.0	39.4	11.7	1.96	0.98	4.27	0.82	19.2
	(Q07) Would you like to participate in environmental activities?	46.2	35.0	16.9	1.47	0.49	4.25	0.82	19.3
3	(Q08) I think it is possible to solve waste problems.	34.0	42.3	20.0	2.20	1.47	4.05	0.87	21.5
	(Q10) Do you know how to reduce waste?	28.9	34.7	17.4	2.44	16.6	3.57	1.37	38.4
	(Q11) How often do you separate waste?	13.0	22.0	42.5	12.5	10.0	3.15	1.11	35.2
	(Q12) I think recycling is good for the environment.	81.7	11.7	3.42	1.22	1.96	4.70	0.77	16.4
4	(Q13) Do you talk about environmental problems with you your family?	14.4	22.7	52.1	8.07	2.69	3.38	0.92	27.2

Teachers' results. When teachers were asked an open-ended question to define EE, 53% responded with keywords and summaries suggesting EE teaches *knowledge* about the environment (Table 2). Other answers to the question suggest defining EE as teaching the importance of the *natural environment* (25.1%) or teaching applicable ways to *preserve and utilize* the environment (18%) (Table 2). A small portion of teachers either left the question blank, or answered unrelated concepts to the question.

When asked to rank order of importance of *awareness, knowledge, attitude, skills* and *participation*, a relatively high percentage (45%) of the questioned primary school teachers ranked *awareness* first (Likert-type average = 4.75). Proportionately high (42.1%) is the percentage of those who chose *knowledge* first in their list of choices (Figure 2). Furthermore, the practical objectives such as *skills* and *participation* were thought to be relatively less important among the teachers, while *attitude* ranked in the middle. Expanding upon this question, we asked teachers an open-ended question about what type of person EE should cultivate. In summary, 56.8% of the teachers answered, “*An individual who is aware of the importance of the environment and willing to protect and preserve the environment with the necessary knowledge and skills*”. The second and third largest majority suggested cultivating, “*an individual who loves and appreciates the environment*” (22.2%) and “*a human endowed with environmental awareness*” (9%).

When teachers were asked whether EE should be compulsory in primary education institutions (Q04), 100% agreed (strongly agree - agree). Many primary school teachers (68%) reported that EE should be implemented as a blended topic into the current curriculum, while one third of teachers (32%) felt it should be provided as an independent subject (Q05). Further, when asked to rank subjects outside of science which might potentially supplement the effectiveness of teaching EE, the two most frequently mentioned subjects were religion (66.4%) and industrial art (32.6%) (Figure 3). On the other hand, the results showed less frequency towards the subjects of information science and music. When asked to rank the most effective way to combat environmental problems (Q07), more than half (54.9%) of the primary school teachers ranked education first and about one fifth (20.8%) suggested grass-roots action. On the contrary, engineering or technological innovation, government and business growth were not ranked high.

Table 2. Summarized open ended question asking 211 primary school teachers (6th grade) from Surabaya, Indonesia to define Environmental Education.

(Q1) How do you define Environmental Education (EE) ?	Answered
EE teaches environment-related <i>knowledge</i> to students (general knowledge).	112
EE teaches the importance of the <i>natural environment</i> to students (nature studies).	53
EE teaches applicable ways for <i>preserving</i> and utilizing nature in daily life (conservation).	38
EE is environmental in scope which does not neglect other sustainability subjects within education (extracurricular).	1
Non-related answer	3
No answer	4

When asked what types of limitations were present towards implementing EE in primary education, 52.6% responded teacher training was a significant limitation, followed by deficiencies in facilities (48.3%), budget (39.3%), and time (35.5%) (Figure 4). When asked if they would be willing to attend environmental education training programs even during holidays, most teachers strongly agreed (62%) and agreed (21%), while 17% disagreed or strongly disagreed. Teachers were also asked to rank what type of content should be taught within EE material (Q11). Topics which ranked relatively high were daily life (47.3%), nature conservation (22.2%) and environmental issues (15.6%). Other possible topics such as geography, ecology, fieldwork and natural science ranked relatively lower. The final question asked teachers which modern day social issue was most closely associated with EE, and showed health and sanitation, and natural resources ranking highest followed by (in order of importance) poverty, economic development, population, starvation, peace, human rights and gender.

Discussion

Children's interest. The subjects of interest (Figure 1a and 1b) suggest a relatively large number of children like science, math and exercise, and also show that most want to become doctors. Surveys which were carried out in Tokyo, Seoul, Beijing, Helsinki, London, and Washington, D.C. reveal that physical education is the most popular subject, followed by the subjects of art, science and math (Benesse 2007). Science and math are important subjects that can enhance the EE experience, and should benefit the overall comprehension of environmental issues (Leach et al. 1995, 1996a, 1996b; Littledyke 2008). Further, children's understanding and concerns about the environment are largely

limited to their experiences in science at school, and science education acts as a vehicle for environmental cognitive and moral development (Littledyke 2004). Therefore, children’s accurate understanding of science is necessary because a lack of knowledge can possibly hinder the sound understanding of environmental problems which is an underlying concept of EE (Helldén 1995).

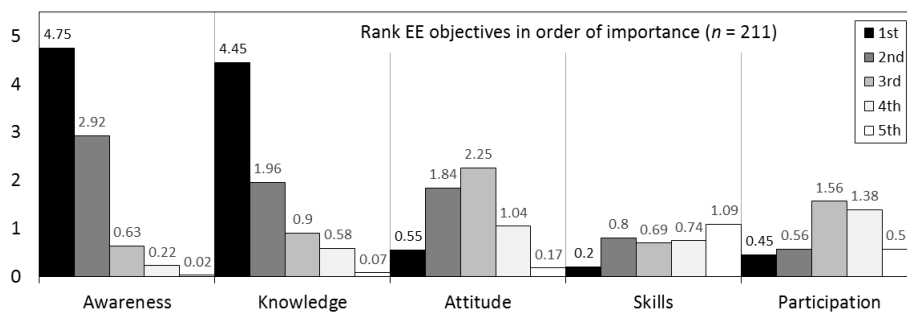


Figure 2. Likert-type scale survey results from 211 6th grade primary school teachers from Surabaya, Indonesia. Teachers were asked to rank the order of importance of the five Environmental Education objectives as originally declared by the 1977 Tbilisi Declaration (Q02).

The children of Surabaya also showed significant interest in environmental problems and wanting to get involved in environment-related studies (Table 1). According to the study by Uitto et al. (2011), positive attitude toward environmental responsibility correlates with eco-centric values to conserve and protect the environment. Thus, children of Surabaya intuitively have the required *awareness* and *attitude* to begin the process of developing eco-centric values towards a sustainable future. In addition, the children showed some familiarity of basic EE concepts such as air and water pollution, ecosystems, recycling, etc. (Figure 1c). In order to further develop environmental interest and positive attitudes toward responsibility, it is important to give children educational experiences that promote the development of skills and self-efficacy in influencing their natural environment, and positive feelings that their pro-environmental actions make a difference. Experiences of the natural environment including past and present are likely to predict positive emotional affinity with the environment and induce positive attitude and behavior toward the environment (Kals et al. 1999; Kals and Meas 2002; Hinds and Sparks 2008; Negev et al. 2008). Thus,

if the children of Surabaya are more readily exposed to the regional natural environment, possibly through geography, and related social conditions, induction of long lasting positive attitudes should prevail.

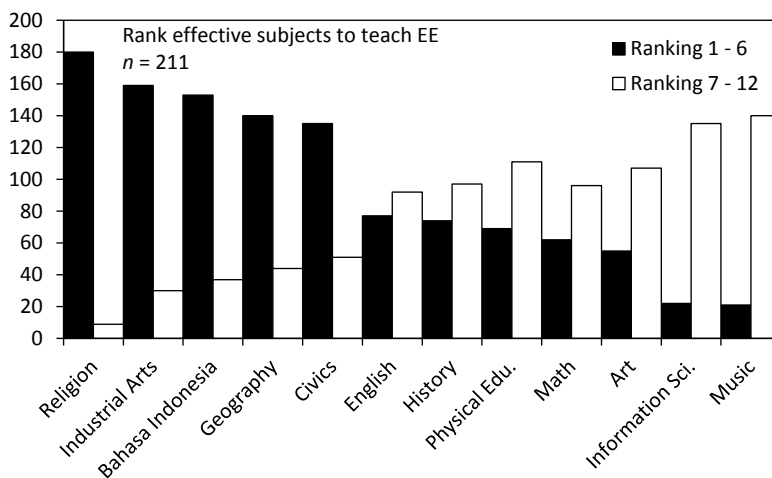


Figure 3. Survey of 211 primary school teachers (6th grade) from Surabaya, Indonesia. Teachers were asked to rank the order of twelve (12) potentially effective subjects to incorporate environmental education (Q06). In order to simplify the figure, ranking 1 – 6 and 7 – 12 were combined.

Children's views of waste issues. Children also had positive views regarding solutions towards resolving waste problems in Surabaya. More than 60% of children are familiar with the concept of recycling and its function towards reducing waste. However, when asked if they knew how to or whether they separate waste (Table 1), the average Likert-type score was relatively lower at 3.57 ± 1.37 (C.V. = 38.4%) and 3.15 ± 1.11 (C.V. = 35.2%), respectively. The result is further reinforced when asked what they consider to be trash where plastics and paper, which could be considered recyclable, ranked highest. In retrospect, the pilot survey failed to explore the distinction between *trash* versus *recyclable*, and *plastic* versus *PET bottles*. Although there are three kinds of garbage bins (combustible, un-combustible and recyclable) to separate waste in many of the primary schools surveyed (observed by the surveyor during the study), many of the children do not actually apply their *knowledge* and positive *attitude* toward an eco-friendly recycling lifestyle; all of the trash bins were filled with a mixed assortment of waste and recyclables. This end result is likely due to a combination

of factors including collection companies combining trash during recovery, limited recycle bins in public locations outside of school, and lack of positive reinforcement at school and at home (Likert-type score = 3.38 ± 0.92) and at school. Therefore, the observations suggest that there is a divergence between recycling knowledge and actual behavior.

A survey of 9th grade students carried out in the Netherlands with an assumption that students with more *knowledge* of environmental problems care more about and act more responsible towards the environment also showed a low correlation between *knowledge* of environmental problems, *attitudes* and behaviour (Kuhlemeier et al. 1999). The discord between knowledge and behavior is often recognized as one of the major hurdles in EE where, for example, the outcome of teaching recycling skills focuses on the recycle bin(s) rather than the *knowledge* and *skill* to modify or adjust behavior when the situation or context is not as obvious (Heimlich and Ardoin 2008). The challenge remains to cultivate EE in primary schools of Surabaya to emphasize *skills* and *participation*, and positive reinforcement through their school education and at home.

Teachers' perceptions about EE. The teacher survey showed that most teachers put emphasis on conveying general *knowledge* about the environment to students (Table 2). In addition, the primary school teachers have tendencies to define EE through a knowledge-centered, goal-directed approach as was also pointed out by Flogaitis et al. (2006). Thus, the idea of incorporating acute sensitivity, appropriate attitude and behaviour, and skills towards practicing EE is limited amongst primary school teachers in Surabaya. It is possible that teachers assume that the gaining of *awareness* and *knowledge* alone naturally escalates towards children's participation and behavior change. Heimlich and Ardoin (2008) suggested that in order to produce behaviour change in children, it is important to develop the *skills* that influence behaviour, and that it is not easy to teach behaviour itself because behaviours are a complex combination of skills. Thus, the teachers' general faith in *awareness* and *knowledge* is finite, and consideration of the importance of *skills* and *participation* is necessary. In the future, it would be beneficial for the teachers of Surabaya to coordinate projects which develop specific environmental-role-playing skills and encourage group participation in environmentally-friendly activities. As mentioned before, children with *knowledge* about how to reduce waste does not always equate to the separation of waste.

Knowledge itself doesn't induce behaviour change or if so, desirable behaviours decrease with the passage of time (Pearce and Hall 1992; Wals 2006). Behaviour change should not be considered from the view point of behaviourism or stimulus-response because it is a more complex process, and changing behaviour is not about changing one act, rather it is about altering the routines that exist around the behaviour (Heimlich and Ardoin 2008).

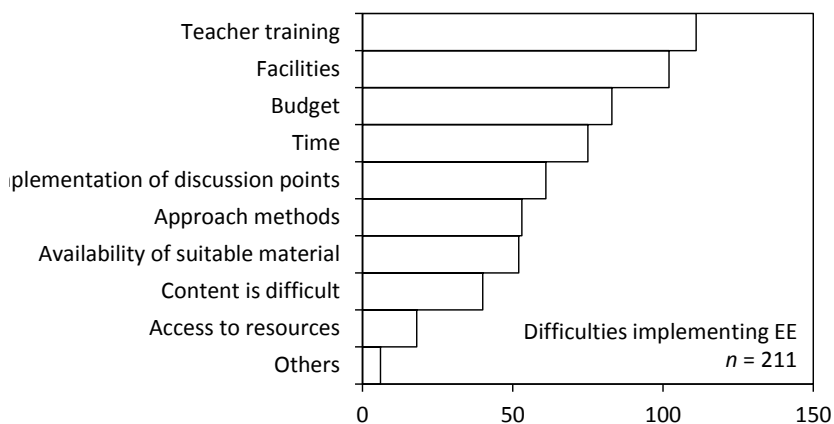


Figure 4. Survey of 211 primary school teachers (6th grade) from Surabaya, Indonesia. Teachers were asked to select relevant difficulties associated with implementing environmental education (Q08).

Robottom and Hart (1993) define three approaches which influence teachers' conception and practice in environmental education: positivist approach, interpretative approach and critical approach. Positivist approach to EE aims to develop knowledge *'about the environment'*, interpretative approach to EE focuses on conducting activities *'in the environment'* and a critical approach seeks to take action *'for the environment'* (Palmer 1998). In a survey conducted by Flogaitis et al. (2006), kindergarten teachers showed signs of two approaches to EE: positivist and critical approach. The kindergarten teachers had a tendency to put emphasis on teaching knowledge about the environment and taking action for the environment. In the present study, the teachers' conceptions are consistent with a positivist approach which attempts to increase awareness and knowledge about the environment through natural sciences (Figure 2). Although many of the teachers strongly believe that education is one of the most important factors for combating environmental issues, there is a clear need to expand the EE approach to include more interpretive and critical approaches in Surabaya.

Practicality of implementing EE. Although 100% of the teachers agreed to the compulsory application of EE in primary school, 68% of them felt EE should be blended within traditional subjects rather than an independent subject. Limited EE has been suggested in conjunction with other traditional subjects ranging from agriculture to religion at the secondary education levels in Indonesia (Nomura 2009). The current study showed that primary school teachers believe the subject of religion would be an effective subject to teach EE to children. Although many of the teachers believe that the subject of religion is highly effective (Figure 3), it is particularly worth noting that children find the subject less enjoyable (Figure 1a). Clearly, there is a cognitive mismatch between the children and teachers towards religion as a subject. One question that arises is how to improve the cognitive gap towards providing EE efficiently. Since most children show interest in learning EE, a well-planned coordination between interdisciplinary environmental education and religion could prove beneficial to both interests (Stevenson 1997; Sauv e 1996). On the other hand, the subjects of music, information science and art, which ranked low amongst the teachers (Figure 3), might actually better provide a forum to where children can learn about EE with more interest (Gurevitz 2000).

The majority of primary school teachers are willing to sacrifice their holidays to attend environmental education training programs. However, the four most mentioned difficulties in implementing EE were teacher training, facility, budget and time. In general, facility, budget and time are problems that can be found in all societies, and these issues are an easy target to the causes of difficulty in carrying out EE. Effective in-service and pre-service trainings can possibly enable the teachers to manage these obstacles more effectively (Zak and Munson 2008). In the future, teacher training opportunities such as at universities should offer more opportunities to the primary school teachers who are keen to join the programs for better implementation of EE in primary schools in Indonesia.

Conclusion

This study provides a baseline, preliminary look at some of conceptions of environmental education and related issues of primary school children and teachers in Surabaya, Indonesia. The goal of the pilot study was to begin the

identification of current needs, capacity and context towards development of environmental education initiatives. The results suggest there is high interest from both children and teachers to initiate environment-related studies. However, there appears to be a divergence between the interests and needs of the children, and the teachers' interests and perceptions of successful methods to implement environmental education. The identification of this context and discord should provide a starting point towards future implementation of environmental studies in the region.

Although it is true that emerging economies are relatively limited in technologies and infrastructure to cope with pressing environmental issues, efforts in EE will definitely serve sustainability in the long run in the region. However, this does not mean that it is acceptable to impose or implement EE which is theorized or implemented in advanced economies in a monolithic way. The geography, socio-economic circumstance and cultural heritage must be considered in order for fruitful implementation of EE. The children who participated in the present study displayed sincere interest in environmental studies and promise towards sustainable behavior. However, they were limited in the necessary *skills* to apply the environmental knowledge to daily life. The teachers generally displayed knowledge-centred approaches, and in the future would benefit from EE seminars which include various methods to encourage EE knowledge in various curriculum subjects. The present study opens the window towards better understanding of what is needed in the primary schools of Surabaya, Indonesia, and allows us to begin the process of developing specific lessons and training programs that will hopefully enhance further development of EE that are conducive to the needs of the educational institutions of the region.

Acknowledgements

This work was supported by Soka University's Environmental Science, Engineering and Education for Sustainable Development (SEED) project in collaboration with the Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia. We would like to express our sincere gratitude to the 11 primary school headmasters, teachers and children for their participation in the survey. We are also grateful for translations to/from the Indonesian language and logistical support by Handrio Nurhan and Dewi Dwirianti Hadiwinoto of Indonesia, respectively.

References

- Adams, S and S. Savahl. 2013. Children's perceptions of the natural environment: a South African perspective. *Children's Geographies* DOI: 10.1080/14733285.2013.829659
- Agelidou, E., G. Balafoutas and E. Flogaitis. 2000. Schematisation of concepts. A teaching strategy for environmental education implementation in a water module third grade students in junior high school (gymnasium-15 years old). *Environmental Education Research* 6(3): 223-243.
- Behrman, J. R., A. B. Deolalikar, and L-Y Soon. 2002. *Promoting effective schooling through education decentralization in Bangladesh, Indonesia, and Philippines*. Manila: Asian Development Bank.
- Benesse Educational Research and Development Center. 2007. Basic Research on Academic Performance: International Survey of Six Cities. http://benesse.jp/berd/center/open/report/gakukihon_6toshi/soku/pdf/6toshi_english.pdf (accessed May 3, 2011).
- Benesse Educational Research and Development Center. 2010. Dainikai kodomo seikatsujittai kihonchosahokokusyo [Report on second survey of the current living conditions of children]. *Kenkyujoho* 59.
- Birnbaum, A, trans. 1989. *Education for creative living: Ideas and proposals of Tsunesaburo Makiguchi*. Ed. Bethel, D. M. Ames: Iowa State University Press.
- Boyes, E. and M. Stanisstreet. 1997. Children's models of understanding of two major global environmental issues (ozone layer and greenhouse effect). *Research in Science and Technological Education* 15(1): 19-28.
- Bruni, C. M., R. C. Chance and P. W. Schultz. 2012. Measuring values-based environmental concerns in children: an environmental motives scale. *Environmental Education* 43(1): 1-15.
- Bunting, T. E. and L. R. Cousins. 1985. Environmental dispositions among school-age children: A preliminary investigation. *Environment and Behavior* 17: 725-768.
- Campbell, E., M. Skovdal and C. Campbell. 2013. Etheopian students' relationship with their environment: implications for environmental and climate adaptation programmes. *Children's Geographies* 11(4): 436-460.
- Chawla, L. 2002. Spots of time: Manifold ways of being in nature in childhood. In *Children and nature: Psychological, sociocultural and evolutionary investigations*. Eds. P.

- H. Kahn Jr., and S. R. Kellert, pp. 199-225. Cambridge, MA: MIT Press.
- Corraliza, J. A. and J. Berenguer. 2000. Environmental values, beliefs, and actions: A situational approach. *Environment and Behavior* 32(6): 832-848.
- Davis, J. 2009. Revealing the research 'hole' of early childhood education for sustainability: a preliminary survey of the literature. *Environmental Education Research* 15(2): 227-241.
- Farmer, J., D. Knapp and G. M. Benton. 2007. An elementary school environmental education field trip: Long-term effects on ecological and environmental knowledge and attitude development. *Journal of Environmental Education* 38(3): 33-42.
- Feinstein, N. W. and G. Carlton. 2013. Education for sustainability in the K-12 educational system of the United States. In *Schooling for sustainable development in Canada and the United States*, ed. Rosalyn McKeown and Victor Nolet, 37-49. New York: Springer.
- Flogaitis, E., M. Daskolia and E. Agelidou. 2006. Kindergarten teachers' conceptions of environmental education. *Early Childhood Education Journal* 33(3): 125-136.
- Gurevitz, R. 2000. Affective approaches to environmental education: going beyond the imagined worlds of childhood? *Ethics, Place and Environment* 3(3): 253-268.
- Japan International Cooperation Agency (JICA). 2011. Country Gender Profile: Indonesia Final Report. <http://www.jica.go.jp/activities/issues/gender/pdf/e10ind.pdf> (accessed April 30, 2011).
- Havighurst, R. 1972. *Developmental tasks and education*. 3rd ed. New York: David McKay Company, Inc., A Division of Random House.
- Hinds, J. and P. Sparks. 2008. Engaging with the natural environment: The role of affective connection and identity. *Journal of Environmental Psychology* 28: 109-120.
- Heimlich, J. E., and N. M. Ardoin. 2008. Understanding behavior to understand behavior change: A literature review. *Environmental Education Research* 14(3): 215-237.
- Hellde'n, G. 1995. Environmental education and pupils' conceptions of matter. *Environmental Education Research* 1(3): 267-277.
- Hosoda, A. 2003. Garbage disposal problems in Indonesia. *Journal of International Economic Studies* 17: 29-41.
- Horwitz, W. A. 1996. Developmental origins of environmental ethics: The life experience of activists. *Ethics and Behavior* 6: 29-54.

- Ikeda, D. 2002. Education for Sustainable Development Proposal. <http://www.daisakuikeda.org/main/educator/education-proposal/edu-proposal-2002.html> (accessed April 28, 2011).
- Inhelder, B. and J. Piaget. 1958. *The growth of logical thinking from childhood to adolescence*. New York: Basic Books.
- Kals, E., D. Schumaker and L. Montada. 1999. Emotional affinity toward nature as a motivational basis to protect nature. *Environment and Behavior* 31(2): 178-202.
- Kals, E., and J. Maes. 2002. Sustainable development and emotions. In *Psychology of sustainable development*. Eds. P. Schmuck, and W. P. Schultz, pp. 97-122. Norwell, MA: Kluwer Academic Publishers.
- Kawai, M., I. F. Purwanti, N. Nagao, J. Hermana and T. Toda. 2012. Seasonal variation in chemical properties and degradability by anaerobic digestion of landfill leachate at Benowo in Surabaya, Indonesia. *Journal of Environmental Management* 110: 267-275.
- Kopnina, H. 2012. Education for sustainable development (ESD): the turn away from 'environment' in environmental education? *Environmental Education Research* 18(5): 699-717.
- Kruger, C. and M. Summers. 2000. Developing primary school children's understanding of energy waste. *Research in Science & Technological Education* 18(1): 5-21.
- Kuhlemeier, H., H. V. D. Bergh and N. Lagerweij. 1999. Environmental knowledge, attitude and behavior in Dutch secondary education. *Journal of Environmental Education* 30(2): 4-15.
- Leach, J., R. Driver, P. Scott and C. Wood-Robinson. 1995. Children's ideas about ecology 1: theoretical background, design and methodology. *International Journal of Science Education* 17(6): 721-732.
- Leach, J., R. Driver, P. Scott and C. Wood-Robinson. 1996a. Children's ideas about ecology 2: ideas found in children aged 5-16 about the cycling of matter. *International Journal of Science Education* 18(1): 19-34.
- Leach, J., R. Driver, P. Scott and C. Wood-Robinson. 1996b. Children's ideas about ecology 3: ideas found in children aged 5-16 about the interdependency of organisms. *International Journal of Science Education* 18(2): 129-141.
- Lianne, F. 2005. The effects of local learning on environmental awareness in children: An Empirical investigation. *The Journal of Environmental Education* 36(3): 39-50.

- Littledyke, M. 1997. Science education for environmental education? Primary teacher perspectives and practices. *British Educational Research Journal* 23(5): 641–659.
- Littledyke, M. 2004. Primary children's views on science and environmental issues: examples of environmental cognitive and moral development. *Environmental Education Research* 10(2): 217-235.
- Littledyke, M. 2008. Science education for environmental awareness: approaches to integration cognitive and affective domains. *Environmental Education Research* 14(1): 1-17.
- Mueller, M. P. and M. L. Bentley. 2009. Environmental and science education in developing nations: a Ghanaian approach to renewing and revitalizing the local community and ecosystems. *Journal of Environmental Education* 40(4): 53-63.
- Moseley, C. and J. Utley. 2008. An exploratory study of preservice teachers' beliefs about the environment. *The Journal of Environmental Education* 39(4): 15-30.
- National Institute for Educational Policy Research of Japan (NIEPRJ). 2007. Teacher's Guide for Environmental Education (Elementary School Edition) [In Japanese]. <http://www.nier.go.jp/kaihatsu/shidou/shiryo01/kankyo02.pdf> (accessed April 30, 2011).
- Negev, M., G. Sagy, Y. Garb, A. Salzberg and A. Tal. 2008. Evaluating the environmental literacy of Israeli elementary and high school students. *Journal of Environmental Education* 39(2): 3-20.
- Nomura, K. 2009. A perspective on education for sustainable development: Historical development of environmental education in Indonesia. *International Journal of Educational Development* 29(6): 621-627.
- Oreg, S. and T. Katz-Gerro. 2006. Predicting proenvironmental behavior cross-nationally: Values, the theory of planned behavior, and value-belief-norm theory. *Environment and Behavior* 38(4): 462-483.
- Palmer, J.A. 1998. *Environmental education in the 21st century: Theory, practice, progress and promise*. London: Routledge.
- Pearce, J.M., and J. Hall. 1992. Stimulus significance, conditionability, and the orienting response in rats. In *Attention and information processing in infants and adults: Perspectives from human and animal research*. Eds. B.A. Campbell, H. Hayne, & R. Richardson, pp. 137–160. Hillsday, NJ: Lawrence Erlbaum Associates.
- Petegem, P. V., A. Blicck and J. V. Ongevalle. 2007. Conceptions and awareness concerning environmental education: A Zimbabwean case-study in three secondary teacher education colleges. *Environmental Education Research* 13(3):

- 287-306.
- Ridgers, N. D., Z. R. Knowles and J. Sayers. 2012. Envourgaing play in the natural environment: a child-focused case study of Forest School. *Children's Geographies* 10(1): 49-65.
- Robottom, I. and P. Hart. 1993. *Research in Environmental Education: Engaging the debate*. Geelong Victoria: Deakin University Press.
- Said, A. M., N. Yahaya and F. Ahmadun. 2007. Environmental comprehension and participation of Malaysian secondary school students. *Environmental Education Research* 13(1): 17-31.
- Sato, M. and P. James. 1999. Nature and environment as perceived by university students and their supervisors. *Environmental Education and Information* 18(2): 165-172.
- Sauvé, L. 1996. Environmental education and sustainable development: further appraisal. *Canadian Journal of Environmental Education* 1(1): 7-34.
- Scott, W. 2009. Environmental education research: 30 years on from Tbilisi. *Environmental Education Research* 15(2): 155-164.
- Statistics Indonesia. 2009. Net Enrolment Ratio (NER) By Province, 2003-2009. http://dds.bps.go.id/eng/tab_sub/view.php?tabel=1&daftar=1&id_subyek=28¬ab=4 (accessed April 30, 2011).
- Stern, P. C., T. Dietz and G. A. Guagnano. 1995. The new ecological paradigm in social-psychological context. *Environment and Behavior*. 27(6): 723-743.
- Stevenson, R. B. 1997. Developing habits of environmental thoughtfulness through the in-depth study of select environmental issues. *Canadian Journal of Environmental Education* 2: 183-201.
- Strife, S. J. 2012. Children's environmental concerns: expressing ecophobia. *Environmental Education* 43(1): 37-54.
- Summers, M., C. Krueger, A. Childs and J. Mant. 2000. Primary school teachers' understanding of environmental issues: An interview study. *Environmental Education Research* 6(4): 293-312.
- Tilbury, D. 1994. The critical learning years for Environmental Education. In *Environmental education at the early childhood level*, ed. R. A. Wilson, pp. 11-13. Washington, DC: North American Association for Environmental Education.
- Uitto, A., K. Juuti, J. Lavonen, R. Byman and V. Meisalo. 2011. Secondary school students' interests, attitudes and values concerning school science related to environmental issues in Finland. *Environmental Education Research* 17(2): 167-186.

- UNESCO-UNEP. 1976. The Belgrade charter. *Connect: UNESCO-UNEP Environmental Education Newsletter* 1(1): 1–2.
- UNESCO. 1978. *Final report: Intergovernmental conference on environmental education*. Organized by UNESCO in Cooperation with UNEP, Tbilisi, USSR, 14–26 October, 1977. Paris: UNESCOED/MD/49.
- Wals, A. 2006. Reflective living practice: analytical case studies and school development. In *Creating Sustainable Environments in Our Schools*. Eds. T. Shallcross, J. Robinson, P. Pace, and A. Wals, pp. 47-60. Stoke on Trent, UK and Sterling, USA: Trentham Books.
- Wilson, R. A. 1996. *Environmental education during the early childhood years*. ERIC Clearing House for Science Mathematics and Environmental Education Columbus OH.
- Zak, K. M., and B. H. Munson. 2008. An exploratory study of elementary pre-service teachers' understanding of ecology using concept maps. *Journal of Environmental Education* 39(3): 32-46.

Appendix

Appendix 1. The following public and private primary schools were surveyed in 2007 (Children) and 2009 (Teachers). *Two administratively independent primary schools adjacent to each other; surveyed simultaneously.

No.	Name of School	School Type	Year of Survey	Subject	Participants
1	SDS MUHAMMADIYAH 4	Private	2007/2009	Children/Teachers	98/23
2	SD AL-MUSLIM	Private	2007/2009	Children/Teachers	72/30
3	SDN KERTAJAYA XII & XIII*	Public	2007/2009	Children/Teachers	178/17
4	SDN MEDOKAN SEMAMPIR I & II*	Public	2007/2009	Children/Teachers	61/23
5	SD MABAD'UL ULUM	Public	2009	Teachers	9
6	SDN KLAMPIS NGASEMI	Public	2009	Teachers	17
7	SDN SEMOLOWARU II	Public	2009	Teachers	14
8	SD YPPI	Private	2009	Teachers	9
9	SD CITA HATI	Private	2009	Teachers	42
10	SD ALAM INSAN	Private	2009	Teachers	14
11	SD RADEN PAKU MULIA	Private	2009	Teachers	13

*Two independent primary schools adjacent to each other

Appendix 2. The following questions were presented in surveys conducted in 2007 (Children) and 2009 (Teachers). Children's surveys are categorized into four types of questions while teacher's surveys are categorized into two. Questions ranged from open-ended question¹, single/multiple choice² or closed-ended questions with 5 response categories ranging from "strongly agree" to "strongly Disagree"³

Children's Survey (2007):

Category (1) Children's interests

- Q01: Which subjects do you like the best?²
- Q02: What do you want to be in the future?²
- Q03: Circle one or more environmental words that you know.²

Category (2) Children's thoughts about environmental issues and EE

- Q04: Are you concerned about environmental problems?³
- Q05: Do you like to study topics about environmental problems?³
- Q06: Would you like to learn more about environmental problems?³
- Q07: Would you like to participate in environmental activities?³

Category (3) Children's views of waste issues

- Q08: Do you think it is possible to solve river waste problems in your town?³
- Q09: Circle the item that you consider to be waste.²
- Q10: Do you know how to reduce waste?³
- Q11: Have you ever separated waste?³
- Q12: Do you think recycling is good for the environment?³

Category (4) Children's reflection in a social context

- Q13: Do you talk about environmental problems with your family?³
- Q14: Do you think you are world citizen?³

Teachers Survey (2009):

Category (1) Perceptions of environmental education

- Q01: How do you define EE?¹
- Q02: Rank the order of importance of the five environmental education objectives.²
- Q03: What kind of human should EE cultivate?¹
- Q07: What is an important factor for combating environmental issues?²
- Q11: What content should be the main topic in environmental education?²
- Q12: Which social issue is associated with EE?²

Category (2) Practicality of implementing environmental education

- Q04: Should EE be compulsory in elementary schools?²
- Q05: How to provide EE?²
- Q06: What is the potentially effective subject to incorporate EE?²
- Q08: What is the problem with providing EE?²
- Q09: Would you be willing to attend environmental education training programs even during holidays?³
- Q10: How will Indonesia deal with waste issues: individually, at schools, at home, the government?¹