

Sustainable and Low Carbon Practices at Schools in Iskandar Malaysia

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In Malaysia, environmental education is not taught as a specific subject in the formal school curriculum; rather its general principles are embedded across the whole of the curriculum. Hence, informal education plays an important role in raising low carbon awareness. Schools in Malaysia organise various green projects but often these best practices were not shared nor recognised. This paper discusses the organising of a sustainable and low carbon schools exhibition. The objective of the exhibition is three-fold. First, from the research point of view, to understand green activities conducted at schools in Iskandar Malaysia; second to give recognition to schools that contributed to sustainable and low carbon Johor and third, to provide a platform for schools to showcase their effort and an opportunity to build network among them. This school exhibition was conducted for two consecutive years (2015 and 2016), inviting all primary and secondary schools to showcase their school effort in promoting sustainable and low carbon practices. For both years, 21 and 23 schools were accepted respectively into the exhibition after sending in their school profiles for preliminary screening. The profiles detailed the activities organised and participated by teachers, students and community around their school area. During the exhibition, each school presented one poster detailing their effort, followed by an oral presentation to a panel of judges. A group interview were conducted after the exhibition among committee members accompanying judges assessing school projects. Drawing data from these three sources (the school profiles, posters and group interview), several main themes of programmes emerged including 3R (Reduce, Reuse and Recycle), Reducing CO₂, Indirect Programmes and Low Carbon Education Programme. Some of these activities are able to generate income to sustain the activities themselves or support other school projects.

1. Introduction

Education is recognised as an important key to sustainable development (United Nations, 1992). In Malaysia, environmental education is implemented in two mechanisms. The first is through formal curriculum where environmental concepts are infused across subjects and the second is through co-curricular activities such as Nature Clubs (Daniel et al., 2006). As such, activities outside of the formal instructional practice plays an important role in raising awareness about sustainable and low carbon and providing an opportunity for students and teachers alike to put their knowledge into practice.

Through a focus group discussion with teachers and school administrators from schools in Iskandar Malaysia, a list of programmes and activities schools conduct and could be implemented was proposed (UTM-Low Carbon Asia Research Centre, 2013). The focus group had also found that not all schools have 3R or low carbon programmes. Those with such programmes were conducted mostly on ad hoc basis and there were no concrete plans to sustain them. There is a lack of information about sustainable and low carbon activities and programmes being implemented in schools. This paper aims to describe the organising of a sustainable and low carbon school exhibition as a means to understand what types of activities were participated and organised by schools in Johor, and specifically in Iskandar Malaysia in an effort to promote sustainable and low carbon practices among school community.

2. Sustainable and Low Carbon Schools Exhibition

Sustainable and Low Carbon Schools Exhibition, is an international exhibition and competition, organised by Centre of Engineering Education Universiti Teknologi Malaysia (CEE, UTM) and UTM Low Carbon Asia Research Centre in collaboration with Johor State Education Department (JSED). It was started in a small scale inviting schools within the Iskandar Malaysian region in 2015 and extend its invitation to schools within the whole of Johor State in 2016.

It was outlined in the “Low Carbon Society Blueprint for Iskandar Malaysia 2025” that an interschool competition would serve as a part of “Awareness through Education” sub-action (UTM-Low Carbon Asia Research Centre, 2013). This exhibition was initially envisioned as part of a research project under the development of Low Carbon Society Scenarios in Asian Regions. Its birth was part of an education programme in realizing a Low Carbon Society in Iskandar Malaysia. All primary and secondary schools in Johor were invited to participate. The objectives of the exhibition can be summarised as first, to give recognition to schools that contributed to realising a sustainable and low carbon Johor and second, to provide a platform for schools to showcase their effort and also an opportunity to build network among them and with experts in the field. The third objective, from a research point of view, is to answer the question, what types of sustainable and low carbon activities and programmes were implemented in schools in Johor, specifically in Iskandar Malaysia.

The exhibition was implemented in two stages. First, all schools in Iskandar Malaysia and Johor were invited to send in their school profiles. After a preliminary screening of the school profiles (details in Data Collection Method below), schools that had green activities or programmes were then selected to participate in an exhibition held in Dewan Sultan Iskandar, UTM. During the exhibition, each school presented one poster detailing their green effort, followed by an oral presentation to a panel of judges consisted of experts in environmental studies from different organizations.

Table 1 shows the number of schools participated in Sustainable and Low Carbon Schools Exhibition in 2015 and 2016. Of these participating schools, 10 schools (5 primary and 5 secondary schools) participated in both years.

Table 1: Schools participating in Sustainable and Low Carbon Schools Exhibition 2015 and 2016

Year	Primary schools	Secondary schools	Total
2015	12	9	21
2016	12	11	23

Parallel to the exhibition, talks and workshop sessions on topics related to sustainable and low carbon practices and lifestyle were conducted by experts from various organisations and backgrounds. These workshops aimed to provide knowledge and information about green actions to the audience, targeting especially school teachers and students. Table 2 shows the number of participants and visitors (not participants of exhibition) to the exhibition.

Table 2: Number of participants and visitors of Sustainable and Low Carbon Schools Exhibition

Year	Exhibition participant (teacher)	Exhibition participant (student)	Invited exhibitors	Teacher	Student	Other organization	Speaker/ Judge	Total
2015	50	80	4	77	226	50	28	515
2016	57	58	11	112	232	30	27	527

3. Data collection method

Data was collected through school profiles submitted to the exhibition organising committee for preliminary screening. Information provided by schools in the school profile includes school demographic (school name, type of school, location), an abstract of sustainable and low carbon programmes participated and organised by school, a list of programmes participated and organised by school within the recent 5 years, organizer(s) of programmes, organization chart of committee handling sustainable and low carbon programmes (if any) and involvement of parents and local community in school's sustainable and low carbon activities. Activities participated by schools were organised by other agencies such as government agencies, NGOs, businesses (as part of their corporate social responsibility, CSR) and higher education institutes, while activities organised by schools were initiated by the school, either by the school administration or by school society or club.

Posters exhibited during the exhibition were captured using camera. Information required in the poster included school name, lead teacher's information, participating students' information, abstract, photos and list of

sustainable and low carbon programmes and activities conducted in school, and future potential activities or projects. A focus group interview was conducted after the exhibition among committee members accompanying judges assessing school programmes. The interview focused on answering the questions about activities reported by schools, parents' and community's involvement, teachers' and school administrators' role in the green activities participated and organised by schools.

4. Data analysis and discussion

Data collected was analysed thematically to identify common themes of programmes participated and organised by schools (Braun and Clarke, 2006). Activities participated and organised by schools were listed and coded. Similar codes were combined in groups of sub themes. Several over-arching main themes emerged. Subsequently, data was analysed descriptively depicting number of programmes under each theme and sub theme.

Activities and programmes were coded based on the type of activities such as "recycle", "making craft with recycle", "reuse tyres", "EM", "compost", "car pool", "campaign", "talk", "seminar", "commodity trees", "edible garden" and so forth. Similar codes were then combined to form sub-themes. A more general pattern emerged from the sub-themes and they were combined into four main themes, namely Low Carbon Education, 3R, Reduce CO₂ and Indirect. Low Carbon Education was set aside from the others because programmes in this theme involves teaching and learning process, similar to those of formal curriculum, supported by practical activities (Phang et al., 2016a, Phang et al., 2016b). 3R and Reduce CO₂ were two themes that involved actual practical activities by students that directly reduce carbon emission. 3R theme comprised of activities about solid waste management while Reduce CO₂ comprised of activities related to resources (water, electricity, fuel) and carbon sequestration. Indirect theme comprised of activities that do not directly contribute to carbon reduction but important to support and promote sustainable and low carbon practices. Activities presented in school profiles and posters were crossed checked and confirmed with reports from post-exhibition focus group interview among committee members accompanying judges for assessment. Table 3 shows the main themes and sub-themes emerged from the analysis with examples of each sub-theme.

Table 3: Main themes, sub-themes and example activities

Main theme	Sub-themes	Examples of activities/ programmes
Low Carbon Education	Low Carbon Education	EcoLife Challenge/ Problem-based Learning-Low Carbon
3R	Recyclable collection	Monthly recycling; Let's Recycle; Recycling competition
	Reuse	Making crafts from recyclables; Reuse old tyres as school garden bed; Reuse PET bottles as pots
	EM/ Composting	Making garbage enzyme; Composting from canteen waste; Making mudball
Reduce CO ₂	Water & Electricity Savings	"Save Electricity Save Money"; Switch off the lights and fans
	Alternative sources	Using solar panel; Rain water harvesting
	Transport	Car pool; walk or cycle to school
	Tree planting	Mangrove planting; Tree planting in school compound
Indirect	Awareness campaign	Environmental talks; "Earth Hour"; "No plastic Sundays"; "No polystyrene Thursdays"
	Green school projects	Sustainable Schools (<i>Sekolah Lestari</i>); Green School
	Produce	Planting commodity trees; Herb garden
	Innovation	Solar cooking; Nutri-pot (bio-degradable pots to replace poly-bags for saplings)
	Nature	"1 school 1 river"; " <i>Program Hutan Kita</i> " ("Our Forest Programme")
	Communication	Information dissemination by school through social media; Mural or posters with environmental theme
Others	Landscape design; flower planting in school compound Cleaning school compound (gotong-royong); Dengue-free Campaign; "Zero motorcycle smoke"	

A total of 52 and 68 activities and programmes organised by other agencies were participated by schools in 2015 and 2016, while a total of 133 and 165 activities and programmes were organised by schools in 2015 and 2016. Table 4 shows the number of activities and programmes participated and organised by schools according

to themes. There was a slight increase in numbers of activities reported both participated and organised by schools. Number of activities organised by schools almost triple the number they participated in (organised by other agencies), especially in theme Reduce CO₂. Figure 1 shows the percentage each theme represents in stack bar for an overview of theme as compared to one another.

Table 4: Number of activities participated and organised by schools in 2015 and 2016 according to themes

Theme	Participated 2015	Participated 2016	Organised 2015	Organised 2016
Low Carbon Education Programme	7	10	0	2
3R	15	16	54	63
Reduce CO ₂	1	5	25	30
Indirect	29	37	54	70
Total	52	68	133	165

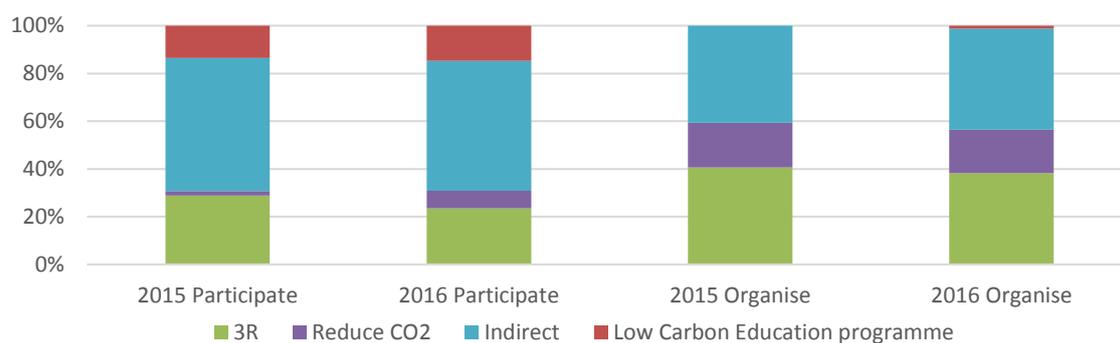


Figure 1: Types of sustainable and low carbon activities participated and organised by schools in 2015 and 2016 (in percentage)

From Figure 1, the most number of programmes participated by schools were Indirect programmes organised by various agencies, followed by 3R programmes. The least number of activities participated were those of Reduce CO₂. Similarly, the most numbers of activities organised by schools are Indirect programmes followed by 3R programmes. All schools reported that they organised 3R activities. Reduce CO₂ programmes only take up about 20 % of all activities organised. The example of programmes showed that Reduce CO₂ activities were energy savings in schools that were practised in a regular fashion. This suggests such activities were of schools' own initiative to either promote the habit of not wasting resources or to reduce the operational cost (electricity and water consumption) of the school, while not strongly promoted by external organisers. The concept of low carbon was relatively new to schools and only recently being introduced by programme such as EcoLife Challenge (Phang et al., 2016b), hence limited activities of this type were organised by schools internally. Theme "Indirect" consists of ad hoc or one-off programmes aiming to raise awareness. It might be seen as an important step to trigger sustainable practices, as well as motivating schools to participate in sustainable efforts through recognition and award. The data showed that 3R activities were well practiced in schools and often organised by external organisers. This could be in line with the enforcement of Solid Waste and Public Cleansing Management Act 2007 (Act 672) to mandate waste separation and its related promotion in the media.

Figure 2 shows the breakdown of activities according to sub-themes, (a) participated and (b) organised by schools while Table 5 shows the percentage of activities participated by schools according to the organisers. Government agencies include Ministry of Education, State Education Department, District Education Offices, Department of Environment, Solid Waste Management and Public Cleansing Corporation and local councils. Businesses include private sector ranging from manufacturing companies, food and beverage companies to real estate developers. Higher education institutes comprise of public universities.

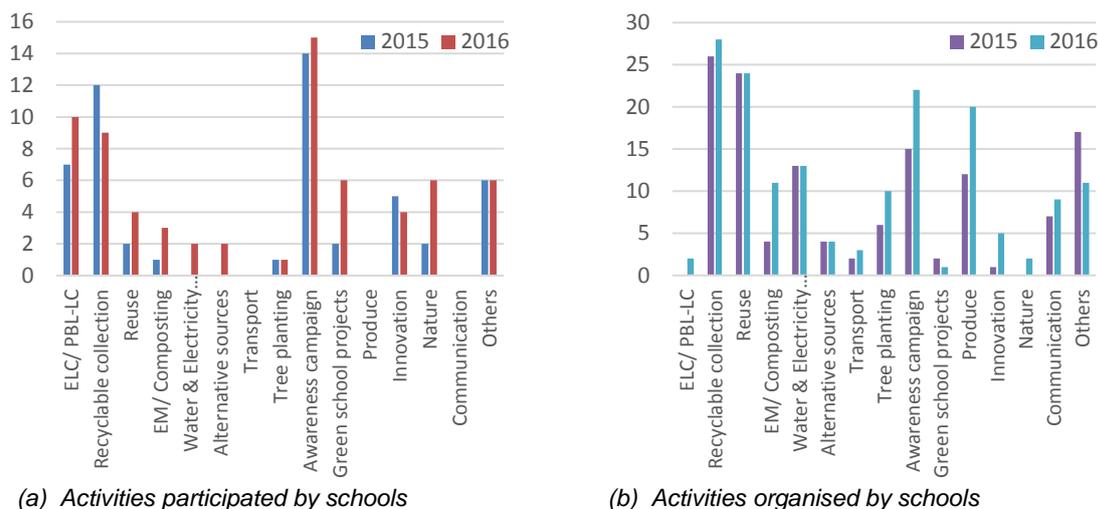


Figure 2: Sustainable and low carbon activities according to sub-themes

Table 5: Activities participated by schools organised by government agencies, NGOs, private businesses and higher education institutes

Year	Government agencies	NGOs	Businesses	Higher Education Institutes
2015	49 %	9 %	21 %	21 %
2016	56 %	8 %	11 %	25 %

From Table 5, government agencies played an important part in advocating green activities in schools. Award and recognition might be a motivation for schools to take part in these programmes. Higher education institutes and businesses also contributed a significant share in organising green activities for schools, providing resources in terms of financial support or knowledge sharing.

In 2015, 15 schools reported that they have a dedicated committee for sustainable and low carbon activities in their school while 19 schools reported so in 2016. A very limited number of schools reported involvement of parents and local community. In 2015, only 3 schools reported parents were involved in their schools' green activities, 1 stated local community involvement and 1 school had both parents and local community actively engaged; while in 2016, 3 schools had parents involvement, 2 schools involved local community and 3 schools stated parents and local community actively engaged with schools' green programmes through Parents-Teachers Association.

Apart from confirming the activities reported by schools, the result of group interview showed that some activities generated income for schools including selling recyclables and e-waste collected, selling crafts made of recyclables shawl rack, fridge magnet, compost fertilizer and vegetables from school edible garden. Funds collected were used to upgrade basic infrastructure, for students' welfare or to sustain future environmental activities at school. This could be a motivation for schools to continuously organising such activities. Several schools also showed evidence of integrating environmental concepts into formal curriculum through subjects like Moral, Civic education, visual art, science and living skills as mentioned in Nadeson et al. (2005). Gardens and plants were used as a teaching aid in Science, Living Skills and Moral Studies but these activities were not reported to be focusing on their role in carbon sequestration and/ or the importance of biodiversity and nature conservation. Group interview result also revealed that principal's participation and encouragement promote green activities in schools, with evidence of principals attending the exhibition, giving oral presentation as well as principal transferred to new school introducing previous school's green ideas to the new school.

5. Conclusions

This paper attempts to provide a glimpse of sustainable and low carbon activities participated and organised by schools in Johor, specifically in Iskandar Malaysia region through Sustainable and Low Carbon School Exhibitions. The result showed strong effort in promoting environmental awareness and practices through campaigns, talks, exhibition, camps and competitions, especially from agencies other than the schools themselves. The result also showed significant work put to encourage 3R practices. All schools have recycling/ recyclable collection programme, whether in a regular fashion or in competition format (ad hoc activity), both

organised by school or partner with NGOs or government agencies. It served as a source of income to the school. Although it is undeniable that indirect campaigns and programmes are important to raise awareness and to disseminate environmental knowledge, some effort could be channelled to encourage schools to participate or organise activities in other areas such as Reduce CO₂ and Low Carbon Education programme that involve students' direct participation (daily lifestyle) and have direct impact on carbon emission reduction. Strong leadership by principals who advocate green activities was identified as one of the success factors for schools to participate in and organise green activities. The result also shows that government agencies play a big part in motivating schools to participate in green programmes, by providing platform and recognition to schools' effort.

6. Limitations and future work

There are several limitation recognised in this paper, the main being limited number of respondents (schools). There were 320 primary and secondary schools in Iskandar Malaysia region (2016) and 1180 primary and secondary schools including vocational college, special education, art, sports, technical, religious schools in Johor (2016) (JSED, 2016). Only 34 different schools (10 schools participated in both years) were included in this investigation. The geographical distribution of schools in this study was concentrated in Iskandar Malaysia region and schools nearby this area. It therefore cannot represent Johor state-wide situation. However, feedback from teachers showed that schools located far from exhibition site (UTM) faced logistic arrangement problem. A possible solution for this might be to organise several exhibition in different locations in Johor. Themes generated in this study could be used to develop a questionnaire to gather more quantitative data with a wider geographical coverage. This study also does not investigate whether there are any activities learned by participants from the exhibition and later carried out at their schools. Further study on the effect of participating and visiting the exhibition have on students and teachers might help to organise workshops that meet schools' needs.

Acknowledgments

The authors acknowledge the research grants from the Ministry of Higher Education (MOHE) Malaysia with grant no. 7301.4B145 and also the funding and support from JICA-JST under the SATREPS program entitled "Development of Low Carbon Scenarios in Asian Region".

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