Application of Eco-School Models as Teaching and Learning Tools in Namibia

授業および学習教材としてエコスクールモデルの可能性とナミビアへの適用

MASTER’S THESIS

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Toyo University

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<tr>
<td>ASEAN</td>
<td>Association of South East Asian Nations</td>
</tr>
<tr>
<td>CEPA</td>
<td>Communication Education and Public Awareness</td>
</tr>
<tr>
<td>CHED</td>
<td>Commission on Higher Education</td>
</tr>
<tr>
<td>DEA</td>
<td>Department of Environmental Affairs</td>
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<tr>
<td>DENR</td>
<td>Department of Environment and Natural Resources</td>
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<tr>
<td>DepEd</td>
<td>Department of Education</td>
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<tr>
<td>DoF</td>
<td>Directorate of Forestry</td>
</tr>
<tr>
<td>Eco</td>
<td>Ecological or Environmental</td>
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<tr>
<td>EE</td>
<td>Environmental Education</td>
</tr>
<tr>
<td>EMB</td>
<td>Environment Management Bureau</td>
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<tr>
<td>ESD</td>
<td>Education for Sustainable Development</td>
</tr>
<tr>
<td>FEE</td>
<td>Foundation for Environmental Education</td>
</tr>
<tr>
<td>IEC</td>
<td>Education, Information and Communication</td>
</tr>
<tr>
<td>MAWF</td>
<td>Ministry of Agriculture, Water and Forestry</td>
</tr>
<tr>
<td>MET</td>
<td>Ministry of Environment and Tourism</td>
</tr>
<tr>
<td>MEXT</td>
<td>Ministry of Education, Culture, Sports, Science and Technology</td>
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<tr>
<td>NGO/s</td>
<td>Non-Governmental Organization/s</td>
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<tr>
<td>PTA</td>
<td>Parent-Teacher Association</td>
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<tr>
<td>SWOT</td>
<td>Strengths, Weaknesses, Opportunities and Threats</td>
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<tr>
<td>YES-Os</td>
<td>Youth for Environment in Schools Organizations</td>
</tr>
<tr>
<td>WESSA</td>
<td>Wildlife and Environment Society of South Africa</td>
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<tr>
<td>WFF</td>
<td>World Wide Fund for Nature</td>
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ABSTRACT

Background

Lack of basic environment-related facilities and activities in public schools in Namibia, inhibit meaningful environmental education and deprive schools of vital teaching and learning resources. Such absence of eco-facilities in schools caused a vacuum for relating to what learners learn theoretically and what is happening at school in practice. Environmental related concepts and issues in Natural and Social sciences subjects are often presented theoretically with no teaching and learning aids. Learners are not effectively engaged in practical environmental solutions as learning activities to inculcate the culture of responsibility toward the environment and to enhance the development of their scientific skills as they learn by doing. As a result, what they learn does not enhance their scientific skills and does not shape their attitudes towards the environment.

Learners’ performances in Natural science subjects, such as Agriculture, Biology and Life Science, are stagnant and not satisfactory. Research on the possible root causes that may be hindering good performance in these subjects confirmed the need to provide adequate resources and learning support materials as well as exposing teachers to innovative ways of improvising to cope with the practical components of the curriculums. Research also suggests that eco-schools make more environment-related teaching and learning resources available, enhance environmental awareness among learners, and provide pedagogical settings and benefits desirable to improve performance in Natural science subjects in Namibia. However, most researches have only focused on the activity-oriented Foundation of Environmental Education eco-school model, and there is no data to substantiate such propositions, about the facility-oriented Japan’s eco-school model and the facility and activity-oriented Philippines’ eco-school model which are relatively different. Thus, underscoring the need and relevance of this study in trying to find a solution to improve performance in Natural science subjects in Namibia while providing an insight about Japan’s and the Philippines’ eco-school models.
Research Objectives and Methods

This study explored the features, applications and benefits of Eco-school models in Japan and the Philippines; examined whether they make environment-related teaching and learning resources available to teachers and learners; examined whether they lead to increased environmental awareness among learners; and proposed a feasible Eco-School Model for Namibia that can serve as tool for teaching and learning. Interviews, questionnaire surveys and observations were conducted in 3 and 4 public elementary Eco-schools in Japan and Philippines respectively. Interviews and observations were also carried-out in 7 public schools in Namibia to ascertain the strengths and weaknesses, as well as opportunities and threats.

Results and Conclusions

Japan’s Eco-School Model

The model is facility-oriented, government funded and based on an inter-ministerial cooperation that provide subsidies to designated public schools for the renovation and installation of eco-facilities. These schools are then classified as “eco-schools”. Ecological and educational aspects constitute the core features of Japan’s eco-school concept, which include creating a school environment that coexisted with nature, energy and resource saving, and recycling; creating a pleasant environment for study; and the utility of eco-facilities and activities as teaching and learning resources.

The model is curriculum-friendly and provides pedagogical, operational and health benefits, including, sustained availability of environment-related teaching and learning facilities; engaging hands-on lessons in the natural environment, ensuring that eco-facilities serve as a laboratory to enhance experiential learning for the learners; reduction of consumption bills for water and electricity; and a ventilated and glare-free learning environment. Teachers use them as hands-on teaching and assessment tools for various topics, while learners use them to observe, explore, practice, experiment and problem solving.

Seventy nine percent of the respondents (n=19) of the questionnaire survey for teachers in Eco-schools surveyed used eco-facilities available at schools as teaching and learning aids, of which 53% used 1 to 4, and 26% used 5 to 7 of those eco-facilities as teaching and learning tools. 21% indicated that they did not utilize those eco-facilities as teaching aids. Some of the challenges experienced are that, teachers do not always have enough time to use these facilities during their lessons; new teachers at schools are not always well introduced to these facilities and the school’s “Eco-school Status”, and that the use of these facilities as teaching aids is not emphasized. Regarding environmental awareness among learners, 53% and 42% of the questionnaire survey respondents feel that the model is significantly effective and effective respectively, whereas 5% feel that it has little positive effect on environmental awareness among learners.
The Philippines Eco-School Model

The model is Public-private cooperation based, and involve an award program that recognizes and accord a status of “sustainable and eco-friendly school” to schools that have initiated and integrated environment-related programs in their instruction and administration. The model is both, facility and activity oriented, and characterized by inexpensive eco-facilities, techniques and solutions that largely encourage the use of resources, knowledge and skills available in the locality and support of parents and local communities. Their approach is to make environmental awareness and action an intrinsic part of the life and ethos of the school for both pupils and for staff, and to engage the wider community. Ecological and educational aspects are fundamental as core features of the Philippines eco-school concept, which include creating a school environment that coexisted with nature, energy and resource saving, and recycling; creating an inviting and enjoyable environment for study; and the use of eco-facilities and programs as teaching and learning resources.

The model provides educational, operational and health benefits such as, sustained availability of environment-related teaching and learning resources; enriching subject contents in the real environment; engaging outdoor lessons in the natural environment, ensuring that eco-facilities and programs serves as laboratory to enhance experiential learning for the learners; reduction of consumption bills for water and electricity; and inviting and child friendly environment. It is curriculum friendly and the integration of eco-programs as subject teaching and learning resources is to a large extend well imbedded in the model. Teachers use them as hands-on teaching and assessment tools in various subjects, while learners use them to observe, explore, practice, experiment and problem solving.

All respondents (n=20) to questionnaire survey for teachers in Eco-schools used eco-facilities available at schools as teaching and learning aids, of which 95% were using more than ten eco-facilities and activities as teaching resources in their lessons and only 5% used less than ten, but more than five eco-facilities/activities in their teaching. As for environmental awareness among learners, all questionnaire survey respondents feel that the eco-friendly school model has a very significant positive effect.

Environmental Education in Public Schools in Namibia

Environmental education is applied across the curriculum, particularly infused in social and natural science subjects. However, the importance and availability of environment related facilities and activities as teaching and learning resources is not emphasized and the eco-school concept is largely unknown, thus not established. Although schools have initiated several environmental friendly programs and activities, most are poorly maintained and often neglected as they are poorly managed due to lack of incentives. Most of those environment related facilities and activities are not linked to teaching and learning. Where school gardens are available and functioning, utility as teaching and learning aids is mainly limited to Agriculture lessons. Some ministries and public agencies, have policies to work
with schools and assist with those initiatives, however, programs are not properly implemented, as it is often difficult to find teachers who are committed to spearhead those programs at schools.

**Proposed eco-school model for Namibia**

These models are exemplar, as they have demonstrated to be curriculum friendly and provides educational settings and benefits desirable to improve performance in Natural science subjects in Namibia. However, as a developing country, Namibia cannot afford a high-tech and government funded, facility-oriented model, like Japan. Therefore, the Philippines’ eco-school model, which encourage simple and inexpensive eco-facilities, approaches, techniques and solutions; promote the use of resources, knowledge and skills available in the locality; and based on the involvement and support of parents, local communities and civil society groups, is more feasible. Hence, the following Eco-School Model Framework is proposed for Namibia:

**Key words:** Eco-school, Japan, Philippines, Namibia, Teaching tool
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CHAPTER 1

INTRODUCTION

1.1. Background and Problem Statement

Environmental education in the Namibian basic education curriculum should aim to exposing learners to green practices, technologies and ideas through various subjects, particularly, Natural and Social sciences in order “to enhance the scientific knowledge, skills, attitudes and values needed to ensure that the environment is respected and sustained” (NIED, 2010). Environmentally friendly facilities and practices should be availed in schools not only as resources for environmental education but also as teaching and learning tools for various subjects. Eco-facilities should be optimized so that all learners and teachers can use them, learn from them, care for them and improve them. Schools ought to be places of learning by doing and teaching by example where it is possible.

Unfortunately, the current situation in Namibia is that most schools lacks even the basic environmentally friendly facilities. Little is known about the eco-school concept and green initiatives in schools are rarely encouraged at micro and macro levels of government. Therefore, Environmental related concepts and issues in Natural and Social science subjects are often presented theoretically with less or no teaching and learning resources.

The unavailability of eco-facilities at schools does not only represent a setback about environmental education but also presents a vacuum for coordinating what learners learn theoretically and what is happening at school in practice. As a result, what learners learn does not enhance their scientific skills and does not shape their attitudes towards the environment. Learners are not effectively engaged in practical environmental solutions as learning activities to inculcate the culture of responsibility toward the environment and at the same time boost the development of their scientific skills as they learn by doing.

The lack of basic eco-facilities and activities in schools such as greenery, school gardens, resource saving activities, etc., does not only inhibit meaningful environmental education but also deprive the schools of vital teaching and learning resources, especially for Natural and social science subjects.

In her official address to the Conference on Agriculture, Biology and Life Science performances in Windhoek, on August 2016, the Minister of Basic Education, Arts and Culture Hon. Katrina Hanse-Himarwa noted that, Learners’ performances in those subjects are stagnant and not to the satisfaction of the Ministry, and that a survey done to find out more about the possible root causes that may be hindering good performance in those subjects, confirms the need to provide adequate resources and learning support materials, as well as exposing teachers to innovative ways of improvising to cope with the practical components of the syllabi (Namibian Economist, 2016).
Introducing the eco-school model concept which not only promote practice-based environmental education but also make eco-facilities available as teaching and learning support materials for the broad curriculum is a solution that does not only allow learners to put what they learn into practice and come up with new ideas, but also encourage teachers to come up with innovative ways to improvise. Once devised and implemented properly, the eco-school concept can also help schools to save resources, and has a potential not only to enhance environmental sustainability in Namibian schools but also help to improve academic performances of the learners.

1.2. Research Objectives

The purpose of this study was to explore the features, application and benefits of Eco-school models in Japan and the Philippines, examine whether these Eco-school models make environment related teaching and learning resources available to teachers and learners and examine whether they lead to increased Environmental awareness among learners; and to propose a feasible Eco-School Model for Namibia that can serve as tool for teaching, learning and environmental education.

1.3. Research Questions

To help achieve the research objectives, the following research questions were addressed.

- What are the features, benefits and challenges of Eco-school models in Japan and the Philippines?
- Do these Eco-school models make environment-related teaching and learning resources available to teachers and learners?
- Do these Eco-school models lead to increased environmental awareness among learners?
- What is the current situation in public schools in Namibia regarding Environmental Education, Eco-friendly practices, policies and initiatives; and the use of eco-facilities and eco-activities as teaching and learning tools?
- What is a feasible eco-school model for Namibia?

1.4. Significance of the Study

The study will contribute to enhanced, meaningful environmental education in Namibian schools as it makes a platform for teachers and learners available to complement theory with practice in their local environments. The study will also benefit the local environment by contributing to the promotion of green footprints for schools while reducing their carbon foot prints, and will also help schools to cut on costs through resource conservation. The study will result into a comprehensive Eco-school model framework for schools in Namibia which will not only be instrumental in helping the Basic Education Curriculum to mould learners at all levels into environmental conscious citizens but will also be a tool that the schools can utilize to provide hands-on resources and learning support materials for Natural
science subjects, such as Life science, Biology and Agriculture as a solution to improve learners’ performance at secondary levels.

1.5. Thesis Structure

This thesis is structured into seven chapters. Chapter one reflects the background, purpose, and the significance of the study. Chapter two discussed the existing literature regarding the eco-school concept, models and associated benefits. Chapter three and four discussed the Eco-school model case studies of Japan and the Philippines respectively, while chapter five discussed the current situation in public schools in Namibia regarding Environmental Education and Eco-friendly practices. Chapter six discussed the results of chapters three to five. Chapter seven reflects the conclusion and recommendations for future research.
CHAPTER 2
LITERATURE REVIEW

2.1. The Eco-School Concept

The term ‘eco-school’ is synonymous with various terms such as environment-friendly school, sustainable school, green school, and energy smart school (Park et al, 2011). Kim et al. (as cited in Park et al, 2011) had a two-way approach to the "environment-friendly school", the environmental and ecological aspect and the educational aspect. They stated that the environmental and ecological aspect included creating a school environment that coexisted with nature, energy and resource saving, and recycling while the educational aspect included creating a pleasant environment for study and creating a school environment as a resource for environmental education.

According to Ferreira et al, in Santamaria (2015), an eco-school is internationally defined as a school that implements Environmental Education programs.

However, literature has also shown that although the eco-school concept is relatively the same in many parts of the world, many countries have developed their own concepts and version of eco-schools, based on their local contexts, their intentions, approaches and the models. These include, Green schools in U.K, U.S.A, China, India, Cyprus, Sweden and Thailand; Enviro schools in New Zealand; Sustainable schools in Australia, Foundation for Environmental Education (FEE) affiliated Eco Schools in Europe, Africa and other parts of the world; Eco-schools in Japan, and Indonesia; Sustainable and Eco-friendly Schools in the Philippines; and Child-Friendly Schools in Cambodia (Edwards, 2006; Kats, 2006; Wu et al in Santamaria, 2015; ASEAN, 2015, MEXT, 2010; ASEAN, 2013). Most of those initiatives subscribes to Kim et al. two-way approach, however, eco-school definitions in those countries are contextualized, thus, not the same.

Unfortunately, some researchers use the term “Eco-schools” to refer to the widely-publicized FEE affiliated eco-schools, perhaps Wikipedia definition of eco-schools as “an international programme of the Foundation for Environmental Education (FEE)” (wikipedia.org) contributed to such reference, therefore, considering Park et al (2011) assertion and the definition by Ferreira et al. in Santamaria (2015), such reference is not only misleading but confusing as well. It is misleading because, there are other types of eco-schools, which are in many ways different from those of the FEE eco-schools programme. For example, there are two types of eco-school movements in Japan, the government funded and facility-oriented Eco-School Model led by the Ministry of Education, culture, Sports, Science and Technology (MEXT); and the NGO-based and activity-oriented Eco Schools programme initiated by FEE Japan.
2.1.1. Activity-oriented FEE Eco-School Model

These are schools that are involved in the activities of the Eco School programme of the Foundation for Environmental Education and accredited by the programme (FEE, 2015). The Eco-Schools programme encourage a specific form of Environmental Education through an award scheme that accredits schools who make a commitment to continuously improve their environmental performance based on seven elements and ten themes (FEE, 2015) activity-based mini curriculum. The programme official start was in 1994, launched in Denmark, Germany, Greece and United Kingdom and today is found in 58 countries involving 48 000 schools all over the world (FEE, 2015).

The aim of the Eco Schools programme is to make environmental awareness and action an intrinsic part of the life and ethos of the school for both pupils and for staff and to engage the wider community (South Ayrshire Council, 2016). The Eco-Schools programme is also a learning resource that raises awareness of environmental and sustainable development issues throughout activities linked to curricular subjects and areas (South-Ayrshire Council, 2016), a claim supported by various literature (FEE, 2015; DOC, 2013). However, there is also a large amount of literature that suggests to the contrary.

In South Africa, the FEE Eco-Schools programme model is less curriculum-friendly, this make it difficult for teachers to implement and it only led to overburdening to teachers and it did not help them achieve curriculum objectives but rather take teachers and students away from their core focus, thus at times adds to the complexity to which some educators struggle to respond coherently (Rosenberg, 2008).

Krnel (2009), in the study to determine whether there were any differences in Environmental literacy between eco-schools and ordinary schools in Slovenia, found that the knowledge level is slightly higher in eco-school pupils than in ordinary school pupils, however, about pupils’ awareness and environmentally responsible behavior, the results of the research indicated that the differences between the two groups were not statistically significant. Similar findings were reported by Hallfreðsdóttir (2011) in Iceland, and de Pauw & Van Petegem in Belgium (2011).

2.1.2. Facility-oriented Japan’s eco-school Model

Schools in which architectural elements of the facilities and the human elements of management and education function harmoniously by following the three perspectives of facilities, management, and education (MEXT, 2010). Environmentally friendly educational facilities (Eco-schools) that reduce environmental load and consider coexistence with nature that are also utilized as teaching materials to serve as centers for the dissemination of global environment and energy-related education (MEXT, 2017).

Japan’s eco-school project was established in 1997 to promote environmentally friendly design and construction by equipping school buildings with ecological features such as
photovoltaic cells, solar thermal collectors, other new energy sources, wood, roof-top gardening and rainwater recycling (Mori, 2007).

2.1.3. Facility and activity-oriented Philippines eco-school Model

Eco-schools in the Philippines are called Sustainable and Eco-friendly Schools and are defined as environmentally friendly schools that have initiated and integrated in their instruction, research, extension and/or administration, programs which are environment-related (ASEAN, 2013). The Philippines’ facility and activity-oriented eco-school award program, is a public-private cooperation started in 2009 (DENR, 2013).

Most researches have focused on the FEE eco-school model and schools, and there is little research on Japan and the Philippines Eco-school models which are different.

2. 2. Education for Sustainable Development (ESD)

The eco-school concept is a brain-child of the Education for Sustainable Development concept which was developed as alternative to an earlier concept which is Environmental Education (EE). The term ‘environmental education’ has been used in German literature since the 1960s, which from its outset, was a policy instrument for finding long-term solutions to existing environmental problems (Rauch & Steiner, 2006), and since the 1992 UN Conference on Environment & Development Summit in Rio, which identified a need to involve young people in finding solutions to environmental and sustainable development challenges at a local level, the preferred policy discourse has shifted from Environmental Education to ESD (Rauch & Steiner, 2006).

Education for sustainable development focus on awareness of sustainable development issues, enhancing knowledge, influencing values and attitudes and encouraging responsive behavior and learning that leads to action. The vision of Education for Sustainable Development is a world where everyone can benefit from quality education and learn the values, behavior and lifestyles required for a sustainable future and for positive societal transformation (SADC-REEP, 2016).

ESD has also been described as holistic and transformational education which addresses learning content and outcomes, pedagogy and the learning environment, i.e. designing teaching and learning in an interactive, learner-centered way that enables exploratory, action oriented and transformative learning (UNESCO, 2017). In addition to equipping individuals with the knowledge, skills and dispositions to help them to live more sustainably in their daily lives, ESD equips learners with a sense of agency and the responsiveness to take action to influence the decisions, institutions and socio-economic structures affecting their communities, societies and the wider world they inhabit, hence, critical to ensuring that education systems are not only responsive to, and prepared for, current and emerging challenges, but that they also serve as a proactive force in moving the sustainable development agenda forward (Mochizuki & Bryan, 2015).
Education for Sustainable Development as a tool to mitigate climate change and enhance adaptation by creating awareness among students and other members of the school community has been gaining momentum worldwide, and as a result, different initiatives have been developed, including, the ‘Ecologisation of schools’ in Austria (Raunch & Steiner, 2006); Schools as shelters in Bangladesh and India; Solar schools in Australia and Eco-schools in Japan (UNESCO, 2012).

Eco-Schools challenge students to engage in tackling environmental problems at a level where they can see tangible results, spurring them on to realize that they really can make a difference. Eco-Schools instill in students a sense of responsibility and cultivate a sustainable mindset which they can apply daily. It equips those involved with the drive to really make a difference, and to spread such proactive behavior amongst family and friends, ultimately passing it on to future generations (FEE, 2015). Therefore, unarguably, the eco-school concept has emerged not only as a modern tool to advance the ESD philosophy, but also as a mechanism to integrate innovation, vision and participatory learning to deal with present and mitigate future potential environmental calamities such as climate change.

2.3. Pedagogical Implications of Eco-Schools

Beyond general tidiness and classroom displays, many educators may not be accustomed to thinking about their physical environments as an active medium contributing to learning behaviors and tend to make distinction between ‘education’ and the physical setting in which this takes place (Clark, 2002). Perhaps, this is because most traditional schools are designed to support learning natural processes in indoor classrooms from abstract descriptions in text books instead of allowing children to experience them directly from the school environment while getting their hands dirty (Danks, 2010). There have been scarce resources produced that provide the opportunity for the built environment to ‘act as a 3-dimensional textbook for teaching concepts across all disciplines’ and there is a need for development of resources that incorporate the use of the built environment into the curriculum at school and national levels (Clark, 2002).

Eco-school offers numerous educational advantages, including the opportunity to teach lessons in an engaging, hands-on manner; make learning more relevant to students; reinforce students’ active participation in their own education; and create rich educational opportunities (Danks, 2010).

A well-designed eco-school is a valuable tool for teaching and learning as it provides valuable outdoor learning experiences for almost every subject taught at the school. The varied plantings, topography, natural materials, and imbedded teaching resources in eco-schools make these dynamic environments applicable to various grade levels and subjects (Danks, 2010). A simple garden, for example, link to the rest of the curricular, from science, math, history to language instruction, music and art. Science students might use the garden to observe plant growth daily, test the soil for nutrients and study the water cycle first hand, while, Math and geometry students might calculate, draw and build garden plots, measure
the length of hose needed to reach the farthest planting bed, or estimate the soil volume of a
given planter box. For Art students, a garden becomes studio space for creating paintings
and a fertile ground for gathering plant-based art materials; garden produce provides
cooking and nutrition classes with healthy food ingredients; and the language class might
use the garden to inspire reading and writing about nature (Manual C.F.S; Danks, 2010).

Eco-schools provide hands-on educational opportunities that conventional schools do not. For example, on site renewable energy generation, water conservation features and other
green technologies provide very valuable opportunities for hands-on learning (Kats, 2006).
Through interacting with the environment in this way, students ‘learn to look at architecture
and design as a source of knowledge and a way to study concepts across all subject matter
areas’ (Clark, 2002). A school that teaches the importance of sustainable practices through
example can be a powerful part of the school curriculum, and using the green school(eco)
itself as a teaching tool allows students to see up close, and in real life, how sustainable
planning, design, and construction work together (Douglas, 2010).

Eco-Schools provides access to resources in the form of links to environmental service
providers who can provide excursions to natural areas, potential funders, and local
authorities and government departments able to assist with school improvements such as
toilets, water tanks, waste management and gardens. These infrastructural improvements
improve the context in which teaching and learning takes place (Rosenberg, 2008).

Ecological (eco) schools also provide opportunities for children to build awareness about
the local environment, their own neighborhoods and enables them to be practically
involved in the process of finding solutions in their local environments (Danks, 2010). As
well as being a location for environmental education for pupils, eco-schools are also a
potential focal point for environmental education among residents, thereby contributing to
the local community (MEXT, 2009).

2.4. Operational and Health Implications of Eco-Schools

One of the key characteristics used to identify green schools in England (Edwards, 2006) is
being ‘Resource efficient’, which include factors such as, low-energy design, exploiting
renewable energy, putting energy controls in the hand of the occupants (with appropriate
education), conserving water, and sourcing of local materials. This is also true for most of
the other eco-school initiatives elsewhere, depending on the model and approach being
pursued.

Resource efficiency lead to operational costs saving. Saving money in operations is
beneficial to school performance because it frees up those operational funds for more
teachers, equipment, and activities (Douglas, 2010).

Beyond lower operating costs, a healthier, safe and natural school environment is another
benefit of eco-schools. Healthier school environments have been shown to improve student
performance, enhance teacher performance and retention, and lower absenteeism among
both students and teachers (Kats, 2006). However, the increased vegetation and nature play also have some potential health concerns, including bee stings, allergies and water safety issues. Nevertheless, each of those concerns can be moderated by thoughtful designs, such as placing bee-attracting garbage cans away from children’s play areas, selecting plants that are not prolific pollen producers, and keeping ponds shallow (Danks, 2010).

2.5. Eco-Schools in Africa

The eco-school concept appears to be relatively new, and thus, not established in most African countries, however, the FEE eco-schools’ programme has been introduced in several countries on the continent.

An FEE eco-schools programme affiliated Eco-Schools South Africa was launched in 2003 with the support of the Wildlife and Environment Society of South Africa (WESSA) and the World Wide Fund for Nature (WWF) as funding conduit (Rosenberg, 2008). Since then, more than 10229 schools across all nine provinces in South Africa, have participated in the programme, reaching 400 000 learners and 16 000 teachers (wessa.org.za). The same model of eco-schools was also started out in Uganda in 2006, Malawi in 2008 and Tanzania in 2010 (DOC, 2013), with the support of international donor funding agencies such as the Danish Outdoor Council (DOC) and local FEE partners. Other countries in Africa were FEE eco-schools program has been introduced include Kenya, Morocco and Tunisia.

2.6. Summary

Existing research suggest that the eco-school concept is centered around creating a school environment that coexisted with nature, energy and resource conservation, and recycling; creating a pleasant environment for study; and creating a school environment as a resource for environmental education.

Research also suggests that eco-schools make more environment-related teaching and learning resources available, enhance environmental awareness among learners, and provide pedagogical settings and benefits desirable to improve performance in Natural science subjects in Namibia.

However, most researches have only focused on the activity-oriented FEE eco-school model and schools, and there is no research data to substantiate such propositions, about Japan’s facility-oriented eco-school model and the Philippines’ facility and activity-oriented eco-school model which are relatively different. Thus, underscoring the need and relevance of this study in trying to find a solution to improve performance in Natural science subjects in Namibia while providing an insight about Japan’s and the Philippines’ eco-school models and trying to fill the data gap that exist.
CHAPTER 3

JAPAN ECO-SCHOOL MODEL

3.1. Introduction

This chapter discussed the features, application, benefits and challenges of the Eco-school model in Japan and examined whether the model makes environment-related teaching and learning resources available to teachers and learners, and further examined whether it is perceived to lead to increased Environmental awareness among learners.

3.2. Methodology

Interviews and observations were used to collect data about the features, benefits and challenges of the model, while questionnaires were used to find out whether the model makes available more teaching and learning resources available to teachers and learners, and whether it lead to increased environmental awareness among learners. The narrative data were transcribed, coded and categorized into themes related to the research questions.

The study included three public elementary schools which are recognized as Eco-schools by the Ministry of Education, Culture, Sports, Science and Technology (MEXT), of which two are in Suginami and one in Arakawa wards of Metropolitan Tokyo prefecture in Kanto region (figure 1).

3.2.1. Target Schools

A purposive sampling procedure was used to select eco-schools with most eco-facilities, using the data provided by MEXT (2010). Participating schools were also selected based on the year of certification as eco-school and location, e.g. two schools from the same ward (Suginami) but one was renovated and certified in 2007 while the other was build and certified as an eco-school in 2011. The other school was also renovated and certified as an eco-school in 2007 but it is in a different ward (Arakawa).

(i) Location

**Suginami ward** – An uptown (figure 1), relatively newly developed area and largely residential, with little business activities and significantly less traffic. The buildings and neighborhoods are packed together, but the result is a surplus of much more open space and greenery just outside the city limits.

**Arakawa Ward** – A Sub-downtown, traditionally developed area, outside the central commercial wards (figure 1), but slightly more shopping-oriented. The urban layout is slightly more relaxed with noticeably greener scenery along the Arakawa river. The school visited is close to the popular Arakawa river.
Figure 1. Study area
(source: Cherry Blossom.tokyo, 2017; Yokoso Japan Association, 2017)

Table 1. Target school’s details

<table>
<thead>
<tr>
<th></th>
<th>Eco-school 1</th>
<th>Eco-school 2</th>
<th>Eco-school 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Location/Ward</strong></td>
<td>Suginami</td>
<td>Arakawa</td>
<td>Suginami</td>
</tr>
<tr>
<td><strong>Year certified</strong></td>
<td>2007</td>
<td>2007</td>
<td>2011</td>
</tr>
<tr>
<td><strong>Number of teachers</strong></td>
<td>25</td>
<td>18</td>
<td>29</td>
</tr>
<tr>
<td><strong>Number of learners</strong></td>
<td>483</td>
<td>332</td>
<td>572</td>
</tr>
</tbody>
</table>
3.2.2. Measurement instruments and Procedures

The researcher used interviews, secondary data, observations and questionnaires to collect data.

(i) Interviews
At two of the three schools, interviews with school heads were held at respective schools’ board rooms, while at the third school, interview was done simultaneously with the guided observation tour of the school. Five questions (Appendix 1) were discussed, and were aimed at generating data about the type of eco-facilities and program initiatives at school; significance of eco-facilities and activities as teaching and learning aids in various subjects; and participants’ perceptions on whether the eco-school initiative has enhanced environmental awareness among learners. Each interview was recorded for accuracy and lasted between 20 and 40 minutes.

(ii) Secondary sources
The researcher used various Education, Information and Communication (IEC) materials about Japan's Eco-school initiative available online. Those materials were used as sources of information about the basis, basic philosophy, mechanisms, and benefits of Japan's Eco-school initiative.

(iii) Observations
A school-head guided tour in each of the participating schools was conducted, during which the researcher took pictures of the observed facilities, and asked questions. Observation tours were aimed at finding out the type of eco-facilities, activities and initiatives each school has implemented; and collecting evidence about their use as teaching and learning materials. All discussions during the observation tours were recorded for accuracy, and the tours lasted between 30 and 45 minutes.

(iv) Questionnaires
The researcher used questionnaires to determine whether the Eco-school model made more teaching and learning resources available to teachers, the extend at which teachers are utilizing those resources and find out the perceptions of teachers on whether the model has improved the teaching process; and on how effective is the model on learners’ environmental awareness. Ten questionnaires comprised of five similar questions (see appendix 2) were given to the school head on the field visit date. Each School head was asked to ask ten different teachers to complete the questionnaires individually. Each questionnaire was accompanied by a sealable envelope and covering letter requesting participants consent and explaining measures to ensure the confidentiality of their responses. A self-addressed large envelope (postage to be paid by addressee) was given to each school head for returning the questionnaires. Nineteen questionnaires out of the
expected thirty were returned, as one school did not return any questionnaire despite repeated attempts from the researcher (table 2).

Table 2. Questionnaires respondents

<table>
<thead>
<tr>
<th></th>
<th>Eco-school 1</th>
<th>Eco-school 2</th>
<th>Eco-school 3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questionnaires given</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>Questionnaires returned</td>
<td>0</td>
<td>10</td>
<td>9</td>
<td>19</td>
</tr>
</tbody>
</table>

3.2.3. Data Analysis
The collected data were transcribed and categorized according to research questions and emergent themes. Individual interview and survey questions were matched to answer the first three research questions. A coding method was used to organize interview and survey data into limited number of themes and topics around the research questions. Quotations that illuminated the themes and concepts were then selected from the interviews. Data from the questionnaires were also compared with the data from interviews and observations to see if they were in corroboration.
3.3. RESULTS

3.3.1. Basis, features and application of Japan’s Eco-School Model

The Eco-school model in Japan is an initiative of the government, first introduced as a pilot project in 1997, through a framework of inter-ministerial cooperation. The model project is aimed at energy conservation and carbon emission reduction in public schools while at the same time addressing the issues of dilapidated school buildings and securing a proper teaching and learning environment (MEXT, 2010).

As shown in figure 2, the model is implemented through a framework of inter-ministerial cooperation between the Ministry of Education, Culture, Sports, Science and Technology (MEXT), the Ministry of Agriculture, Forestry, and Fisheries (MAFF), the Ministry of Economy, Trade and Industry (METI), and the Ministry of Environment (MOE). These Ministries support local governments by providing subsidies for renovations and installation of eco-facilities at designated public schools. These schools are then certified as eco-schools. Since then, the number of schools certified as eco-schools of this model grew from 18 in 1997 to 1547 in 2015 (Santamaria, 2015) across the country.

Figure 2. Japan’s Eco-school model project framework (Developed by author, based on interviews and MEXT, 2010)
Japan’s eco-school concept is built on three aspects, namely; Facilities, Management and Education (Figure 2), thus, eco-schools are defined as “schools in which architectural elements of the facilities, and the human elements of management and education function harmoniously” (MEXT, 2010). Fundamental to this model concepts, are the ecological consideration of the facilities in the schools, namely; the efficient use of energy and water resources, the use of clean energy and rainwater harvesting, greening of the school yards and school gardens, window shades etc. (Facilities); efficient utilization and caring of these facilities (Management); and the utilization of these facilities for learning (Education).

(i) Facilities

The government, through MEXT embarked on the initiative to renovate public schools based on the local government’s basic plan for eco-school renovation by improving architectural performance such as by:

- Installing eaves to keep the sun out, securing air flow, insulating outer walls and windows;
- Introducing resource saving devices such as water and light fixtures and energy conserving air conditioning systems;
- Introducing renewable energy such as sunlight, solar heat, wind and biomass to hold down carbon dioxide emission, and
- By making green spaces in schoolyards, rooftops, and along the walls, and by installing biotope spaces.

These schools are designed and built in the way that they are not only places where children study and spend most of the day; but also as places used for different purposes such as bases for activities of local communities and evacuation sites for residents in the case of emergencies or disasters. In other words, the school facilities are designed and build in a way that they are healthy and comfortable as a space and tools for learning and living; in harmony with the surrounding environment and in a way to reduce the burden on the environment.

(ii) Management

The facilities and resources in these schools, including energy, are utilized economically and efficiently as a mean to prevent wastage and ensure longevity, and effective use of natural energy. The schools are responsible for the caring and optimum utilization of the eco facilities, resources and activities such as greening the school. Some facilities such as gardens are co-managed by the teachers and learners.

(iii) Education

To utilize eco-schools for environmental education, eco-facilities are designed and arranged in the way that children can access them to gain hands-on learning experience, and teachers in the school are able to utilize them in their teaching thereby carrying out the education
function of the model. Hence, eco-facilities are utilized by both, teachers and learners as teaching and learning materials to provide outdoor learning experiences and enhanced understanding of the environment.

Therefore, considering those three perspectives, the eco-school model is designed in the manner that it is curriculum-friendly with the idea to help the curriculum to achieve all its objectives including teaching and learning while directly addressing the issue of environmental efficiency among public facilities.

(iv) Environmental education in the curriculum.

Environmental education is not established as a specific subject in the Japan’s school curriculum, however, this does not mean that Environmental education does not take place in schools. Environment-related contents are positioned in various subjects in the curriculum such as Social Studies, Natural Sciences, Integrated Study, Ethical training and through special activities in accordance with the grade of the pupils. This means that, Environmental education public schools is taught across the curriculum, and certified eco-schools rather provide more functional eco-friendly facilities as educational resources to teachers and learners as well as an environmentally sustainable enabling environment for teaching and learning in comparison to ordinary schools.

3.3.2. Eco-initiatives, facilities and activities in eco-schools

Interviews with school heads, and observations in participating schools revealed that Japan’s eco-school model is primary facility based, and eco-facilities at schools are generally high-tech based. The parents, community and the private sector are not involved in the implementation or the maintenance of the eco-school initiative or facilities. Although eco-activities in these schools are mainly about the use of those eco-facilities available, eco-schools have also initiated eco-friendly methods and solutions, especially to address issues of space for urban gardening and greening. Some of those eco-initiatives include, corridor-side gardening, container gardening, window shades and wall greening. Eco-facilities and activities observed at eco-schools can be divided into five main categories, such as, Waste management and recycling; school greening and gardens; clean energy and energy conservation; Water conservation; and Environmental protection and awareness.
i) School Gardens and Greening

Photo 1. School Gardens and Greening activities
ii) *Clean Energy and Energy Conservation*

<table>
<thead>
<tr>
<th>Wind turbines</th>
<th>Solar panels</th>
<th>Solar thermal system</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Wind turbines" /></td>
<td><img src="image2" alt="Solar panels" /></td>
<td><img src="image3" alt="Solar thermal system" /></td>
</tr>
<tr>
<td><img src="image4" alt="Energy display" /></td>
<td><img src="image5" alt="Light intensive fixtures" /></td>
<td></td>
</tr>
<tr>
<td><img src="image6" alt="Sky light" /></td>
<td><img src="image7" alt="Heat control fixtures" /></td>
<td><img src="image8" alt="Wooden rooftop" /></td>
</tr>
<tr>
<td><img src="image9" alt="Cold &amp; heat trench/geo thermal" /></td>
<td><img src="image10" alt="Rooftop swimming pool" /></td>
<td></td>
</tr>
</tbody>
</table>
iii) Waste Management and Recycling

![Image of waste management and recycling facilities]

Photo 3. Waste management facilities and recycled Waste

iv) Water Conservation

![Image of water conservation facilities and techniques]

Photo 4. Water conservation facilities and techniques

v) Environmental Awareness and Protection

![Image of environmental awareness and protection facilities]

Photo 5. Environmental awareness and protection facilities
3.3.3. Use of Eco-facilities as teaching and learning aids

Based on interviews with school heads, eco-facilities are used as tools to expose learners to real working examples to enhance their understanding about environmental issues such as global warming and climate change, and help them appreciate new, efficient measures and technologies being used to address these issues as they learn them through various subjects. “The exposure of children to eco facilities helps them to recognize the merit of such facilities, thereby helping them develop positive understanding towards the environment”. The eco-facilities and activities provide an excellent exemplar and template for learners and the school as a whole to “walk the talk” about environmental protection through energy conservation and climate action at grass root level. “Learners can link what they learn and see at school to their local environment”.

As confirmed by observations, interviews and surveys, respondents specified that eco-facilities are also used as a source of teaching and learning aids for various subjects that enable learners to understand environment related concepts, and unveil the opportunity of greater “learning by doing and gain real life experience”. Teachers, for example, use facilities such as biotopes to explain the ecosystem and other related terminologies; solar panels and wind turbines to explain energy generation, consumption and cost; gardens to teach crop husbandry; Environmental studios to teach about pollution and global warming; etc. On the other hand, learners use these eco-facilities to practice crop care; observe plant growth; study and observe growth and life cycle of organisms such as insects; visualize countermeasures for greenhouse effect, calculate energy generation, consumption and cost; etc.

Photo 6. A variety of living organisms in a biotope
As shown in photo 6 and 7, as an eco-facility, a biotope is not only being utilized to enhance environmental awareness and contributing to a better understanding of the ecosystem, but it also provides a wide range of specimens needed for science experiments and projects in the school.

Photo 7. A specimen collected from the biotope by the science class

Eco-facilities are also used as a good source of activities and tools to assess the learners, especially practice based assessment. Photo 8, displays a transparent photovoltaic cell panel which is used to generate electricity from the sun for some buildings in the school; and a science worksheet that is used by the learners in the science class to calculate the amount of energy it can generate. The solar panel is designed, arranged and installed in the way that children can see and count the number of cells it has, as they use it as a learning tool.

Photo 8. A solar panel used for both, power generation and education purpose at school.
Photo 9. shows a cold and heat trench constructed in the school to supply natural cold air during hot seasons, and warm air during winter, to different class rooms in the school; and a worksheet used by the learners. This cold and heat trench is also used by the teachers as a teaching aid. Example, Learners in science or mathematic class are asked to measure temperature at different locations inside the trench and outside, and calculate and discuss the temperature differences, etc.

![Photo 9. A Cold and heat trench, and a sample of a worksheet used by the learns](image)

However, some eco-facilities are primarily installed to make the schools energy efficient, to reduce the schools carbon footprint and securing a proper teaching and learning environment, and therefore, not really usable as hands-on teaching and learning tools, including light intensive fixtures, heat/cold control fixtures, solar thermal fixtures, etc.

(i) Use of eco-facilities for teaching

The questionnaire survey for teachers found that 79% of the respondents used eco-facilities available at school as teaching aids, while 21% indicated that they did not utilize those eco-facilities as teaching aids (table 3). The survey also found that most respondents (53%) used 1 to 4, and 26% used 5 to 7 of those eco-facilities available at school (table 4).

### Table 3. Use of Eco-Facilities as Teaching Aids

<table>
<thead>
<tr>
<th>Use of eco-facilities</th>
<th>Number of teachers</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers using eco-facilities as teaching aids</td>
<td>15</td>
<td>79%</td>
</tr>
<tr>
<td>Teachers not using eco-facilities as teaching aids</td>
<td>4</td>
<td>21%</td>
</tr>
<tr>
<td>Total</td>
<td>19</td>
<td>100%</td>
</tr>
</tbody>
</table>

### Table 4. Extent of Eco-Facility Usage as Teaching Aids
As shown in table 5, in most cases, the number of respondents (teachers) who marked a specific eco-facility/activity as significant to their subject teaching is bigger than the number of those that are using it as a teaching aid, e.g. 13 respondents indicated that photovoltaic cells are significant to their subject teaching, but only 5 are using it as a teaching tool. This suggests that although the eco-school model makes eco-facilities available as teaching aids, some of the prospective users are not using those facilities.

Table 5. Eco-Facility Significance to Teaching, and Usage as Teaching Tool

<table>
<thead>
<tr>
<th>Eco-facility</th>
<th>Number of teachers marked it as significant to my subject teaching</th>
<th>Number of teachers using it as teaching tool</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>School garden</td>
<td>15</td>
<td>11</td>
<td>73%</td>
</tr>
<tr>
<td>Greening walls and rooftops</td>
<td>15</td>
<td>8</td>
<td>53%</td>
</tr>
<tr>
<td>Waste separation/monitoring</td>
<td>15</td>
<td>5</td>
<td>33%</td>
</tr>
<tr>
<td>Recycled materials</td>
<td>11</td>
<td>5</td>
<td>45%</td>
</tr>
<tr>
<td>Photovoltaic cells</td>
<td>13</td>
<td>5</td>
<td>38%</td>
</tr>
<tr>
<td>Rain water harvesting</td>
<td>8</td>
<td>2</td>
<td>25%</td>
</tr>
<tr>
<td>Sun shades</td>
<td>7</td>
<td>3</td>
<td>43%</td>
</tr>
<tr>
<td>Biotopes</td>
<td>9</td>
<td>4</td>
<td>44%</td>
</tr>
<tr>
<td>Energy monitors</td>
<td>2</td>
<td>1</td>
<td>50%</td>
</tr>
<tr>
<td>Permeable Pavements</td>
<td>4</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Water intensive fixtures</td>
<td>4</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Sky light fixtures</td>
<td>7</td>
<td>1</td>
<td>14%</td>
</tr>
<tr>
<td>Solar thermal system</td>
<td>3</td>
<td>1</td>
<td>33%</td>
</tr>
<tr>
<td>Geothermal</td>
<td>3</td>
<td>1</td>
<td>33%</td>
</tr>
<tr>
<td>Wind turbine</td>
<td>5</td>
<td>1</td>
<td>20%</td>
</tr>
<tr>
<td>Greening outdoor areas</td>
<td>7</td>
<td>2</td>
<td>29%</td>
</tr>
</tbody>
</table>

Interviews with school heads revealed that teachers do not always have enough time to use these facilities during their lessons; and, that the use of these facilities as teaching aids is
not well emphasized. These may well be some of the reasons of the patterns shown by table 5 as explained above.

(ii) Level at which eco-facilities are perceived by teachers to have improved the teaching process.

As shown in figure 3 above, 47% and 26% of the teacher respondents in the survey felt that eco-facilities have improved the teaching process significantly and very significantly respectively; however, 21% felt that they have little significance on the teaching process. One of the three school heads interviewed felt that eco-facilities have little significance, while the other two felt that they have significantly improved the teaching process. Teachers who felt that eco-facilities have less significance on the teaching process mentioned the following challenges as the contributing factors:

- Teachers do not have enough time to use these facilities during their lessons;
- The intention to use these facilities as teaching resources is not well emphasized;
- New teachers at schools are not always well introduced to these facilities and the school’s “Eco-school Status”;
- Some teachers find it difficult to utilize these facilities in their subject teaching;
- Some teachers feel that Only "Science" class is connected to these facilities; and
- Sometimes facilities are not well maintained, particularly, greening.

The other main challenge, identified by school heads is the changing of teachers from one school to another, which sometimes lead to eco-schools losing the teachers who understand well the eco-school concept.

Figure 3. Eco-facilities significance rating on the teaching process (n=19)
3.3.4. Effect on environmental awareness among learners

The last question in the questionnaire asked whether teacher respondents think that the eco-school initiative has a positive effect on environmental awareness among learners. As shown in figure 4, 53% felt that it is significantly effective, and 42% felt that it is effective, however, 5% think that it has little positive effect on environmental awareness among learners. Overall, 95% of the respondents think that the eco-school initiative has a positive effect on learners’ environmental awareness.

![Figure 4. Teachers’ perceptions about eco-facilities effect on environmental awareness among learners (n=19)](image)

3.4. Summary

The Eco-school model in Japan is facility-oriented, government funded and based on an inter-ministerial cooperation that provide subsidies to designated public schools for the renovation and installation of eco-facilities. These schools are then classified as “eco-schools”. Ecological and educational aspects constitute the core features of Japan’s eco-school concept, which include creating a school environment that coexisted with nature, energy and resource saving, and recycling; creating a pleasant environment for study; and the utility of eco-facilities and activities as teaching and learning resources.

The model is curriculum-friendly and provides pedagogical, operational and health benefits, including, sustained availability of environment-related teaching and learning facilities; engaging hands-on lessons in the natural environment, ensuring that eco-facilities serve as a laboratory to enhance experiential learning for the learners; reduction of consumption bills for water and electricity; and a ventilated and glare-free learning environment. Teachers use them as hands-on teaching and assessment tools for various topics, while learners use them to observe, explore, practice, experiment and problem solving.

Seventy nine percent of the respondents (n=19) of the questionnaire survey for teachers in Eco-schools surveyed used eco-facilities available at schools as teaching and learning aids, of which 53% used 1 to 4, and 26% used 5 to 7 of those eco-facilities as teaching and
learning tools. 21% indicated that they did not utilize those eco-facilities as teaching aids. Some of the challenges experienced are that, teachers do not always have enough time to use these facilities during their lessons; new teachers at schools are not always well introduced to these facilities and the school’s “Eco-school Status”, and that the use of these facilities as teaching aids is not emphasized. Regarding environmental awareness among learners, 53% and 42% of the questionnaire survey respondents feel that the model is significantly effective and effective respectively, whereas 5% feel that it has little positive effect on environmental awareness among learners.

The model is ideal, not only as a tool for securing a proper teaching and learning environment, but also as a source of teaching and learning aids as well as environmental education and awareness. However, a lot still need to be done to ensure that all teachers are orientated on how to use eco-facilities as teaching aids in their lessons and to ensure that more eco-facilities are being utilized for teaching and learning.
CHAPTER 4

THE PHILIPPINES ECO-SCHOOL MODEL

4.1. Introduction

This chapter presents the features, application, benefits and challenges of the Philippines’ Eco-school model; and discussed whether the model makes teaching and learning resources available to teachers and learners, and whether it lead to increased Environmental awareness among learners.

4.2. Methodology

Interviews and observations were used to collect data about the features, benefits and challenges of the model, while questionnaires were used to find out whether the model makes available more teaching and learning resources available to teachers and learners, and whether it lead to increased environmental awareness among learners. Narrative data were transcribed, coded and categorized into themes related to the first three research questions. Field survey was conducted in four public Elementary Eco-schools. Two of the four eco-schools are located in urban, Metro Manila district, while the other two are located in sub-urban Santiago city in Isabela province, northern part of Luzon Island.

Figure 5. study area (Map sources: Driftwood Journeys, 2017; Peter, 2016)
The researcher also interviewed officials from the Department of Environment and Natural Resource (DENR); and the Department of Education (DepEd) in the National capital region.

4.2.1. Target Schools

A purposive sampling procedure was used to select three successful eco-schools at National and Regional levels, using the data provided by DENR about previous Sustainable and Eco-friendly school winners. However, a fourth school was added on the target schools list during the field visit based on the recommendations of DepEd in the National capital region. The first school on the list is the winner of the 2015 National Search for Sustainable and Eco-friendly School award. The second school is the winner of the 2013 National Search for Sustainable and Eco-friendly School award, as well as the 2015 Association of South East Asian Nations (ASEAN) Eco-School award. The third school is the 2015 Regional winner of the National Search for Sustainable and Eco-friendly School award, whereas, the fourth school is the Regional winner of the 2016 Green School Award.

Table 6. Target schools’ details

<table>
<thead>
<tr>
<th>Eco-School 1</th>
<th>Eco-School 2</th>
<th>Eco-School 3</th>
<th>Eco-School 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Santiago, Isabela</td>
<td>Santiago, Isabela</td>
<td>Metro Manila</td>
</tr>
<tr>
<td>Learners</td>
<td>843</td>
<td>877</td>
<td>2045</td>
</tr>
<tr>
<td>Teachers</td>
<td>23</td>
<td>25</td>
<td>79</td>
</tr>
</tbody>
</table>

The first and second schools are situated in Santiago city of Isabela province (figure 5), which sits on a vast area of predominantly flat and fertile land in the cagayan valley. With

---

1 The ASEAN Eco-Schools Award is a triennial award given to all Association of South East Asian Nations member states that nominates schools selected on a competitive basis at the national level (ASEAN, 2013). It aims to give a recognition to schools that have exemplary eco-school’s programs, to encourage them to continue their efforts as well as encourage other schools to follow their lead (ASEAN, 2015).
the population of about 134,830 people (Philippines Statistics Authority, 2016). Santiago city is largely suburban, with more open natural space, greenery and agricultural activities. The third and fourth schools are situated in highly densely populated, predominantly residential area of metro Manila, which is largely compact, with very less open space.

4.2.2. Measurement instruments and Procedures

The researcher used focus group interviews, secondary data, observations and questionnaires to collect data.

(i) Interviews

Focus group interviews were conducted in all the four schools, and at the Environment Management Bureau (EMB) of the DENR and at the DepEd offices in Quezon city in Metro-Manila district. At each school, interviewees included the principal and teachers who were available at the time. Interview questions were sent to schools and offices four weeks before the site visit so that interviewees are prepared for the interviews. A total of six questions were discussed with the EMB-DENR and DepEd officials, and were aimed at finding out about the basis, basic features, mechanisms and benefits of the National Search of Sustainable and Eco-friendly School Award program; the roles they play and the challenges they experienced in the implementation of the program (see Appendix 4 and 5), whereas five questions were discussed at schools and were aimed at providing data about the type of eco-facilities and program initiatives at school; the use eco-facilities and activities as teaching and learning aids in various subjects, how the school benefit from the eco-school initiative; and the challenges the school experienced (see Appendix 6). Interviews were held in respective schools’ and offices board rooms, where interviewees first made presentations based on the questions send to them earlier and then the researcher asked follow-up questions, clarification and unanswered questions. Each interview was recorded for accuracy and lasted between 25 and 40 minutes.

(ii) Secondary sources

The researcher requested for any available Education, Information and Communication (IEC) materials about the National Search of Sustainable and Eco-friendly School Award program initiative from the EMB-DENR and DepEd. These materials were used as sources further information about the basis, basic philosophy, mechanisms, achievements and challenges of the Philippines Eco-school model.

(iii) Observations

Guided observation tours were conducted after interviews, in the first two schools, and before interviews in the last two schools. The researcher took pictures of the observed facilities and activities, and asked questions. Observation tours were aimed at finding out the type of eco-facilities, activities and initiatives each school has implemented; and collecting evidence about their use as teaching and learning materials. All discussions
during the observation tours were recorded for accuracy, and the tours lasted between 30 and 45 minutes.

(iv) Questionnaires

The researcher used questionnaires to determine whether the model makes teaching and learning resources available to teachers, the extend at which teachers are utilizing those resources and find out the perception of teachers on how effective is the model on learners’ environmental awareness. Ten questionnaires comprised of seven similar questions (see appendix 3) were sent to 3 of the 4 target schools, four weeks before the field visit. Since the fourth school was only added to the list of target schools during the field visit, it was not possible to prepare the questionnaires for the teachers at that school, thus, it was excluded from the questionnaires. The principal at each of the three schools was asked to ask any ten different teachers from each grade level to complete the questionnaires individually. Questionnaires were collected from the respondents on the day of the field visit at each school. Twenty questionnaires out of the expected thirty were returned, as one school did not return any questionnaire despite several inquiries from the researcher (table 7).

Table 7. Questionnaires distribution

<table>
<thead>
<tr>
<th></th>
<th>Eco-School 1</th>
<th>Eco-School 2</th>
<th>Eco-School 3</th>
<th>Eco-School 4</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questionnaire Send</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>30</td>
</tr>
<tr>
<td>Questionnaire Returned</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>20</td>
</tr>
</tbody>
</table>

4.2.3. Data Analysis

The collected data were transcribed and categorized according to research questions and emergent themes and patterns. Individual interview and survey questions were matched to answer the first three research questions. A coding method was used to organize interview and survey data into limited number of themes and topics around the research questions. Quotations that illuminated the themes and concepts were then selected from the interviews. Data from the questionnaires were also compared with the data from interviews and observations to see if they were in corroboration.
4.3. RESULTS

4.3.1. Basis, features and application of the Philippines Eco-School Model.

The Philippines Eco-school model was founded on the Republic Act (Act No. 9512 of 2008) also known as the Environmental Awareness and Education Act which was signed into law on December 2008. This Republic Act, also referred to as R.A. 9512, recognizes the important role of the youth in nation building and the role of education in promoting environmental awareness. It is also regarded as a local concrete expression of support and response to the United Nations Decade of Education for Sustainable Development (UN DESD 2005-2014) and the ASEAN Environmental Education Action Plan (AEEAP 2008-2012 and 2014-2018). The Act aims to promote environmental education through an inter-agency and a multi-sectoral approach, involving various agencies such as the DENR, DepEd, Commission on Higher education (CHED), Department of Interior and Local Government (DILG) and others (DENR, 2015).

In responses to the R.A. 9512 decree, the DENR in 2009 issued a special order creating the DENR Environmental Education Committee, and has also spearheaded the Inter-Agency Steering Committee on Environmental Education with members from the R.A. 9512 agencies. The Inter-Agency Steering Committee initiated the development of the National Environmental Education Action Plan for Sustainable Development as the Roadmap for the implementation of the R.A. 9512 (DENR, 2015). The National Environmental Education Action Plan included the establishment of a national program that would encourage schools to initiate and integrate programs that are environment-related into their instruction and administration. In pursuit of that, the DENR through its EMB, DepEd, CHED and SMART Communications Inc (a Non-Governmental Organizations) started a Public-Private cooperation program initiative, the National Search for Sustainable and Eco-friendly Schools Award Program (figure 4.2), which was launched in 2009 (DENR, 2016).

The main objectives of the National Search for Sustainable and Eco-friendly Schools program are to encourage schools/academic institutions to become more actively involved in environmental issues at a practical and local level; and to develop skills and understanding among the students, faculty and school administrators in initiating active responses and increasing community awareness and participation on environmental concerns (Environmental Management Bureau-DENR, 2015). The program is also aimed at recognizing and documenting schools that have initiated and integrated environment-related programs in their instruction and administration as “Sustainable and Eco-friendly Schools” (DENR, 2016). Hence, Sustainable and Eco-friendly Schools are defined as “schools that have initiated and integrated in their instruction, research, extension and/ or administration, programs which are environment-related” (DENR, 2016; ASEAN, 2013).
Figure 6. The support structure of the sustainable and eco-friendly school initiative (Developed by author, based on interviews and, DENR, 2016).

The Sustainable and Eco-Friendly School Model concept is characterized by seven aspects, namely: Environmental responsibility aspects of the school’s policy, Environmental dimensions of school operations, Environment features of the school Curriculum, Presence of vibrant eco organizations in campus, Socio-cultural sustainability, and Economic sustainability.

To be awarded a Sustainable and Eco-Friendly School award, a school must have initiated and successfully implemented best programs and activities in relation to those seven aspects, and must out-perform others in the National Search for Sustainable and Eco-Friendly School contest. Schools initiate, implement and maintain their environmental programs and activities without any funding from the government for that purpose.
(i) Program mechanisms

Every two years, the National Search for Sustainable and Eco-friendly Schools Program invites entries by schools in all regions of the country to take part in the Sustainable and Eco-friendly Schools Recognition Award competition. The competition entries are divided into three categories, namely: Elementary schools, High schools and College categories. As an entry requirement, a school must submit an entry form, giving a brief description of the Environmental Projects or programs of the school, and attaching photos, videos, etc.

As detailed in figure 7, entries are judged at regional level whereby one school in each category is selected and recognized as a Regional Sustainable and Eco-friendly school winner. The Regional winners then proceed to the National level competition as finalists. At this stage, finalists are asked to prepare and submit exhibit-ready materials of their entry on a specified format, e.g. a tarpaulin material with a dimension of 2 feet wide and 5 feet high and eyelets at the four edges. Finally, three winners (First, Second and Third) from each category are announced and awarded as National Sustainable and Eco-friendly school winners, and their entries, together with all National finalist’s entries are exhibited during the National awarding ceremonies, usually held in November which is a National Environmental Awareness Month.

Judging of entries is done by the Board of Judges convened by EMB Regional office for Regional judging and EMB Central office for National judging, and comprises of representatives from DepEd and private sector partners, for Elementary and High school entries, while the board of judges for College and University entries comprises of representatives from CHED and private sector partners. Civil society members may sometimes be invited to join the board of judges depending on the EMB Regional/Central Offices, and at an odd-numbered Team composition. As Program Secretariat, the EMB Central and Regional Offices do not serve as members of the Board of Judges.
National winners (first, second and third) from previous searches, e.g. in the 2009, 2011, 2013 and 2015 are no longer eligible to join the search. This is done to ensure that new schools are added on the list of Sustainable and Eco-friendly school with every search.

(ii) Criteria for Determining Eco-Friendliness and the Level of Sustainability of the Schools in the Elementary and High school’s category.

The Environmental Management Bureau of the DENR, the CHED, some civil society and private sector groups, jointly, drew up the criteria (figure 8) for evaluating and rating the extent of sustainability and eco-friendliness of schools participating in the National Search for Sustainable and Eco-friendly Schools Program to determine the winners of the biennial Regional and National Sustainable and Eco-friendly Schools awards, who are eventually recognized as Sustainable and Eco-friendly schools.
Environmental education in the school curriculum

Environmental education is taught across the curriculum, particularly integrated in various subjects under the Basic Education Curriculum as follows: Elementary Education - Science and Health (Grade II), Civics and Culture (Grades I to III), Geography, History and Civics (Grades IV to VI), Values Education (Grades I to VI), and Technology and Livelihood Education (Grades IV to VI). Secondary Education – Science, Social Studies, Values Education, Technology and Livelihood Education, and Music, Arts, Physical Education and Health (DENR, 2015.

4.3.2. Eco-Friendly Program Initiatives, Facilities and Activities

The Philippines Eco-school model is characterized by inexpensive methods, technologies and solutions that largely encourage the use of resources, knowledge and skills available in the locality, including the support of internal and external stakeholders. “We cannot offer you the luxury of the so advanced technology, knowing that our locality does not permit”, said one of the respondents during the interview. Stakeholders, such as the Parents, Parent-Teacher Association, senior citizens, Alumni groups Local Government Units, Youth for Environment in Schools Organizations (YES-O’s), City governments, local business groups, private and religious organizations and other civil society groups plays an instrumental role in implementing, sustaining and maintaining environmental friendly programs of Eco-schools in their localities. They join hands to help schools in setting up and maintaining some the eco-friendly facilities such as mini-parks and gardens, and to do beautifications, installations, repairs, cleaning and other activities needed at eco-schools through voluntary work or giving donations. The schools also ask for donations and assistance from different organizations.

Pupils are involved in the implementation and maintenance of eco-friendly programs in their schools in different ways, such as, assigning certain facilities or areas to each grade
level/class to maintain, through YES-O projects, and through subject related projects/activities. “Our pupils take part in planting, from seedlings to harvesting and sometimes selling the produce to teachers”, said one of the teachers. However, some work is done by parents and or teachers. “We do not let our pupils do some grass cutting, it is all the parents who co-work with us”, one of the principals interviewed said.

To ensure continuous implementation, maintenance and proper monitoring of eco-friendly programs, eco-schools have established program committees (figure 9) or designated program coordinators which/who monitor and coordinate specific programs activities with the support and guidance of the principal and Parent-Teacher Association (PTA).

![Eco-friendly Program Organizational Chart in one of the surveyed schools.](image_url)

During holidays, the schools utilizes maintenance workers (institutional workers) to take care of the gardens and other plants, and teachers also voluntarily come to school when their services are needed to attend to program facilities, without getting additional compensation.

Based on interviews and observation, eco-schools have initiated a wide range of programs and activities with the aim of not only making the school environmental friendly, but also making it a place where pupils can safely live, play, enjoy and effectively learn. According to DENR, Programs and activities adopted in pursuit of a Sustainable and Eco-Friendly School Status include:

- Physical cleanliness, orderliness and beautification of the school.
- Resource conservation such as water, energy, paper; Waste prevention, reduction, segregation, recycling and composting.
- Environmental policies in the school.
• Prevention and control of air, water and soil pollution.
• Vegetable gardening/ seedling production and marketing.
• Reforestation/greening.
• Establishment of nursery, botanical garden, herbarium and bio-park.
• Environmental audits of school operations and facilities.
• Integration of environmental themes into the school curriculum.
• Development of environmental support instructional materials.
• Contact of in-service environmental training for faculty members.
• Presences of environmental clubs.
• Offering of environmental awards programs.
• Environment and natural resource-related research works and studies.
• Linkages and exchanges on the environment with national government agencies, non-governmental agencies, religious organizations, local government units, business sectors.
• Environmental awareness and community education, holding of green fairs and environmental exhibits/sale of green products, holding of eco-tours, healthy lifestyle campaigns.
• Climate change mitigation and adaptation programs.
• Disaster risk reduction programs.
• Celebration of cultural diversity and application of cultural inclusivity.

Those programs and activities were also confirmed by interviews and field observations as shown in (photo 10).

Photo 10. A display of eco-school programs in one of the eco-schools.
The following programs, activities and facilities were observed during the observation tours of the participating schools:

(i) **School Greening**

*Photo 11. Greening facilities and activities (a)*
Photo 12. Greening facilities and activities (b)
(ii) Environmental policies in the school


(iii) Energy Conservation

Eco-Schools have adopted a habit to turn off all lights, electric fans, machines, air condition units and other gadgets or shutting down of main switch and breaker for an hour or 30 minutes every day at a designated time, to minimize the consumption of electricity and raise awareness about the need to conserve energy. This habit is referred to the hour it is observed, e.g. 9 o’clock habit or 12 o'clock habit. Other initiatives include the policy of switching off all electric appliances when not in use; installation of energy saving lamps and bulbs; monitoring monthly electricity bills; presence of “Power Rangers” in every classroom who are in charge in putting off lights and electric fans not in use; signage, reminders, and slogans on energy conservation; and advocacy on energy conservation.

(iv) Water Conservation

Photo 14. Water conservation facilities

Other activities are; regular checking and quick repair of leaking faucet and pipes; monitoring monthly water bills; signage, reminders, slogans and advocacy activities on water conservation.
(v) Waste Management

These include, segregation of bio and non-biodegradable waste, recyclable waste recovery, safe disposal of harmful waste (Septic Vaults), ban on the use of Plastics and straws at the canteens, composting, and recycling. Some schools have initiated Weekly or monthly Eco days, whereby parents and learners submit recyclable waste materials to raise funds for school’s eco projects to sustain their eco-friendly programs. Common activities and facilities include:

<table>
<thead>
<tr>
<th>Waste segregation facilities</th>
<th>Material Recovery Facility</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Waste segregation facilities" /></td>
<td><img src="image2" alt="Material Recovery Facility" /></td>
</tr>
</tbody>
</table>

*Reuse waste for urban gardening and decoration*

<table>
<thead>
<tr>
<th>Artistic play, learning space and garden fencing</th>
<th>Luminescent bottles along corridors</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3" alt="Artistic play" /></td>
<td><img src="image4" alt="Luminescent bottles" /></td>
</tr>
</tbody>
</table>

*Making useful products out of recyclable waste materials*

| ![Making useful products](image5) |
As an alternative to burning, composting also ensure a continuous supply organic fertilizer for Bio-intensive vegetable gardens and organic materials for vermiculture.

**(vi) Pollution prevention**

Eco-schools have initiated and implemented a Zero burning and a “No smoke” policy (photo 17) in the school premises, and all biodegradable wastes are collected either for composting or recycling, while non-degradable wastes are reused.

**(vii) Ecological literacy**

This program involves orienting teachers to important ecological concepts that should be integrated in the curriculum and conducting demo lessons on environmental
concepts/messages integration. Eco-schools also conduct seminars and contests focusing on environmental protection and conservation, and invites experts from different agencies, such as the Bureau of Plants to share their expertise and technical skills. Reminders, tips and slogans are also posted on bulletin boards and strategic areas in the school. Pupils are encouraged to write and publish environmental issues/concerns in the school paper.

(viii) Child protection policies

To ensure the eco-friendliness of schools regarding health and safety of the learner, schools have initiated and implemented several policies, such as, a ban on sale of junk food and soft drinks at the school canteen and an anti-bullying policy.

(ix) Documentation

All school eco-friendly policies, programs, initiatives and reports are recorded and properly documented, and all eco-friendly facilities, activities and events are photographed and filled in the School Eco-friendly Activities’ Album and record books (photo 18).

Photo 18. Record books, reports and albums

4.3.3. Use of Eco-facilities and activities as teaching and learning aids.

Eco-friendly activities and facilities are integrated in the curriculum as experiential teaching and learning resources, not only for environment related subject contents but for other subject contents as well, by linking subject contents to the environment, “so that students can see the relevance of their classroom studies to complex environmental issues confronting the planet, and they can acquire the skills needed to become problem solvers” said one of the teachers during interview.

In Science and Livelihood Education, teachers make use of the different mini parks (photo 19), orchidarium and gardens such as the vegetable, botanical, herbal, Bio-intensive (BIG) and urban gardens (photo 11 and 12), as outdoor teaching and learning resources to teach different topic such as Classification of living organisms, organic and inorganic fertilizers, soil erosion, decomposition and others. “E.g. the lesson of classifying living and nonliving things in science, teacher would take the children in the park, such as the science park, and let them explore”, says one of the teachers during the interview. “Science teachers bring
learners into the herbal garden to explore, practice or experiment”, said the herbal garden coordinator. Learners make use of the vegetable garden to learn how to take care of plants and using garden tools through practice. They also use the vegetables harvested from the school garden for cooking lessons. The butterfly garden is used as a source of learning where learners can observe the life cycle and stages of development of butterflies as insects in science, while, Aquaponics are used to explain the life cycle of nutrients and how fish and plants live in harmony, and sustaining one another.

Photo 19. Mini parks

In Mathematics, a Math garden or math area is used as a resource for practical teaching and learning of mathematics. A Math garden/area is a green section in the school in which Mathematical concepts are integrated and displayed and is maintained by pupils and teachers in mathematics. Pupils in mathematics class use this garden/area to explore various math concepts, play mathematic related games, problem solving and practical learning (photo 20). Resource consumption monitoring activities and facilities are used for lessons such as water and electricity meter reading, recording and computing monthly consumption; while, recyclable materials are used to make cylinders and cubes for Geometry (photo 20).

Photo 20. Use of Eco-facilities in Mathematic lessons
In English lessons for example, pupils are asked to write about an environmental event that took place in the school, of which the best piece of writing is sometimes published in the school paper.

School eco-tours are used as a mean to expose learners to various natural environments and enable them to experience what they learn at school.

The use of eco-facilities and activities as support instructional materials for subject teaching is supervised and monitored as a vital component of the sustainable and eco-friendly school initiative, therefore, lesson plans are being checked specifically to ensure that integration of eco-programs, activities and facilities really takes place.

All teacher respondents to questionnaire (n = 20) indicated that they use eco-facilities and activities as teaching aids. As evinced in Tables 8 below, 95% of the respondents in the survey use more than ten eco-facilities and activities as teaching resources in their lessons and 5% use five to ten eco-facilities/activities in their teaching.

*Table 8. Extent of Eco-Facility Usage as Teaching Aids*

<table>
<thead>
<tr>
<th>Number of eco-facilities</th>
<th>Number of teachers</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 5</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>5 to 10</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td>More than 10</td>
<td>19</td>
<td>95%</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>100%</td>
</tr>
</tbody>
</table>

*Table 9. Eco-Facilities Significance to Teaching and Usage as Teaching Resources*

<table>
<thead>
<tr>
<th>Eco-Facility/Activity</th>
<th>Significance as a teaching aid</th>
<th>Teachers using it as teaching aid</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 not significant while 4 very significant</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1  2  3  4</td>
<td>NR</td>
<td>%</td>
</tr>
<tr>
<td>1. School garden/Nursery</td>
<td>20</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>2. Recycle Materials</td>
<td>20</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>3. Water saving methods</td>
<td>9  11</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>4. Energy monitoring</td>
<td>1  19</td>
<td>19</td>
<td>95%</td>
</tr>
<tr>
<td>5. Compost facility</td>
<td>1  19</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>6. Waste separation</td>
<td>20</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>7. Rain water harvesting</td>
<td>2  18</td>
<td>18</td>
<td>80%</td>
</tr>
<tr>
<td>8. Sun shades</td>
<td>8  5  7</td>
<td>6</td>
<td>30%</td>
</tr>
<tr>
<td>9. Greening outdoor areas</td>
<td>2  18</td>
<td>18</td>
<td>80%</td>
</tr>
<tr>
<td>10. Energy saving lighting</td>
<td>10  10</td>
<td>17</td>
<td>85%</td>
</tr>
<tr>
<td>11. Different Mini-Parks</td>
<td>9  1</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>12. Forest area and Orchard</td>
<td>9  1</td>
<td>10</td>
<td>100</td>
</tr>
<tr>
<td>13. Bio-intensive Garden</td>
<td>9  1</td>
<td>10</td>
<td>100</td>
</tr>
</tbody>
</table>
Although some facilities were rated as less or not significant as teaching aids to some participants’ teaching, most of the facilities/activities were rated by large numbers of participants as significant or very significant (table 9). Facilities such as vegetable garden, nursery, composting, energy monitoring, waste separation, mini-parks, etc. were marked as very significant, and used by almost everyone as teaching aids. Table 9 also shows also that many teachers were using a variety of eco-facilities/activities as teaching aids.

Question 3 and 4 on the questionnaire asked whether respondents felt that eco-facilities/activities have improved the teaching and learning processes, using the Likert scale (1 = not significant while 4 = very significant). All respondents felt that eco-facilities/activities have improved both, the teaching and learning processes very significantly.

4.3.4. Effect on environmental awareness among learners

All respondents to the questionnaire felt that the eco-friendly school model has a very significant positive effect on the learners’ environmental awareness.

4.3.5. Benefits of the Eco-friendly school initiative

Some of the notable achievements of the Sustainable and Eco-friendly schools program mentioned during interviews with EMB and DepEd are, the increased participation in the observation of National Environmental Days by schools, and more involvement of schools and communities in environmental protection and awareness activities. The initiative has also since been recognized by the ASEAN Secretariat and all winners of the National Search for Sustainable and Eco-friendly Schools Award are similarly recognized for the ASEAN Eco-Schools Award. The initiative is also credited with various benefits for schools as well as for teaching and learning.

(i) Benefits of the Eco-friendly school initiative to the schools

According to respondents interviewed, benefits include:

- Sustained availability of teaching and learning resources;
- Enriching subject content in the real environment;
- Helping school to ensures that Eco-facilities and activities serves as a laboratory to enhance experiential learning, and are used to provide learners with engaging lessons in the natural environment;
- Provide important opportunities for the schools to become engaged in finding local and world environmental solutions, enhanced academic performance, Increased
involvement and support from parents and other stakeholders help deepen their relationship; and
- More parents are encouraged to send their children to the schools.

The eco-friendly school initiative has also contributed to the reduction of consumption bills for water and electricity, “Because of these initiatives, the school now conserves one-third of the electricity consumption bill”, stated one of the principals interviewed.

Other benefits identified is that, harvested vegetables and fruits are sometimes used to supplement school feeding program menu and or sold to the benefit of the school. Interview participants also emphasized that the Eco-school initiative, particularly the greening program, have not only improved the general ambiance and beauty as natural environment, but has also helped the schools to provide a healthy natural environment conducive for pupils not only to learn and play but also to live as a natural habitat.

(ii) Benefits of eco-friendly facilities and activities to teaching and learning

Based on the questionnaire, 75% of the respondents felt that eco-friendly facilities and activities serve as a laboratory or teaching and learning aids for the teachers and learners, and they use them as resources for hands-on experiential learning, whereby skills and knowledge learnt inside the classroom is put into practice through learning by doing. Respondents also mentioned other benefits such as, providing students with engaging lessons about the natural world that give more dynamic and interactive learning experience; making subject teaching easier and helping children understanding better; offering a variety of learner-centered learning activities; helping makes the subject contents meaningful; reducing the need for buying teaching materials; helping learners to be creative and promotes the culture of sharing ideas, cooperation, teamwork among learners and improve their social skills; and providing an environment conducive for effective teaching learning.

4.3.6. Challenges Experienced in Implementing the Eco-Friendly School Initiative

Interviews and observations have revealed that the Eco-friendly school initiative is hugely successful, not only as a tool for environmental protection, conservation, education and awareness, but also as a source for teaching and learning aids for schools. However, several challenges in the implementation of the initiatives have also been identified by the EMB-DENR, DepEd and the schools.

(i) Challenges identified by EMB-DENR and DepEd

Adequate financial resources to properly coordinate, implement and sustain the program is one of the impediments. “The winners are mainly determined through a table validation process, as only four schools are physically visited for validation, due to lack of funds”. They also mention that since identification of schools is based on voluntary entry into the award program, some good eco-friendly schools may not be identified. “Identifying which is truly the best Eco-school, is a challenge because if the school does not join the
competition it will never be identified”. Schools in the rural setting have more experience in protecting the environment than those in the cities, but they have less funding to carry out environmental activities compared to those in the cities, thus, negatively affecting their participation in the program on an equal footing. Other challenges identified include the need to realign the teaching pedagogy to accommodate the initiatives in teaching and learning process; continuously promote and create awareness among educators about the initiatives so that the teachers have the understanding and motivation to implement them; and provide teachers with necessary training for integrating environmental education in schools. The need to make a baseline assessment of the program was also highlighted.

(ii) Challenges identified by Eco-Friendly Schools

Based on interviews, schools needed to put in extra efforts to raise awareness among parents, communities and other stakeholders about their intentions to participate in the eco-friendly school initiative, the benefits involved, and involving them in the program activities to gain the support required from them. “There was resistance in the beginning, but when they see the school and the efforts being made, they are really willing to assist”, said one of the principals during interview. Since schools received no funding from the government for the eco-friendly program, they had to work hard to mobilize resources, maintain the facilities and sustain the program. Other challenges identified by schools include, getting sustained support and collaborative involvement from NGOs as well as internal and external stakeholders; the need not only to educate the children but also the parents about the school’s campaign so that they can guide their children in the practice; ensuring that learners put in practice what they learn at school, such as proper ways of waste disposal and organic gardening, at their homes and communities; and the need for constant reminders to protect the school environment.

4.4. Summary

The Philippines’ Eco-school model is Public-private cooperation based, and involve an award program that recognizes and accord a status of “sustainable and eco-friendly school” to schools that have initiated and integrated environment-related programs in their instruction and administration. The model is both, facility and activity oriented, and characterized by inexpensive eco-facilities, techniques and solutions that largely encourage the use of resources, knowledge and skills available in the locality and support of parents and local communities. Their approach is to make environmental awareness and action an intrinsic part of the life and ethos of the school for both pupils and for staff, and to engage the wider community. Ecological and educational aspects are fundamental as core features of the Philippines eco-school concept, which include creating a school environment that coexisted with nature, energy and resource saving, and recycling; creating an inviting and enjoyable environment for study; and the use of eco-facilities and programs as teaching and learning resources.
Eco-programs, Particularly the greening program, have not only improved the general ambiance and beauty of schools as natural environments, but has also helped provide a healthy natural environment conducive for pupils not only to learn and play but also to live as a natural habitat. Therefore, the Eco-friendly school initiative is exemplar, not only as a tool for environmental protection, conservation, education and awareness, but also as a source for teaching and learning aids for schools.

The model provides educational, operational and health benefits such as, sustained availability of environment-related teaching and learning resources; enriching subject contents in the real environment; engaging outdoor lessons in the natural environment, ensuring that eco-facilities and programs serves as laboratory to enhance experiential learning for the learners; reduction of consumption bills for water and electricity; and inviting and child friendly environment. It is curriculum friendly and the integration of eco-programs as subject teaching and learning resources is to a large extend well imbedded in the model. Teachers use them as hands-on teaching and assessment tools in various subjects, while learners use them to observe, explore, practice, experiment and problem solving.

All respondents (n=20) to questionnaire survey for teachers in Eco-schools used eco-facilities available at schools as teaching and learning aids, of which 95% were using more than ten eco-facilities and activities as teaching resources in their lessons and only 5% used less than ten, but more than five eco-facilities/activities in their teaching. As for environmental awareness among learners, all questionnaire survey respondents feel that the eco-friendly school model has a very significant positive effect.

However, as a challenge, schools needed to put in extra efforts to raise awareness among parents, communities and other stakeholders about their intentions to participate in the eco-friendly school initiative, the benefits involved, and involving them in program activities to get sustained support required from them.
CHAPTER 5

ENVIRONMENTAL EDUCATION IN SCHOOLS IN NAMIBIA

5.1. Introduction

This chapter discussed the current situation and practices in public schools in Namibia regarding Environmental Education, Eco-friendly practices, policies and initiatives; and the use of eco-facilities as teaching and learning resources.

5.2. Methodology

Interviews and secondary data sources were used to collect data about Environmental Education in the basic education curriculum and how it is implemented in schools, while interviews and observations were used to collect data about Eco-friendly practices, programs and initiatives in schools; and the use of eco-facilities as teaching and learning tools. Narrative data were transcribed, coded and categorized into themes related to the fourth research question.

5.2.1. Target Schools

A field survey conducted in seven public schools in Khomas, Kunene, Ohangwena and Omusati regions (fig. 10) included, three Elementary schools, two Combined schools and two High schools. As shown in table 10, two of these schools are located in urban, two in sub-urban, while three are in rural areas.

Figure 10. Study setting (map source: Laurence ourac, 2014)
The researcher also interviewed the officials from the Environmental Education and Awareness Section in the Department of Environmental Affairs (DEA) of the Ministry of Environment and Tourism, and the Directorate of Forestry (DoF) in the Ministry of Agriculture, Water and Forestry.

*Table 10. Target schools*

<table>
<thead>
<tr>
<th>School</th>
<th>Elementary</th>
<th>Combined²</th>
<th>High Learners</th>
<th>Teachers</th>
<th>Rural Suburban</th>
<th>Urban</th>
<th>Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>✓</td>
<td></td>
<td>833</td>
<td>29</td>
<td>✓</td>
<td></td>
<td>Khomas</td>
</tr>
<tr>
<td>2</td>
<td>✓</td>
<td></td>
<td>700</td>
<td>34</td>
<td>✓</td>
<td></td>
<td>Khomas</td>
</tr>
<tr>
<td>3</td>
<td>✓</td>
<td></td>
<td>617</td>
<td>24</td>
<td>✓</td>
<td></td>
<td>Kunene</td>
</tr>
<tr>
<td>4</td>
<td>✓</td>
<td>✓</td>
<td>509</td>
<td>26</td>
<td>✓</td>
<td></td>
<td>Ohangwena</td>
</tr>
<tr>
<td>5</td>
<td>✓</td>
<td>✓</td>
<td>679</td>
<td>25</td>
<td>✓</td>
<td></td>
<td>Ohangwena</td>
</tr>
<tr>
<td>6</td>
<td>✓</td>
<td></td>
<td>770</td>
<td>34</td>
<td>✓</td>
<td>✓</td>
<td>Omusati</td>
</tr>
<tr>
<td>7</td>
<td>✓</td>
<td></td>
<td>672</td>
<td>32</td>
<td></td>
<td></td>
<td>Omusati</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>3</td>
<td>2</td>
<td><strong>4780</strong></td>
<td>204</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

5.2.2. Measurement Instruments

Interviews were held at respective schools’ and departments offices and board rooms. At each school, the school head was interviewed, whereby seven main questions aimed at getting information about the integration of Environmental Education in the curriculum, eco-friendly activities that the school engage in as part of the curriculum and the promotion of environmental awareness, and the challenges experienced, were discussed (see appendix 7). As for the DEA and DoF, five questions aimed at getting information about their policies, programs and initiatives to promote environmental awareness, greening and tree planting in schools; challenges they experienced; and possible roles they can play in the implementation of the eco-school initiative were discussed with the officials (see appendix 8 and 9). Interviews were recorded for accuracy and lasted between 25 and 40 minutes.

A guided observation tour in each school was conducted after the interviews. The researcher took pictures of the observed facilities and activities, and asked questions. Observation tours were aimed at finding out the type of eco-facilities, activities and initiatives each school has implemented; and collecting evidence about their utility as teaching and learning materials. All discussions during the observation tours were recorded for accuracy, and the tours lasted between 10 and 15 minutes.

Secondary data sources such as the National Curriculum for Basic Education (NIED, 2010) were also used to provide further information about Environmental education in the curriculum.

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² A combined school consist of Elementary and Junior secondary levels.
5.2.3. Data Analysis

The collected data were transcribed and categorized according to the fourth research question and emergent themes and patterns. Individual interview questions were matched to answer the research question. A coding method was used to organize interview data into limited number of themes and topics around the research question. Quotations that illuminated the themes and concepts were then selected from the interviews. Data from interviews were also compared with the data from observations to see if they were in corroboration.

5.3. RESULTS

5.3.1. Environmental Education in schools

As shown in figure 11, Environmental Education is taught in Environmental Studies as a subject at grades 1 to 4. Environmental Studies integrates Natural science and Social science learning contents about the natural and social environment. “This integrated approach enables learners to see society and nature as whole” (NIED,2005). However, from grades 4 to 12, Environmental Education is integrated in Natural science and Social Science subject areas (figure 11). “In Natural Sciences, learners learn to manipulate and relate to the natural environment in the value-framework of the sustainable use of matter, energy and processes in living and nonliving things; while Social Science is a key learning area for understanding environmental issues”.

![Subject areas connected to Environmental Education in schools](Developed by author based on interviews and National Curriculum for Basic Education -NIED, 2010)
5.3.2. **Eco-friendly practices and initiatives in schools**

Based on observations and interviews, schools have initiated various types of environmental friendly initiatives (figure 12), which include programs such as Greening, energy and water conservation, animal rearing, and waste management.

<table>
<thead>
<tr>
<th>Eco-friendly practices and initiatives</th>
<th>School</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1-u</td>
</tr>
<tr>
<td>Planting of indigenous plants</td>
<td>G</td>
</tr>
<tr>
<td>Planting of semi-arid plants</td>
<td>G</td>
</tr>
<tr>
<td>Tree planting</td>
<td>G</td>
</tr>
<tr>
<td>Switch to solar power after school</td>
<td>●</td>
</tr>
<tr>
<td>Hand washing basins</td>
<td>●</td>
</tr>
<tr>
<td>Ornamental garden/plants</td>
<td>M</td>
</tr>
<tr>
<td>Waste segregation facilities</td>
<td>●</td>
</tr>
<tr>
<td>School garden area</td>
<td>●</td>
</tr>
<tr>
<td>Functioning garden at time of visit</td>
<td>●</td>
</tr>
<tr>
<td>Nursery</td>
<td>●</td>
</tr>
<tr>
<td>Guinea fowl husbandry</td>
<td>●</td>
</tr>
<tr>
<td>Orchard</td>
<td>●</td>
</tr>
<tr>
<td>Rainwater harvesting</td>
<td>●</td>
</tr>
<tr>
<td>Observation of tree planting (Abor) day</td>
<td>●</td>
</tr>
<tr>
<td>Cleaning campaigns</td>
<td>●</td>
</tr>
<tr>
<td>Tap rangers</td>
<td>●</td>
</tr>
<tr>
<td>Water conservation committee</td>
<td>●</td>
</tr>
<tr>
<td>Water leakage rangers</td>
<td>●</td>
</tr>
<tr>
<td>No container, no drinking policy</td>
<td>●</td>
</tr>
<tr>
<td>Switching of lights when not in use policy</td>
<td>●</td>
</tr>
<tr>
<td>Energy saving bulbs</td>
<td>●</td>
</tr>
<tr>
<td>Monthly utility bills display</td>
<td>●</td>
</tr>
<tr>
<td>Recycling</td>
<td>●</td>
</tr>
</tbody>
</table>

**Key:** u = urban su = sub-urban r = rural ● = Present G = Present in good condition/number M= Present in moderate condition/number P= Present in poor condition/number

**Figure 12. Eco-facilities and initiatives by schools**

Some schools such as school 1, 3 and 5 have more, well maintained initiatives (photo 21), however, at some schools, those facilities are either, neglected, in poor condition or insignificant in number (photo 22). Interview respondents have also stated that in many cases initiatives become neglected or abandoned once teachers who initiated them are transferred from the school.
Figure 12 also shows that although most schools have school gardens or areas designated as school gardens, only one school had a functioning school garden at the time of the school visit, and none of the two urban schools has a school garden. Interviews and observations have also shown that the two High schools show interest in resource conservation, particularly, water and energy, whereas, the same is true for only one of the three Elementary schools and none for the combined schools.
Based on interviews, some schools have established partnerships with different public and private agencies in the implementation of their environmental friendly initiatives, such as energy saving, tree planting, cleaning campaigns and waste segregation (table 11).

**Table 11. Public-private cooperation for eco-friendly initiatives in schools**

<table>
<thead>
<tr>
<th>Eco-friendly practices and initiative</th>
<th>School</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Planting of semi-arid plants</td>
<td></td>
</tr>
<tr>
<td>Tree planting</td>
<td>MAWF</td>
</tr>
<tr>
<td>Waste segregation facilities</td>
<td>M</td>
</tr>
<tr>
<td>School garden</td>
<td></td>
</tr>
<tr>
<td>Orchard,</td>
<td></td>
</tr>
<tr>
<td>Observation of tree planting (Abor) day</td>
<td>MAWF</td>
</tr>
<tr>
<td>Cleaning campaigns</td>
<td></td>
</tr>
<tr>
<td>Energy saving bulbs</td>
<td></td>
</tr>
</tbody>
</table>

MAWF – Ministry of Agriculture, Water and Forestry  
DEA – Department of Environmental Affairs  
M – Municipality  

Interviews have also revealed that some government ministries and agencies, such as the Department of Environmental Affairs (DEA) in the Ministry of Environment and Tourism (MET), and Ministry of Agriculture, Water and Forestry (MAWF) have policies that requires them to have related programs/activities in schools and or assist schools with those initiatives. Some of those policies include; the “Environmental Education / Education for Sustainable Development (EE/ESD) policy at advance stage of formulation; and the Communication Education and Public Awareness (CEPA) strategies” by the Ministry of Environment and Tourism.

As shown in table 12, programs and initiatives implemented for in schools by MAWF and MET include,

- technical assistance for interested schools in establishing and maintaining school gardens, orchards and environmental clubs,
- the Youth Environmental Summit (YES) project,
- providing trees to schools on request,
- tree planting school competitions, etc.
Table 12. Eco-Initiatives in schools by MAWF and MET

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Youth for the Environment.</td>
<td>MET</td>
</tr>
<tr>
<td>Commemoration of environment days.</td>
<td>MET</td>
</tr>
<tr>
<td>Youth Environment Summit (YES) project.</td>
<td>MET</td>
</tr>
<tr>
<td>Environmental Centers that offer facilities to schools for seminars, camping etc.</td>
<td>MET</td>
</tr>
<tr>
<td>Assist schools to establish environmental clubs</td>
<td>MET</td>
</tr>
<tr>
<td>Providing plants to school.</td>
<td>MAWF</td>
</tr>
<tr>
<td>Arbor day commemorations at schools.</td>
<td>MAWF</td>
</tr>
<tr>
<td>Regional tree planting promotion committees.</td>
<td>MAWF</td>
</tr>
<tr>
<td>Tree planting school competition.</td>
<td>MAWF</td>
</tr>
<tr>
<td>Assist interested schools to establish orchards and school gardens</td>
<td>MAWF</td>
</tr>
</tbody>
</table>

However, officials from MET and MAWF also mentioned that programs are not fully or properly implemented, as “it is difficult to find teachers who are committed or willing to spearhead some of those programs at schools”. Participants also mentioned other challenges such as:

- lack of incentives for schools which are trying,
- non-involvement of all teachers at school,
- transfer of teachers who are committed to initiatives,
- care and maintenance of school gardens and other plants during holidays,
- security of school yards/fences,
- erratic rainfall, unsuitable land (rocky, salty, poor),
- difficult to get manure for gardens, and
- availability of space.

Observations showed that all surveyed schools are properly fenced with diamond mesh and are connected to running water supply (table 13), nevertheless, all have express water concerns and two have indicated that their school fences are not secure enough. “Sometimes there is no water for days, and sometimes water is rationed by water regulatory authorities when there are water shortages”. Despite such water concerns, only one of the seven schools surveyed, harvest rainwater and only three have water conservation programs. As shown in table 13, all surveyed schools have institutional workers, who are responsible for maintaining and taking care of the school environment and facilities, such as cleaning and watering the plants.
5.3.3. Use of available Eco-friendly facilities as teaching and learning aids

Facilities such as school gardens, nurseries, orchards and guinea-fowl run, where they exist, are initiated by committed agriculture teachers, as teaching and learning tool, mainly to be used for practical works by the learners and as assessment tools by the teachers. “But once they are established and running, other teachers also want to use them”. When those agriculture teachers covered topics that require the use of those facilities or after harvesting or if they are transferred, the facilities are no longer maintained and sometimes it may take some years before they are restored again. Respondents also explained that the concept of relating other subjects, other than Agriculture, to eco-facilities and programs as teaching and learning resources is not established, and thus, not emphasized. “We have no Agriculture as subject, that is why we do not have a school garden”, one of the interview respondents stated.

5.3.4. Strengths, Weaknesses, Opportunities and Threats (SWOT)

To help determine the most feasible eco-school model for schools in Namibia and decide what can be learnt from Japan and the Philippines eco-school models, the researcher processed the data collected from the interviews, observations and secondary data sources by categorizing the results into internal strengths and weakness as well as external opportunities and threats as summarized in table 14.

### Table 14. Other situations in the schools

<table>
<thead>
<tr>
<th>Situation/Facilities</th>
<th>Number of schools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fenced</td>
<td>7</td>
</tr>
<tr>
<td>Security concern</td>
<td>2</td>
</tr>
<tr>
<td>Has institutional workers</td>
<td>7</td>
</tr>
<tr>
<td>Connected to water supply</td>
<td>7</td>
</tr>
<tr>
<td>Water concerns</td>
<td>7</td>
</tr>
<tr>
<td>Has electricity</td>
<td>7</td>
</tr>
<tr>
<td>Water conservation initiatives</td>
<td>3</td>
</tr>
<tr>
<td>Energy conservation initiatives</td>
<td>2</td>
</tr>
<tr>
<td>Rain water Harvesting</td>
<td>1</td>
</tr>
</tbody>
</table>

**Table 13. Other situations in the schools**
Table 14. Summary of SWOT in schools in Namibia

<table>
<thead>
<tr>
<th>STRENGTHS (+)</th>
<th>WEAKNESSES (-)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental education is integrated in the school Curriculum.</td>
<td>Most gardens are not functional.</td>
</tr>
<tr>
<td>Established partnerships between schools and various public and private agencies.</td>
<td>School gardens are not adequately linked to subjects other than Agriculture.</td>
</tr>
<tr>
<td>There are some schools with good Eco-friendly initiatives.</td>
<td>Environment-related initiatives are teacher-led, instead of being school-led.</td>
</tr>
<tr>
<td>Most schools have designated garden spaces.</td>
<td>Lack of motivation to maintain eco-initiatives.</td>
</tr>
<tr>
<td>Most Schools are fenced.</td>
<td>Available eco-facilities are not promoted as education resources.</td>
</tr>
<tr>
<td>Most schools have institutional workers who can be utilized during holidays.</td>
<td>Lack of teachers willing to spearhead environmental programs.</td>
</tr>
<tr>
<td>There is interest in resource conservation in schools.</td>
<td></td>
</tr>
<tr>
<td>Most schools are connected to water supply and electricity.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPPORTUNITIES (+)</th>
<th>THREATS (-)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing DEA and MAWF policies and interest in working with schools.</td>
<td>No platform to recognize schools’ eco-friendly initiatives.</td>
</tr>
<tr>
<td>Existing DEA and MAWF programs and initiatives for school.</td>
<td>Lack of incentives for schools who initiated successful programs.</td>
</tr>
<tr>
<td>Technical assistance by MAWF and MET in establishing and maintaining school gardens, orchards and environmental clubs</td>
<td>Lack of collaboration among agencies.</td>
</tr>
<tr>
<td>MAWF Providing seedlings to schools.</td>
<td>Erratic rainfall.</td>
</tr>
<tr>
<td></td>
<td>Unsuitable land (rocky, salty, poor).</td>
</tr>
<tr>
<td></td>
<td>Water availability.</td>
</tr>
</tbody>
</table>
5.4. SUMMARY

In Namibia, Environmental education is an important subject matter applied across the curriculum, particularly infused in social and natural science subject areas. The importance and availability of environment related facilities and activities as teaching and learning resources in schools is not emphasized and the eco-school concept is largely unknown, thus not established. Some schools have initiated several environmental friendly programs and activities, however, most are poorly maintained and often neglected as they are poorly managed due to lack of incentives. Most of those environment related facilities and activities are not linked to teaching and learning. Where school gardens are available and functioning, utility as teaching and learning aids is limited to Agriculture lessons.

Some schools have established partnerships with different public and private agencies in the implementation of their environmental friendly initiatives. Some ministries and public agencies, have policies that requires them to have related programs/activities in schools and or assist schools with those initiatives, however, sometimes, programs are not fully or properly implemented, as it is often difficult to find teachers who are committed to spearhead those programs at schools.

The above-mentioned findings turned out to be strengths and opportunities to be taken advantage of, and weaknesses to be eliminated, in pursuit of an Eco-school model for Namibia that does not only enhance environmental awareness in schools but also avail teaching and learning support materials for various subjects in the curriculum. However, there are several challenges, such as transfer of teachers who are committed to initiatives, security of school yards/fences, erratic rainfall, unsuitable land, and availability of water, which turned out to be threats that need to be moderated.
CHAPTER 6

DISCUSSION

This chapter reflects on the results of the studies presented in chapter three, four and five, which are deliberated in five sub-topics based on the research objectives and questions.

6.1. Features and benefits of Eco-School Models in Japan and the Philippines

6.1.1. Japan’s Eco-School Model

The eco-school initiative in Japan is a cooperation between government ministries. This is explained by the fact that in Japan, the eco-school project is an inter-ministerial cooperation initiative led by MEXT as the implementer; that involve various Ministries, each of which has it is area of interest to promote in the project. Co-operating ministries provide subsidies to designated public schools through local governments for renovation and installation of eco-facilities.

This model fits in Douglas’ (2010) description of a green school as “the physical result of a consensus process of planning”. This may be beneficial since eco-schools are not only likely to benefit the Education ministries but other Ministries as well, such as Energy and Environment Ministries. Such collaborative approach is good because it provides an opportunity for different ministries to work together while promoting individual interest for mutual benefits. As is the case in Japan, in such a partnership, the Ministry of Education may promote the installation of eco-facilities and more engagement into eco-activities in schools, so that these can be utilized as subject teaching and learning resources; to provide a healthy and inviting environment conducive to teaching and learning; and to help save costs through resource conservation, such as water and electricity. The Ministry of Environment on the other hand, may promote eco-friendly initiatives in schools to enhance environmental awareness and instill the culture of environmentalism in children who will then grow up as environment-conscious adults and responsible societies, while other Ministries such as the Forestry, Water, Energy, etc. may use eco-schools to promote conservation of resources.

Japan’s eco-school initiative is aimed at energy conservation and carbon emission reduction in public schools while addressing the issues of dilapidated school buildings and securing a proper teaching and learning environment. Hence, their eco-school concept is characterized by three notable aspects that reflect their eco-school initiative’s basic philosophy, and determine the definition and recognition criteria of an eco-school in their context. The three aspects include, the ecological consideration of the facilities in the schools, (Facilities); efficient utilization and caring of these facilities (Management); and the utilization of these facilities for learning (Education). This clearly makes the model consistent with Kim et al. in Park et al. (2011) two-way approach mentioned earlier in chapter two.
Japan’s eco-school model is much more facility-oriented, and most eco-facilities are high-tech based and generally expensive, but on a par with the country’s socio-economic status, as a developed economy.

The model focuses more on a school building or facility that secures a proper teaching and learning environment while saving energy, resources, and money, an approach much more like that of Green schools in U.S.A, which is discussed by Douglas (2010). This is also mirrored in MEXT definition of an “Eco-school”, as “schools in which architectural elements of the facilities and the human elements of management and education function harmoniously”.

Japan’s eco-school models is designed in the manner that it is curriculum-friendly, with the idea to help the curriculum achieve its objectives including child-centered pedagogy while directly addressing the issue of environmental efficiency. For example, viewing spaces are created for pupils to observe environmentally friendly equipment such as wind turbines and solar panels at work, and monitoring equipment are installed, that allows pupils to see how much energy is being consumed. These examples fit the assertion by Park et al. (2011) that School facilities should be built in a way to help implement various education methods and contents efficiently, safely and pleasantly.

6.1.2. The Philippines’ Eco-School Model

The eco-school initiative in the Philippines is a public-private cooperation. This is explained by the fact that the Sustainable and eco-friendly school award program is an inter-agency and multi-sectoral initiative led by the Department of Environment and Natural Resources, involving various public and private agencies. This model is also consistent with Douglas’ (2010) description of a green school as the physical result of a consensus process of planning. This may be valuable since eco- schools are not only likely to benefit the Education department, but other agencies as well, including utility service providers and environmental agencies.

In the Philippines, as cohorts, public and private agencies, administer a biennial Sustainable and Eco-friendly Schools Award Program which recognizes and document schools that have initiated and integrated programs that are environment-related into their instruction and administration. Schools initiate, implement and maintain their own environmental programs and activities without any funding from government for that purpose. Stakeholders, such as the Parents, local communities, business groups, private and religious organizations and other civil society groups join hands to help schools in their locality in setting up and maintain eco-friendly facilities.

Such a coordinated cooperative approach is applaudable, not only because it is likely to add value to the eco-school program, but it also provides an opportunity for different agencies to work together while promoting individual interest for mutual benefits.
In such a partnership, the Department of Education promotes the setting up of eco-facilities and engagement into more eco-activities in schools, so that these can be utilized as subject teaching and learning resources; to provide a healthy and inviting environment conducive to teaching and learning; and to help save costs through resource conservation, such as water and electricity. The Department of Environment on the other hand, promotes eco-friendly initiatives in schools to enhance environmental awareness and instill the culture of environmentalism in children who will then grow up as environment-conscious adults and responsible societies, while other agencies such as the Forestry, Water, Energy, etc. use eco-schools to promote conservation of resources.

In this aspect, the Philippines model seems to be more practicable for Namibia, for the following reasons: Firstly, providing subsidies as is the case in Japan, may not be sustainable especially for developing countries like Namibia. Secondly, the desire for the school to be recognized and accorded the Eco-school status not only motivates schools more but also encourage more schools to initiate, implement and maintain various eco-programs and activities, to take a challenge into the program. Thirdly, every school can participate into the program. This model is also much more consistent with Child Friendly Schools principles of inclusion and participation (Manual, C. F. S,) which seek the participation of adult stakeholders, such as parents and teachers, while recognizing children’s preferences.

The main objectives of the Philippines’ eco-school initiative are to encourage schools to become more actively involved in environmental issues at a practical and local level; to develop skills and understanding among the students, faculty and school administrators in initiating active responses and increasing community awareness; and to recognize and document schools that have initiated and integrated programs which are environment-related in their instruction and administration. Hence, their eco-school concept is characterized by seven aspects, namely: Integration of environmental responsibility in the school policy; Environmental dimension of school operations (facilities and programs); Integration of eco-related programs in the curriculum; Presence of vibrant eco organizations in campus; Environmental partners and linkages in various programs, projects and activities; Social-cultural sustainability; and Economic sustainability. These aspects are reflective of their initiative’s basic philosophy and are used as criteria to determine the sustainability and eco-friendliness of the schools competing in the award program.

The environmental and ecological aspect in this model included creating a school environment that coexisted with nature, energy and resource saving, and recycling while the educational aspect included creating a pleasant environment for study and creating a school environment as a resource for environmental education, thus making the model consistent with Kim et al. in Park et al. (2011) two-way approach to the "environment-friendly school."
Their approach is to make environmental awareness and action an intrinsic part of the life and ethos of the school for both pupils and staff, and to engage the wider community, as they provide opportunities for children to build awareness about the local environment, their own neighborhoods and enables them to be practically involved in the process of finding solutions in their local environments by allowing children experience natural process directly from the school environment while getting their hands dirty. This description is also echoed in DENR definition of “sustainable and eco-friendly schools” as “schools that have initiated and integrated in their instruction, research, extension and/or administration, programs which are environment-related in nature”. This approach is much more like that one of the Foundation for Environmental Education discussed in FEE (2015), but different in the way that the Philippines’ approach emphasizes the integration of eco-facilities, programs and activities in the curriculum as teaching and learning tools, thus making the model more recommendable for Namibia, in view of this research.

This eco-school model is designed in the manner that it is curriculum-friendly, with the purpose to help the curriculum achieve its objectives including child-centered pedagogy while directly addressing the issue of environmental efficiency. For example, eco-friendly programs and facilities are integrated in the curriculum as experiential teaching and learning resources, not only for environment related subject contents but for other subject contents as well, by linking subject contents to the environment. Subject contents in the curriculum may also have been used to determine the type of eco-facilities, activities and programs the school initiate and implement.

The Philippines’ eco-school model is facility and activity-oriented, thus, balancing facilities and activities; and has also added the policy element to it. It is characterized by inexpensive eco-facilities, methods, technologies and solutions that largely encourage the use of resources, knowledge and skills available in the locality and support of parents and local communities.

This model may be feasible for developing countries such as Namibia where funding from the government for this purpose may not be readily available or difficult to get.

6.2. Eco-facilities, programs, and their utility as teaching and learning tools.

6.2.1. Japan’s Eco-School Model

The most common eco-facilities installed in eco-schools include gardens, greening, renewable energy, energy Conservation, Water Conservation, Waste segregation and composting. Most of these facilities are useful as hands-on teaching and learning resources and in many cases, are strategical placed so that teachers and learners can easily access them. These include gardens, biotopes, solar panels, display monitors, heat and cold trenches, etc. Teachers use those facilities as outdoor teaching and assessment resources for various topic such as to explain the ecosystem and other related terminologies; to explain energy generation, consumption and cost; to teach crop husbandry; to teach about pollution
and global warming; etc. On the other hand, learners use them to observe, explore, practice, and experiment.

Seventy-nine percent of survey respondents (n=19) use eco-facilities available at school as teaching aids in their lessons, while 47% and 26% of them felt that eco-facilities have improved the teaching process significantly and very significantly respectively. This clearly suggest that Japan’s model does make environment-related teaching and learning resources available to teachers and learners, a suggestion also supported by material evidence shown in chapter 3 (photo 6 to 9).

Twenty-six percent of the respondents use 5 to 7 of those facilities as teaching aids, while 53% use 1 to 4 of them. This suggest that most of the teachers use few of the eco-facilities available at school. This suggestion is also evidenced in Chapter 3 (table 5) which show that the numbers of teachers who feel that specific eco-facilities are significant as teaching aids to their subjects are high than the actual numbers of teachers who are using them. This may well be attributed to the challenges that some teachers and school heads have identified, including that, new teachers are not always well introduced the school’s “eco-school” status, those eco-facilities and the intention to use them as teaching resources; the intention to use these facilities as teaching resources is not well emphasized; some teachers find it difficult to utilize those facilities in their subject teaching; teachers do not have enough time to use these facilities during their lessons; and that only the "Science" class is connected to these facilities.

Those challenges are likely to have contributed to the fact 21% of the respondents, do not use any of those facilities as teaching aids in their lessons, and the same number (21%) felt that eco-facilities have little significance on the teaching process. This result corresponds with the finding by Rosenberg (2008) on FEE eco-schools in South Africa, that many teachers find it hard to develop lessons which draw meaningfully on the environmental projects the school has undertaken, even when there are obvious curriculum opportunities to do so. These inefficiencies are most likely to be due to the lack of a program for introducing and orientate new teachers at eco-schools to the school’s eco status, and on how to integrate eco-facilities in their teaching, thus, underscoring the importance of a comprehensive orientation program in eco-schools.

The other contributing factor may be the fact that some eco-facilities are primarily installed to make the schools energy efficient, to reduce the schools carbon footprint and securing a proper teaching and learning environment, and therefore, not really usable as hands-on teaching and learning tools, including light intensive fixtures, heat/cold control fixtures, solar thermal fixtures, etc.

However, it is very important to emphasis the fact that 79% of teachers who are using these facilities as teaching aids is largely a significant number, and represents a large majority. This also suggest that the model is curriculum friendly.
It is equally important to point-out that some questionnaire respondents seemed to have misunderstood the instruction that said, “rank their significance to your teaching” (see appendix 2), some seemed to have referred to general significance rather than significance as a teaching aid.

6.2.2. The Philippines Eco-School Model

Eco-programs implemented in eco-schools include School Greening; Energy Conservation; Water Conservation; Waste Management and recycling; Environmental policies; Ecological literacy; Child protection policies; Documentation; Disaster Risk Management; Eco-tours; Physical cleanliness, orderliness and beautification; and Environmental clubs.

To a large extend, the greening program seemed to be the main source of environment-related teaching and learning facilities and activities, for example, many different types of gardens and gardening activities are noticeable in every eco-school, these include Crop Museums, Bio-intensive gardens, Vermiculture, Vegetable gardens, Urban Gardening (container and vertical gardening), Herbal gardens, Botanical gardens, Ornamental gardens, Ferneries, Nurseries, Orchards, Butterfly gardens, Orchidarium, Hydroponics, Aquaponics, Kitchen gardens, Science gardens, Math Gardens, and Mini parks.

Teachers use those facilities as outdoor teaching and assessment resources for various topics in different subjects such as Classification of living organisms, organic and inorganic, decomposition, the life cycle of nutrients and insects etc., while learners use them to observe, explore, practice, experiment and problem solving. Vegetables harvested from the gardens are used for cooking lessons in Home economics, and together with the fruits harvested from the orchards may be sold by the learners as part of their Entrepreneurship projects.

Those facilities are relevant for use almost in all subjects in Namibia’s school curriculum, not only at Elementary level, but High school level as well, including Mathematics, Entrepreneurship and Home economics. This match the assertion by UNICEF (Manual, C. F. S.) that within the principles of child-centered pedagogy, gardens link to the rest of the school’s curricula, from literature to mathematics to science.

Most interesting is also the fact that gardens and parks are erected and maintained with the help of parents, learners and local communities and organizations, using locally sourced expertise and materials including recyclable wastes.

Other eco-programs that this study found to provide more teaching and learning facilities and activities are waste management, energy conservation and eco-tours. Waste management includes the segregation of biodegradable and non-biodegradable waste, recyclable waste recovery, composting and recycling. Segregation facilities are used to teach bio and non-biodegradability and littering topics in different subjects.
Teachers and pupils in the Art, and Home economics class use the recyclable wastes such as papers, plastic bottles and card boxes to make creative artistic products, teaching materials, paper charcoal etc. In Geometry class, pupils use different recyclable wastes to create different shapes as projects for assessment purposes, while pupils and teachers in Science and Livelihood Education use old tires and plastic containers/bottles for urban gardening, and turn organic wastes into compost for use in bio-intensive gardens.

Some of these products may also be sold by mathematics and Home economics class as part of their projects. These examples show how eco-programs and activities in the school can benefit teaching and learning in many different subjects in the curriculum.

Utility of eco-facilities and activities as subject teaching and learning tools is to a large extent more well imbedded in the model. This is underpinned by the inclusion of an “Ecological literacy program” which involves orientating teachers to important ecological concepts in different programs that should be integrated in the curriculum and vice versa, and conducting demo lessons on environmental concepts/messages integration. It is also evidenced by the fact that the integration of eco-facilities and activities as support instructional materials for subject teaching in the curriculum, is supervised and monitored by school heads, mainly because it is part of the criteria used to determine the sustainability and eco-friendliness of the school.

All survey respondents (n=20) use eco-facilities, with 95% of them using more than ten of the eco-facilities and activities at school, and only 5% use less than ten, but more than five; and all respondents felt that eco-facilities/activities have improved the teaching process very significantly. This strongly suggest that the model makes more environment-related teaching resources available to the teachers, a suggestion also supported by material evidence shown in chapter 4 (photo 19 and 20) and table 9, which shows that many facilities were rated by many teachers as very significant as teaching aids, this indicate that most of the facilities are relevant to their subjects as teaching aids.

Many specific facilities were used by many teachers, relative to the numbers of those marked them as significant and very significant to their teaching, as evinced in chapter 4 (table 9). This suggest that the model is not only making more environmental-related teaching and learning resources available but also enable the teachers to use them in their lessons, which may be credited to the following attributes of the model, including, integration of eco-programs in the curriculum being supervised and monitored because it is part of the Award criteria; orientation program for teachers on integration; more eco-facilities at schools are usable as teaching aids; and offering more activity based programs.

Eco-programs are school-led rather than teacher-led. This is exhibited by the fact that eco-schools have established program committees and or designated program coordinators which/who monitor and coordinate specific programs activities under the supervision and support of the principal and the Parent Teacher Association (PTA) chairperson. This arrangement is good because it prevents the collapse of programs when any one teacher is
transferred from the school and it also help to boost the participation of all teacher and everyone in the school, and promote the sense of collective ownership of the programs and the initiative.

Such inclusive participation and sense of program ownership is evinced by the fact that during holidays, the schools utilize maintenance workers (institutional workers) to take care of the gardens and other plants, and teachers voluntarily come to school when their services are needed to attend to program facilities, without getting additional compensation.

6.3. Teachers’ perceptions on the effectiveness of the model on environmental awareness among learners.

6.3.1. Japan’s eco-school model

Fifty three percent and forty two percent of the survey respondents indicated that the eco-school initiative has a very significant and significant positive effect respectively, effectively translating that a total of 95% feel that the initiative has a positive effect on learners’ environmental awareness. This strongly suggest that the model lead to increased environmental awareness among the learners.

This may be attributed to combining the ecological aspects and the educational aspect in the models.

6.3.2. The Philippines’ eco-school model

All questionnaire respondents indicated that the eco-friendly school initiative has a very significant positive effect on the learners’ environmental awareness. This strongly suggest that the model lead to increased environmental awareness among the learners. This may be accredited to combining the ecological aspects and the educational aspect in the models.


6.4.1. Making use of the strengths

Environment-related contents are taught in Environmental Studies as a subject at grades 1 to 4 and integrated in Natural and Social Science subject areas at grade 5-12, which includes Natural Science and Health Education, Elementary Agriculture, Life Science, Agriculture, Biology and Physical Science (Natural Sciences); and Social Studies, Life Skills, Geography and Development Studies (Social Sciences). This shows that the eco-school initiative has the potential to benefit many subjects across the curriculum; and can be beneficial for both primary and secondary school levels. Schools may use environment-related concepts and topics from these subjects as part of their guide when deciding the type of eco-programs and activities, and discuss how other subjects such as mathematics, Arts etc. can be integrated in the programs in the way that it is beneficial to the curriculum.
and the school in general. This would enhance coherence between lessons (curriculum) and eco-programs, therefore, a program like the “Ecological literacy” in the Philippines model, which involves orientation of teachers on how to integrate programs into the curriculum and curriculum into the programs should also be part of the eco-school initiative.

Schools have the ability and willingness to pursue eco-friendly programs and initiatives. This is displayed by the finding that all seven schools in the sample have initiated and implemented several types of eco-friendly initiatives some of which are very well maintained. This may be a signal that if a platform is created, where schools are recognized for their eco-initiatives and stand a chance to improve their academic performance through them, such as the Eco-School Award program, most schools are likely to participate and do even much better.

Schools are able to cooperate with local communities, businesses, organizations, and agencies to support their eco-school program initiatives. This is demonstrated by the fact that some schools are already cooperating with local municipalities, communities and public agencies such as Nampower, in support of their existing environmental friendly initiatives. Schools may utilize resources available in their localities including expertise and skills by involving the parents and the public at large, in initiating, setting up, implementing and maintaining their eco-friendly programs.

Schools have institutional workers such as cleaners and handyman. These may be utilized to take care and maintain the gardens and plants during school holidays.

6.4.2. Exploiting the opportunities

There is an opportunity for inter-agency cooperation and a multi-sectoral approach. This is displayed by the finding that various agencies have policies that requires them to have related programs/activities in schools and or assist schools with those initiatives, hence, some agencies such as the Department of Environmental Affairs (DEA), Department of Forestry (DoF), Nampower, and some local municipalities have established programs for/in schools, including providing technical assistance for interested schools in establishing and maintaining environmental clubs, gardens, orchards; providing trees on request; tree planting school competitions; providing energy saving bulb; and assist with cleaning campaigns. Therefore, an eco-school initiative appears to be an excellent tool and opportunity for these agencies to harmonize their activities in pursuit of their common and individual interests.

The ministry of Education would promote the eco-school initiative as a tool to make more environmental-related teaching and learning resources available, exposing teachers to innovative ways of improvising to cope with the practical components of the curriculum, a tool for Education for Sustainable Development / Environmental Education (ESD/EE), and resource conservation; while DEA would promote it as a Communication, Education and Public Awareness (CEPA) strategic tool for the implementation of the National
Biodiversity Strategies and Action Plans (NBSAPs) and ESD/EE policy. The DoF would use the eco-school initiative to promote public action and education about tree planting, while Nampower and Namwater would promote energy and water conservation. Those and other public and private agencies have an opportunity to partner and establish a National Eco-School Award program. They can establish a program secretariat which would decide on the criteria of awarding, aspects and the definition of an Eco-school, based on their context.

6.4.3. Eliminating the weakness

At present, environment-related initiatives such as gardens and orchards in most schools depends on individual “committed or willing” teachers and not all teachers are involved. This is evidenced by the finding that in most schools where they exist, those facilities are either, neglected or in poor condition and become abandoned once committed teachers are transferred from the school. To eliminate any chance of such situations, all stakeholders such as parents, pupils and all teachers must be involved in deciding which eco-programs to be implemented and how they should be implemented. Various program committees and or program coordinators may be selected to coordinate activities of specific programs, while the school head plays leading, supporting and guiding roles of the whole initiative. Pupils would be involved in the implementation and maintenance of eco-friendly programs in different ways, such as, assigning certain facilities or areas to each grade level/class to maintain, through subject related projects/activities and Environmental club projects. This approach may be effective in involving all teachers and ensuring that programs are school-led, rather than teacher-led.

Currently, there are no incentives for schools which have initiated environment-related programs, and the eco-school concept is largely unknown. As stated by Rosenberg (2008), teachers value the opportunity to compare what they do in their schools with others, and such benchmarks can help them ‘set the bar higher’ for themselves, their learners and their management. The Eco-school Award program would set a benchmark and provide incentives including the “Eco-school status” and other benefit that may be attached to such status. The more the schools try to achieve those benchmarks, the more the benefits of eco-facilities and activities to teaching and learning becomes obvious and would themselves become incentives for schools to do even more. A search for eco-schools would start at Circuit level through to Regional and onto the National level. This would help to enhance the eco-school concept awareness.

6.4.4. Reducing the threats

Although most of the schools are fenced, security of school yards remains a challenge that many schools must overcome, therefore, schools may mobilize support from local communities, businesses and organization to tackle this problem as part of their campaign to join the eco-school initiative.
As they try to meet the criteria set out for the award of an eco-school status, schools should initiate programs and activities such as rain water harvesting, composting, container gardening, vertical gardening, bottle watering, planting of arid and semi-arid plants, etc. as measures to overcome other threats including unsuitable land (rocky, salty, poor), difficult to get manure for gardens, availability of space and water scarcity. The ability to conquer those threats may well become part of the eco-school challenge.

6.5. Proposed Eco-school model for Namibia.

After an in-depth analysis of the eco-school models in Japan and the Philippines as tools for teaching and learning, and a closer SWOT analysis in public schools in Namibia, the following Eco-School Model Framework is proposed for Namibia:

![Figure 13. Proposed eco-school model framework for Namibia](image)

To harmonize the activities and resources of all stakeholders with interest in the eco-school initiative and to create an open and inclusive platform for all potential actors, a Multi-Sectoral Public-Private Cooperation Award Program approach is feasible. The main partners should include The Ministry of Basic Education, Arts and Culture, the Ministry of Environment and Tourism (Department of Environmental Affairs), the Ministry of Agriculture, Water and Forestry (Directorate of Forestry), Nampower, Namwater, etc. These partners should establish a program secretariat that shall determine the Aspects and Definition of an” eco-school”, and the criteria and mechanics of awarding.
To build an eco-school model with a basic philosophy of creating a school environment that coexisted with nature, energy and resource saving, and recycling; creating a healthy natural environment conducive for pupils to learn, play and live in as a natural habitat; and the utility of eco-facilities and activities as teaching and learning resources, the ecological and educational aspects must be considered among core features of the initiative.

To encourage schools to initiate and utilize eco-programs as teaching and learning tools, the Award program should aim to identify, recognize and document schools which have initiated, integrated and maintained environment-related programs in their teaching and administration. The primary award should be the National Eco-school status, and participants should be divided into categories such as Primary, Combined and Secondary school categories.

To enhance cohesion between the curriculum and eco-programs, prospective eco-schools should identify ecological concepts and environment-related topics in the curriculum to decide on the eco-programs to be implemented. In other words, environmental programs should draw meaningfully to the curriculum.

To ensure that integration of the eco-programs into the curriculum and the curriculum into the programs takes place, such integration assessment should be included in the award criteria.

To help provide hands-on experience resources and learning support materials as well as exposing teachers to innovative ways of improvising to cope with the practical components of the curriculum, Namibia’s eco-school model should be both, facilities and activities oriented.

As a developing economy, an eco-school model that promote inexpensive eco-facilities, approaches, techniques, technologies and solutions; encourage the use of resources, knowledge and skills available in the locality; and elicit the involvement and support of parents, local communities and civil society groups, is more realistic for Namibia.
CHAPTER 7

CONCLUSION AND RECOMMENDATIONS

7.1. Conclusion

This research explored the features, applications, challenges and benefits of Eco-school models in Japan and the Philippines; examined whether they make environment-related teaching and learning resources available to teachers and learners; examined whether they lead to increased environmental awareness among learners; and proposed a feasible Eco-School Model for Namibia that could serve as tool for teaching and learning. The study was necessary to explore the best eco-school practices that can be learnt from these two models, in pursuit of an eco-school model that would make environment-related teaching and learning resources available to teachers and learners in Namibia. Field observations, interviews and questionnaire surveys were conducted in public elementary Eco-schools in Japan and Philippines respectively. Investigations were also carried-out in public schools in Namibia to ascertain the internal strengths and weaknesses, as well as external opportunities and threats.

These models are exemplar, as they have demonstrated to be curriculum friendly and provides educational benefits, such as, sustained availability of environment-related teaching and learning resources; enriching subject contents in the real environment; engaging outdoor lessons in the natural environment, ensuring that eco-facilities and programs serves as laboratory to enhance experiential learning for the learners; and inviting and child friendly learning environments. Thus, these are the qualities needed to enhance the development of learners’ scientific knowledge and skills, and improve performance in Natural science subjects in Namibia.

Field observations in all eco schools visited; and all questionnaire respondents in surveyed eco-schools in the Philippines and 79% in Japan, confirmed that the proposition made about other eco-school models, that Eco-Schools make environment-related teaching and learning resources available, is valid for the Eco-school models in in Japan and the Philippines. Thus, these eco-school models strongly proved to provide environment-related teaching resources to most of the teachers in these schools.

This research has also established that Eco-school models in Japan and the Philippines also enhance environmental awareness among learners, as all questionnaire respondents in surveyed eco-schools in the Philippines, and 95% in Japan, strongly feels that way.

In Namibia, environmental education is applied across the curriculum, particularly infused in Social and Natural science subject areas at primary and secondary levels, therefore, the eco-school initiative has the potential to benefit many subjects across the curriculum; and can be helpful for both primary and secondary school levels. All surveyed schools have initiated and implemented several types of eco-friendly initiatives, thus, demonstrating the
ability and interest to pursue eco-friendly programs and initiatives. This is a positive sign that once a platform where schools are recognized for their eco-initiatives and stand a chance to improve their academic performance through them is established, such as the Eco-School Award program, most schools are likely to participate and do even much better.

However, as a developing country, Namibia cannot afford a high-tech and government funded, facility oriented model, such as the one in Japan. Therefore, the Philippines’ facilities and activities-oriented eco-school model, which encourage inexpensive eco-facilities, approaches, techniques, technologies and solutions; promote the use of resources, knowledge and skills available in the locality; and based on the involvement and support of parents, local communities and civil society groups, is more feasible.

7.2. Limitations

The distribution, administration and collection of questionnaires to the Philippines was a challenge. A sealable envelop was supposed to accompany each questionnaire so that respondents had to submit their returned questionnaires in sealed envelopes, this would have made them feel that their responses were confidential and would have increased honesty in responses. However, since the researcher live in Japan, it was not possible to do that due to cost and time limitation. As a result, confidentiality of responses was not properly guaranteed and that might have caused some bias in responses as some questionnaires were answered in an identical manner. This might have influenced the results in one way or the other. Secondly, the researcher was only able to visit few eco-schools in Japan and the Philippines and not all the schools returned questionnaires, this limited the extent to which the result can be generalized.

7.3. Recommendations for future research

Further research need to be carried-out to determine the effect on environmental knowledge and behavior among learners in Japan’s and the Philippines’ Eco-school models.
REFERENCES


# APPENDIX 1: INTERVIEW SHEET FOR SCHOOL HEADS (JAPAN)

**Researcher Details**

**Apollos F Shakumu**
apollosshakumu@gmail.com

**Sheet Number**

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**Date**

**Time**

**School Level**

**Number of Learners**

**Number of Teachers**

---

1. **Since when was the school listed as an eco-school?**

---

2. **Which eco-facilities have been installed in the school?**

<table>
<thead>
<tr>
<th>Facility</th>
<th>Check Box</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Indoor garden</td>
<td></td>
</tr>
<tr>
<td>2. School garden/Nursery</td>
<td></td>
</tr>
<tr>
<td>3. Greening of walls/roof tops</td>
<td></td>
</tr>
<tr>
<td>4. Recycled Materials</td>
<td></td>
</tr>
<tr>
<td>5. Permeable Pavements</td>
<td></td>
</tr>
<tr>
<td>6. Water intensive fixtures</td>
<td></td>
</tr>
<tr>
<td>7. Energy monitoring</td>
<td></td>
</tr>
<tr>
<td>8. Sky lighting</td>
<td></td>
</tr>
<tr>
<td>9. Solar thermal system</td>
<td></td>
</tr>
<tr>
<td>10. Photovoltaic/ solar panels</td>
<td></td>
</tr>
<tr>
<td>11. Compost facility</td>
<td></td>
</tr>
<tr>
<td>12. Waste separation / monitoring</td>
<td></td>
</tr>
<tr>
<td>13. Geothermal</td>
<td></td>
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<tr>
<td>14. Rain water harvesting</td>
<td></td>
</tr>
<tr>
<td>15. Sun shades</td>
<td></td>
</tr>
<tr>
<td>16. Wind turbines</td>
<td></td>
</tr>
<tr>
<td>17. Greening outdoor areas</td>
<td></td>
</tr>
<tr>
<td>18. Biotopes</td>
<td></td>
</tr>
<tr>
<td>19. Others:</td>
<td></td>
</tr>
</tbody>
</table>

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3. **What is the significance of the eco-facilities identified (in question 2) to subject teaching and learning in your school?**

<table>
<thead>
<tr>
<th>Scale of significance</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
</table>

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78
4. (a) Do you feel that the installed eco-facilities have improved the teaching process for teachers?

<table>
<thead>
<tr>
<th>Scale of significance (1 not significant while 4 very significant)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
</tbody>
</table>

(b) Can you explain how such improvement/lack of improvement is evident?

………………………………………………………………………………………………
………………………………………………………………………………………………

5. (a) Do you feel that the installed eco-facilities have improved the learning process for learners?

<table>
<thead>
<tr>
<th>Scale of significance (1 not significant while 4 very significant)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
</tbody>
</table>

(b) Can you explain how such improvement/lack of improvement is evident?

………………………………………………………………………………………………
………………………………………………………………………………………………

Thank you very much for your time and cooperation.
APPENDIX 2: QUESTIONNAIRE FOR TEACHERS (JAPAN)

Dear Participant

Thank you very much for availing your precious times to complete this research questionnaire. The purpose of this research is to explore the benefits of the facility based Eco school model in relation to teaching and learning, and to investigate its effectiveness on Cross-curricular Environment Education. Your answers will be treated confidentially remain anonymous. It will take about 15 minutes to complete the questionnaire.

Instructions:

- Do not write your name on the questionnaire.
- Close your questionnaire in envelop provided as it is completed.

1. Grade/Subject taught …………………………………………………………………………

2. Mark (○) all the eco-facilities that are available in your school, those that you use in your lessons as teaching materials and rank their significance to your teaching on the scale of 1 – 4 in the corresponding boxes. (Use the facility images examples attached at the end of this questionnaire for reference)

<table>
<thead>
<tr>
<th>Facility/Activity</th>
<th>Available</th>
<th>Use in your lesson</th>
<th>Scale of significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Indoor garden</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2. School garden/Nursery</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3. Greening of walls/roof tops</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4. Recycle Materials</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>5. Permeable Pavements</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>6. Water intensive fixtures</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>7. Energy monitoring</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>8. Sky light</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>9. Solar thermal system</td>
<td>1</td>
<td>2</td>
<td>3</td>
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</tr>
<tr>
<td>10. Photovoltaic/solar panels</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>11. Compost facility</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>12. Waste separation/monitoring</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>13. Geothermal</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>14. Rain water harvesting</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>15. Sun shades</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>16. Wind turbine</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>17. Greening outdoor areas</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>18. Biotopes</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>29. Automatic light sensors</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>20. Energy saving florescent lighting</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>21. Others:</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<td></td>
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<td>2</td>
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<td>3</td>
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</tbody>
</table>

3 (a) Do you feel that those eco-facilities have improved the teaching process in your school?

Scale of significance (1 not significant while 4 very significant)

<p>| | | | |</p>
<table>
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<tr>
<td>1</td>
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</tbody>
</table>

(b) Explain how such improvement/lack of improvement (in question 3) is evident?

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4 (a) Do you feel that the installed eco-facilities have improved the learning process for learners?

Scale of significance (1 not significant while 4 very significant)

<p>| | | | |</p>
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</table>

(b) Explain how such improvement/lack of improvement (in question 5) is evident?

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5. Do you think the eco-facilities in your school have a **positive effect** on learners’ environmental awareness and pro-environmental behavior?

<table>
<thead>
<tr>
<th>Positive effect on environmental awareness</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
</table>

*Thank you very much for your time and cooperation.*
### Examples of Eco-facilities (for reference only)

<table>
<thead>
<tr>
<th>Facility Images</th>
<th>Facility Images</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Indoor garden</td>
<td>6. Water intensive fixtures</td>
</tr>
<tr>
<td><img src="image1" alt="Indoor garden" /></td>
<td><img src="image2" alt="Water intensive fixtures" /></td>
</tr>
<tr>
<td>2. School garden/Nursery</td>
<td>7. Energy monitoring</td>
</tr>
<tr>
<td><img src="image3" alt="School garden/Nursery" /></td>
<td><img src="image4" alt="Energy monitoring" /></td>
</tr>
<tr>
<td><img src="image5" alt="Greening of walls/roof tops" /></td>
<td><img src="image6" alt="Sky lighting" /></td>
</tr>
<tr>
<td><img src="image7" alt="Recycled Materials" /></td>
<td><img src="image8" alt="Solar thermal system" /></td>
</tr>
<tr>
<td><img src="image9" alt="Permeable Pavements" /></td>
<td><img src="image10" alt="Photovoltaic" /></td>
</tr>
<tr>
<td>11. Compost facility</td>
<td>15. Sun shades</td>
</tr>
<tr>
<td>----------------------</td>
<td>--------------</td>
</tr>
<tr>
<td><img src="image" alt="Compost facility" /></td>
<td><img src="image" alt="Sun shades" /></td>
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</tbody>
</table>

<table>
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<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td><img src="image" alt="Waste monitoring" /></td>
<td><img src="image" alt="Wind turbine" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>13. Geothermal</th>
<th>17. Greening outdoor areas</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Geothermal" /></td>
<td><img src="image" alt="Greening outdoor areas" /></td>
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<th></th>
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</thead>
<tbody>
<tr>
<td><img src="image" alt="Rain water harvesting" /></td>
<td><img src="image" alt="Biotopes" /></td>
</tr>
</tbody>
</table>
Dear Participant

Thank you very much for availing your precious times to complete this research questionnaire. The purpose of this research is to explore the benefits of the Eco school model in the Philippines in relation to teaching and learning, and to investigate its effectiveness on Cross-curricular Environment Education. Your answers will be treated confidentially and will remain anonymous. It will take about 15 minutes to complete the questionnaire.

Instructions: Do not write your name on the questionnaire

1. Grade/Subject taught ………………………………………………………………………

2. Mark (○) all the eco-facilities/activity that are available in your school, those that you use in your lessons and rank their significance to your teaching on the scale of 1 – 4 in the corresponding boxes. (Use the facility images examples attached at the end of this questionnaire for reference)

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<tr>
<th>Facility/Activity</th>
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<th>Use in your lesson</th>
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<td>1 2 3 4</td>
<td></td>
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<tr>
<td>2. School garden/Nursery</td>
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<td>1 2 3 4</td>
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</tr>
<tr>
<td>12. Waste separation / monitoring</td>
<td></td>
<td>1 2 3 4</td>
<td></td>
</tr>
</tbody>
</table>
3. Do you feel that those eco-facilities/activities have improved the teaching process in your school?

<table>
<thead>
<tr>
<th>Scale of significance (1 not significant while 4 very significant)</th>
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<tbody>
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</table>

4. Do you feel that the installed eco-facilities have improved the learning process for learners?

<table>
<thead>
<tr>
<th>Scale of significance (1 not significant while 4 very significant)</th>
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<tbody>
<tr>
<td>1</td>
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</tbody>
</table>

5. Do you think the eco-facilities in your school have a **positive effect** on learners’ environmental awareness and pro-environmental behavior?

| Positive effect on environmental awareness | 1 | 2 | 3 | 4 |

6. Does your subject benefit from the school’s Eco-friendly program? (If your answer is yes, proceed to question 7)

| Yes | No |

7. How does your subject benefit from eco-friendly facilities and activities?

………………………………………………………………………………………………………

_Thank you very much for your time and cooperation._
Examples of Eco-facilities (for reference only)

<table>
<thead>
<tr>
<th>Facility Images</th>
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<tr>
<td><img src="image1.jpg" alt="Image" /></td>
<td><img src="image2.jpg" alt="Image" /></td>
</tr>
<tr>
<td>2. School garden/Nursery</td>
<td>7. Energy monitoring</td>
</tr>
<tr>
<td><img src="image3.jpg" alt="Image" /></td>
<td><img src="image4.jpg" alt="Image" /></td>
</tr>
<tr>
<td><img src="image5.jpg" alt="Image" /></td>
<td><img src="image6.jpg" alt="Image" /></td>
</tr>
<tr>
<td><img src="image7.jpg" alt="Image" /></td>
<td><img src="image8.jpg" alt="Image" /></td>
</tr>
<tr>
<td><img src="image9.jpg" alt="Image" /></td>
<td><img src="image10.jpg" alt="Image" /></td>
</tr>
</tbody>
</table>
11. Compost facility

12. Waste monitoring

13. Geothermal

14. Rain water harvesting

15. Sun shades

16. Wind turbine

17. Greening outdoor areas

18. Biotopes
APPENDIX 4: INTERVIEW SHEET (DepEd - PHILIPPINES)

THE DEPARTMENT OF EDUCATION (DepEd)

National Capital Region, North Edsa, Quezon City

1. The Search for Sustainable and Eco-friendly school initiative.

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2. The role of DepEd in the establishment and implementation of the Sustainable and Eco-friendly school initiative.

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3. The Basic Philosophy and framework of the Sustainable and Eco-friendly School model.

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4. Specific Legislations aimed at Environmental education in schools.

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6. Challenges experienced and what has been done to mitigate those challenges.

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APPENDIX 5: INTERVIEW SHEET (DENR - PHILIPPINES)

DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES (DENR)

ENVIRONMENTAL MANAGEMENT BUREAU (EMB)

*Environmental Education and Information Division*

1. The Search for Sustainable and Eco-friendly schools’ initiative

2. The role of DENR in the establishment and implementation of the Sustainable and Eco-friendly Schools initiative.

3. The Basic Philosophy and framework of the Sustainable and Eco-friendly School model

4. Specific Legislations aimed at Environmental education in schools.

5. How the DENR benefit from the Sustainable and Eco-friendly schools and Youth for Environment in Schools Organization initiatives.

6. Challenges experienced and what has been done to mitigate those challenges.
APPENDIX 6: INTERVIEW SHEET (ECO-SCHOOLS - PHILIPPINES)

1. The schools’ Eco-friendly activities_Initiatives/policies, etc.

2. How Eco facilities and activities are used as teaching and learning aids in various Subjects.

3. How Environmental Education is applied in the school through different subjects in the school curriculum.

4. Overseeing the initiatives implementation.

5. How the school benefit from the Sustainable and Eco-friendly school initiative.

6. Challenges experienced and how the school overcomes the challenges.
APPENDIX 7: INTERVIEW SHEET (SCHOOLS - NAMIBIA)

1. The existence of the environmental policy in the school.

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…………………………………………………………………………………………………………………………

2. Resource conservation in the school.

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3. How Environmental education/Environment related topics are presented (teaching and learning resources).

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4. Eco-friendly activities the learners engage in as part of the curriculum.

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5. School initiatives to promote Environmental awareness in the school.

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7. Reasons for the absence of basic Eco-friendly facilities in the school.

…………………………………………………………………………………………………………………………
…………………………………………………………………………………………………………………………

8. Number of Teachers at school.

……………………

9. Number of Learners.

……………………
APPENDIX 8: INTERVIEW SHEET (DoF - NAMIBIA)

MINISTRY OF AGRICULTURE, WATER AND FORESTRY

DIRECTORATE OF FORESTRY

Government Office Park, Luther Street, Windhoek

1. Policies regarding public education about tree planting and forests protection in schools.

2. Initiatives to promote tree planting and greening in schools.

3. Related achievements and challenges.

4. Opinions about the Eco-School concept.

5. Possible area of cooperation/support in the establishment and implementation of an Eco-school initiative to promote Eco-friendly practices such as tree planting and forests protection in schools.
APPENDIX 9: INTERVIEW SHEET (DEA - NAMIBIA)

MINISTRY OF ENVIRONMENT AND TOURISM

DEPARTMENT OF ENVIRONMENTAL AFFAIRS (DEA)

Windhoek

1. The DEA Policies regarding public education and environmental awareness.

………………………………………………………………………………………………………

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2. Legislations related to Environmental education in schools.

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3. Initiatives to promote Eco-friendly practices and Environmental awareness in schools.

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4. Related achievements and challenges.

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5. Opinions about the Eco-School concept.

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6. Possible area of cooperation/support in the establishment and implementation of an Eco-school initiative to promote Eco-friendly practices and Environmental awareness in schools.

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