

EMPOWERING STUDENTS THROUGH VALUES-BASED EXPERIENTIAL LEARNING: CASE STUDIES OF RECENT INITIATIVES IN SOME SEAMEO COUNTRIES

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Abstract

The paper reports on how teaching science involving values-based experiential learning helps in student transformation. The transformation process impacts students' thinking as they research and explore real life situations. The research approach transforms their attitudes and behaviours. The report includes how projects were implemented through various science activities integrating scientific concepts and specific values which help students to have a more holistic view of learning. Part of the output of their learning was disseminated in science/technology fair and academic carnival. Case studies on the contextual and values-based experiential learning activities and games conducted during the Human Values-based Water Education programmes for schools in Thailand and Malaysia are deliberated. Teachers' perceptions and their beliefs on the benefits of the values integrated teaching are elaborated. The study also introduces some revelations of teachers' perceptions of student transformation using pedagogies such as story-telling, silent sitting and music during their teaching moments. These pedagogies are used along with the research approach to prompt students to think about the way forward. Educational implications are further deliberated with elaboration on future direction.

Keywords: Learning beyond classroom; Science projects/games/plays; Science and technology fair/carnival; Integration of values in teaching

Introduction

The global educational system is undergoing constant restructuring. Teachers have increasingly recognised the significance of investigative science, both in promoting the societal well-being and economy, as well as enhancing the development of learners' attitudes, skills and lifelong interests. Much emphasis has been placed on such investigative projects in global science curriculum, the outcome of which has been illustrated through various science activities through integration of techniques related to enhancing positive values.

Project-based activities involving contextual learning experience beyond classroom have been exciting parts of school curriculum ever since the first science fair was held in New York in 1928. By the 1950s and 1960s, science fairs were spreading through the United States, Europe, New Zealand and most of the developed as well as some developing countries. Not exclusively it also provides excellent opportunities for us to communicate with the decision makers of the future about the issues and themes being investigated (Ng & Percy, 1997). However, these project based activities have skewed mostly to teaching students' scientific thinking and scientific concepts but somehow most of the output has left the missing link which is the human factor and potential to use the outcome of projects for the betterment of nations. This study mainly emphasizes the significance of leading students to value the environment, manage ethically the problems they see at hand thinking of a larger society and not just for personal gains.

Objectives of Study

The main objective of this paper is to report exemplary practices related to project-based programmes that engage student in experiential activities as well as create positive attitudes and ethical behaviours. The use of the curriculum and the teaching techniques to implement the curricular activities for better student development of both cognitive and affective learning are discussed.

Methodology and Brief Description of Programmes

Two project-based programmes are elaborated using qualitative research methods incorporating the analysis of archival records, observation and interview findings. The first one is the implementation of values-based water education project from Thailand as part of the follow-up activities of SEAMEO-led 'Human Values-based Water, Sanitation and Hygiene Education' (HVWSHE). Two other projects supported by Ministry of Education (MOE) and implemented through State Education Department as well as Teacher Education Institute in Penang are also deliberated. These include the Implementation of science fair and academic carnival to display scientific project with ESD related themes to promote values education in Penang.

Implementation of Values-based Water Education project-based programme as part of SEAMEO Science Learning beyond Classroom Project. The SEAMEO Secretariat and UN-HABITAT initiated the SEAMEO-UN HABITAT cooperative project on promoting Human Values-based Water, Sanitation and Hygiene Education (HVWSHE) in Southeast Asian Schools. The case study to be reported from studies conducted in Thailand included the implementation of projects through integrated teaching and student researched projects incorporating science and mathematics concepts taking into consideration values education as part of SEAMEO HVWSHE programme. The outcome was an interview and survey of teachers who implemented the values-based projects. The study included a mixed method design in analysing data. The open-ended survey of teachers' beliefs and perception questionnaire was analysed using thematic approach. Interview transcripts were also analysed using the coding methods formulated by Teddlie and Tashakkori (2009).

This project involved contextual as well as values-based experiential learning activities and games that provide opportunities to learn beyond classroom. It was launched through a 'Regional Planning Workshop' organized by the SEAMEO Secretariat and UN-HABITAT in conjunction with the 28th SEAMEO High Officials Meeting (HOM) held on 21 to 24 November 2005 in Cha-Am, Thailand. This project aims to support the achievement of the Millennium Development Goals (MDGs), namely Goal 5 and Goal 7 (Dzikus, 2007) set by the United

Nations relating to access to water and sanitation as well as ‘Education Sustainable Development’ (ESD) towards achieving sustainable water-use ethics.

Southeast Asia (SEA) ‘Values-based water education’ (VBWE) or ‘Water and Values Education’ (WAVE) is an innovative approach that not only seeks to impart information on water, sanitation and hygiene but also to inspire and motivate learners to change their behaviour with a view to promote wise and sustainable use of water. The main rationale of HVWSHE or SEA WAVE is to inculcate the human values into the lives of children from young so that they will be more caring and responsible adults. The integration of human values in all subjects and all activities could be achieved through various direct and indirect approaches. Seetharam and Seetharam (2005) suggested that the indirect approach for HVWSHE could be achieved through integrating values across the curriculum related to languages, sciences, mathematics and all subjects. Students are also encouraged to learn these subjects through activities that are organized inside or outside school to promote learning beyond classroom possibly with enriched exposure gained through networking with international organizations. For example, in the lesson plans of Integrated Development of Youth and Adults (VIDYA) initiated in India, the aforementioned subject areas were incorporated with strategies such as discussions, debates, interviews, role-play, games (that may involve outdoor activities including water games), charts, field work, project report, and so forth (Jumsai, 2003; Seetharam & Seetharam, 2005).

The capacity building activities under the SEAMEO – UN-HABITAT cooperative project came in the form of a ‘Material planning workshop’ on developing teaching and learning materials for integrating HVWSHE conducted by SEAMEO INNOTECH, Manila, Philippines from 29th November to 1st December 2006. This was followed by a ‘Regional HVWSHE instructional materials review meeting’ organized by SEAMEO SEAMOLEC at Universitas Terbuka, Jakarta, Indonesia from 31st January to 2nd February 2007 with publication of HVWSHE resource package (Pannen, Ng, Ikhsan, Mustafa, & Herawati, 2007).

Subsequently the resource materials were introduced incorporating pedagogical-content knowledge (PCK) and teaching approaches with beta-testing as well as R&D activities during the conduct of Regional Training of Trainers (TOT) course on Integration of HVWSHE Lessons in Southeast Asian Schools (16th to 25th May 2007) held at RECSAM (Ng, Abdullah, Cheah, & Devadason, 2007). This regional training programme and a series of subsequent national echo-training activities in the SEAMEO member countries were both part of the Quality and Equity in Education (QEE) initiative towards building capacity for training teachers on the integration of HVWSHE into the existing curriculum of the respective countries. These are part of the capacity building initiatives to train teachers on the integration of HVWSHE with conceptual understanding of its philosophy, exemplary practices and its integration into mainly Science, Mathematics and Social Science curriculum subjects. Curriculum officers and teachers from the SEAMEO region participated actively in curriculum development and the output of field testing on HVWSHE curriculum materials was documented. In the subsequent workshop conducted at Innotech, they reported experiences from the activities in their own country to promote HVWSHE in their respective countries [as elaborated in http://www.seameo.org/_HVWSHE-Toolkit/img/home.html (SEA country experiences and Resources) (SEAMEO Secretariat, 2010)]. The toolkit developed by the collective efforts throughout the entire phase since the conceptualisation stage on the HVWSHE cooperative project is accessible on-line for the sharing of best practices [URL: http://www.seameo.org/_HVWSHE-Toolkit/Toolkit.html] and the promotion of learning beyond classroom integrating blended learning approaches.

For example, in Malaysia, the participants who had attended the Regional TOT and National echo-training workshop had followed up with R&D activities involving students to learn science, mathematics and/or social science subjects beyond classroom. Some of learning output related to values-based water education were reported (e.g. Ch'ng et al., 2007; Isma et al., 2007; Tan et al., 2007; Toh, Muhammad, Phetsamone, & Daw, 2007). Research findings were presented in the international conferences or seminars, (e.g. Ch'ng, Tan, & Ng, 2007; Tan, Ng, Ch'ng, & Teoh, 2007; Tan, Leong, & Ng, 2009; Toh, 2008; Toh & Ng, 2007; Toh, Yeap, Ng, & Isma, 2007) as well as presented as project output participated in the state science and technology fair or carnival (an annual event to be reported in the subsequent section). There were also follow-up activities to encourage the sharing of best practices through participation in web-based learning portals such as 'Science across the World' (SAW) programme [<http://www.scienceacross.org>](for the curriculum topics such as '*Drinking Water or Domestic Waste*') and 'Science Project/problem/programme-based Activities Incorporating Experiment Management' (SP3ACEMAN) [<http://sp3aceman.net>] (under threaded discussion topics such as 'Values-based Water Education', 'World Water Day' and 'Climate change and environmental issues', e.g. URLs: <http://forum.sp3aceman.net/index.php>, <http://forum.sp3aceman.net/viewtopic.php?f=16&t=15&p=20#p20>, <http://forum.sp3aceman.net/viewtopic.php?f=16&t=17&p=100378#p100378>). A mini science fair was conducted as part of the enrichment activities to involve students' learning beyond classroom through project-based activities (PBA) and problem-based learning (PBL) under the SP3ACEMAN programme. The brief report of this event could be viewed from the URL: <http://www.waterwatchpenang.org/science-project-problem-based-activities-incorporating-experiment-management-sp2aceman-1november.html>. Some project teachers also followed up with guiding students with investigative projects presented in the science and technology carnivals organized at state and national levels.

Teachers and educators who participated in the workshop generally felt that the program was very motivating to teachers. However the use of the pedagogies required further training. The method has been used in the Sathya Sai School in Thailand, Hong Kong (Taplin, Huang, & Ng, 2005) and Malaysia (Parahakaran, 2013)

Implementation of values-based activities through science and technology fairs/carnivals and academic carnival. The Penang State Education Department Curriculum Unit organised Science and Technology Carnival annually in collaboration with some governmental and non-governmental organization that promote 'Education for Sustainable Development' (ESD). Numerous activities were conducted to encourage primary and secondary school students' participation in science and mathematics learning beyond classroom. These included science and technology competitions, exhibitions organised by governmental and private agencies, science shows, seminars and hands-on workshops.

The Teacher Education Institutes (TEI) in Malaysia had been upgraded from offering teaching diploma to teaching degree since year 2007. In the first cohort, Penang campus only offered mathematics and science as the major to about 80 student teachers. Since then more major courses had been added and to date nine major courses are offered in this campus. In order to meet the requirement of a degree program, the curriculum designed is not only dynamic and coherence, but also holistic in nature, integrating content knowledge, skills and moral value for a balance approach. The curriculum is designed and relevant to the needs of the teaching force and most importantly the graduate teachers are able to cater to the development of children's cognitive, psychomotor and affective domain when serving in schools. Other than emphasising the mastery of content knowledge and pedagogical skills, the curriculum also places emphasis

on practical and contextual learning integrating values education. The actualisation of the curriculum has been implemented through a variety of teaching strategies. Student-centred learning such as Problem-based learning and project-based learning are prevalent to develop scientific, social, and higher order thinking skills so that the student teachers are more readily fit to serve in the real world. Student teachers are expected to be independent learners and constantly be engaged in self-access and self-directed learning. The performance of the students is assessed through summative and formative assessment. In this study, analysis will be made on students' ESD learning output related to promotion of values education.

Results and Discussion

The results of the case studies are reported in this section.

Learning science integrating values: The case from HVWSHE project in Thailand

Students Values development program and the impacts on their attitudes and behaviours. In Thailand, activities related to problem based learning which were values-based were incorporated as "integrated classes". During these integrated classes, a practical experiential lesson was implemented but there were additional teaching techniques used here. Students were asked to go through a reflective process of the actions taken and a discussion follows. Story telling of real happenings was narrated with questions asked to elicit positive values from students. The point of discussion rooted using love, truth, peace; non-violence and right conduct as founding principles. The project activities involved students researching on mathematics and science related issues. This research based approach was conducted as part of academic activities to enhance values-based learning. The most significant finding was that students learnt through their own hands-on experience with HVWSHE.

The following is the verbatim of one of the questions raised by the researcher in an interview and the responses from teacher (T4) from Thailand who implemented HVWSHE:

Researcher: "What are your experiences with teachers when you use HVWSHE for teacher training?"

T4: "We just had one training (for teachers) from China...they said that it changed the whole way of thinking...they realized that it is more effective with the values education especially with the different techniques...in China it's like chalk and board...it's an eye opener that we could do activities like singing and stories...They said that of all the things they learnt, the most important is silent sitting."

Teachers' attitudes changed when they realised that traditional modes of teaching students can be replaced with interesting pedagogies such as stories and music with their normal classroom teaching. Teachers felt that silent sitting was one important technique that was unique to their teaching practices.

In experiential learning, teachers use themes and interdisciplinary approach in their teaching. Teachers use inquiry based learning to prompt students to respond. One of the respondents (T5) stated the following:

T5: "We use themes...the main emphasis is for teachers to bring out the values and when we do training we always ask them what are the values they learn... so they

can use the same kind of methodology...we use a lot...like biology combining with geography and social studies...although we have a lot of water, very little water can we drink...why is it there is very little water...We are very selfish... we are using too much of the natural resources and unless we teach children, not to teach, how to teach the world better, how to teach specifically with water...this is really very important working with a group...has an advantage as teachers..."

The following responses (T6 and T7) clearly depicted that teachers helped students to learn on how to plan and research to find solutions to problems. Students used research methods to learn more on the same topic. The teachers' responses were as follows:

T6: "I did a project with one class where they planned out a conservation plan for the school, and one of the things they came up with themselves is...like leakages...in pipes...we combine mathematics and domestic science...with the older children, we got them to do statistics on how much water is needed, for instance to grow a pound of grain versus producing a pound of meat...producing meat requires about 10 times more water..."

T7: "...We have to think about so many changes, even changes in diet...these kinds of things, if the children do it themselves, if they find out for themselves, it has so much more meaning than if the teacher just gave them the statistics...one of the things we try to do here is get the children to do research, get them to think for themselves and ... it's a very different learning process. The problem with education today is that it is just a process of giving information...there's not much learning...what we want is teach children how to learn, how to find out."

(Parahakaran, 2013, pp. 311-312)

The teacher emphasised on inquiry based learning and problem based learning so that students enhance their research capacities as well as understand the existing issues related to their learning context through a direct experience. The findings of the study by Parahakaran (2013) revealed that most of the teachers from Thailand mentioned the use of cooperative learning approaches, which were interdisciplinary because they used terms such as "integrated classes" and "teaching lessons using water issues for mathematics and science". The cohort of Thai teachers did not give negative reports on the use of cooperative learning activities. On the contrary they were motivated because of the help and cooperation they received from each other. According to the responses from teachers in Thailand, the use of integrated approaches and problem-solving approaches has motivated students (Parahakaran, 2013).

A teachers' belief survey was conducted as part of the study after the workshop and training outputs was implemented in the schools in SEAMEO regions which included the Sathya Sai school in Lopburi, Thailand, schools from districts of Jakarta, Indonesia and Lao PDR. The majority of teachers (i.e. eighty one percent of the total of 23 samples from Thailand, Indonesia and Lao PDR) reported on the improvement in attitudes and behaviours when students used the HVWSHE in their classroom.

There was evidence to prove that students changed their attitudes for conserving oil through real experiential implementation of a biodiesel project. When the teacher with his students calculated the profit and loss involved in recycling and producing biodiesel, it was found that there was very little profit. When students were asked in general what they learnt from the project, one of them replied the following:

“...even if we have just small profit but we should carry on because it is good not just for our school to save, but also for the conservation of the environment and for everything...” (Parahakaran, 2013, p. 211).

The techniques involved in teaching included reflections of the environmental changes, discussions with students on the significance of reducing usage and wastage of natural resources.

The theme that was dominant was: “*improvement in attitudes and behaviours in student awareness*”. Some of the statements written by teachers in their reflective journals were as follows:

- “So HVWSHE is important for character building and behavioural change”.
- “...Integration of HVWSHE is a must in curriculum as this will help guide moral behaviours”.
- “...Help to develop community values, such as inter-relationships, beauty, generosity, equilibrium and gifts in the environment can be sources to facilitate HVWSHE in students”.
- “...promotes unity with all living beings on earth”.
- “...If HVWSHE is used fully considering all factors mentioned, the result of behavioural change is certain”

(Parahakaran, 2013, pp. 209)

The teachers’ belief survey of the human values program in Thailand resulted in the following perceptions of the program; Five percent of the themes that emerged from thematic analysis revealed that students will inculcate the beliefs of knowledge on the significance of water to life; 4% of students will learn from integration and elicitation of human values in academic teaching, 7% of themes were related to student learning of “interconnectedness of water to human life and society” and 4% of the themes that emerged were of student “working together to increase cohesiveness” (Parahakaran, 2013, p. 176).

From the teachers’ responses, there was evidence that teachers saw positive outcomes after implementing HVWSHE in their own classrooms. There was evidence that the important indicators here for helping the understanding of the impact of HVWSHE, were curriculum content, contextual factors, cognitive-affective factors, classroom ethos and concerns regarding assessment factors. At the same time teachers referred to impact of HVWSHE as curriculum that create awareness among students, with possibility to achieve both academic outcomes as well as contributing to society and the preservation of the environment. This was the evidence from the analysis of the open-ended teachers’ belief survey. The results reported that three successful factors were found to have impacted the values learning program, i.e. ‘teacher-teacher, student–student and student–teacher’ interrelationships, teacher motivation to use a values-based curriculum and teachers’ role as reflective practitioners as they had to be role model of values they introduced to students.

When teachers used principles of values-based program to teach topics using an interdisciplinary method, they reported that in the process of teaching, teachers and students were found to have to work together, share their materials, share success and failure. When teachers used various teaching approaches and to find solutions together, they also have to be caring. Students need to be ‘motivated’, to “enjoy lessons”, “being motivated to help environment in a large way” (Parahakaran, 2013). Teachers reflected on their teaching methods and reported

that they themselves increased their reflective capacities. Thus, experiential learning using a research approach and teaching pedagogies helped students develop better attitudes and behaviours from the perspective of teachers.

Learning Science Integrating Values: Cases of Science/Technology Fair and Academic Carnival

Implementation of values-based activities through science and technology fair/carnival. The analysis of archival records revealed that during the Penang State Science and Technology Carnival in 2012 (at one of the secondary school in Sabah) and 2013 (at one of the Secondary School in Penang island), various activities were organised included to promote project-based learning integrating values education and ESD:

- ‘Science and Technology Innovation Challenge’ for secondary and primary schools students integrating values-based projects with ESD related themes set each year and ‘the sustainability or application of ESD concepts as one of the criteria for judging.
- ‘Eureka house with energy efficiency’ competition (*Pertandingan Eureka Rumah Cepak Tenaga*) for primary school students.
- ‘Solar Car Race’, ‘Solar Boat Race’ and ‘Solar Kitchen’ competitions (*Pertandingan Dapur Solar*) for secondary school students.
- Young scientists’ competition for secondary and primary school students.
- English science story telling competition for primary school students.
- Rocket launching technology competition (*Pertandingan Teknologi Pelancaran Rocket*) and Mathematics Magic competition.

Prior to the events of activities, schools registered for the competitions were encouraged to download the participation form and information brochures on the rules and regulations of the various competitions that they intended to participate from the Penang Education Department website. The completed application forms should also be verified by the school principals before submission by email attached files or fax to the secretariat of the competitions (Shamsir, 2012, 2013a, 2013b).

In addition, informative and illustrative posters were prepared to make the learning activities beyond classroom more appealing incorporating values-based experiential learning and ESD concepts, to attract the attention as well as encourage wider participation of public including all school students, teachers and parents in these events. An example can be seen from the ‘Science on Wheels’ programme poster that was prepared to announce the aforementioned competitions and exhibitions that were held during the Penang State Science and Technology Carnival (27-29 May 2013). Among the co-organizers of the exhibitions that were successfully conducted during the 2013 event included Centre for Education, Training and Research in Renewable Energy and Energy Efficiency (CETREE), USM; National Science Centre; Petrosains; Tunku Fauziah Museum and Gallery, USM; Department of Wildlife and National Parks (DWNP/PERHILITAN), Penang; Malaysian Meteorological Department; National Drug Agency; Centre for Global Archaeological Research; *Unit Falak dan Sains Atmosfera*, USM; *Pusat Falaq Sheikh Tahir Penang*; Perseid Telescope; Department of Fisheries Malaysia; *Pejabat Kesihatan Timur Laut*; National Department for Culture and Art; Department of Tourism and Culture Malaysia; Cyber Security; Fire & Rescue Department; and Atomic Energy Licensing Board (Shamsir, 2013c). In addition, School Technology Challenge 2013 F1 competition was also conducted in collaboration with F1 Company to raise students’ interest in the application of science learning beyond classroom (Shamsir, 2013d).

Academic carnival in Teacher Education Institute (TEI), Penang Campus. The analysis revealed that the science and mathematics students carried out a varied range of values-based experiential learning integrating projects and problem-based learning in the 8-semester program. In order to encourage and motivate learning among students, carnival academic was introduced in 2012 where it was opened to all students in the Institute. The aims of the carnival are as follows:

- Streamline all learning activities such as exhibition, presentations, performances, seminar, workshops so that they are carried out simultaneously in a day or two.
- Provide a platform for student teachers to showcase their project and products.
- Provide opportunities for all students and staffs to experience the success attained by the fellow peers.
- Share the success of all student teachers involved and encourage others to learn and improve through modeling.
- Provide an avenue for visits and learning by school children.

Science students in particular also set up booths to show their exhibits and project in 2012:

- demonstrating how to launching a water rocket
- testing acidity and alkalinity of substance
- different types of rocks and fossils
- project showing different phases of the moon

The outcomes of the carnival are as follows:

- Student teachers felt a sense of satisfaction because the product of their hard work in completing values-based projects had been shared by peers, lecturers and school children and had been used as exemplary to others' learning in promoting ESD.
- Students demonstrated the ability to organise the beyond classroom activities with great enthusiasm and confidence.
- A lot of fun learning was found and students motivating one another.

The event provide opportunity for lecturers to see the well over ability of the student teachers instead of just only the formal learning within the classroom. Some amazing and creative ideas were revealed in students' projects related to values education to promote ESD. Such noble attainment by students had not been realised or seen if they were not been given chances to show through the informal learning.

Summary. The crest jewel missing in today's teaching and learning of science is the values-based education. From the study there was clear evidence that the experiential learning approach practiced in the school took time and needed teacher reflective practices to guide students. The success with the approach is not possible without cooperation from peer groups among teachers and students. The skills imparted from values based learning includes learning how to research, work with one another, cooperation using an interdisciplinary mode of learning (Teh, 2013).

Conclusions and Recommendations

Value-based teaching and learning processes aim to stimulate learners and raise their social consciousness to enable them to make better choices and to develop pro-environmental behaviours. The process of implementing values encompasses touching students' heart and not just activities that involve the mind as well as the body. Current learning using books and

Internet involves thinking scientifically and logically but does not aim at student transformation through critical thinking with direct experiences related to values-based experiential learning. It is hoped that the cases presented in this article have one way or another raised awareness on the importance of integrating values-based experiential learning into school curriculum and co-curricular activities that can be organized at schools and institutions at state and national levels in the SEAMEO region and beyond

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