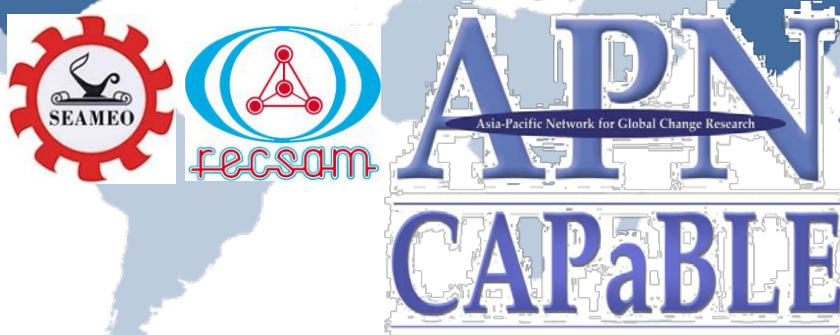


Climate Change Integrated Education Model: Building Adaptive Capacity for the Next Generation (Malaysia, Indonesia, Thailand, Philippines and Lao PDR)



- Making a Difference -

Scientific Capacity Building & Enhancement for Sustainable Development in Developing Countries

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***Climate Change Integrated Education
Model: Building Adaptive Capacity for the
Next Generation (Malaysia, Indonesia, Thailand,
Philippines and Lao PDR)***

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OVERVIEW OF PROJECT WORK AND OUTCOMES

Non-technical summary

It is an undeniable fact that the world today is experiencing serious problems such as the worsening condition of the environment, slump economic productivity and disintegration of social infrastructures. These problems may be attributed to the effects of climate change and other related factors, which are directly and indirectly caused by human activities. If awareness level among the population remains low and if the government won't take appropriate holistic action, then it is possible to head to irreversible direction towards environmental disaster. However, there is still hope in reversing this phenomenon through relevant and responsive education. Education is still the most powerful tool to initiate change and to building adaptive capacity, transform and empower the community especially the young people.

This project on Climate Change Integrated Education is aimed to integrate climate change issues across learning areas in the basic education curriculum with the end goal of learners studying and solving real world issues, informing and developing them to be responsible enough to manage their own future without compromising the sustainability of the earth's resources. Therefore, there is an urgent need for the involvement of the teachers, educators and curriculum specialists to design a learning curriculum to present the real world issues (i.e. climate change issues) to the learners in its real context not only in the classroom but also outside the classroom, hence this Climate Change Integrated Education model.

Objectives

This project is aimed to:

1. Explore and design integration models for climate change integrated education within and across curriculum;
2. Pilot and evaluate the integration design models on the ground both indoor and outdoor learning systems through problem oriented and project-based learning approaches;
3. Evaluate the performance and the level of understanding of teachers, educators and curriculum specialists in climate change issues and acceptance and the level of support for implementation;
4. Identify climate change integrated education competencies that can be integrated in the learning curriculum standards in the SEA region; and
5. Evaluate the economic viability of climate change issues integration into curriculum.

Amount received and number years supported

The Grant awarded to this project amounted to US\$ 40,000.00 for one year and six months duration. The project started on June 2011 and should end on November 2012.

Activity undertaken

The first series of workshop was conducted within the period September 2011 to January 2012 in the 5 SEAMEO member countries namely, Malaysia, Indonesia, Philippines, Lao PDR and Thailand after the approval by the Ministries of Education of the participating countries to implement the climate change integrated education project.

In the first series of the workshop, the project leader or the local project coordinator at the same



time serving as facilitator, conducted a 2-3 hour presentation on the issues of global warming and impact of climate change to the following sectors: (a) biodiversity and ecosystem, (b) freshwater resources, (c) sea temperature and sea level rise, (d) energy efficiency, (e) food security, (f) poverty and some minor issues that were related directly or indirectly to climate change. The education personnel involved in this project 161 teachers, educators and curriculum specialists from a total of 22 secondary schools in the five (5) participating countries. Each school was able to design and develop a "School based Learning Project (SBLP) thus producing a total of 22 SBLP proposals. However, only 17 SBLP proposals were implemented and they were categorized as follows :(a) Biodiversity and Ecosystem (5 projects), Poverty Alleviation (2 projects), Recycling (3 projects), Health and Nutrition (1 project), Carbon-Energy (4 projects) Climate Science (2 projects). Furthermore, these 17 SBLPs can be broken down by countries as follows; Malaysia (4 projects), Indonesia (4 projects), Philippines (3 projects), Thailand (3 projects) and Lao PDR (3 projects).

The 2nd workshop was conducted 4-5 months after the first workshop. The objective of the workshop was to gather again all the teachers and curriculum specialists involved in the preliminary workshop to find out how the teachers implemented their school based learning projects at their own schools.

Results

Of the 22 school based learning project (SBLP) proposals that were developed from the 22 pilot schools in 5 countries (Malaysia, Philippines, Indonesia, Thailand and Lao PDR) only 17 SBLPs were successfully implemented and as a result the teachers were able to produce project reports, lesson plans and session guides: Biodiversity and Ecosystem (5), Poverty Alleviation (2), Recycling (3), Health and Nutrition (1), Carbon-Energy (4) climate science (2) from the 17 SBLP; Malaysia (4), Indonesia (4), Philippines (3), Thailand (3) and Lao PDR (3).

Relevance to the APN Goals, Science Agenda and to Policy Processes

Education is the vital sector that develops the nation's human resources. The importance of educating the young people to become responsible and self-reliant individuals who will become the steward of the Earth's resources as well as to maintain peace, harmony and sustainability is captured in Abraham Lincoln's statement "*The children are the message that we send to the future*". Thus this climate change integrated education project offers very important contents, strategies and policies gearing into producing a more informed citizen who will take greater responsibilities of sustaining the capacity of the resources to provide ecological services for man's existence. In terms of scientific agenda and policy direction, the project is envisioned to create a pivotal impact on the education sector through the integration of climate change issues into or across the school curriculum. In addition the project would improve scientific literacy of the population especially the young people as a result of learning the contents of the real-life issues. This project offers rich, positive relevant perspective to all sectors of the society and of the government leaders towards producing a more tangible educational programmes and projects in aid of policy formulations for developing full human potential ready to face the challenges of the 21st century living as well as of achieving the nation's economic and development goals.

Self evaluation

The scientific community has produced significant advancements in science and technology through systematic research and investigations. However, these breakthroughs in experiments and researches were just stored in the huge databases as declared by a scientist from the European Geosciences Union (EGU) during the Geophysical Information for Teachers (GIFT) workshop in

Malaysia. The present day scientists are faced with big challenge on how to translate these scientific investigation and researches into a form that can be understood and utilized by classroom teachers, who can influence the most the next generation of adults. Reflecting on this scenario, we should be working not totally for this present generation but rather for the incoming generation who will utilize the natural resources without compromising the opportunity of the next generation to avail of these natural resources at their own time. This school based learning project indeed is very timely so that we can provide an innovative learning approach to our young people without disturbing much the mainstream curriculum, which principally is geared to theoretical learning approach to prepare students for the high stake tests. Indeed this is the very reason why the education sector must accept and explore this integrated learning approach in the mainstream of learning strategies via policy formulation and execution.

Potential for further work

The potential to widen this approach of learning is very huge especially since the Decade of Education for Sustainable Development (DESD) will end by 2014. The survival of the future generation depends on how we prepare them today. The scenario for the 21st century learning environment should be taken seriously or else the next generation will face severe consequences of social dysfunction and materialism among individuals that would result to increased lawlessness, upheaval, corruption and eventually depletion of the available resources which provide sustenance to the existence of all life forms on the earth. Infusing problem oriented and project-based learning approaches in the instructional delivery system showed remarkable impact in reshaping individual's perspective on how to deal with socio-scientific issues especially the conservation and preservation of the immediate environment as well as addressing the issues of survival. Thus, the author/project leader thought of embarking on a new concept "***Sustainability Science; an Organic Approach***" which sprang from the conduct of this project. This concept will explore the integration of local wisdom and indigenous knowledge coupled with strong scientific values needed for immediate survival of humans from a worst case scenario. The other concept is about resolving the issue on instructional time faced by teachers and curriculum specialist stated as "***Not Enough Time to Carry out Authentic Learning: The Economic Perspective of Learning***".

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TECHNICAL REPORT

Preface

This educational learning project is a response to the urgent need of developing human resources who will manage our natural resources responsibly and in a sustainable way. It is a fact that humans are the only living species that could become the true stewards of the environment for the purpose of development, management and protection. However, in whatever manner man performs his multiple roles toward the environment for his benefit is dependent upon his own perspective which maybe shaped by time, space and learning experience. Though an individual may be academically superior but ecologically illiterate, he could be a potential threat towards the depletion and destruction of the natural resources triggered by his high level of materialistic value orientations. The articles contained in this report were written by teachers from several countries, of varying cultures, economic status, ecological environment and learning experience that can be used as guide in shaping sustainable society.

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1.0 Introduction

The issue of global warming is alarming and the impact of climatic change is disastrous. The stability of the natural resources is being compromised. Today's youths are most likely to experience and suffer more the effects of climate change much more than we experience today. In effect, they will be forced to address the issue or else perish with the vanishing resources. Much effort is being exerted today for adaptation and mitigation strategies but less effort is being done to prepare the most affected sector of the society-the young people. The future of the planet depends on how we prepare the young people today. This effort aims to strengthen the learning system to be more connected or interconnected into a real life situation through integration approach. The biggest challenge for the 21st century education system is how to integrate real life issues in the education system such as impact of climate change in relation to poverty, conflict over use of scarce and depleting resources that are basic for survival, health and nutrition, access to safe water, rising sea level and temperature, agricultural production and food security, and biodiversity and ecosystem.



This project aims to develop scientific skills of the generation for them to cope and adapt with the ever changing environment. If this effort will be found effective and viable this can be translated into development policy to insure integrated learning system for sustainable development.

The main objective of the project is to engage the school system into innovative ways of learning in integrating the climate change issues through school based learning project (SBLP) approach capitalizing on the local authentic issues and problems. The researchers/facilitators strongly believe that one of the most effective ways of influencing an individual especially the young people is through education in the context and within the framework of sustainable development. This means that effective learning process should not be compromised if we want to see a balance between economic development and sustainable future. We need to move away from a theoretical teaching and learning and under in a very fragmented curriculum into a more dynamic student-centred innovative and outcomes-based learning system.

Integrated teaching approach is a way to teach students in a more meaningful way by breaking down barriers between subjects. It allows two or more concepts or skills within or across subject areas to be integrated in one lesson. In this approach, knowledge from all of the traditional subjects is accessed without labeling them as such. The concepts or skills are embedded in real-life situations where students are given problem solving tasks that necessitate connection of ideas already known to them with those they encounter for the first time.

Klein (1990) defines integrated teaching as the synthesis of two or more disciplines, establishing a new level of discourse and integration of knowledge. It is a process for achieving an integrative synthesis that often begins with a problem, question, or issue. It is a means of solving problems and answering complex questions that cannot be satisfactorily addressed using single disciplinary approaches. Interdisciplinary education is a process in which two or more subject areas are integrated with the goal of fostering enhanced learning in each subject area. The disciplines may be related through a central theme, issue, problem, process, topic, or experience (Jacobs, 1989).

"The integrated curriculum is a great gift to experienced teachers. It's like getting a new pair of lenses that make teaching a lot more exciting and help us look forward into the next century. It is helping students take control of their own learning"-M. Markus, media specialist, quoted in Shoemaker, September 1991, p. 797.

"I'm learning more in this course, and I'm doing better than I used to do when social studies and English were taught separately"-Student, quoted in Oster 1993, p. 28

These are some of the remarks by students and teachers who experienced integrated learning system more than decades ago as captured by researchers and authors. These teachers and students express an increasingly widespread enthusiasm for curriculum integration. While not necessarily a new way of looking at teaching, curriculum integration has received a great deal of attention in educational settings. Based both in research and teachers' own anecdotal records of success, educational journals are reporting many examples of teachers who link subject areas and provide meaningful learning experiences that develop skills and knowledge, while leading to an understanding of conceptual relationships.



The subject of curriculum integration has been under discussion on and off for the last half-century, with a resurgence occurring over the past decade. The "explosion" of knowledge, the increase of state mandates related to myriad issues, fragmented teaching schedules, concerns about curriculum relevancy, and a lack of connections and relationships among disciplines have all been cited as reasons for a move towards an integrated curriculum to patch the gap of education research (Jacobs, 1989).

The learning systems of the 19th century had created enormous gap on relevance and connectedness of the curriculum in developing responsible citizens specifically in the context of human resources development. Evidence further showed that young individuals still manifest the fragmentation of the curriculum in their own present lifestyles. Though the current curriculum has produced learners with high technical literacy output, sad to say, they are still ecologically illiterate (Orr, 1994). This is the research gap of the learning curriculum. We need to address this through a transformative learning model to develop the young people of today or the next generation to make responsible decisions and actions.

However, it is not enough to integrate relevant knowledge such as environmental and climate change education into the curricula. Education must provide the necessary skills to facilitate critical thinking, open-mindedness and problem-solving across all subjects. This is essential to developing and sustaining adaptive capacity because these skills can enable learners to comprehend, analyze and use information to think creatively and change behavior in order to adapt to different futures.

Recent researches in cognitive science and neuroscience demonstrate the necessity of helping learners establish bridges between school and life, knowing and doing, content and context, with a parallel rekindled interest in constructivism as opposed to strictly behaviourists' philosophical approach to teaching and learning. The variable and indicator are the integration design and the assessment tools for students, evaluation tools for teachers and socio-economic analysis for its economic implication for human resource development in the context of climate change.

The evaluation of the "In the School Field School" curriculum showed significant result in terms of student performance and affirmative perspective on learning environment offered by discovery based and experiential learning process. The proposed curriculum aimed to reform education delivery including pedagogy and school governance through flexibility. This is because students need to construct their own understanding of each concept, so that the primary role of teaching is not to lecture, explain, or otherwise attempt to transfer knowledge, but to create situations for students that will foster their making of the necessary mental constructions (Aligaen, 2006). Moreover, Aligaen (2006) signified that facilitating new learning process calls for the need to put ecological literacy at the centre of the formal or non formal education process thus bringing the lifelong learners closer to the real world scenario and gain real sense of learning. Experiential and discovery learning tend to build the confident of the learners.

Greenhouse gases (GHGs) are spelled out as the main culprit of rising temperature and anthropogenic CO₂ is one of them that altered the normal pathway of climate patterns and weather systems.



Integrated teaching adds problem-solving, real-world application and social consciousness to the learning process, making it a more comprehensive way of educating and of learning. Therefore, it is high time to patch the research gap on an era of environmental disaster to intensify information dissemination to the young people of today about the impending catastrophic events if climate change issues will not be addressed. The climate change issues must be integrated into the curriculum as a way of informing and educating the next generation of the Southeast Asian community.

This project is aimed to:

1. Explore and design integration models for climate change integrated education within and across curriculum;
2. Pilot and evaluate the integration design models on the ground both indoor and outdoor learning systems through problem oriented and project-based learning approaches;
3. Evaluate the performance and the level of understanding of teachers, educators and curriculum specialists in climate change issues and acceptance and the level of support for implementation;
4. Identify climate change integrated education competencies that can be integrated in the learning curriculum standards in the SEA region; and
5. Evaluate the economic viability of climate change issues integration into curriculum.

2.0 Methodology

The Research Design

In the early concept and development of the proposal there was a series of online consultation and discussion with the 4 countries, Philippines, Indonesia and Thailand and Malaysia while Lao PDR came later. The premise why we come up with this concept it is because there is a need to strategize learning approach integrating climate change issues. Southeast Asian or SEAMEO countries are sharing common boundaries, resources climate and even cultures. However due to regional emerging issues of climate change, we will be facing challenges beyond historical experience if GHGs keep on rising unabated. Thus, through this research project we will be exploring the capability of teachers and curriculum specialists to develop such intervention in the learning process integrating climate change issues in localized environment. So, a qualitative research design was used in the project development and implementation since the main purpose is to explore the possibility and potentials of teachers and curriculum specialists to design simple but effective way of integrating climate change issues or socio-scientific in general in the learning journey and experience for the secondary students. Some of the data has been generated through the focus group discussion (FGD) during the first and second workshop, observation and project report analysis. Some other extraneous information has been gathered through online questionnaire for students based on their infrastructure capability.

The Respondents

The respondents in this study were the secondary school teachers and curriculum specialists coming from the 22 pilot schools in five (5) SEAMEO member countries (Malaysia, Indonesia, Philippines, Thailand and Lao PDR). These teachers were selected through the help of the experts from the



Ministry of Education (MOEs) while the curriculum specialists served as collaborator/coordinator of the project.

The Process

The first series of workshop was conducted from September 2011 to January of 2012 in the 5 SEAMEO member countries namely, Malaysia, Indonesia, Philippines, Lao PDR and Thailand after the approval by the respective Ministries of Education of the participating countries to implement the climate change integrated education project.

In the first series of the workshop, the project leader or the local project coordinator, at the same time serving as the facilitators, have conducted a 2-3 hour presentation on the issues of global warming and impact of climate change to the following sectors: (a) biodiversity and ecosystem, (b) freshwater resources, (c) sea temperature and sea level rise, (d) energy efficiency, (e) food security, (f) poverty and some minor issues that were related directly or indirectly to climate change. The teachers, educators and curriculum specialists insisted that only school based learning projects could be used to design and develop integrated learning approach highlighting the issues of climate change (Appendix A). A total of 161 teachers, educators and curriculum specialists coming from the 22 secondary schools in the five participating countries were involved in this project. Each school was able to design and develop school based learning project (SBLP) thus producing 22 SBLP proposals. However only 17 projects were implemented and were categorized as follows; Biodiversity and Ecosystem (5 projects), Poverty Alleviation (2 projects), Recycling (3 projects), Health and Nutrition (1 project), Carbon-Energy (4 projects) and Climate science (2 projects.). As to the number of projects by countries, the breakdown is as follows: Malaysia (4 projects), Indonesia (6 projects), Philippines (4 projects), Thailand (4 projects) and Lao PDR (3 projects). (Appendix B).

The 2nd workshop on the other hand was conducted 4-5 months after the first workshop. The objective of the workshop was to gather again all the teachers and curriculum specialist involved in the project to find out how the teachers implemented their school based projects at their own schools.

Design and development

The project leader and local coordinators believed in the principle of “No one size fits all”. In this project, no format was prescribed to the teachers to avoid a prescriptive learning design. Based on their own country’s education curriculum content standard and learning competencies, the teachers, represented by at least 5 learning areas (science, math, history/geography, economics and language [English]), together with their curriculum specialists or supervisors, designed and developed a learning system (school based learning project design). The development of the learning system considered the materials available within the school campuses and has the potential of contextualizing science, math, economics and English in order to become an interdisciplinary learning approach.

The five (5) teachers representing the different learning areas worked collaboratively so the team became multi-disciplinary. Usually the team was lead by a science teacher and closely supported by a mathematics and an English language teacher. Some teachers from the other learning areas only



made collaborations with the team when the topic or socio-scientific issues identified by science teachers have connections with their learning objectives or competency. But in most cases, the contents of economics and geography have close relationships to climate change issues. This multi-disciplinary team had something in common. They taught or facilitated learning of the same groups of students following the rule “teaching the same topic to the same group of students” to reduce the risk of difficulties on the part of the teachers.

The group of teachers and curriculum advisers concluded with a certain model or framework of an integrated learning system which capitalized on real and current socio-economic and environmental problems with a focus on climate change issues as shown in Figures 1 and 2.

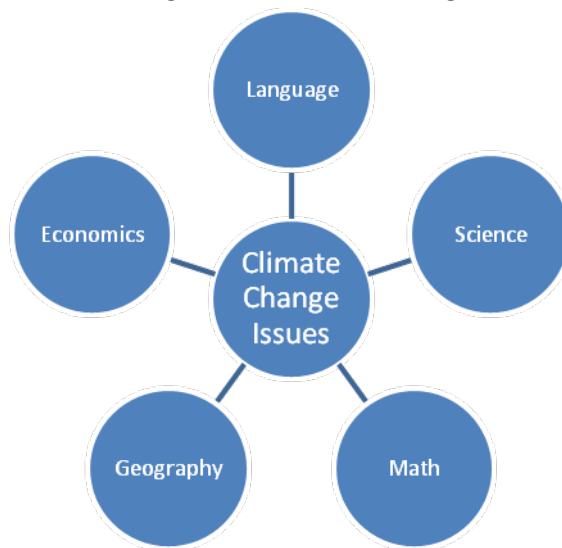


Figure 1. Integration Conceptual Framework

THE 3 STAGE OF CLIMATE CHANGE INTEGRATED EDUCATION MODEL

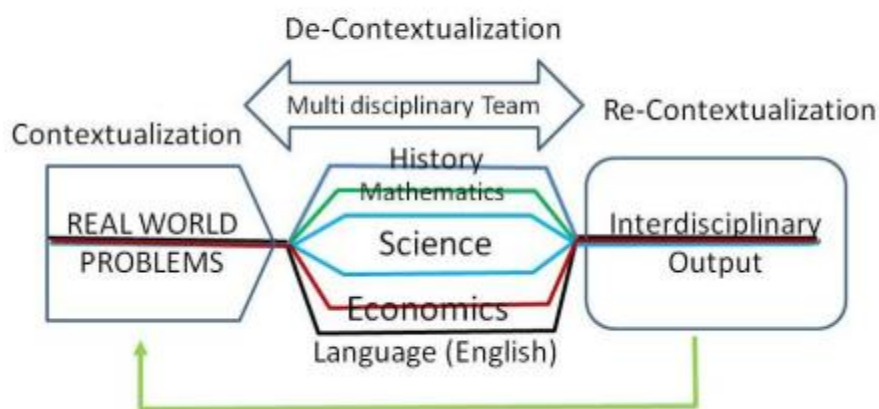


Figure 2. The 3 Stage Model of Designing and Developing an Interdisciplinary Learning System for Climate Change Integrated Education.

Stage 1. Identification of Real-world Problems (Contextualization of the problems into disciplines). In this stage, the lead teacher will evaluate the problem or an issue prevalent in the community and



find out what disciplines are involved. The lead teacher will organize multi-disciplinary group of teachers composed of teachers teaching Science, Mathematics, Health, Economics, Social Science and Communication Arts /Language (English) together with the school principals and curriculum specialists. This multi-disciplinary group will deal with the existing problems as the starting point of exploration to achieve holistic learning. Most of the authentic real-world problems are comprised by different academic disciplines and contents.

Stage 2: Identification of Academic Disciplines and Contents (De-contextualization). This process deals with the theoretical and conceptual component of the authentic, real-life problems in the context of academic value or domain called de-contextualization. There is an organization of multi-disciplinary team or group of teachers who will work within their own academic backgrounds at the same time will collaborate with each other to provide solution to the identified problem or issue.

Stage 3. Development of Projects to resolve the identified problem or issue (Re-contextualization). The multi-disciplinary team will attempt to design and develop integrated project that will provide solution to the problem identified in Stage 1 (contextualization).

Workshop Process

The first wave of teachers' workshops held in 5 countries has a main task of providing concrete information about climate change scenarios for Southeast Asia and its impact to people, properties, environment and natural resources. The workshop was aimed to help the teachers design and develop a school-based learning curriculum integrating climate change issues in both inside and outside the classroom environment using the 3 stage model of integration. The dates of the workshops conducted in the five (5) countries involved in this project are as follows; Figures 3,4,5,6, and 7.



Figure 3. Thailand (25-26 Aug, 2011)



Figure 4. Philippines (2-3 Sept., 2011)





Figure 5. Lao PDR (29-30 January 2011)



Figure 6. Malaysia (18-19 January, 2012)



Figure 7. Indonesia (12-13, January, 2012)



Figure 8. Small group focused discussion to capture significant information on the issue of interdisciplinary in learning real world issues both in the classroom and outside the classroom, May 22-23, 2012, Thailand.

The 2nd wave of the workshop entitled “Climate Change Integrated Education Model Development Workshop,” aimed to provide an avenue for every pilot school to report their own school-based output from the plan they had designed during the first workshop. During this workshop every pilot school was asked to polish their outputs; narrative reports, activity guide/lesson plans, and presentation with video or photos as shown in Figures 9,10,11,12 and 13.



Figure 9. Iloilo, Philippines April 2012



Figure 10. IPST-Bangkok, Thailand May 2012





Figure 11. Vientianne, Lao PDR, June 2012



Figure 12. Bandung, Indonesia, July 2012



Figure 13. Penang, Malaysia, August 2012

3.0 Results & Discussion

The project implementation ran for about 14 months which started in June 2011 until August 2012. While the curriculum of the 5 participating countries has some level of differences yet there is a common denominator in relation to the proposed integration of the climate change education into the curriculum since Southeast Asian or SEAMEO countries share common natural resources and landscapes. The actual School-based Learning Project (SBLP) implementation however lasted only for 3-4 months in the respective pilot school sites.

A total of 161 teachers from the 22 secondary schools together with the curriculum specialists from the five (5) SEAMEO member countries took part in this climate change integrated education project. They were able to design and develop one (1) school based learning project per pilot school integrating climate change issues or other issues which directly or indirectly emanate from climate change. However, out of the 22 schools, five schools were not able to implement the proposed school based learning projects. In the case of Thailand, one secondary school did not implement due to massive flooding last year (2001) while the 2 secondary schools from the Philippines and Indonesia were not able to fully implement due to management issues and financial reasons. But in spite of this, the 22 pilot schools were able to implement a total 17 projects which is about a 77.2 percent and document the proposed project accordingly as shown in Table 1.



Table 1. Five countries in Southeast Asia as Pilot site which designed and developed school based learning project integrating climate change issues either directly or indirectly.

Location of Pilot Sites in Southeast Asia	No. of Pilot Schools involved in the Project	No. of School Based Learning Projects Developed and Implemented	Actual Number of Participants
Bangkok, Thailand	4	3	27
Iloilo, Philippines	5	3	41
Vientiane, Lao PDR	3	3	27
Bandung, Indonesia	6	4	41
Penang, Malaysia	4	4	25
Total	22	17	161

School based Learning Project (SBLP)

The project was implemented in the 17 pilot sites located in **Thailand, Indonesia, Philippines, Malaysia and Lao PDR**. The pilot schools worked on different projects such as biodiversity and ecosystem, energy generation and efficiency, health and nutrition, waste management (3Rs) and environment. The choice of the project was based on socio-scientific background, students' accessibility and availability of materials for learning. The teachers designed and developed a school based learning project (SBLP) to inform the young school children of the impending threat and potential damaging consequences of climate change to the environment and for them to get involved in the activity while learning the academic theory and concept of various learning areas such as biology, environmental science, mathematics, geography and other learning areas.

Presentation of the Results

School based learning Project-I

Category: Biodiversity and Ecosystem

1.1. [Mudskipper- Benchama Rat Rungsarit School-THAILAND] Appendix C.

Mudskipper was decided to be the subject of the school based learning project (SBLP) by the teachers since the school is located along the coastal area and they have prior knowledge about the animal species. Moreover, a philosophical thought support their subject since there is specific physiological and behavioral changes in organisms considered as bio-indicators and is known to detect changes in environmental health conditions. Mudskippers are considered as bio-indicators of marine pollution in Kuwait Bay [Nature and Science. 2010; 8(5):79-89] as cited Al-Behbehani, B.E., & Ebrahim, H.M.A. (2010). Therefore the science behind the mudskipper's life in the coastal areas will be important to monitor the impact of climate change.

The main purpose of this SBLP was to use the Mudskipper as a subject to study authentic biology, environmental science, mathematics through its density per unit area, geography and language (English). Through this SBLP teachers and students learned to monitor pollution, mangrove forest degradation through its density, sizes and deformities. Mudskipper becomes a local material to learn academic strand within the context of mainstream curriculum.

Adaptation and Mitigation

Teachers, students and the community around the school must understand the phenomenon of climatic changes triggered by increased presence of pollutants coming from the community or industry which creates impact in the habitat of Mudskipper. Through school based research guided by teachers, students will be learning the science of Mudskipper as bio-indicator and can send



the message to the concern through different platform of communication and collaboration then a negotiation and dialogue can be initiated to mitigate the source of pollution that may impact the mangrove ecosystem.

1.2. [The Study of the Extinction of Nonthaburi Durians-Triamudomsuksapattakarn Nonthaburi School, THAILAND] Appendix D

Nonthaburi durian has a very strong cultural connection to the people of Nonthaburi province of Thailand. One of the main reasons why teachers decided to embark on this study was because of the strong conviction that the next generation should be aware of the cultural heritage of their forefathers communicated through durian species. Indeed because of unstable environmental condition brought about by climatic changes, the landscape changed too. The flooding of the 2011 brought an enormous damage to the ecosystem of this durian species. This was the first flooding incident that lasted for almost 2 months, so teachers suggested that this will be part of the climate change issues in the present time. Teachers and students study and learn the reasons why this durian species is dying and slowly diminishing. Through students' research guided by teachers teaching biology, environmental science, chemistry, mathematics and other learning areas, students study the biology and habitat of Nonthaburi Durians.

Adaptation and Mitigation

As presented by the students in their school based learning project report which was guided by multi-disciplinary team of teachers, one of the causes of the deterioration of durian habitat was the expansion of urbanization which trigger wider pollution and compromise fragile ecosystem for highly sensitive tropical fruits like durian. One of the adaptation strategies of growing this durian species in a changing ecosystem, is by relocating the planting site to a higher ground and be planted in a more diversified approach so as to create micro-climate that will provide required habitat for this precious type of durian species. Through these engagement students as the future farmers could have a better perspective of sustainability in spite of the changing environment.

1.3. [Experiential and Cooperative Learning through Rehabilitating the Ilog-Ilog Creek-Iloilo, PHILIPPINES] Appendix E

Ilog-ilog creek is traversing the school campus of Leon National High School. This creek is now very far from its status about 15 to 20 years ago wherein the community living along the creek banks used to catch fish and use the down streaming water for household use. However, now it becomes desolate and even becoming a rubbish dumping site. Through the first workshop facilitated by SEAMEO RECSAM-APN project, the teachers identified this as one of the critical environmental problems. They designed and developed the SBLP on biodiversity and ecosystem investigation through biophysical and demographic survey for students. Students presented the research output to the local policy makers and community leaders. They started the negotiation and dialogue on how to effectively rehabilitate the creek so that the school could use it as rich learning resources to study biology, biodiversity and ecosystem, environmental science, mathematics and other learning areas for school population.

Adaptation and Mitigation

One of the practices by the residents along Ilog-Ilog creek is not to use anymore the creek as source



of water, food and pleasant environment but rather convert it into a dumping site. This adaptation was altered by the students who conducted the study and communicated the results as well as initiated collaboration with the local policy makers and leaders to rehabilitate the creek. By doing these GHGs can be minimized through proper waste management and disposal and the creek can function again as a source of water, food and a pleasant environment. More importantly, the impact of the SBLP to students is that they learned the skills of research, dialogue and negotiation.

1.4. [The Relationship of Water and Mangrove Ecological Situation in Bangpu-Samut Prakan, THAILAND] Appendix F

As it was urgently needed to integrate socio-scientific issues into the mainstream curriculum, this group of teachers fined a way to develop integration of climate change issues across learning areas. By developing such integrated curriculum, teachers' capacity in facilitating learning activities integrating climate change issues has been enhanced. The highly commendable efforts and initiatives by a multi-disciplinary team of teachers were the development of learning approaches wherein they capitalized on the issue of climate change in the context of sea water and mangrove relationships. Students through teachers' guidance they learned how to conduct investigation on the impact of sea water and air temperature, pollution (air and sea water), land pollution and level of destruction of infrastructure as a result of weathering or increase of sea level and inundation.

Adaptation and Mitigation

The school community of teachers and students has shown a higher level of adaptability as reflected in their activities. They were eager to learn if there are already changes so that they can prepare to adapt and do something to mitigate its impact by communicating their ideas, collaborating to other sectors in the community and do some kind of negotiation and dialogue if the suggestion could not be taken into consideration.

1.5. [Butterfly Garden- Laos-Vietnam Secondary School, Vientiane, LAO PDR] Appendix G

Butterflies will not be attracted without habitable ecosystem around. In order to attract these small animals, the school should have green spots like flowering garden and flowering vegetables. This is a strategy which indirectly encouraged the school teachers and students to develop their school into a green school wherein the biodiversity exists in a modified ecosystem. When they attended the workshop of RECSAM-APN, they designed and developed simple learning project like converting few unused school spaces into a garden of flowers. Weeks after, they observed butterflies starting to come and flying over the garden doing their basic work of pollinating the flowers while looking for their food. At the same time the students were observing those simple interaction of natural objects in a given space and time.

Adaptation and Mitigation

An understanding on the simple relationships of plants and animals will increase the adaptive capacity of teachers and students alike.

School Based Learning Project II

Category: Reduce, Reused and Recycle



II.1. [Bring Your Own Tumbler to School- SMK Bukit Jambul, Penang, MALAYSIA]-Appendix H

The main aim of this SBLP is to inform students and some other teachers that plastics will be the worst enemy of our environment since it is not biodegradable and it will cause a lot of problems in our environment. The concepts of reduce and reuse are being introduced here. The “throw away culture” that we inherited from the west has been slowly diverted to a more responsible way of making things. Students are taking measures to reduce their ecological footprints by bringing their own water tumblers in school. Although there were some issues in terms of gender wherein male students seem not liking much the idea but the change of perspective is taking place in general. However, the male students gradually followed the stream when they learned the facts about environmental science and related it to their own future thus resulting to an increase in their adaptive capacity.

Adaptation and Mitigation

Adaptive capacity of students is developed when they understood the impact of what they are doing. The process of understanding through learning and adjusting to the use of water tumblers would mean students are mitigating the impact of plastic garbage.

II.2. [Recycling Awareness Campaign- SMK Hamid Khan, Penang, MALAYSIA]-Appendix I

Reduce, Reuse and Recycle (3Rs) are the most common activity that can be done in the school by the students. As the number of students and teachers increase in the school campus so the garbage and its ecological footprints likewise increase. The most important point stressed in this SBLP is the relationship of garbage to global warming, Whatever method is used to disposed of garbage's will still leave its GHGs footprints. Other important points are the science behind the degradable and non-biodegradable as a pre cursor to be an effective mitigation strategy through the concept of sustainable consumption and production

Adaptation and Mitigation

The technical adaptability results when one understands the ecological footprints from his/her own making. The adaptive capacity that was developed in this SBLP could be attributed to knowing exactly how much garbage one is producing everyday so that responsible decision can be made to limit or minimize his/her ecological footprints.

II.3. [Experiential Learning through Composting in 36 Junior High School Bandung, INDONESIA]-Appendix J

In this SBLP composting is more sophisticated than what other schools or community is doing. In the composting process, students incorporated the scientific approach of doing things such as the use of fermented juice (composting starter) lactic acid to hasten the decomposition process by the bacteria. This is authentic evidence showing that students knew exactly the science behind the art of composting. Students likewise came up with tangible product from the activity, particularly the production of lactic acid and organic compost, as well as selling them in the market for vegetable and cut flowers growers.

Adaptation and Mitigation

Practicing a scientific process of composting is a very significant impact of higher adaptability skills and thus making mitigation a one step closer to a reality.



School Based Learning Project III

Category: Health and Nutrition

III.1. [Five High Schools Ban the Use of Styrofoam as Food and Drink Packaging-Bandung, INDONESIA]-Appendix K

It is scientifically proven that Styrofoam will remain for 50 years or before it will degrade into pieces but will still continue to haunt our environment in terms of its toxic content. The danger of Styrofoam when used for food packaging is the presence of toxic chemicals that will leach and contaminate the food and causes health risk. This SBLP has successfully transformed the use of food packaging in the school from Styrofoam to carton box, banana leaves, papers and other alternative materials. This idea only started right after the attendance of a few teachers in the first workshop conducted by RECSAM-APN on the issue of climate change. The toxic trail of Styrofoam was discovered when the biology and chemistry teachers study the impact of Styrofoam to human health and environment through internet research. The students and teachers started the campaign trail and eventually transformed the whole school unanimously and pushed to ban the use of Styrofoam in packaging food.

Adaptation and Mitigation

The use of Styrofoam packaging has offered convenience to the people until everyone is so adapted to it that it became part of one's normal daily living in this modern world. In the process of banning the Styrofoam, it means an adjustment on the way of life wherein people would revert back to using carton box, papers or plants leaves. This is the adaptation process taking place. When someone becomes used to something, he/she adapted the changes but through process. When Styrofoam will gradually disappear in the trail, then its impact to environment has been mitigated.

School Based Learning Project IV

Category: Energy/CO₂ Sequestration

IV.1. [Go Green for a Better Climate through Carbon Sequestration- SMK Convent Green Lane, Penang, MALAYSIA]-Appendix L

The first reaction of teachers about carbon sequestration was that they don't know what sequestration means. It sounds technical but if you study the photosynthesis process, sequestration of CO₂ is there. In this SBLP teachers and students explored how to quantify the CO₂ released from human beings per capita and how much CO₂ can be absorbed by trees depending on its size of trunk and how much oxygen can be released in the process of photosynthesis. Among other things trees can reduce wind speed, regulate temperature and help recharge underground water.

Adaptation and Mitigation

When individual learns about its carbon footprints he/she can find a way to do something to reduce it or balance it out to mitigate its impact to environment.

IV.2. [School-in-a Garden-SMK Tunku Puan Habsah Jalan Sepoy Lines, Penang, MALAYSIA]-Appendix M

It's a perspective of aesthetic value of a garden. Greening the school environment has a lot of exciting points that can be added into the value of its impact to environment such as absorbing CO₂



and releasing of oxygen through photosynthesis, absorbing heat thus regulating the campus temperature and improving the small scale biodiversity inside the school campus.

Adaptation and Mitigation

Teachers and educators thinking actually along this line are trying to do anticipatory adaptation and mitigation process against rising temperature and warming environment.

IV.3. [Evaluation of Energy Consumption and Determining the Number of Trees to Compensate CO₂ Emission within the Alimodian National Comprehensive High School, Iloilo, PHILIPPINES]-Appendix N

IV.4. [CO₂ Audit- Leonora S. Salapantan National High School, Iloilo, PHILIPPINES]-Appendix O

Carbon dioxide has been singled out as the main culprit of rising temperature that caused global warming. Due to rapid computerization programme in our learning system we are becoming energy dependent and consuming relatively higher energy than expected. This SBLP investigates how much is the energy consumption of the school in a given time and how much carbon is emitted from the energy consumed and at the same time quantifying the capacity of the trees around the school to absorb carbon. The objective of the SBLP is to integrate climate change issues across curriculum. This is a school based research on how to balance the carbon emission from the energy consumption and carbon sequestration in the process of photosynthesis by the forest and agro-forest trees within the school landscape. It shows a strategic approach to give in the school greening so that school landscape could balance out the carbon emission from the energy consumption and likewise awareness on global warming and climate change would increase.

Adaptation and Mitigation

Increasing the awareness level of the school population about carbon emission from their own making will lead to realization that proper use of electrical facilities will lead to energy efficiency of the school. In order to mitigate or balance the carbon emission from energy consumption, there is a need to plant more trees or any plants that will occupy any vacant spots in the school landscape to help sequester CO₂ from the atmosphere and connect all of these things in the school curriculum.

School Based Learning Project V

Category: Poverty Alleviation /Adaptation and Mitigation

V.1. [School in the Park in SMP Negeri 4 Lembang, Bandung, INDONESIA]-Appendix P

Poverty is one of the social illnesses that makes individual vulnerable to any injustices, access to social per share, social discrimination and even in education. Unstable environment and disconnected learning strand will complicate the issue and making vulnerability even higher. The school population lead by the school head takes the problem into their own hands. During the workshop conducted by RECSAM-APN on climate change issues integrating across curriculum, they designed and developed the concept of the greening the school so as to absorb more CO₂ from the atmosphere. While harvesting the produce to support the students' daily subsistence at school, they also d established partnership with the business community to help provide technical skills on production, harvesting, packaging and selling their produce. A memorandum of understanding was signed to help the school and even absorb the students who cannot proceed for further studies and



as well as to provide jobs to students while continuing their learning in non-formal education.

Adaptation and Mitigation

When the teachers and curriculum specialists learned the scenario about the issue of climate change and at the same time learned too that they can do something about it, it is therefore a manifestation of adaptability to the situation through education. Making the school greener is the only tangible target they can do for the teachers, but for the students, it will become an integral part of their lives because it has been done through lifelong learning process (Experiential Learning Approach). It will help them throughout their life in order to survive in this rapidly changing technological world.

V.2. [Reforestation Program and Biogas in Integrated Baiturrahman SMA Ciparay, Bandung, INDONESIA]-Appendix Q

There are two adaptation measures being practiced to cope with the change in the environment; the reactive and anticipatory adaptation. Usually in the education sector the more popular is anticipatory adaptation. This particular school based learning project used the biophysical materials to prepare the young students of the community to become proactive to the immediate threat of environmental changes that may cause problems in the community. To develop the young people's adaptability capacity, the teachers exposed the young students to work with the community and the resources within them. Reforestation project not only inside the school campus but also in the community spaces and the biogas integrated approach served as one example of clean and green technology in energy generation. Thus, there are two GHGs emission mitigation on this project; the carbon sequestration from photosynthetic activity of the forest trees and trapping the methane gas from biogas digestion and its conversion into a renewable energy of the school.

Adaptation and Mitigation

There is a strong anticipatory adaptation build up in this project through integrated learning approach wherein components of lifelong learning has been incorporated thus, adaptation through real-life learning.

School Based Learning Project VI

Category: Environment

VI.1. *[Climate Change Integrated Education]-Appendix R*

VI.2. *[Experiential learning through conserving environment within Naxaythong Secondary School]-Appendix S*

The educational experience of installing/mounting a rain gauge and thermometer then measuring a rainfall and temperature is something that learners will never forget. It will be remembered maybe for a lifetime since it is an experiential learning process; the installation, actual reading of the amount of rainfall and the rise and fall of the temperature collected in a given time, the interpretation of the data by using tables or graphical presentations can be a worthwhile learning experiences to prepare the young generation to be proactive to the unpredictable climatic pattern. Two secondary schools in Vientiane, engaged more on environmental study of the abiotic component of ecosystem.



Learning Journey and Experience

The actual learning journey of teachers and curriculum specialists started during the first workshop when they asked primarily on how to identify problems that have social and scientific value for the purpose of learning the real life issues which are directly and indirectly linked to climate change issues. The reaction it seems not so pleasant because of their learning environment might not be connected so much to community involvement. There were mixed reactions and apprehensions that they cannot carry over what we are expecting. But the project and the local coordinators were adapting the strategic approach 'facilitation' methods wherein we are building up the capacity of the teachers and curriculum specialists to be able to identify , analyze, communicate the output of the learning activity and start to collaborate with anyone back to school and community and developing their negotiation skills by presenting the idea or concept of learning that should be taking place in the learning environment wherein real-life issues will be integrated in the learning activity in the process of learning the theory and concept of the academic strand.

Online Evaluation Results: [Students]

An online questionnaire was sent to the students through Google Document soliciting their perspectives and insights based on the study they have gone through (Appendix T). When they were asked; "Do you like to study the mudskipper?" the entire 66 respondents said yes. When they were asked why, most of them replied, "I want to study about mudskipper because of its amazing behaviour and its importance as an indicator in environmental condition of the mangrove". The follow-up question, "What is unique in Mudskipper?", almost 90% of the respondents answered "because Mudskipper can walk but other fish can't, so I want to know how mudskipper evolved to have fins like the other fish but the world have changed them, there were adjustments so that the fins became too strong that mudskipper can be able to walk". The third question dealt on students' ideas and perspectives on how mangroves interact with mudskipper while the fourth question focused on the impact of pollution and deforestation to mangroves and the mudskippers. They all agreed and said that "Because, the mangrove forest is mudskipper's habitat. When the mangrove forests are destroyed, the mudskippers do not have habitat and have no food and would be very difficult for mudskipper to survive and maybe they will all die. When they were asked, "Are you willing to protect the mudskippers and the mangrove? All of them replied yes. When they were asked further, "In what way?" The entire respondents' ideas were summarized as follows: "Protect and health mangrove forest until the state improves; don't discard the garbage anywhere especially in the rivers; don't deforest or cut down trees irresponsibly; help mangrove forest preservation campaign.

Building Adaptive Capacity

Education plays a vital role in securing the safer, productive but sustainable future. Raising awareness within the young people is a major adaptive action and that is the main purpose of this education project to bring together teachers and curriculum specialist to develop intervention in our education system that will trigger critical thinking of the current status of our society, economy and environment. The project leader and local coordinators have found opportunities for building up adaptive capacity through experiential and discovery learning approach. Generally through this strategic approach in learning process wherein we use real-life local socio-scientific issues, important skills were developed such as; communication skills, collaboration skills, problem solving skills and dialogue and negotiation skills.



- *Communication Skills*
Students developed communication skills by presenting the output of the research they have conducted to the teachers and even to the concerned authorities like local leaders and policy makers. According to Tamura and Uegaki (2011) community skills include the ability to understand the emotions of others, to see perspectives other than one's own and to build relationship with others.
- *Collaboration skills*
Students developed and promote the spirit of partnership through collaboration between and among peers, teachers and local leaders and policy makers such as stated by Tamura and Uegaki (2011). This skill will help build relationship using communication skills and linking these relationships with various other related factors.
- *Problem Solving Skills*
Through this learning process the students developed problem solving skills. It started on how to identify socio-scientific problems and find solution to the problems. This undertaking is quite remarkable if given preferential attention by the education sectors. Likewise Tamura and Uegaki (2001) stressed that this skill will include the ability to single out problems and find clues for their resolution.
- *Dialogue and Negotiation skills*
During dialogue and negotiations, students are reflecting their skills in communication which will lead to collaboration in search of possibilities of solving a problem that confronts them. Thus, through this process the core competencies could be applied to provide venue for the young people or students to communicate, negotiate and collaborate in finding solution to the problem which will end up in a better and sustainable society.

Integration Models

The School based Learning Project (SBLP) is just an exploratory effort to find out how teachers and curriculum specialists integrate socio-scientific issues particularly climate change issues into the school curriculum. It also aimed to design and develop a learning system model that is most appropriate in the 21st century learning environment. As Otsuji and Gungi (2011) put it “as the learners change, so too can the providers, and, through these mutual changes, the situation on the ground will change dynamically.” This is the point that the present authors are trying to espouse, that is to reconnect the fragmented curriculum through an interdisciplinary-multidisciplinary approach capitalizing on the real issue of climate change.

The climate change integrated education model was developed by the teachers with the help of their respective curriculum specialists, thus in the first place a strong sense of ownership of the product is established. The innovative education project uses “Climate Change issues” as the formidable socio scientific issues to learn the content of science and mathematics and not through the use of sophisticated instruments or equipment that are beyond the reach of the schools. Instead, the integration education model capitalizes on real issues to study and learn sciences, numbers and socio-economic issues and uses locally, indigenous materials such as plants to study photosynthesis in the context of rising temperature, flooding, and drought or small animals such as mudskipper, butterfly, and bees as bio indicators in the context of erratic environmental condition due to climate change. Thus, development of life skills and sustainable learning will be materialized and will eventually lead to sustainable development.



The 17 implemented school based learning projects from the 22 pilot schools in five SEAMEO countries demonstrated that an integrated learning process which focused on the development of life skills has a high tendency of reshaping the perspectives of young school children and eventually changed or transformed their behaviour. Although these are difficult to prove through concrete evidences, however, their learning can be assessed through observable performance such as cooperation, willingness to work, willingness to get their hands dirty, and walking in the mud to observe and document Mudskipper behavior in the case of Thai students. In the case of Indonesian students, they used tools to cultivate the soil and to plant, conducted weeding, took care of the crops, harvested, packed and sold the agricultural products. These learning experiences were simple manifestations giving support to ESD (education for sustainable development) advocates that if learning process is transformed into a more hands-on and experiential learning, lifelong and lasting learning will be attained and will redound to sustainable development as supported by Gwang-Jo Kim (2011) during one of his interviews when he said *“We need to focus also on the non-cognitive, on the social dimension, what we might call the Social Outcome of Learning (SOL) which is so important for coping with changes. While these skills are not always observable, and therefore not quantifiable, their significance should not be undermined”*.

Focus Group Discussion (Teachers and Curriculum Specialists)

During the Focus Group Discussion teachers and curriculum specialist were asked whether the approach is doable and can be implemented adapting the framework of integration that the authors have developed. Teachers responded positively *“Yes, if just given enough time”*. *“Why if given enough time?”* *“Where did the teachers’ time go? This is a crucial concern in the learning community, because if there is no enough time given to the learning process, the teaching methods will likely end up with theoretical approaches and this would undermine the real process of learning (lifelong learning/ESD).* When the teachers and curriculum specialists were asked about how much more time is needed to mean enough time, they responded about 15% more time. This can be translated into 1.2 hours more per day and that means 15% more economic input. This becomes now the intended cost if integration of climate change issues in the curriculum will be adapted.

4.0 Conclusions

In the 2nd series of workshops, the teachers and curriculum specialists were able to finalize the model on how to develop and implement an integrated learning approach through the process of contextualization, de-contextualization and re-contextualization or the so called the 3 Stage Model of Integration. There were 22 school based learning projects that have been designed and developed integrating climate change issues. Of these 22 projects, only 17 were successfully implemented. The results suggest that not all secondary schools have the capacity to carry out learning journey that will address learning demand for the 21st century and therefore needs further provision of skills development if we want to educate the young people today on the kind of e future we want.

The exploration of climate change integrated education by the teachers and curriculum specialists have shown remarkable performance. Although during the orientation workshop many of these teachers and curriculum specialist struggle to design and develop school based learning project which tries to reconnect the disconnected strand of learning. The common things happening in the school campus when we talk about the school based project is like this *“What we are doing is not*



what we are learning”. Gardening or tree planting is just gardening and tree planting, or garbage recycling and composting, it is not explicitly connected to our learning system “It seems that what we are talking is different from what we do. In this integrated approach the disconnected is now reconnected and it makes sense and this would entail more concept of sustainability.

The school based learning projects on integrating climate change issues have shown significant impact and helped shape the perspective of young people, the students. It provided an avenue wherein the students have time to engage and a space to manipulate real-life issues which can trigger to change their perspectives and eventually influence their attitude or behavior and lifestyles as they are becoming adult in the near future.

There were four core competencies or skills discovered that are needed to carry out the lifelong learning process. These are the communication skills, collaboration skills, problem solving skills and dialogue and negotiation skills. Dialogue and negotiations with other pre-requisite skills are highly needed skills for the 21st century in order to survive in a very uncertain future. Students or the young people today should be equipped with these skills in communication which will lead to collaboration in search of possibilities of solving a problem that confronts them.

The process of integration has a positive acceptance and a strong appeal to the teachers since it has remarkable impact to the lifelong learning of young people as reflected in the results and discussions of the school based learning projects. The mysterious words “No enough time” from teachers suggest that they do not have more experience in this kind of learning process and they struggle to find ways on how to integrate real-life issues into their learning activities. As a consequence, they only resort to theoretical teaching and lecture approach which cause the fragmentation of learning. Furthermore teachers demand about 15% or 1.2 hours more time per day if the issues of climate change should be integrated into the learning process. Definitely this becomes now the economic cost of integrating climate change issues across curriculum.

5.0 Future Directions

If we believe that the future depends on our own making today, therefore we must now provide an opportunity where lifelong learning approach can be utilized as the platform of our learning system so that we can achieve the future we want.

There is a need to slim down the knowledge gap of the teachers in the secondary level in the issue of climate change and one of the suggested approaches is engaging teachers in the school based learning project wherein it is lifelong learning process.

The potential to widen or expand this approach of learning is very huge especially that the Decade of Education for Sustainable Development (DESD) is coming to an end by 2014. The survival of the future generation depends on how we prepare them today. A 21st century learning environment should be taken seriously or the next generation will face severe consequence of social dysfunction and materialism that may lead to increase lawlessness, upheaval, corruptions and eventually consummate the available resources irresponsibly. Infusing problem oriented education showed remarkable reshaping of the individual perspective on how to deal with issues of taking care of immediate environment and address the issues of survival. Thus, the author/project leader embarked on a new concept that developed during the conduct of this project entitled”



Sustainability Science: an Organic Approach.” This concept will explore the integration of local wisdom and indigenous knowledge that have strong scientific values needed for immediate survival of humans from a worst case scenario. The other concept is about resolving the issues faced by teachers and curriculum specialists entitled **“No enough Time to Carry out Authentic Learning: The Economics Perspective of Learning”**. The theoretical concept is revitalizing thematic learning approach wherein multi-disciplinary teachers will facilitate learning to the same of group of students with thematic unit. The expected output is enhancing the learning output of students without increasing the input (time).

6.0 References

- Al-Behbehani, B.E., & Ebrahim, H.M.A.(2010). *Environmental studies on the mudskippers in the intertidal zone of Kuwait bay*. Science Department, College of Basic Education, PAAET, Kuwait, 2-College of Health Sciences, PAAET, Kuwait; retrieved September 21, 2011. http://free-journal.umm.ac.id/files/file/09_2445_ns0805_79_89.pdf
- Aligaen, J.C.,(2006). *Lifelong Learning System: Learner Centered “School Field School”*. SEAMEO Secretariat, Mom Luang Pin Malakul Centenary Bldg., 920 Sukhumvit Rd., Bangkok 10110, Thailand. <http://www.seameo.org/vl/library/dlwelcome/projects/jasper/jasper06/abstract06.html>
- Jacobs, H. H. (1989). *Interdisciplinary Curriculum: Design and Implementation*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Gwang-Jo Kim, (2011). The World has changed; so too must Education: Interview. Retrieved October 19, 2012 from <http://www.unescobkk.org/news/article/the-world-has-changed-so-too-must-education/>
- Klein. J.T. (1990). *Interdisciplinarity: history, theory and practice*. Detroit: Wayne State University Press.
- Orr, D.W. (1994). *Earth in Mind: On Education, Environment and the Human Prospect*.
- Oster, L. (1993) *Sub-Saharan Africa: An Interdisciplinary Curriculum Unit*. *English Journal* 82/4 .
- Otsuji, H. and Gunji, H. (2011). *Sustainability Science: A Multidisciplinary Approach*. (Pedagogies, 6-3) United Nations University Press. Tokyo, Japan.
- Shoemaker, B. (1989) *“Integrative Education: A Curriculum for the Twenty-First Century.”* Oregon School Study Council 33/2 .
- Tamura, M., and Uegaki, T. (2011). *Sustainability Science: A Multidisciplinary Approach*. (Core Competencies, 6-4) United Nations University Press. Tokyo, Japan.



7.0 List of Appendices

Appendix A-First and Second Workshop Programmes

Appendix B-List of the School based Learning Projects.

Appendix C-I.1. [*Mudskipper- Benchama Rat Rungsarit School-THAILAND*]

Appendix D-I.2. [*The Study of the Extinction of Nonthaburi Durians-Triamudomsuksapattakarn Nonthaburi School, THAILAND*]

Appendix E-I.3. [*Experiential and Cooperative Learning Through Rehabilitating the Ilog-Ilog Creek-Iloilo, PHILIPPINES*]

Appendix F-I.4. [*The Relationship of Water and Mangrove Ecological Situation in Bangpu-Samut Prakan, THAILAND*]

Appendix G-I.5. [*Butterfly Garden- Laos-Vietnam Secondary School, Vientianne, LAO PDR*]

Appendix H-II.1. [*Bring Your Own Tumbler to School- SMK Bukit Jambul, Penang, MALAYSIA*]

Appendix I-II.2. [*Recycling Awareness Campaign- SMK Hamid Khan, Penang, MALAYSIA*]

Appendix J-II.3. [*Experiential Learning through Composting in 36 Junior High School Bandung, INDONESIA*]

Appendix K-III.1. [*Five High Schools Ban the Use of Styrofoam as Food and Drink Packaging-Bandung, INDONESIA*]

Appendix L-IV.1. [*Go Green for a Better Climate through Carbon Sequestration- SMK Convent Green Lane, Penang, MALAYSIA*]

Appendix M-IV.2. [*School-in-a Garden-SMK Tunku Puan Habsah Jalan Sepoy Lines, Penang, MALAYSIA*]

Appendix N-IV.3. [*Evaluation of Energy Consumption and Determining the Number of Trees to Compensate CO₂ Emission within the Alimodian National Comprehensive High School, Iloilo, PHILIPPINES*]

Appendix O-IV.4. [*CO₂ Audit- Leonora S. Salapantan National High School, Iloilo, PHILIPPINES*]

Appendix P-V.1. [*School in the Park in SMP Negeri 4 Lembang, Bandung, INDONESIA*]

Appendix Q-V.2. [*Reforestation Program and Biogas in Integrated Baiturrahman SMA Ciparay, Bandung, INDONESIA*]

Appendix R-VI.1. [*Climate Change Integrated Education*]

Appendix S-VI.2. [*Experiential learning through conserving environment within Naxaythong Secondary School*]

Appendix T-Summary of Students Response (Google Documents)

Appendix U-MOU Between School in the Park in SMP Negeri 4 Lembang and Business Community of Bandung, Indonesia

Appendix V- Climate Change Integrated Education: A Model for Lifelong Learning System

Appendix W- Carbon Balance and Biodiversity Conservation: A Strategic Entry for Greening the School and its Community



Workshops' Schedules

Table 2. First workshop: Orientation Workshop Programme Orientation Workshop on the Integration of Climate Change Issues across Curriculum for Southeast Asian Schools

SEAMEO Countries	Date	No. of Pax	No. of School
Samut Prakan, Thailand	25-26 Aug. 2011	27	4
Iloilo, Philippines	2-3 Sept. 2011	41	5
Vientiane, Lao PDR	29-30 Sept. 2011	27	3
Bandung, Indonesia	12-13 Jan. 2012	41	6
Penang, Malaysia	18-19 Jan. 2012	25	4
Total		161	22

Table 3. Second Workshop: Climate Change Integrated Learning Model Development Workshop Programme

SEAMEO Countries	Date	No. of Pax	No. of School
IPST, Bangkok, Thailand	22-23 May 2012	27	4
Iloilo, Philippines	18-19 April 2012	40	5
Vientiane, Lao PDR	19-20 June 2012	28	3
Bandung, Indonesia	09-10 July. 2012	41	6
Penang, Malaysia	28-29 August. 2012	25	4
Total		161	22

Conference

Paper presentation in an international conference

1. Aligaen J.C. and Mangao D.D (2012) *Climate Change Integrated Education: A Model for Lifelong Learning System*. Educating the Future We Want; Greening Southeast Asia, 11-13 December 2012 EDSA Shangri-La Hotel, Mandaluyong, City, Philippines, 2012.
2. Aligaen J.C. and Mangao D.D. (2012) *Carbon Balance and Biodiversity Conservation: A Strategic Entry for Greening the School and its Community*. . Educating the Future We Want; Greening Southeast Asia, 11-13 December 2012 EDSA Shangri-La Hotel, Mandaluyong, City, Philippines, 2012.



Funding sources outside the APN

Support Leveraged:

Budget Secured from Other Sources (Cash and In-kind Contribution)

Activity	Organisation/Country	In-Kind (US\$)	In Cash equivalent (US\$)
Workshop Facilities	RECSAM-Malaysia (Venue)	Venue Facilities	200
	IPST-Thailand (Venue)	Venue Facilities	200
	QITEP-Indonesia (Venue)	Venue Facilities	200
	Depart. of Education-Philippines (Venue)	Venue Facilities	200
	Lao PDR		
Administration Support	RECSAM-Malaysia		3,000
	IPST-Thailand		500
	QITEP-Indonesia		500
	Department of Education-Philippines		500
	Lao PDR		500
Personnel support (Expertise)	RECSAM (staff)-Malaysia (expertise)	(60% of the time)	10,000
	IPST-Thailand (expertise)		1,000
	QITEP-Indonesia (expertise)		500
	Department of Education-Philippines		500
	Lao PDR		
Total			17,000

List of Acronyms

ESD-Education for Sustainable Development

DESD-Decade of Education for Sustainable Development

IPST-Institute for the Promotion of Teaching Science and Technology

P4TK-Pusat Pengembangan Dan Pemberdayaan Pendidik Dan Tenaga Kependidikan Ilmu Pengetahuan Alam: (Science Education Development and Empowerment Centre)

QETIP-Regional Centre for Quality Improvement of Teachers and Education Personnel in Science

RECSAM-Regional Education Centre for Science and Mathematics

SBLP-School Based Learning Project

SEAMEO-Southeast Asian Ministers of Education Organization

