

## EXEMPLARY PRACTICES IN SEARCH FOR YOUTH SCIENCE AND MATHEMATICS RESEARCHERS (SERIES 3): ‘SCIENCE PROJECT/PROBLEM/PROGRAMME-BASED ACTIVITIES INCORPORATING EXPERIMENT MANAGEMENT’ (SP<sup>3</sup>ACEMAN)

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### Abstract

*Research in science learning revealed that learners and teachers need highly interactive conversational environments around media-rich artifacts to provide common grounds for fostering learning communications. In this third series of the article, on exemplary practices in SEARCH for youth researchers through blended learning, elaboration will be made on another sub-portal of SEARCH, entitled ‘Science Project/problem/programme-based Activities inCorporating Experiment MANagement’ (SP<sup>3</sup>ACEMAN) [<http://sp3aceman.net>]. The programme was founded in 2004 with off-line resources and incorporated with blended learning activities since 2009. Workshops were also conducted in 2011 and 2012 to replicate some of the activities adapted from previous research findings. Some main features of SP<sup>3</sup>ACEMAN that promote student-centred learning supported by ICT with threaded discussion topics related to science and mathematics learning are highlighted. Educational implications of Web 2.0 to promote and enhance 21<sup>st</sup> century skills are also deliberated.*

### Introduction

Technology plays an important role to facilitate science and mathematics learning in the recent years. Cognitively-guided research in science education shows that teacher-centred pedagogy with lecture and demonstration is not effective in securing student’s understanding of subject matter (Betrus, 2007; Gallagher & Stepien, 1996). The advancement of technology education through e-learning portals allows teachers to employ various constructivist strategies that could actively engage learners’ interest in learning science and mathematics.

Hence technology-enhanced learning activities supported by ICT tools were identified as important components in RECSAM's training programmes. Effective and sustainable use of e-learning platforms that are also supported by innovative technological tools are important to facilitate science and mathematics education with the sharing of exemplary practices.

This article reports the third of a series of some completed and on-going e-learning activities facilitated through the web-based learning portal entitled 'South East Asia Regional Capacity-enhancement Hub' (**SEARCH**) (<http://www.recsam.edu.my/search/index.html>). Evidences of exemplary practices in **SEARCH** for youth science and mathematics researchers are illustrated. These include activities facilitated under its third hyperlinked portal, 'Science Project/problem/programme-based Activities inCorporating Experiment **MAN**agement' (**SP<sup>3</sup>ACEMAN**). **SP<sup>3</sup>ACEMAN** is the international education flagship programme founded in 2004 with off-line resources and with blended learning activities since 2009. These activities involved contextual problem-solving skills as reflected in project-based activities (PBA), problem-based learning (PBL) and participatory inquiry (PI). All these approaches combine investigation, education and purposeful action with knowledge creation and transformation through shared learning (using blended learning mode) in contrast with transmission approach. Participants in the aforementioned activities are capable of growth, change and creation (Briton, Collett & Cooney, 2010). Incorporating blended learning in the **SP<sup>3</sup>ACEMAN** programme was made in response to the research findings in science learning that learners and teachers need highly interactive conversational environments around media-rich artifacts to provide common grounds for fostering learning communications (Pea, 1995). The review of literature also showed the possibility of interactive e-learning initiatives and other technologies as useful tools for effective and ever-expanding global web-based cooperative learning projects.

### **Programmes Brief, Activities and Exemplary Practices**

#### **SP<sup>3</sup>ACEMAN**

'Science Project/problem/programme-based Activities inCorporating Experiment **MAN**agement' (**SP<sup>3</sup>ACEMAN**) is a student-centred learning programme founded in 2004 aimed at promoting investigative research through PBA/PBL. It was initially designed as an off-line web-portal in 2004 to serve as a platform for sharing of resource materials such as support tools for project-based activities (PBA)(that were used during the research studies between 2003 and 2008). This e-portal has been available since 2009 and was officially launched in 2011 as one of the sub-portal of 'South East Asia Regional Capacity-enhancement Hub' (**SEARCH**) as shown in *Figure 1* [<http://www.recsam.edu.my/search>] and the official portal in *Figure 2* [URL: <http://sp3aceman.net>] for Problem-based Learning (PBL) and Project-based Activities (PBA).



## Closed Forums

### Science Project/Problem/Programme-based Activities inCorporating Experiment MANagement (SP<sup>3</sup>ACEMAN)



Are you a beginner, or would you like to know about investigative project and problem-based learning (PBL)? Why not visit this site for a guided-tour of project-based programmes and PBL?

Contact us at:  
**ssyssaw@gmail.com**

Search for SEAMEO Young Scientist (SSYS)

Figure 1. The SP<sup>3</sup>ACEMAN as sub-portal to the SEARCH official website for on-line learning and e-forums [URL: <http://www.recsam.edu.my/search> <http://forum.sp3aceman.net>]

**SP<sup>3</sup>ACEMAN**  
Science Project/Problem-based Activities inCorporating Experiment MANagement.

**International Networking and Global Learning**  
Face-to-face workshops and virtual learning web-conferences provided to promote Education for All.  
February 8, 2011 Posted Under: Uncategorized [Read More](#)

**Enrichment and Capacity-enhancement Activities**  
Links to 'South East Asia Regional Capacity-enhancement Hub' (SEARCH) provides enrichment and support for further investigations.  
February 8, 2011 Posted Under: Uncategorized [Read More](#)

**Platforms for Ideas Dissemination and Exchange**  
Opportunities for dissemination of research findings and exchange via science congress and science fair.  
February 8, 2011 Posted Under: Uncategorized [Read More](#)

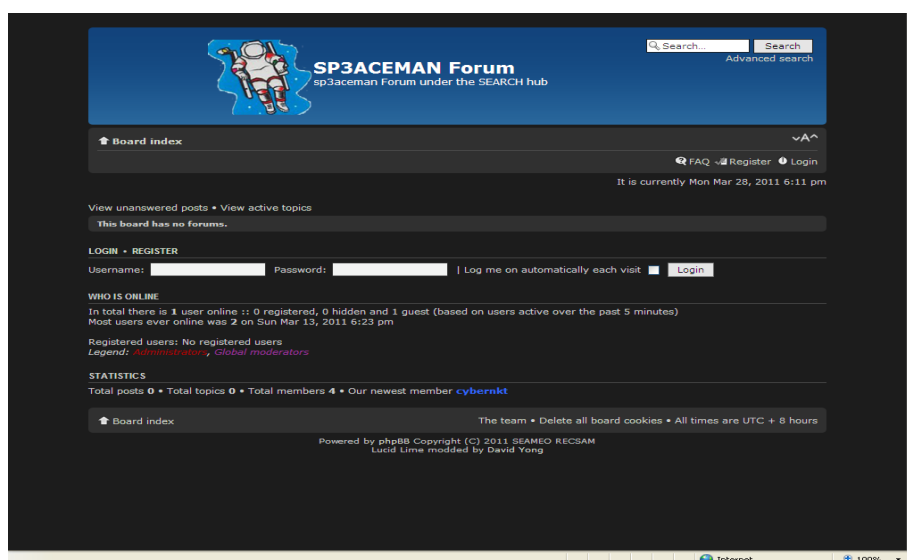
**Links**

**Hit Counter**  
02498  
Visitor Counters

**Announcement Scroller**  
The study entitled 'Promoting sustainable living in the borderless world through blended learning platforms' was awarded with ICDE Prize for Innovation and Best Practice on the theme of Leadership [http://icde.org/b7C\_wRfS5C.ips] during the ICDE World Conference (celebrating 75 years of global impact) at Tienjin, China (16th to 18th October 2013) [http://www.tjrtvu.edu.cn/icde/en/en.html]. The award recipients would like to acknowledge the contribution by ICDE at Norway and all the sponsors (Hamdan bin Mohammed e-University, United Arab Emirates; The OU of Japan; Korean National OU; The OU UK; ...)

Figure 2. Print screen of the recent SP<sup>3</sup>ACEMAN e-portal with highlights in the announcement scroller on the latest events (in 2013)[<http://sp3aceman.net>]

This portal is designed for all types of learners with various levels of background knowledge and academic achievement to explore further on investigative research. SP<sup>3</sup>ACEMAN was introduced with scaffolded instruction (SI). Dickson, Chard & Simmons (1993) described scaffolded instruction as a systematic sequencing of prompted content, materials, tasks, with teacher and peer support designed for beginners of PBA/PBL. This e-portal, which is supported by a closed forum was developed using WordPress, i.e., a free and open source blogging tool and a dynamic content management system (CMS) based on PHP and MySQL (Wikipedia, 2012). The SP<sup>3</sup>ACEMAN e-portal was used to facilitate wider groups of participation towards Education for All (EFA) and fostering creativity with sharing of more Open Educational Resources (OER). More challenging activities were also prepared for advanced learners for self-directed/self-paced/self-accessed learning. Some of the research evidences related to SP<sup>3</sup>ACEMAN had been reported by Ng (2009) and Ng (2010) with downloadable resources as OER available from <http://forum.sp3aceman.net> (as shown in *Figure 3* and *Figure 4*) with more detailed announcement provided as shown in *Figure 5*.



*Figure 3.* The closed forum site of SP<sup>3</sup>ACEMAN e-portal [<http://forum.sp3aceman.net>]

*Figure 4* is the printscreen of the upper part of the main activity page of e-forum site that includes (a) **General introduction and reference resources** (i.e. Input on PBA/PBL support tool and evaluation rubric, Archival records of SSYS congress reports and research projects, Networking/Events/Announcements, Publications and Success stories); (b) **Sharing of resources for topics of interests** (i.e. Astronomy; Climate change and environmental issues; Health science and nutrition; Values-based water education; Other science and maths related topics via interdisciplinary/cross-curricular approaches; Science/maths, culture and indigenous knowledge; Ideas and resource centre; Brain teasers and brainstorming for experimentation; The Lounge) and (c) **Case studies/Archives/On-going sharing or collaboration** (i.e. Project schools participated in PBA/PBL research activities; Regional Centre/Institute/University; Project schools participated in science fair/carnival/congress/workshop).

GENERAL INTRODUCTION AND REFERENCE RESOURCES		TOPICS	POSTS	LAST POST
	Input on PBA/PBL Support Tool and Evaluation Rubric	37	63	by <b>tlpicazo</b> Tue Nov 15, 2011 5:25 am
	Archival Records of 'Search for SEAMEO Young Scientists' (SSYS) Congress Reports and Research Projects	9	74	by <b>jalpillo</b> Mon Nov 14, 2011 7:50 pm
	Networking/Events/Announcements, Publications and Success stories	13	19	by <b>alicezhou</b> Fri Nov 18, 2011 4:17 pm

SHARING OF RESOURCES FOR TOPICS OF INTERESTS		TOPICS	POSTS	LAST POST
	Astronomy/Astrophysics and Space Science Moderator: <b>Moderators</b>	9	20	by <b>liyan9565</b> Thu Nov 10, 2011 4:17 pm
	Climate Change and Environmental Issues Moderator: <b>Moderators</b>	14	38	by <b>ceqrxew</b> Sun Nov 20, 2011 7:36 pm
	Health Science and Nutrition Moderator: <b>Moderators</b>	11	23	by <b>jalpillo</b> Mon Nov 14, 2011 7:51 pm
	Values-based Water Education Moderator: <b>Moderators</b>	10	20	by <b>chunli956</b> Mon Nov 14, 2011 4:27 pm
	Other Science Related Topics via Interdisciplinary/Cross-curricular Approaches Moderator: <b>Moderators</b>	14	21	by <b>chunli956</b> Mon Nov 14, 2011 4:26 pm
	Other Mathematics Related Topics via Interdisciplinary/Cross-curricular Approaches Moderator: <b>Moderators</b>	5	9	by <b>jalpillo</b> Mon Nov 14, 2011 7:52 pm
	Science/mathematics, Culture and Indigenous knowledge Moderator: <b>Moderators</b>	4	5	by <b>skalasdmg</b> Thu Nov 10, 2011 8:58 am
	Ideas and Resource Centre Moderator: <b>Moderators</b>	9	35	by <b>ceqrxew</b> Sun Nov 20, 2011 7:37 pm
	Brain Teasers and Brainstorming for Experimentation Moderator: <b>Moderators</b>	8	11	by <b>skalasdmg</b> Thu Nov 10, 2011 9:00 am
	The Lounge Moderator: <b>Moderators</b>	23	30	by <b>ceqrxew</b> Sun Nov 20, 2011 7:35 pm

Figure 4. Print screen of the activity page or e-forum site of SP<sup>3</sup>ACEMAN [http://forum. sp3aceman.net]

Figure 5 is the printscreen of sub-heading 'Networking/Events/Announcements'.

**SP3ACEMAN Forum**  
sp3aceman Forum under the SEARCH hub

Board index < General Introduction and Reference Resources < Networking/Events/Announcements, Publications and Success stories < Networking/Events/Announcements

User Control Panel (0 new messages) • View your posts • FAQ • Members • Logout [ cyberadmin ]

[ Moderator Control Panel ]

### Networking/Events/Announcements

Moderator: **Moderators**

NEWTOPIC \* Search this forum Search Mark topics read • 3 topics • Page 1 of 1

ANNOUNCEMENTS	REPLIES	VIEWS	LAST POST
<b>Board Update</b> by <b>adunth</b> • Sat Aug 27, 2011 11:29 pm	0	170	by <b>adunth</b> Sat Aug 27, 2011 11:29 pm
<b>Disclaimer</b> by <b>adunth</b> • Thu Mar 31, 2011 1:17 pm	0	243	by <b>adunth</b> Thu Mar 31, 2011 1:17 pm

TOPICS	REPLIES	VIEWS	LAST POST
<b>Announcements on Events/Competitions</b> 0 by <b>cyberadmin</b> • Mon Apr 18, 2011 9:23 am	1	23	by <b>cyberadmin</b> Fri Jul 01, 2011 5:32 pm
<b>Links to 'South East Asia Regional Capacity-enhancement Hub'</b> by <b>cyberadmin</b> • Mon Apr 18, 2011 9:15 am	1	33	by <b>academics</b> Thu May 05, 2011 9:52 pm
<b>Facilitator needed for water watch penang</b> 0 by <b>hollowman</b> • Wed Apr 27, 2011 1:19 am	1	5	by <b>academics</b> Wed Apr 27, 2011 10:13 am

Display topics from previous: All Topics Sort by Post time Descending Go

NEWTOPIC \* Mark topics read • 3 topics • Page 1 of 1

Figure 5. More details announcement are provided in the 'Networking/ Events/ Announcement' column [http://forum. sp3aceman.maays.net /viewforum.php?f=70]



## Developing and piloting a support tool for scaffolded instruction during investigative activities

This programme was monitored and evaluated using the POSITIVE rubric guide [an acronym for ‘**P**lanning, **O**bjective/organization, **S**kills, **I**nformation procurement, **T**raining/transfer of HOT skills, **I**nvolvement/Incorporating pedagogical-content knowledge (PCK), **V**alues with enhanced motivation and **E**valuation/exchange/enrichment/ever-lasting exposure’]. The first step in developing this support tool involved summarizing the essential elements of PBL to be deliberated with an acronym ‘POSITIVE’ in the rubric devised to guide teachers and non-gifted learners or underachievers with low motivation in science when implementing PBL activities in Community of Practice (CoP). Non-gifted learners or underachievers are students who are not talented in certain aspect, do not perform as well as expected or the IQ indicates their low academic ability compared to high-achievers or gifted/more able learners (Myhill, 2002). They may be students who do not achieve academically in their school curriculum as measured by school tests and examinations (Menon, 1998). In the aforementioned two research studies on PBA and PBL, ‘non-gifted learners, underachievers or low achievers’ were used to include all learners other than high-achievers or gifted learners. It is believed that the children’s potential development in working alone is less than what they can achieve when working in collaborative teams as explained in Zone of Proximal Development (ZPD) theory. ZPD is a concept defined by Vygotsky (1978) to represent the difference between a child’s independent problem-solving activity and the level of problem-solving possible under the guidance of an adult, a more capable peer or ‘More Knowledgeable Others’ (MKO) (McCormick & Paechter, 1999). It is expected that these students’ abilities will be enhanced when they work closely with someone who are more skilled. Hence the following were identified as the roles of POSITIVE support tool, i.e.:

- To guide the reflective practice of teachers as core member in CoP towards more in-depth understanding before they introduce and assess PBL through scaffolded instruction (PBL-SI) activities among learners of various levels especially non-gifted students.
- To support teachers in *scaffolding* the students’ practice in PBL-SI, continually adjusting the level of their help in response to the students’ level of performance with feedback of results; thereby instill the skills necessary for their future independent problem-solving ability as explained in Zone of Proximal Development (ZPD) theory.

According to this, the POSITIVE support tool that is anchored in a social constructivist theoretical framework, ‘*Planning and Objectives*’ are considered as two important components. This is because literature revealed that “*setting clear learning objectives at the start of a lesson and encouraging pupils to assess their own understanding following each lesson*” (Spavold, 2005, p.119) was effective to enhance the motivation of students who appeared to be more engaged throughout the lessons. Various cognitive, psychomotor and affective factors contributing to effective learning are considered in the tool. It was also assumed that all types of learners especially non-gifted learners would develop beliefs about the extent to which their tasks in PBL were useful and enjoyable according to ‘*Expectancy-Value Theory*’ (Palmer, 2007). The meaning of each letter in the acronym ‘POSITIVE’ is related to the features of PBL-SI and is elaborated below as:

- P** [**Planning** the **Procedures** in carrying out thoughtfully planned PBL teaching and learning **process**]
- O** [**Objectives/Organization** considering diverse learning styles and socio-cultural background]
- S** [**Skills** in experimentation, e.g. scientific (process/manipulative) and ICT or technology skills]
- I** [**Information**/data gathering and resources/facilities procurement via cooperative role taking]
- T** [**Training** and **Transfer** of learning via Higher Order Thinking Skills (HOTS)]
- I** [**Involvement** actively in various context, **Incorporating** pedagogical-content knowledge (PCK)]
- V** [**Values** emphasis and inculcation of positive attitudes/interests/motivation (AIM) towards STES]
- E** [**Evaluation**/assessment, **Exchange** of ideas/experiences, **Enrichment**, **Everlasting Exposure**]

The support tool used as part of this study was ‘content validated’ by one Physics master teacher, one environmental expert and one science lecturer. It was later pilot-tested with the in-service teachers who attended training courses at RECSAM in year 2004 and 2006 when the first author was the course supervisor as reported in Ng (2004) and Ng (2006). The course titles were ‘Action research: Improving teaching in primary and secondary science’ (AS-1018)(9/2 to 20/3/2004) and ‘Designing and implementing project/problem/ programme-based learning in secondary science’ (SS-6384)(20/2 to 17/3/2006). Moreover, the POSITIVE tool had also been used by a group of a local secondary school Form 4 students (Ng et al., 2006). It was later revised in the form of guiding template in May 2008 with adaptation of the essential features as suggested by Lambros (2008) Tunnicliffe (2008), Spurr and Loveless (2008). The tool was again reviewed by one Master Teacher, three senior science teachers and one lecturer during the pilot study phase in July 2008. The findings of the validation process of the instrument and the results of the pilot studies conducted since 2004 were presented in ICDE world conference (Ng, 2009).

The POSITIVE tool outlines the essential elements of PBL with the translation of the researcher’s knowledge from literature review and understanding on various aspects of problem-solving behaviours including the mastery of *conceptual* and *procedural* knowledge in PBL. Apart from the aforementioned, the researcher has in the POSITIVE support tool and rubric, requested the respondents to reflect on their learning through developing scientific/ICT skills (**S**); Information gathering (**I**) using non-digital/digital mode of resource procurement; Transfer of learning from trainings (**T**) through higher order or critical/creative thinking, metacognitive thinking, decision making and problem-solving skills that are related to *cognitive/psychomotor* aspects. Moreover, the aspects of ‘*values*’ emphasis and motivation in STES via PBL (**V**) are included. Thus this support tool covers three vital aspects of problem-solving in PBL, i.e. cognitive, psychomotor and affective domains, with

evaluation/exchange supported by ICT tools (such as e-learning portal, multimedia, web-conferencing tool).

### **Enrichment and networking activities for PBL programme**

PBL has been used in science education for gifted students for many years (Sitkoff, 1988; Gallagher & Stepien, 1996). This issue about equitable participation of PBL by all students was raised by an audience during the paper presentation by the first author (Ng, et al., 2006) in 10<sup>th</sup> APEID conference (6<sup>th</sup> to 8<sup>th</sup> December 2006) organized by UNESCO Bangkok with the theme *Education for Sustainable Development* (ESD). Literature revealed that there is a gap between theory and practice whereby students were not given equal opportunities to participate in numerous educational initiatives. Betrus (2007) stated that a renewed movement toward learner-centered approaches in education has become possible instructional settings in which students defined their own content, and pursue learning based on their own interests. But this opportunity was limited to high-achievers or gifted students. The SP<sup>3</sup>ACEMAN programme supported by the POSITIVE evaluation rubric was designed to bridge the aforementioned educational gap. The studies for PBA (2003 to 2008) and PBL (2007 to 2012) involved mostly underachievers or non-gifted learners in two main PBA and PBL research activities with some of the more successful students who also eventually participated in SSYS 2006 (in the aforementioned PBA study) and SSYS 2010 (in the aforementioned PBL study). It is envisaged that at the end of the studies, the POSITIVE support tool could be made accessible to a wider group of participation in technology enhanced PBL with networking opportunities and to propose solutions to minimize the barriers in attaining the goals of Education for All (EFA). In fact, during the research studies, all the students were also given the opportunities to participate in other enrichment and networking activities such as the e-forum (<http://forum.maays.net>) and workshop/activity organized by ‘**MA**gnificent **A**dvancement for **Y**oung **S**cientist’ (MAAYS) to interact with other students and educators, share resources and exchange findings.

### **Development of e-portal to promote blended learning activities**

Based on the philosophy and theoretical framework as aforementioned, the SP<sup>3</sup>ACEMAN site is designed for all types of learners with various levels of background knowledge and academic achievement to explore more about investigative research activities. A guided tour with scaffolded activities is specially designed for beginners with support rendered [for example, ‘*Teachers’ and students’ guide for the use of support tool*’ as illustrated in Figure 6]. More challenging activities are also prepared for advanced learners for self-accessed learning.



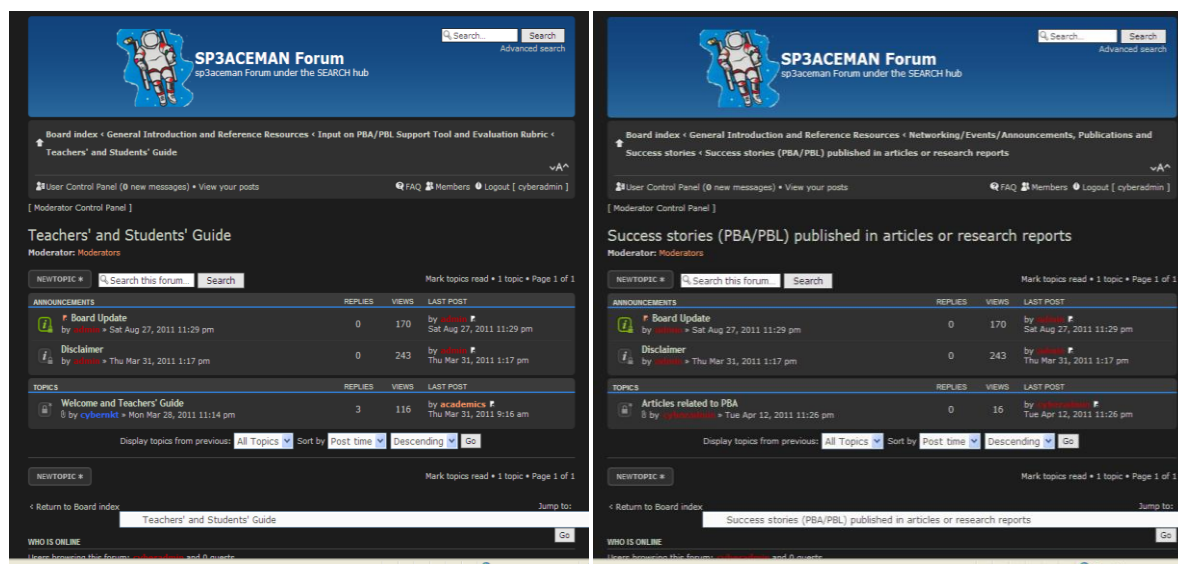


Figure 6. 'Teachers' and students' guide' are provided [<http://forum.sp3aceman.maays.net/viewforum.php?f=28>] and 'Success stories' related to SP<sup>3</sup>ACEMAN programme are also disseminated in the forum [<http://forum.sp3aceman.maays.net/viewforum.php?f=11>]

**SP<sup>3</sup>ACEMAN blended learning in SEARCH for Science and Mathematics Researchers**  
This section elaborates other activities implemented for SP<sup>3</sup>ACEMAN with print screen pictures.

#### (A) Transformation of practices for student-centred e-learning in Community of Practice (CoP)

##### (1) Promoting PBA and PBL through face-to-face workshops and e-forum initiatives

Apart from promoting on-line discussion and e-forum exchanges, face-to-face workshops were also organized to develop resource materials that enhance science and mathematics student-centred learning through project-based activities (PBA) and problem-based learning (PBL). The first PBL workshop was conducted from 21 to 24 June 2011 [as illustrated in Figure 7 to Figure 12] as part of the global learning initiatives towards 'Education for Sustainable Development' (ESD) and 'Education for All' (EFA). Interactive ICT tool i.e. 'Learning Activities Management System' (LAMS) was the main platform for the development PBA and PBL lessons. Teaching and learning materials or e-learning objects and resource materials were developed by participants who were mainly science and mathematics teachers or lecturer from local secondary/primary schools and teacher training college. The following were the objectives of the first workshop:

- To prepare teaching and learning materials related to ESD (such as values-based water education, climate change and environmental awareness) using 'Learning Activity Management System' (LAMS) as platform to develop e-learning objects.
- To develop a global learning platform supported through e-learning objects that enhance student-centred learning and to develop investigative activities focusing on PBA/PBL in search of future talents/researchers using the curriculum developed to promote ESD.
- To widen enrichment opportunities involving wider groups of learners towards EFA and extend networking activities using technological tools leveraging on ever expanding digital learning technologies and available Open Educational Resources (OERs).



*Figure 7.* Input from facilitator on ‘Learning Activities Management System’ (LAMS) during SP<sup>3</sup>ACEMAN workshop to develop e-learning resources (21 to 24 June 2011) that promote PBA and PBL



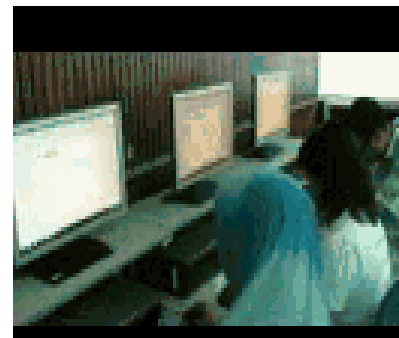
*Figure 8.* Workshop participants listening attentively to the facilitator’s input



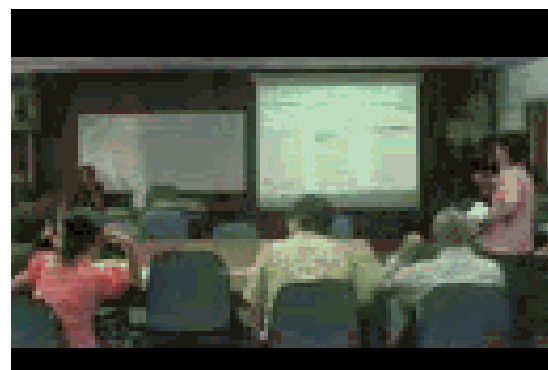
*Figure 9.* Workshop participants sitting in the respective project teams inside the computer laboratory



*Figure 10.* Workshop participants’ hands-on sessions on the assigned tasks in LAMS and completed draft lesson plans using the ICT tools being uploaded onto SP<sup>3</sup>ACEMAN e-forum [as illustrated in *Appendix A to E* <http://forum.sp3aceman.maays.net/viewforum.php?f=18>]



*Figure 11.* Debriefing session during SP<sup>3</sup>ACEMAN workshop (21/6/2011).



*Figure 12.* Interactive question and answer (Q&A) session.

The first workshop with blended learning activities consisted of:

- (I) Interactive input with workshops and cooperative project team work activities incorporating the use of ICT tools that covered:

- Integration of ICT tools with student-centred pedagogies mainly through PBA and PBL from the aspects of Science, Mathematics and Social sciences (i.e. Geography, Language/Arts, Physical/Health/Moral Education, etc.). The areas discussed include Learning Activities Management Systems (LAMS) and use of ICT tools for the development of e-learning objects; essential scientific and Higher Order Thinking (HOT) skills for investigation; problem-solving and critical/creative thinking skills; values-based and issues-based approaches; constructivist and contextual learning; interdisciplinary/cross-curricular approaches incorporating active learning strategies considering various aspects of multiple intelligence.
- Planning and assessment/evaluation skills supported by rubric as guide towards 'Planning, Objective setting/organizing, Skills (scientific/ICT), Information, Training/transfer of HOT skills, Involvement/incorporating pedagogical-content knowledge (PCK), Values-emphasis to promote motivation, Evaluation/exchange/enrichment/ever-lasting exposure' (POSITIVE) implementation of PBA/PBL.
- Planning activities with implementation of primary and secondary science and/or mathematics curriculum including the preparation of (a) Pedagogical Content Knowledge (PCK) required for PBA/PBL; (b) flow diagrams and action plans for the development of e-learning objects; (c) forum posts and e-learning output being uploaded onto the closed forum site of SP<sup>3</sup>ACEMAN (<http://forum.sp3aceman.net>) and LAMS (<http://lamsfoundation.org>).

(II) Enrichment activities with input through seminar presentation and video viewing which included:

- Seminar entitled '*Blended learning: Rebranding learning for the 21<sup>st</sup> Century*' by Prof. Dr. Zoraini Wati Abas (Professor of e-learning, Open Universiti Malaysia) with the second author.
- Video presentation on topics, e.g. (a) 'Did you know?' and 'What is the next generation learning?' (part of seminar presentation on 'Blended learning' by Prof. Zoraini Wati Abas) (b) '*South East Asia Regional Capacity-enhancement Hub*' (SEARCH) portal and its six sub-portals in SEARCH for science and mathematics researchers' (part of the launching ceremony of SEARCH portal with multimedia).

At the end of the workshop/seminar, the following were completed by the participants:

1. Registration as member of the e-forum under the account provided for their respective project school with participation in threaded discussion topics in the SP<sup>3</sup>ACEMAN portal [URL: <http://forum.sp3aceman.net>].
2. Preparation of action plans for teacher education resources with outline of intended curricula to be planned for particular age groups and evaluation guided by POSITIVE rubric as well as flow-chart for e-learning objects incorporating the school science/mathematics/social science curriculum focusing on ESD-related issues (e.g. values-based water education, climate change) that could be used to promote students' investigation and PBA/PBL activities.
3. Pre-/post-tests responses on the learning experience.

4. Development of e-learning objects or interactive resource materials that promote student-centred learning through PBA/PBL involving wider groups of students towards EFA using support tools and scaffolded instruction (SI) activities guided by evaluation rubric (as shown in *Appendix A to D* elaborated below)(More details are also downloadable from URL <http://forum.sp3aceman.maays.net/viewforum.php?f=18>).

*Appendix A* is an outline plan by primary teacher participants working with teacher educator to develop lesson ideas incorporating PBA for the topic ‘Waste management’ (Year 6 science) within the timeframe allocated for the lesson using transmission approach (The final lesson output was posted onto <http://forum.sp3aceman.maays.net/viewforum.php?f=61>).

*Appendix B* consists of outline plans for secondary teacher participants working with teacher educator to develop lesson ideas incorporating PBA/PBL for the topics ‘Endangered ecosystem’ (Form 4 Biology) and ‘Preservation and conservation – Air pollution (acid rain)’ (Form 5 General Science) within the timeframe initially allocated for the lesson to be delivered using transmission approach (The final lessons output were also posted onto <http://forum.sp3aceman.maays.net/viewtopic.php?f=54&t=112> and <http://forum.sp3aceman.maays.net/viewtopic.php?f=53&t=113> respectively).

*Appendix C* is an outline plan by secondary teacher participants who developed lesson ideas incorporating PBA/PBL for the topic ‘Drinking water’ (Form 2 science) within the timeframe initially allocated for the lesson to be delivered using transmission approach (The final lesson output was posted onto <http://forum.sp3aceman.maays.net/viewtopic.php?f=24&t=123>). The flowchart of the e-lesson incorporating Learning Activities Management System (LAMS) was also illustrated including the icons showing ‘Activity’ and its corresponding ‘Content’, i.e. (1) ‘Notice board’ to give instructions to students on what to do; (2) ‘Share resources’ with URLs given on ‘drought, Climate Change, webpage on Penang Water Authorities’; (3) ‘Assessment’ that includes multiple-choice questions (MCQ), matching pairs questions, true-false questions and short answer questions; (4) ‘Web conference’ with instruction for students to sign up and participate in the web conference.

*Appendix D* is an outline plan by secondary teacher participants who developed lesson ideas incorporating PBA/PBL for the topic ‘Litter-bugs syndrome’ (Form 4 mathematics/additional mathematics) within the timeframe initially allocated for the lesson to be delivered using transmission approach (The final lesson output was posted onto [forum.sp3aceman.maays.net/viewtopic.php?f=47&t=106](http://forum.sp3aceman.maays.net/viewtopic.php?f=47&t=106)). The flowchart of the e-lesson incorporating LAMS as well as the summary of PBL lesson ideas guided by ‘Planning, Objectives/organization, Skills, Information, Training/transfer, Incorporating Pedagogical-content knowledge (PCK), Values, Evaluation/exchange/enrichment’ (POSITIVE) rubric were also illustrated.

The second workshop was conducted from 17-18 May 2012 and 21-22 May 2012 to review the draft lesson plans through ‘Lesson Study’ approach with input given by the experts in the fields of Science, Mathematics, PBL, ICT and academic staff of RECSAM. After two ‘Lesson Study’ cycles, the refined lesson plans were posted onto the forum site of the SP<sup>3</sup>ACEMAN portal (<http://forum.sp3aceman.net>) for the subsequent e-learning activities focusing on ESD/EFA-related activities.

Problem scenarios were created in accordance with science and mathematics curriculum to enhance students' investigative skills using the PBL support tool and evaluation rubric [downloadable from the e-forum]. Reference was also made to existing resources or materials adapted from secondary and primary school science, mathematics and social science curricula that were developed in previous phases. Adaptation was also made with reference to ESD/EFA-related topics implemented in the international programmes participated by the participants prior to the workshop such as 'Science across the World' (SAW) (Ng, Toh & Boey, 2010). Another regional programme was the 'Human Values-based Water, Sanitation and Hygiene Education' (HVWSHE) or 'Water and Values Education' (WAVE)(SEAMEO Secretariat, 2007) with publication by Ng (2007), Ch'ng, Tan and Ng (2009). Several ESD/EFA-related publications e.g. 'Climate Change related issues' were also developed in collaboration with SEAMEO centres (Ch'ng, et al., 2010; Toh, et al. 2010). During the workshop, the participants went through self-directed/self-paced/self-accessed learning using a blended learning mode, i.e. with reference to off-line resources from RECSAM's library or other available references. They also participated in hands-on/minds-on activities using on-line resources through surfing the Internet and web-links related to PBA/PBL under SEARCH and its six sub-portals

## (2) *Facilitating e-sharing sessions through training courses and other project/event/activity*

In conjunction with the conduct of centre's regular or customized training courses (e.g. TCTP in *Figure 13* and *14*) and other projects, programmes or events such as 'Science Across the World' (SAW)(as illustrated in *Figure 15*), 'Search for SEAMEO Young Scientist' (SSYS) congress (as shown in *Figure 16*) and community project with SK Pos Dipang in Kampar, Perak (as illustrated in *Figure 17*), SP<sup>3</sup>ACEMAN e-platform was also used for interactive e-discussions, information dissemination and sharing of resources.



*Figure 13.* Third Country Training Programme (TCTP) Colombo Plan course (19/9-7/10/11) participants' involvement in SP<sup>3</sup>ACEMAN activities [http://forum.sp3aceman.maays.net/viewtopic.php? f=31&t=150]



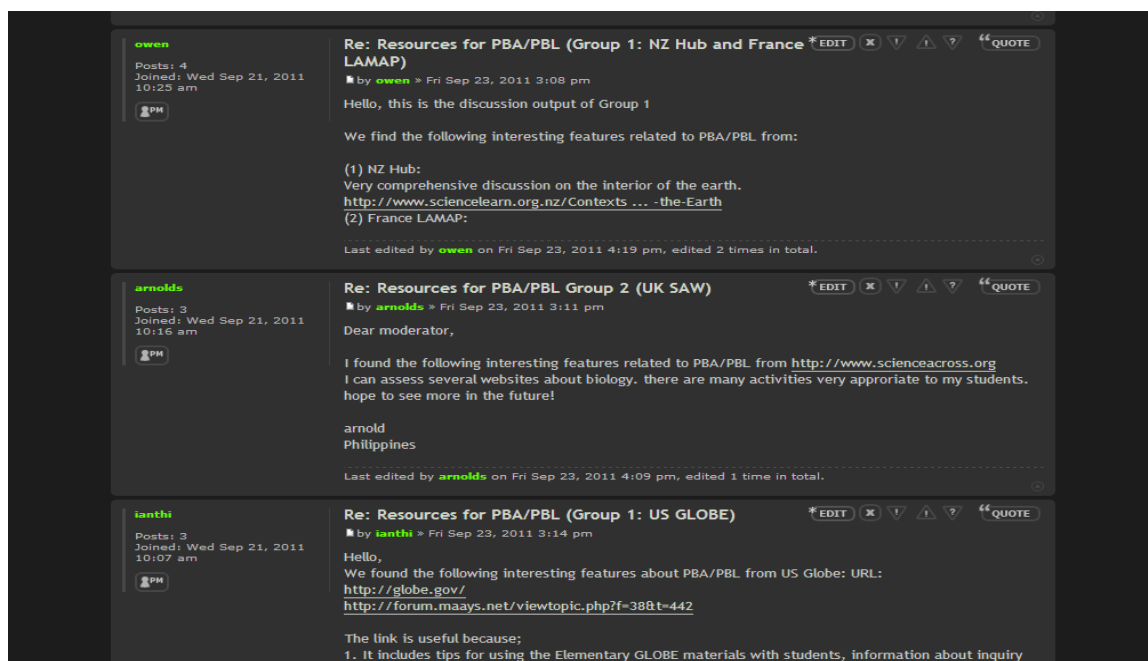


Figure 14. Output of group discussion generated from TCTP course posted onto e-forum [http://forum.sp3aceman.maays.net/viewtopic.php?t=152]

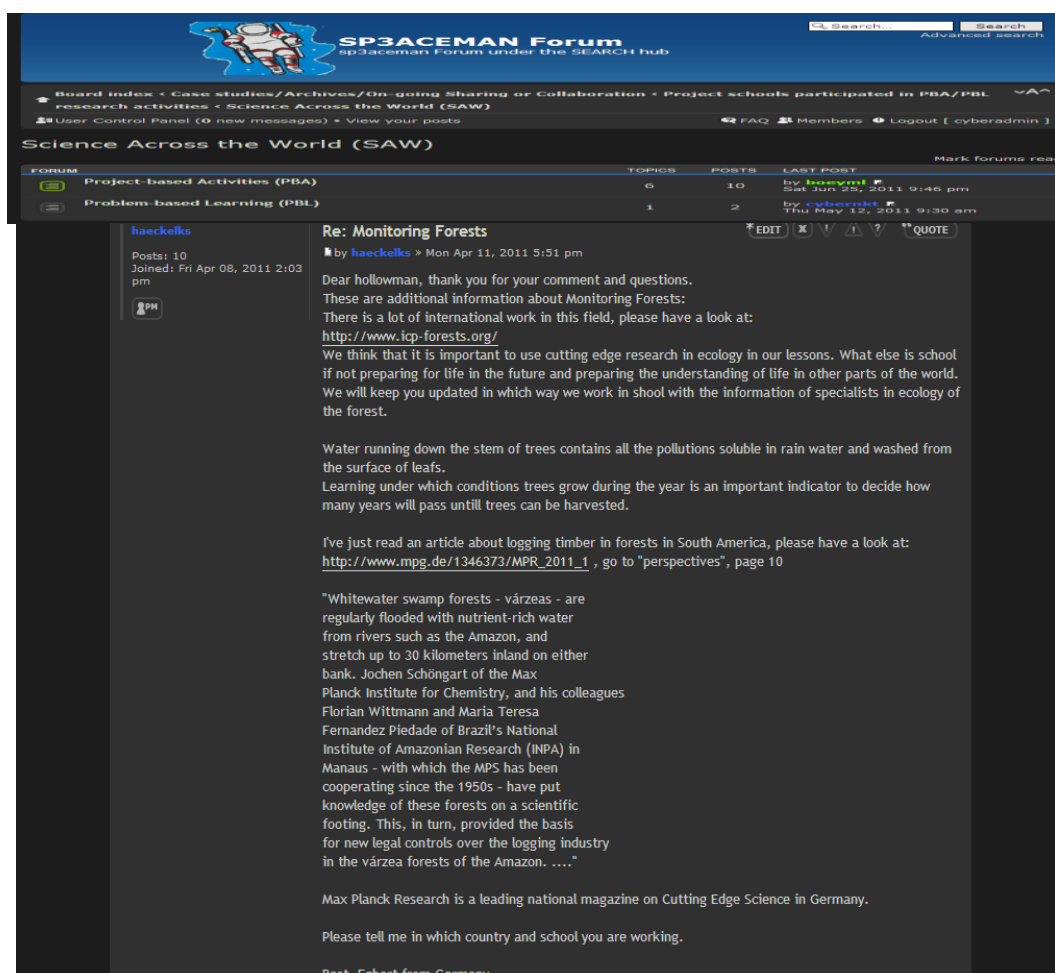


Figure 15. 'Science across the World' (SAW) team members shared resources and exchanged information using the SP<sup>3</sup>ACEMAN portal [http://forum.sp3aceman.maays.net/viewforum.php?f=64 and f=14&t=36]

The screenshot shows the SP3ACEMAN Forum interface. At the top, there's a blue header with the forum logo and name. Below it, a navigation bar lists various forum sections. A user control panel shows the user is logged in as 'cyberadmin'. The main content area is titled 'SSYS related articles, publication series and special issues'. It features a search bar and a list of announcements and topics. The announcements include a 'Board Update' and a 'Disclaimer'. The topics list includes 'SSYS publication series' and 'Publications related to SSYS'. The interface also includes pagination controls and a 'Jump to:' section.

ANNOUNCEMENTS	REPLIES	VIEWS	LAST POST
<b>Board Update</b> by admin » Sat Aug 27, 2011 11:29 pm	0	168	by admin » Sat Aug 27, 2011 11:29 pm
<b>Disclaimer</b> by admin » Thu Mar 31, 2011 1:17 pm	0	243	by admin » Thu Mar 31, 2011 1:17 pm

TOPICS	REPLIES	VIEWS	LAST POST
<b>SSYS publication series</b> by cyberadmin » Sat Dec 24, 2011 8:54 am	12	121	by cyberadmin » Sat Dec 24, 2011 10:03 am
<b>Publications related to SSYS</b> by cyberadmin » Tue Apr 12, 2011 11:17 pm	0	13	by cyberadmin » Tue Apr 12, 2011 11:17 pm

Display topics from previous: All Topics Sort by Post time Descending Go

NEWTOPIC \* Search this forum. Search Mark topics read • 2 topics • Page 1 of 1

< Return to Board index SSYS related articles, publication series and special issues Jump to:

Figure 16. A special section was allocated for sharing of 'Search for SEAMEO Young Scientist' (SSYS) related articles, publication series and special issues  
[URL: <http://forum.sp3aceman.maays.net/viewforum.php?f=10>]

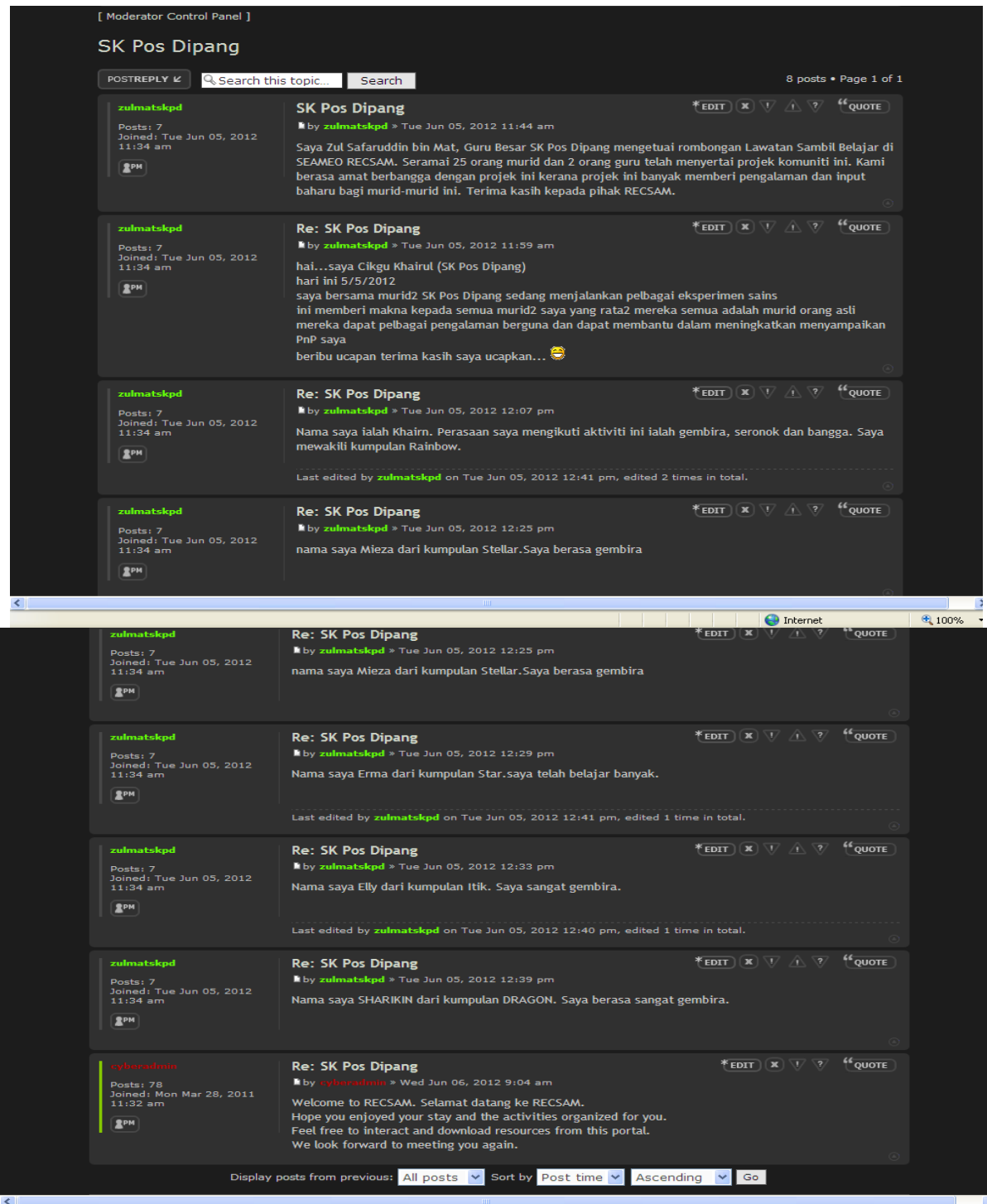


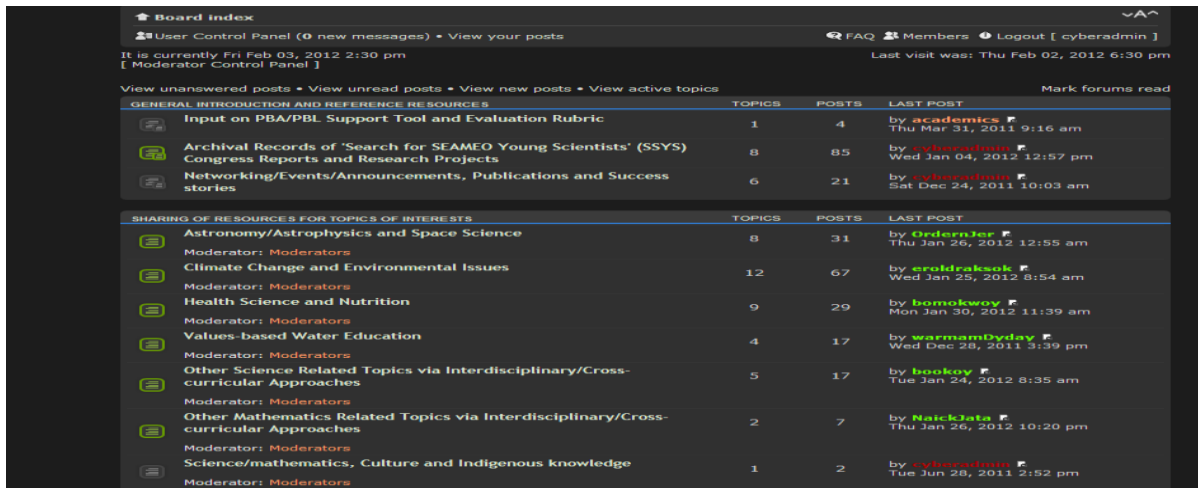
Figure 17. A forum site was also created for SK Pos Dipang to share their thoughts including learning experience in the activities organized during the recent community project (4-7/6/2012) held at RECSAM

[URL: <http://forum.sp3aceman.maays.net/viewtopic.php?f=76&t=1219>]

## (B) Theme-based approach to science and mathematics learning

### (1) Topics of special interests with skills development among e-forum participants

There were many topics of special interests related to current trends and issues. For a start, the SP<sup>3</sup>ACEMAN team members had chosen four topics of special interest and of immediate concern (*Figure 18*) [i.e. Astronomy; Climate change and environmental issues (*Figure 19*); Water and values-based education (*Figure 20*); Health science and nutrition (*Figure 21*)] which attracted much participation in e-forum by blog viewers. Facilitators also used this site for the teaching related to ‘Education for Sustainable Development’ (ESD). For example, the output of active learning pedagogy incorporating role play was disseminated as forum discussion on ‘the greenhouse effect’ [<http://forum.maays.net/viewtopic.php?f=31&t=301>]



TOPICS	POSTS	LAST POST
Input on PBA/PBL Support Tool and Evaluation Rubric	1	4 by academics F Thu Mar 31, 2011 9:16 am
Archival Records of 'Search for SEAMEO Young Scientists' (SSYS) Congress Reports and Research Projects	8	85 by cyberadman F Wed Jan 04, 2012 12:57 pm
Networking/Events/Announcements, Publications and Success stories	6	21 by cyberadman F Sat Dec 24, 2011 10:03 am
<b>SHARING OF RESOURCES FOR TOPICS OF INTERESTS</b>		
Astronomy/Astrophysics and Space Science Moderator: Moderators	8	31 by GordenJae F Thu Jan 26, 2012 12:55 am
Climate Change and Environmental Issues Moderator: Moderators	12	67 by aridrakook F Wed Jan 25, 2012 8:54 am
Health Science and Nutrition Moderator: Moderators	9	29 by bomokwoy F Mon Jan 30, 2012 11:39 am
Values-based Water Education Moderator: Moderators	4	17 by warmamDyday F Wed Dec 28, 2011 3:39 pm
Other Science Related Topics via Interdisciplinary/Cross-curricular Approaches Moderator: Moderators	5	17 by bookoy F Tue Jan 24, 2012 8:35 am
Other Mathematics Related Topics via Interdisciplinary/Cross-curricular Approaches Moderator: Moderators	2	7 by NaickJata F Thu Jan 26, 2012 10:20 pm
Science/mathematics, Culture and Indigenous knowledge Moderator: Moderators	1	2 by cyberadman F Tue Jun 28, 2011 2:52 pm

*Figure 18.* Topics of special interest attracted the participation of quite a number of bloggers [<http://forum.sp3aceman.maays.net/index.php>]

**SP3ACEMAN Forum**  
sp3aceman Forum under the SEARCH hub

Board index < Sharing of resources for topics of interests < Astronomy/Astrophysics and Space Science

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[ Moderator Control Panel ]

### Astronomy/Astrophysics and Space Science

Moderator: Moderators

NEWTOPIC \* Search this forum Search

Mark topics read • 5 topics • Page 1 of 1

ANNOUNCEMENTS	REPLIES	VIEWS	LAST POST
Board Update by <a href="#">cyberadmin</a> • Sat Aug 27, 2011 11:29 pm	0	168	by <a href="#">cyberadmin</a> • Sat Aug 27, 2011 11:29 pm
Disclaimer by <a href="#">cyberadmin</a> • Thu Mar 31, 2011 1:17 pm	0	243	by <a href="#">cyberadmin</a> • Thu Mar 31, 2011 1:17 pm

TOPICS	REPLIES	VIEWS	LAST POST
The Earth in the Universe by <a href="#">cyberadmin</a> • Fri Apr 22, 2011 3:42 pm	12	59	by <a href="#">cyberadmin</a> • Thu Jan 26, 2012 12:55 am
NASA Education Resources by <a href="#">jerritino</a> • Thu Apr 07, 2011 4:20 pm	3	22	by <a href="#">acurcecon</a> • Thu Jan 05, 2012 3:42 am
pluto by <a href="#">jadensmith95</a> • Fri May 20, 2011 2:07 pm	4	40	by <a href="#">warmamdyday</a> • Wed Dec 28, 2011 3:38 pm
Accelerated Expansion by <a href="#">JustAThought</a> • Wed Oct 05, 2011 4:06 am	0	18	by <a href="#">JustAThought</a> • Wed Oct 05, 2011 4:06 am
Astrophysics discussion by <a href="#">devoted1910</a> • Thu Apr 07, 2011 4:22 pm	1	21	by <a href="#">hollowman</a> • Mon Jul 11, 2011 1:06 pm

Display topics from previous: All Topics Sort by Post time Descending Go

[ Moderator Control Panel ]

### Climate Change and Environmental Issues

Moderator: Moderators

NEWTOPIC \* Search this forum Search

Mark topics read • 10 topics • Page 1 of 1

ANNOUNCEMENTS	REPLIES	VIEWS	LAST POST
Board Update by <a href="#">cyberadmin</a> • Sat Aug 27, 2011 11:29 pm	0	168	by <a href="#">cyberadmin</a> • Sat Aug 27, 2011 11:29 pm
Disclaimer by <a href="#">cyberadmin</a> • Thu Mar 31, 2011 1:17 pm	0	243	by <a href="#">cyberadmin</a> • Thu Mar 31, 2011 1:17 pm

TOPICS	REPLIES	VIEWS	LAST POST
Microscopy and Experiments by <a href="#">haeckelks</a> • Thu May 19, 2011 5:59 pm	9	37	by <a href="#">eroldraksok</a> • Wed Jan 25, 2012 8:54 am
The they also license the coach brand name for watches, shoe by <a href="#">zhangyang2</a> • Tue Dec 06, 2011 10:39 am	5	4	by <a href="#">Nupneonee</a> • Sun Jan 08, 2012 9:43 am
is there at deep sea have tree, plant?? by <a href="#">greybone</a> • Thu Apr 21, 2011 11:33 am	10	40	by <a href="#">acurcecon</a> • Thu Jan 05, 2012 3:39 am
The if the hair has previously been waxed or had tweezers us by <a href="#">esiUgg15</a> • Thu Dec 15, 2011 5:28 pm	5	6	by <a href="#">Clewarcle</a> • Sat Dec 24, 2011 10:39 am
Resources from GIFT workshop by <a href="#">cyberadmin</a> • Thu Jun 23, 2011 6:07 pm	3	13	by <a href="#">adverfrate</a> • Fri Dec 16, 2011 3:30 am
Teacher's Guidebook on Integrating Climate Change Issues by <a href="#">juli1964</a> • Tue Jun 28, 2011 8:30 am	3	28	by <a href="#">adedselve</a> • Fri Dec 09, 2011 6:38 am
2012 by <a href="#">jadensmith95</a> • Fri Apr 08, 2011 2:26 pm	2	20	by <a href="#">scampalda</a> • Thu Dec 08, 2011 8:50 am
Monitoring Forests by <a href="#">haeckelks</a> • Sat Apr 09, 2011 2:41 am	7	50	by <a href="#">miombo</a> • Fri Aug 12, 2011 4:07 am
Climate Change by <a href="#">boeyml</a> • Sat Jun 25, 2011 9:40 pm	1	21	by <a href="#">hollowman</a> • Mon Jul 11, 2011 1:36 pm
Resources from 'Green Profits' conference by <a href="#">cyberadmin</a> • Tue Mar 29, 2011 5:38 pm	3	51	by <a href="#">hollowman</a> • Mon Apr 11, 2011 2:53 pm

Display topics from previous: All Topics Sort by Post time Descending Go

Figure 19. Snapshots of some topics of interest under the themes 'Astronomy' and 'Climate Change and Environmental Issues' [http://forum.sp3aceman.maays.net/viewforum.php?f=13 and viewforum.php?f=14]

**SP3ACEMAN Forum**  
sp3aceman Forum under the SEARCH hub

Board index < Sharing of resources for topics of interests < Values-based Water Education

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### Values-based Water Education

Moderator: Moderators

NEWTOPIC \* Search this forum Search

Mark topics read • 3 topics • Page 1 of 1

ANNOUNCEMENTS	REPLIES	VIEWS	LAST POST
Board Update by <a href="#">cyberadmin</a> • Sat Aug 27, 2011 11:29 pm	0	170	by <a href="#">cyberadmin</a> • Sat Aug 27, 2011 11:29 pm
Disclaimer by <a href="#">cyberadmin</a> • Thu Mar 31, 2011 1:17 pm	0	243	by <a href="#">cyberadmin</a> • Thu Mar 31, 2011 1:17 pm

TOPICS	REPLIES	VIEWS	LAST POST
World Water Day and the importance of water conservation by <a href="#">cyberadmin</a> • Sat Dec 24, 2011 9:22 am	5	5	by <a href="#">warmamdyday</a> • Wed Dec 28, 2011 3:39 pm
The values of water towards health if practise correctly by <a href="#">cyberadmin</a> • Thu Mar 31, 2011 3:08 pm	5	19	by <a href="#">Venlimmak</a> • Tue Dec 20, 2011 7:46 am
Singapore Water Treatment: Reverse Osmosis by <a href="#">jerritino</a> • Thu Apr 07, 2011 4:15 pm	3	30	by <a href="#">haeckelks</a> • Sun May 22, 2011 8:45 pm

Display topics from previous: All Topics Sort by Post time Descending Go

Return to Board index Values-based Water Education

Figure 20. Special topic on 'Values-based Water Education' received informative responses, quite a number of views and a number of replies [http:// forum.sp3aceman. maays.net/viewforum.php?f=16]



## (2) Science related topics using interdisciplinary/cross-curricular approaches

The science topics were discussed on-line through the created 'Science related topics via interdisciplinary/cross-curricular approaches' column (Figure 22) created. Apart from referring to the school curriculum, students and bloggers also explored new topics of interests and discussed on-line. Occasionally, in-service teachers who had attended courses at RECSAM also posted new challenging questions and responded to the questions posted by students and other teachers.

**SP3ACEMAN Forum**  
sp3aceman Forum under the SEARCH hub

Board index < Sharing of resources for topics of interests < Health Science and Nutrition

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ANNOUNCEMENTS	REPLIES	VIEWS	LAST POST
Board Update by admin • Sat Aug 27, 2011 11:29 pm	0	168	by admin • Sat Aug 27, 2011 11:29 pm
Disclaimer by admin • Thu Mar 31, 2011 1:17 pm	0	243	by admin • Thu Mar 31, 2011 1:17 pm

TOPICS	REPLIES	VIEWS	LAST POST
Food related to cancer by wanzul • Wed Jun 22, 2011 2:51 pm	4	19	by homokway • Mon Jan 30, 2012 11:39 am
post workout meal by Alberto25 • Tue Jan 10, 2012 9:12 pm	1	3	by FutKeessMed • Sat Jan 14, 2012 4:45 am
exercise enhances your life by kimplpg • Thu Mar 31, 2011 7:13 am	9	51	by Alberto25 • Tue Jan 10, 2012 9:04 pm
health by jadenSmith95 • Fri Apr 08, 2011 2:34 pm	5	31	by choscrile • Thu Jan 05, 2012 9:43 pm
pendidikan jasmani by jadenSmith95 • Fri Apr 08, 2011 2:29 pm	2	14	by peeneusly • Thu Dec 22, 2011 3:44 am
health by wanzul • Fri May 20, 2011 2:14 pm	0	20	by wanzul • Wed Jun 22, 2011 2:47 pm
What did you eat by haeckelks • Fri May 20, 2011 3:47 pm	3	15	by boeyml • Mon Jun 20, 2011 4:33 pm

Figure 21. Questions posted on 'Health science and nutrition' column with frequency of views and replies [http://forum.sp3aceman.maays.net/viewforum.php?f=15]

**SP3ACEMAN Forum**  
sp3aceman Forum under the SEARCH hub

Board index < Sharing of resources for topics of interests < Other Science Related Topics via Interdisciplinary/Cross-curricular Approaches

User Control Panel (0 new messages) • View your posts

Moderator: Moderators

Search this forum...

Mark topics read • 4 topics • Page 1 of 1

ANNOUNCEMENTS	REPLIES	VIEWS	LAST POST
Board Update by admin • Sat Aug 27, 2011 11:29 pm	0	168	by admin • Sat Aug 27, 2011 11:29 pm
Disclaimer by admin • Thu Mar 31, 2011 1:17 pm	0	243	by admin • Thu Mar 31, 2011 1:17 pm

TOPICS	REPLIES	VIEWS	LAST POST
Integrating Biology, Chemistry and Eng/Ger - topic: forests by annehgw • Mon Sep 26, 2011 2:49 am	5	33	by bookoy • Tue Jan 24, 2012 8:35 am
Integrating science, arts and technology by MGTF, USM by cyberadmin • Tue Apr 12, 2011 5:52 pm	7	19	by Abensemom • Tue Dec 20, 2011 6:00 pm
Content and Language Integrated Learning - CLIL - Bio-Chem by haeckelks • Mon Oct 10, 2011 3:03 pm	0	4	by haeckelks • Mon Oct 10, 2011 3:03 pm
Integrating Science/Technology/Environment/Maths (STEM) by cyberadmin • Tue May 10, 2011 12:20 pm	0	9	by cyberadmin • Tue May 10, 2011 12:20 pm

Display topics from previous: All Topics Sort by Post time Descending Go

Figure 22. Questions posted on 'Science related topics via interdisciplinary/cross-curricular approaches' [http://forum.sp3aceman.maays.net/viewforum.php?f=29]

### (3) *Mathematics related topics; Science, Culture and Indigenous knowledge*

It is believed that the teaching of mathematics may also be made more lively if teachers involve students in on-line discussions with sharing of digital resources. The column 'Mathematics related topics via interdisciplinary/cross-curricular approaches' (Figure 23) was also created to facilitate on-line discussions such as 'Mathematics and Statistics', 'Technologically-enhanced mathematics learning' and other mathematics related topics. Another column, i.e. 'Science/mathematics, Culture and Indigenous knowledge' (Figure 24) was also created so that national or international participants and advisors interested in these topics could share knowledge, expertise and download references/publications that are of Open Educational Resources (OERs). An example of a publication related to science and culture that was shared on-line and retrievable from this portal (URL <http://forum.sp3aceman.maays.net/viewtopic.php?f=78&t=133>) is entitled, 'Southeast Asian and Japanese Cultural Influence on the Understanding of Scientific Concepts' (Loo & Sarmiento, 2005). This is the proceedings of an Intellectual Exchange project workshop funded by the Japan Foundation for fiscal year 2005 jointly organized by Universiti Sains Malaysia and RECSAM involving Southeast Asian Culture and Science (SACAS) group (Figure 25).

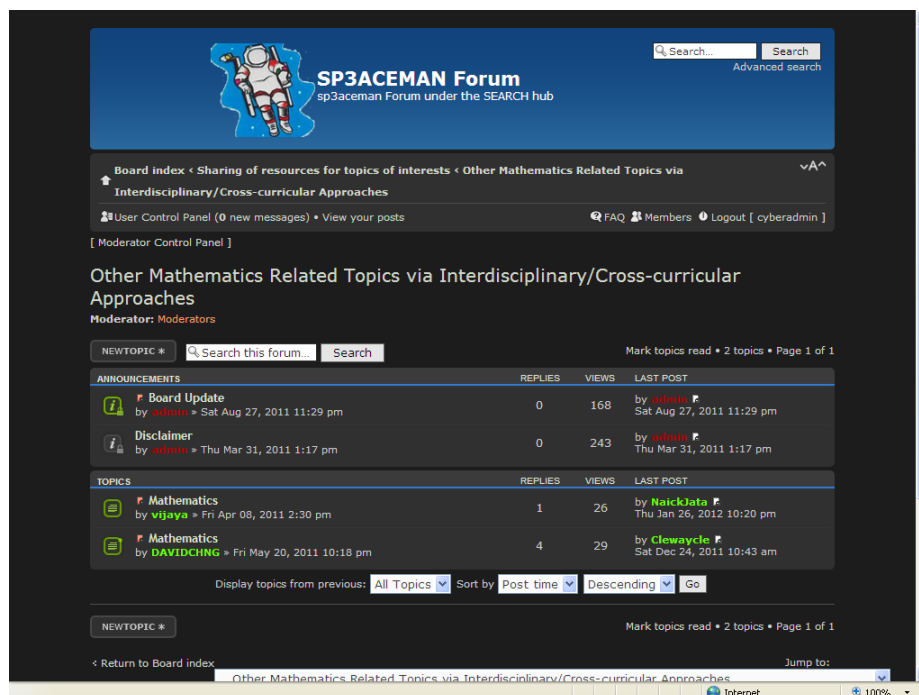


Figure 23. Questions posted on 'Mathematics related topics via interdisciplinary/cross-curricular approaches' column [<http://forum.sp3aceman.maays.net/viewforum.php?f=30>]

**SP3ACEMAN Forum**  
sp3aceman Forum under the SEARCH hub

Board index < Sharing of resources for topics of interests < Science/mathematics, Culture and Indigenous knowledge

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[ Moderator Control Panel ]

**Science/mathematics, Culture and Indigenous knowledge**  
Moderator: Moderators

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ANNOUNCEMENTS	REPLIES	VIEWS	LAST POST
<b>Board Update</b> by admin » Sat Aug 27, 2011 11:29 pm	0	168	by admin » Sat Aug 27, 2011 11:29 pm
<b>Disclaimer</b> by admin » Thu Mar 31, 2011 1:17 pm	0	243	by admin » Thu Mar 31, 2011 1:17 pm

TOPICS	REPLIES	VIEWS	LAST POST
<b>Southeast Asian Culture and Science Group (SACAS)</b> 0 by cyberadmin » Tue Jun 28, 2011 2:45 pm	1	26	by cyberadmin » Tue Jun 28, 2011 2:52 pm

Display topics from previous: All Topics Sort by Post time Descending Go

NEWTOPIC \* Mark topics read • 1 topic • Page 1 of 1

< Return to Board index Science/mathematics, Culture and Indigenous knowledge Jump to: Go

**WHO IS ONLINE**  
Users browsing this forum: cyberadmin and 0 guests

Figure 24. Questions posted on 'Science/Maths, Culture and Indigenous knowledge' column with frequency of views and replies [http://forum.sp3aceman.maays.net/viewforum.php?f=78]

The figure consists of three screenshots of the SP3ACEMAN Forum interface. The top screenshot shows the 'Southeast Asian Culture and Science Group (SACAS)' forum page. It features a search bar, navigation links, and a list of posts. The middle screenshot shows a post by 'hollowman' dated Fri Feb 03, 2012, discussing a report on the community project. The bottom screenshot shows a post by 'cyberadmin' dated Wed Jun 06, 2012, titled 'Culture of indigenous people', which mentions the community project and lists participants from SK Pos Dipang.

**SP3ACEMAN Forum**  
sp3aceman Forum under the SEARCH hub

Board index < Sharing of resources for topics of interests < Science/mathematics, Culture and Indigenous knowledge

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[ Moderator Control Panel ]

**Southeast Asian Culture and Science Group (SACAS)**  
Moderator: Moderators

POSTREPLY < Search this topic... Search

5 posts • Page 1 of 1

**cyberadmin**  
Posts: 78  
Joined: Mon Mar 28, 2011 11:32 am

**Southeast Asian Culture and Science Group (SACAS)**  
by cyberadmin • Tue Jun 28, 2011 2:45 pm

Useful URLs:  
<http://members.ozemail.com.au/~mmichie/dec05.htm> (Indigenous Science Network Bulletin)

**cyberadmin**  
Posts: 78  
Joined: Mon Mar 28, 2011 11:32 am

**Re: Southeast Asian Culture and Science Group (SACAS)**  
by cyberadmin • Tue Jun 28, 2011 2:32 pm

Publication on "Southeast Asian and Japanese Cultural Influences on the Understanding of Scientific Concepts"

ATTACHMENTS  
21seamscipublication.pdf  
SACAS publication  
(2.24 MiB) Downloaded 3 times

**hollowman**  
Posts: 38  
Joined: Mon Apr 11, 2011 1:14 pm

**Re: Southeast Asian Culture and Science Group (SACAS)**  
by hollowman • Fri Feb 03, 2012 5:23 pm

I just downloaded... will need a long time to read the report (over 200 pages).. should be interesting though..

**cyberadmin**  
Posts: 78  
Joined: Mon Mar 28, 2011 11:32 am

**Re: Southeast Asian Culture and Science Group (SACAS)**  
by cyberadmin • Sat Feb 04, 2012 11:31 pm

Thanks for your interest to read the publication, hope you enjoy reading. We also hope that more teachers could visit this column with more postings and sharing of resources.

**cyberadmin**  
Posts: 78  
Joined: Mon Mar 28, 2011 11:32 am

**Re: Southeast Asian Culture and Science Group (SACAS)**  
by cyberadmin • Wed Jun 06, 2012 9:28 am

From 4th to 7th June, 2012 SEAMEO RECSAM has organized activities under the Community Project with SK Pos Dipang, Kampar, Perak.

Among the activities included:  
(1) interactive hands-on session for Science/Mathematics/Technology (by R&D science and mathematics specialists)  
(2) interactive hands-on session for Mathematics (by TPD mathematics specialists)  
(3) interactive hands-on session for Science (by TPD science specialists)  
(4) Star gazing and fun with soap bubble activities (by Astronomy club USM)  
(5) Aerobic exercise and games (by Admin. Division)  
(6) ICT programme (by ICT department, Admin. Division)  
(7) Island tour including Georgetown, Ferry ride, Penang bridge, DCA tower  
(8) Video show on 'SEEFood' (by Admin. Division)

Their on-line participation could be viewed from URL:  
[viewtopic.php?f=76&t=1219](http://viewtopic.php?f=76&t=1219)

Display posts from previous: All posts | Sort by Post time | Ascending | Go

5 posts • Page 1 of 1

**Internet** 100%

Board index < Sharing of resources for topics of interests < Science/mathematics, Culture and Indigenous knowledge

User Control Panel (0 new messages) • View your posts

[ Moderator Control Panel ]

**Culture of indigenous people**  
Moderator: Moderators

POSTREPLY < Search this topic... Search

3 posts • Page 1 of 1

**cyberadmin**  
Posts: 79  
Joined: Mon Mar 28, 2011 11:32 am

**Culture of indigenous people**  
by cyberadmin • Wed Jun 06, 2012 11:45 am

During the community project at RECSAM [<http://forum.sp3aceman.maays.net/viewtopic.php?f=78&t=133> and [viewtopic.php?f=76&t=1219](http://forum.sp3aceman.maays.net/viewtopic.php?f=76&t=1219)], the following two teachers who had accompanied the groups also participated in the e-forum:

I am Fiza from SK Pos Dipang. I am Khairul Anuar from SK Pos Dipang also. We would like to share some knowledge about my school.

**khaishah**  
Posts: 1  
Joined: Wed Jun 06, 2012 11:54 am

**Re: Culture of indigenous people**  
by khaishah • Wed Jun 06, 2012 11:57 am

ko dah brapa tahun kat sekolah tu??? (How long have you been there at the school)

**Hafiza5246**  
Posts: 2  
Joined: Wed Jun 06, 2012 12:00 pm

**Re: Culture of indigenous people**  
by Hafiza5246 • Wed Jun 06, 2012 12:04 pm

It's wonderful to be here at SEAMEO RECSAM, Penang. The language use at Pos Dipang is called Bahasa Semai.  
'Hek mo I gah?' = How are you?

Display posts from previous: All posts | Sort by Post time | Ascending | Go

**Internet** 100%

Figure 25. E-forum for 'Southeast Asian Culture and Science' (SACAS) group with information on the community project organized at RECSAM (4-7/6/2012) [<http://forum.sp3aceman.maays.net/viewtopic.php?f=78&t=133>] and sharing of indigenous culture and knowledge by teachers from SK Pos Dipang, Kampar, Perak [<http://forum.sp3aceman.maays.net/viewtopic.php?f=78&t=1223>]

## (C) Archival records, dissemination of R&D and sharing of information

### (1) South East Asia Regional Capacity-enhancement Hub (SEARCH)

Figure 26 shows the 'Announcement on Events/Competitions', for example SSYS regional congress with its projects archived in this SP<sup>3</sup>ACEMAN.net close forum, both of which are sub-portals hyperlinked to the official SEARCH portal (<http://www.recsam.edu.my/search/index.html>) (Figure 27). This special forum site in SP<sup>3</sup>ACEMAN.net was created as clearing house with links to relevant sites under this e-learning hub with more closed forum discussions (<http://forum.sp3aceman.net>). Discussions could also be facilitated through another sub-portal 'MAgnificent Advancement for Young Scientists' (MAAYS) (<http://maays.net>). Sharing of e-learning experience organized by the SP<sup>3</sup>ACEMAN team members in collaboration with other educational partners such as MAAYS and Intel webinar was also available in the e-forum.

The screenshot displays the SP<sup>3</sup>ACEMAN Forum interface. The top section features a search bar and navigation links. The main content area shows a forum post titled "Announcements on Events/Competitions" by user "cyberadmin". The post includes details about the SSYS regional congress, including dates (6-9 March 2012), location (SEAMEO RECSAM, Penang, Malaysia), and a link to the official website. It also mentions the participation of MAAYS and SP<sup>3</sup>ACEMAN team members in previous SSYS congresses. The bottom section of the forum shows a table of archival records for the SSYS congress reports and research projects, listing topics, posts, and last post dates.

**Announcements on Events/Competitions**  
Moderator: Moderators

LOCKED  Search 2 posts • Page 1 of 1

**Announcements on Events/Competitions** EDIT X ? QUOTE  
by cyberadmin • Mon Apr 18, 2011 9:23 am

Stay tuned with the following links to the announcement on events/competitions:  
<http://forum.maays.net/viewforum.php?f=6>

The latest update:  
'Search for SEAMEO Young Scientists' (6 to 9 March 2012)  
Theme:  
'Beyond 2012: Greening the Environment for a Sustainable Future'

The Search for 8th SEAMEO Young Scientist (SSYS) Regional Congress will be held at SEAMEO RECSAM, Penang, Malaysia on 6-9 March 2012. More details of the congress are available from the following URL:  
[http://www.recsam.edu.my/SSYS%202012%20...\\_index.html](http://www.recsam.edu.my/SSYS%202012%20..._index.html)  
[viewtopic.php?f=8&t=21](#)

MAAYS and SP3ACEMAN team members had participated in the networking activities of previous SSYS congresses. Part of the activities were reported in the file attached or the following link:  
[http://www.recsam.edu.my/lsm/2011/2011\\_4\\_NKT.pdf](http://www.recsam.edu.my/lsm/2011/2011_4_NKT.pdf)

All are welcome to join 'Search for SEAMEO Young Scientist' (SSYS) Facebook group to participate in networking activities.

**ATTACHMENTS**

- 2011\_4\_NKT.pdf  
LSM article reporting MAAYS in support of SSYS (3.07 MIB) Not downloaded yet
- SSYS 2012 information booklet (LATEST).pdf  
SSYS 2012 (1010.05 KIB) Downloaded 1 time

**SP3ACEMAN Forum**  
sp3aceman Forum under the SEARCH hub

Board index • General Introduction and Reference Resources • Archival Records of 'Search for SEAMEO Young Scientists' (SSYS) Congress Reports and Research Projects

User Control Panel (0 new messages) • View your posts • FAQ • Members • Logout [ cyberadmin ]

**Archival Records of 'Search for SEAMEO Young Scientists' (SSYS) Congress Reports and Research Projects** Mark forums read

FORUM	TOPICS	POSTS	LAST POST
SSYS 1997, 1999, 2002, 2004, 2006 Moderator: Moderators	5	69	by cyberadmin • Wed Jan 04, 2012 12:57 pm
SSYS 2008, 2010, 2012 Moderator: Moderators	3	16	by bernardkkt • Tue Jan 03, 2012 9:40 pm

Jump to: Archival Records of 'Search for SEAMEO Young Scientists' (SSYS) Congress Reports and Research Projects

**WHO IS ONLINE**  
Users browsing this forum: cyberadmin and 0 guests

Board index • The team • Delete all board cookies • All times are UTC + 8 hours

Powered by phpBB Copyright (C) 2011 SP3ACEMAN  
Forum style modified by David Yong  
Administration Control Panel

Figure 26. Announcement of events/competition/congress such as SSYS congress with the projects presented in previous years archived in this SP3ACEMAN closed forum



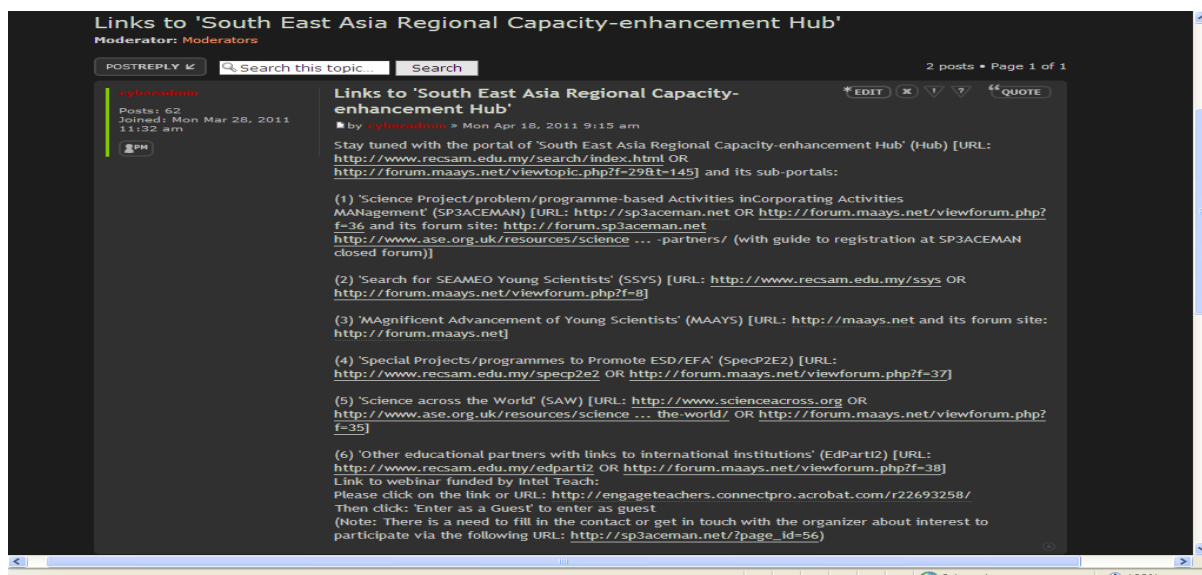


Figure 27. Printscreen of all other sub-portals hyperlinked to SEARCH portal  
[<http://forum.sp3aceman.maays.net/viewtopic.php?f=70&t=55>]

## (2) Brain teasers, useful tools to generate ideas and brainstorming for experimentation

Student-centred investigative activities have been much emphasized in science and mathematics education (Gallagher& Stepien, 1996; Menon, 1998; Sitkoff, 1988). To facilitate effective learning and development of such skills, a special section on 'Brain Teasers and Brainstorming for Experimentation' was also designed to facilitate ideas generation activities to promote Higher Order Thinking (HOT) skills and scientific skills for experimentation (Figure 28). Students shared learning activities with fun quizzes and other related readings onto the 'Brain Teasers' forum site to challenge others' thinking.

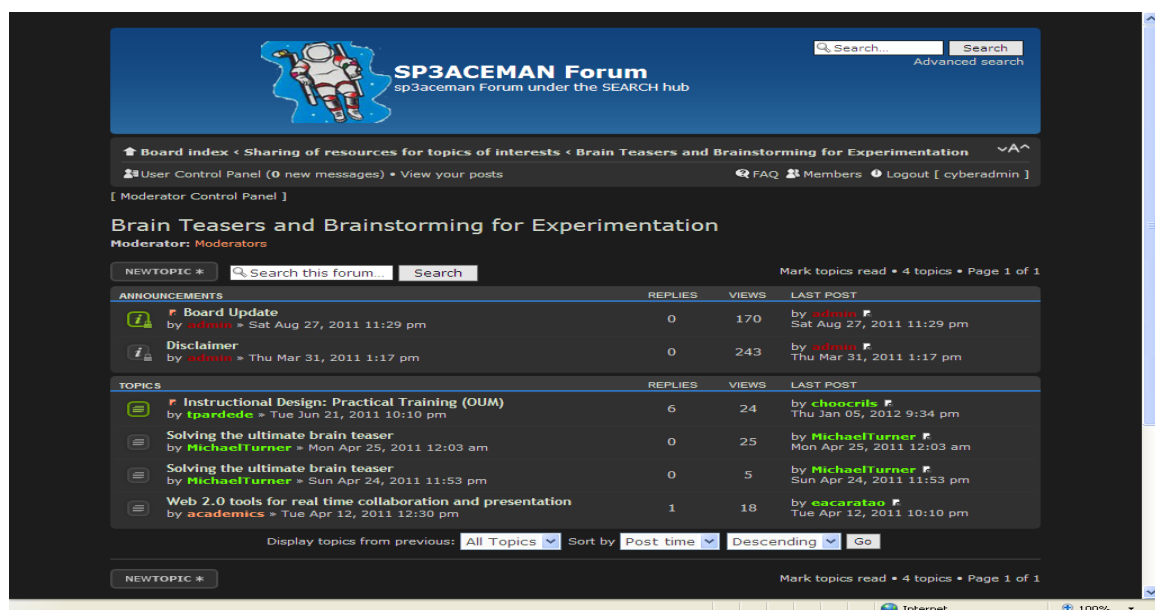


Figure 28. Students were challenged with mind boggling quizzes posted on the 'Brain Teasers' site and useful information related to ICT tools for brainstorming of ideas  
[<http://forum.sp3aceman.maays.net/viewforum.php?f=69>]

### (3) Ideas, resource centre and off-topic discussions forum sites

The SP<sup>3</sup>ACEMAN.net e-research platform leveraged on the accessibility of various useful Internet resources. Apart from the availability of open forums accessible to all on-line learners and blog viewers, it is also a platform for the dissemination of various relevant information and important announcements as posted onto URL <http://forum.sp3aceman.maays.net/viewtopic.php?f=70&t=56>. ‘Ideas and Resource Centre’ (Figure 29) was created. With the organization of on-line resources for easy reference, not only the teaching and learning of science and mathematics will be effective, but it also contributes to a greening environment in a paperless world! To encourage wider participation by non-science major students or teachers towards ‘Education for All’ (EFA), general and off-topic discussion columns such as ‘The Lounge’ (Figure 30) was also created. It has attracted the participation of secondary and primary school students. Students and general public shared their life and learning experiences in the virtual ‘Lounge’ with further networking activities. In fact, students with no ICT or Internet background were first introduced to these sites and coached with various e-learning skills. When they became independent learners, they then actively participate in other column sites to share their academic knowledge and learning experiences.

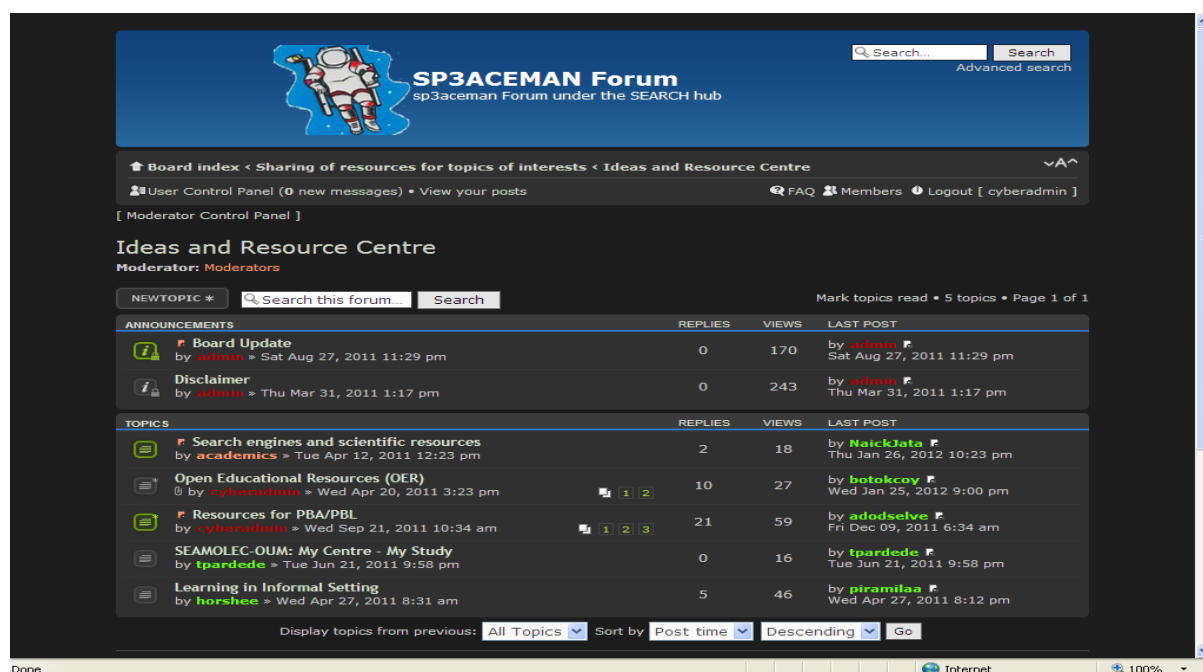


Figure 29. ‘Ideas and Resource Centre’ column provides useful information and on-line Open Educational Resources (OER) [<http://forum.sp3aceman.maays.net/viewforum.php?f=67>]

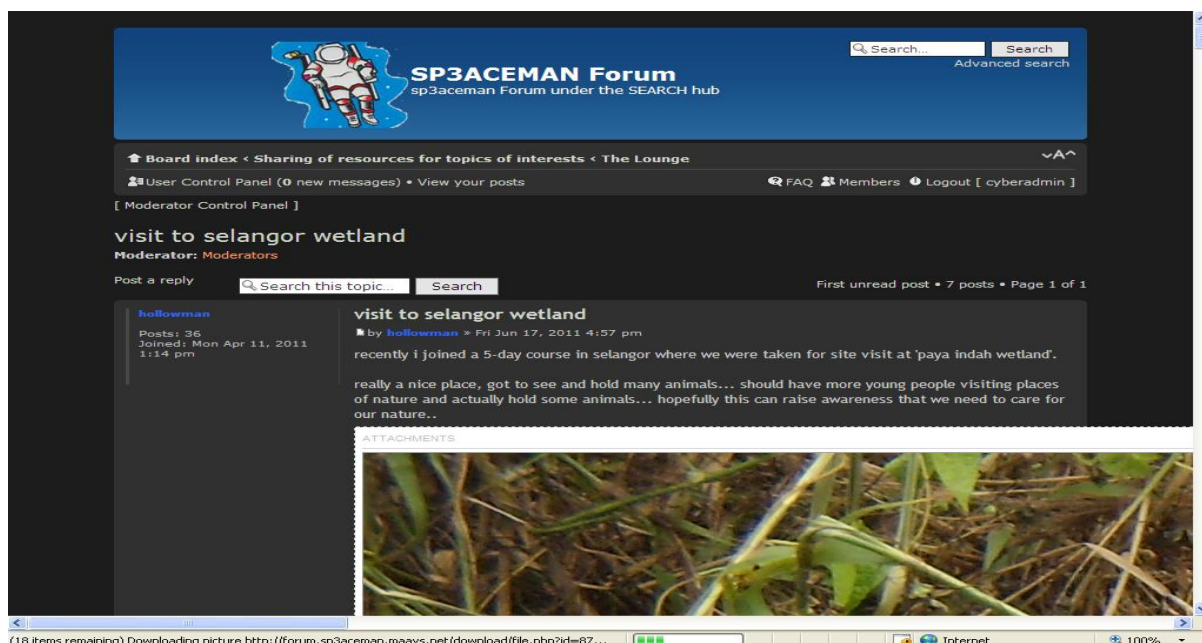


Figure 30. Many off-topic discussions also posted onto 'The Lounge' to attract further participation [http://forum.sp3aceman.maays.net/viewforum.php?f=68]

### Conclusion and Future Direction

This paper outlines the major activities of SP<sup>3</sup>ACEMAN.net portal with evidences of exemplary practices in SEARCH for young science/mathematics researchers that were facilitated through the on-line learning hub and its sub-portals. All the authors of this paper had participated actively as founder, administrator, advisors, participants (e.g. during SP<sup>3</sup>ACEMAN workshops) or facilitators (e.g. during SK Pos Dipang community project) for workshops at various phases. The authors were also involved as participants or project teachers of the SP<sup>3</sup>ACEMAN forum to further enhance science and mathematics education through blended learning approaches with sharing of resources. An example is the *'Exemplary science and mathematics lesson plans incorporating technology education'* compiled as the output of the *'Lesson Study'* workshop that was conducted from 18-19 May and 21-22 May 2012 [The uploaded resources are available from <http://forum.sp3aceman.net> and available from URL: <http://forum.sp3aceman.maays.net/viewforum.php?f=18>].

In addition, this article reveals the feasibility of a blended mode to learn the different themes and issues towards building networks for knowledge-exchange and peer learning in science and mathematics education in the region and beyond (Azian, Devadason, Ng & Wahyudi, 2010). ICT has been identified as one of the effective tools to extend the knowledge of learners through extensive research and interactive activities over the Internet in the recent years. Increasing emphasis has been placed on the enhancing of students' technological skills and ability to access on-line learning resources in the 21<sup>st</sup> century apart from developing their Higher Order Thinking (HOT) skills, scientific and social skills such as communication, research and collaborative project work as elaborated. In this technologically advanced era, a supportive learning environment with pedagogically enriched teaching strategies integrating ICT is also important for educators who wish to incorporate the e-learning portals in science and mathematics education. To achieve this aspiration, a Teacher 'Professional Learning Community' (PLC) was formed by the second author who is also the founder of MAAYS to invite participation of more educators for continuing professional development (CPD) and lifelong learning. The information was disseminated on URL:

<http://forum.maays.net/viewtopic.php?f=25&t=143>. The ‘Search for SEAMEO Young Scientist’ (SSYS) Facebook group was also formed for more networking activities apart from the SP<sup>3</sup>ACEMEN closed forum and MAAYS forum. These activities were supported by many science/mathematics teachers and all teachers are welcome to join in these groups.

In conjunction with the organization of the 8<sup>th</sup> Regional Congress on ‘Search for SEAMEO Young Scientists’ (SSYS) (scheduled from 5<sup>th</sup> to 9<sup>th</sup> March 2012) with the theme ‘*Beyond 2012: Greening the Environment for a Sustainable Future*’, SP<sup>3</sup>ACEMAN team members had also participated in the e-forum on ‘Green innovation and creative lifestyle’ (posted on announcement scroller of <http://sp3aceman.net> and <http://forum.sp3aceman.maays.net/viewtopic.php?f=70&t=56>) Various networking activities and e-learning initiatives (through Intel Webinar and Facebook as e-platforms) as enrichment for investigative science and mathematics education (URL: <http://forum.sp3aceman.maays.net/viewtopic.php?f=14&t=1224&p=2436#p2436>) were also conducted. More updates of the activities were posted onto the website (URL: <http://www.recsam.edu.my/search>), e-forums of SP<sup>3</sup>ACEMAN and MAAYS.

More promotional activities will be conducted in various workshops to invite participation with dissemination of learning output. Other research evidence (that were disseminated using the closed forum of this site) will also be reported in the subsequent series to illustrate how inquiry-based activities, scientific thinking skills could be promoted through e-learning activities supported by interactive digital learning environments with evidences of students’ enhanced thinking skills towards Education for Sustainable Development (ESD).

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## Appendix A

### **‘Waste management’: PBL lesson for Year 6 general science by SJK(C) Kwang Hwa and Institut Pendidikan Guru Kampus Tuanku Bainun**

(Project teachers: Lim Yoon Khim, Susan Wee and Chin Chee Keong)

(1) Incorporating PCK for Year 6 science (POSITIVE)ss and cck (MS-Word file for positive tool)

#### **Incorporating Pedagogical Content Knowledge (PCK) in PBA/PBL**

Please indicate a (✓) or state in the following column with grade levels and topic in secondary or primary science/mathematics with title or content of the curriculum adapted in PBA/PBL.

School/Institution: SJKC KWANG JWA & IPG KAMPUS TUANKU BAINUN

Participant's name: LIM YOON KHIM & CHIN CHEE KEONG

Year/Form	Science	Biology	Chemistry	Physics	Maths/Add Maths	Topic/Title/Unit of Content
Primary 1						
Primary 2						
Primary 3						
Primary 4						
Primary 5						
Primary 6	✓					WASTE MANAGEMENT
Form 1						
Form 2						
Form 3						
Form 4						
Form 5						
Form 6						

Additional notes:

The estimated timeframe to be used to teach the entire Unit of Science/Mathematics content using

(1) transmission approach: 1 WEEK

(2) PBA approach: 2 WEEKS

Remarks by participants:

More time needed for students to gather resources. Max compromise crucial time to prepare students for UPSR exam. But worth a try to have meaningful learning experience for the students.

Figure A(1). Incorporating Pedagogical Content Knowledge (PCK) for Year 6 science topic on ‘Waste management’

[Refer more details at URL: <http://forum.sp3aceman.maays.net/viewforum.php?f=61>]

(2) LAMS flow chart

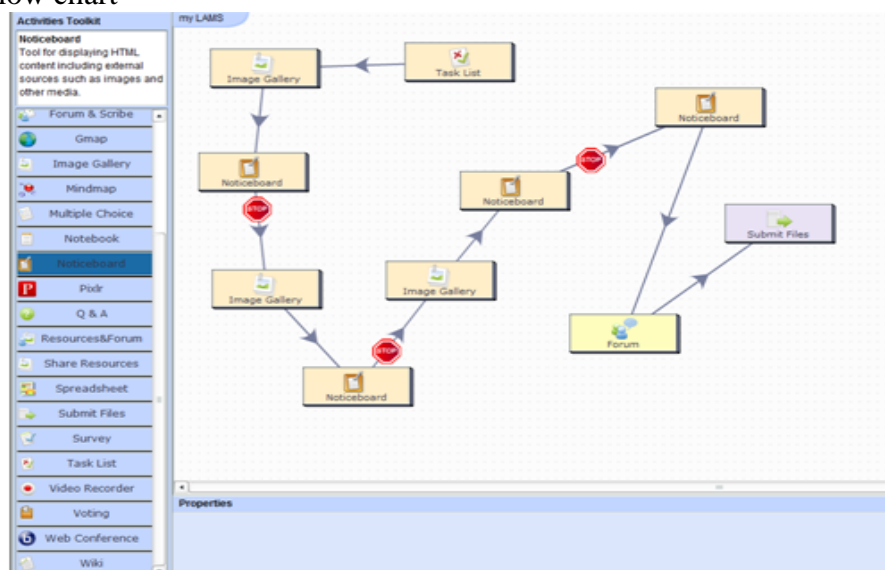


Figure A(2). Learning Activities Management System (LAMS) flowchart for Year 6 science topic on ‘Waste management’

[Refer more details at URL: <http://forum.sp3aceman.maays.net/viewtopic.php?f=57&t=124>]

## Appendix B

### **‘Endangered ecosystem: PBL lesson for Form 4 biology by SMK Abdullah Munshi and Institut Pendidikan Guru Kampus Tuanku Bainun**

(Project teachers: Savanee Sararaks and Chin Chee Keong)

(1) Incorporating PCK for Form 4 Biology (POSITIVE)s and cck (MS-Word file for positive tool)

**Incorporating Pedagogical Content Knowledge (PCK) in PBA/PBL**

Please indicate a (✓) or state in the following column with grade levels and topic in secondary or primary science/mathematics with title or content of the curriculum adapted in PBA/PBL.

School/Institution: **SMK ABDULLAH MUNSHI AND IPG KAMPUS TUANKU BAINUN**

Participant's name: **SAVANEE SARARAKS(SMK) AND CHIN CHEE KEONG(IPG)**

Year/Form	Science	Biology	Chemistry	Physics	Maths/Add Maths	Topic/Title/Unit of Content
Primary 1						
Primary 2						
Primary 3						
Primary 4						
Primary 5						
Primary 6						
Form 1						
Form 2						
Form 3						
Form 4		✓				ENDANGERED ECOSYSTEM
Form 5						
Form 6						

Additional notes:

The estimated timeframe to be used to teach the entire Unit of Science/Mathematics content using

(1) transmission approach: 2 WEEKS

(2) PBA/PBL approach: 3 WEEKS

Remarks by participants:

Today is the 3<sup>rd</sup> day of our workshop. We have 3 assignments to fill up and upload.

i. POSITIVE RUBRICS

ii. PCK

iii. LAMS – SCREEN PRINT OUT.

THANK YOU.

SS AND CCK

*Figure B(1).* Incorporating Pedagogical Content Knowledge (PCK) for Form 4 biology topic on ‘Endangered ecosystem’

[Refer more details at URL: <http://forum.sp3aceman.maays.net/viewtopic.php?f=54&t=112>]

## **‘Preservation and conservation – Air pollution (acid rain)’: PBL lesson for Form 5 general science by SMK(P) Sri Mutiara and SMK Tanjung Bunga**

(Project teachers: Boey Mei Li, Gurumintarjit and Loo Say Leng)

### **(1) Incorporating PCK for Form 5 General Science**

**Incorporating Pedagogical Content Knowledge (PCK) in PBA/PBL**

Please indicate a (✓) or state in the following column with grade levels and topic in secondary or primary science/mathematics with title or content of the curriculum adapted in PBA/PBL.

School/Institution: SMK(P) SRI MUTIARA / SMK TANJONG BUNGA

Participant's name: PN BOEY MEI LI / PN GURUMINTARJIT / CIK LOO SAY LENG

Year/Form	Science	Biology	Chemistry	Physics	Maths/Add Maths	Topic/Title/Unit of Content
Primary 1						
Primary 2						
Primary 3						
Primary 4						
Primary 5						
Primary 6						
Form 1						
Form 2						
Form 3						
Form 4						
Form 5	✓					Preservation and Conservation - Air pollution (acid rain)
Form 6						

Additional notes:

The estimated timeframe to be used to teach the entire Unit of Science/Mathematics content using

(1) transmission approach: 1 WEEK

(2) PBA/PBL approach: 3 WEEKS

Remarks by participants:

A PBL approach is used to discuss this topic as it is believed to enhance students' learning experience and foster better understanding on the topic.

*Figure B(2). Incorporating Pedagogical Content Knowledge (PCK) for Form 5 general science topic on ‘Preservation and conservation – Air pollution (acid rain)’ [Refer more details at URL: <http://forum.sp3aceman.maays.net/viewtopic.php?f=53&t=113>]*

## Appendix C

### **‘Drinking water’: PBL lesson for Form 2 science by SMKA Al-Mashoor(L)**

(Project teachers: Linda Toh and Wan Mohamman Zulkifli)

[URL: <http://elearn.recsam.edu.my/LAMS>] (please zoom to 150% for viewing)

(1) Incorporating PCK for Form 2 science, (POSITIVE)SMASH(MS-Word file uploaded onto forum)

**Incorporating Pedagogical Content Knowledge (PCK) in PBA/PBL**

Please indicate a (✓) or state in the following column with grade levels and topic in secondary or primary science/mathematics with title or content of the curriculum adapted in PBA/PBL.

School/Institution: SMKA AL-MASHOOR(L)

Participant's name: WAN MOHD. ZULKIFLI AND LINDA TOH

Year/Form	Science	Biology	Chemistry	Physics	Maths/Add Maths	Topic/Title/Unit of Content
Primary 1						
Primary 2						
Primary 3						
Primary 4						
Primary 5						
Primary 6						
Form 1						
Form 2	✓					Drinking Water
Form 3						
Form 4						
Form 5						
Form 6						

Additional notes:

The estimated timeframe to be used to teach the entire Unit of Science/Mathematics content using

(1) transmission approach: 4 periods (4 x 40 min.)

(2) PBA/PBL approach: : 6 periods (6 x 40 min.)

Remarks by participants:

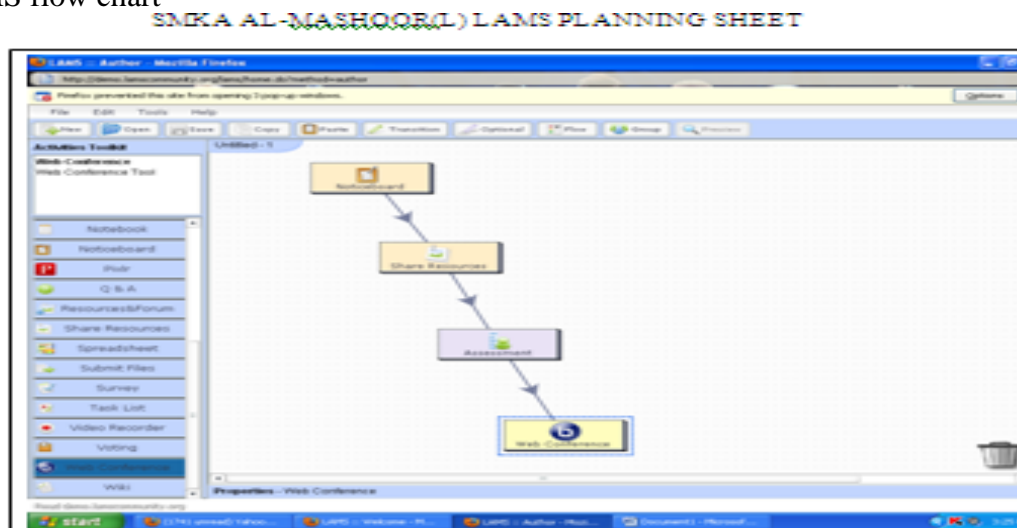
...STUDENT-CENTRED APPROACH WHERE THEY SET HANDS-ON AND MIND-ON EXPERIENCES. WORKING IN GROUPS INVOLVES COOPERATIVE LEARNING. THIS VALUES-INCORPORATED LESSON WILL NURTURE THEM TO BE RESPONSIBLE ADULTS, ENABLING THEM TO SOLVE PERTINENT PROBLEMS FACED BY ALL MEMBERS IN THE SOCIETY.

The dynamic involvement and proactive attitude will groom the students to be global players in the international arena via life forums.

Figure C(1). Incorporating Pedagogical Content Knowledge (PCK) for Form 2 science topic on ‘Drinking Water’ [Refer more details on POSITIVE tool at URL: <http://forum.sp3aceman.maays.net/viewtopic.php?f=24&t=123>]



## (2) LAMS flow chart



Activity	Content
Noticeboard	1. Give instructions to students what to do.
Share Resources	1. URL of drought 2. URL of Climate Change 3. URL of Penang Water Authorities Webpage
Assessment	1. Prepare 5 MCQ. (5 marks) 2. Prepare 2 matching pairs questions. (2 marks) 3. Prepare 3 true-false questions. (3 marks) 4. Prepare 1 short answer question. (5 marks)
Web Conference	1. Ask students to sign up and participate in the web conference.

Prepared by: Mr. Wan Mohd. Zulkifli and Ms Linda Joh

Figure C(2). Learning Activities Management System (LAMS) flowchart for Form 2 science topic on 'Drinking Water'

## Appendix D

### **‘Litter-bugs syndrome’: PBL lesson for Form 4 maths/add maths by SMK Penang Free**

(Project teachers: David Ch’ng, Vijaya a/p Arjunan and Ling Jia Yi)

#### (1) Incorporating PCK for Form 4 mathematics/additional mathematics

**Incorporating Pedagogical Content Knowledge (PCK) in PBA/PBL**

Please indicate a (✓) or state in the following column with grade levels and topic in secondary or primary science/mathematics with title or content of the curriculum adapted in PBA/PBL.

School/Institution: PENANG FREE SCHOOL

Participant's name: MR. DAVID CHNG YEANG SOON, MISS VIJAYA A/P ARJUNAN, MISS LING JIA YI

Year/Form	Science	Biology	Chemistry	Physics	Maths/Add Maths	Topic/Title/Unit of Content
Primary 1						
Primary 2						
Primary 3						
Primary 4						
Primary 5						
Primary 6						
Form 1						
Form 2						
Form 3						
Form 4					✓	LITTER-BUGS SYNDROME / STATISTICS - MEASURES OF CENTRAL TENDENCY
Form 5						
Form 6						

Additional notes:

The estimated timeframe to be used to teach the entire Unit of Science/Mathematics content using

(1) transmission approach: \_\_\_\_\_

(2) PBA/PBL approach: Problem-Based Learning in Mathematics

Remarks by participants:

Many of the participants are still very new about PBL which could mean

Problem-based Learning or Project-based Learning both of which are similar

in many ways but different.

The LAMS ~~experience~~ was somewhat different from other LMS and many of

its functions needs to be demonstrated for the participants to fully understand it. The animated tutorials did not tell the whole story.

Figure D(1). Incorporating Pedagogical Content Knowledge (PCK) for Form 4 mathematics topic on ‘Litter-bugs Syndrome’

[Refer more details at URL: [http:// forum.sp3aceman.maays.net/viewtopic.php?f=47&t=106](http://forum.sp3aceman.maays.net/viewtopic.php?f=47&t=106)]

#### (2) LAMS flow chart

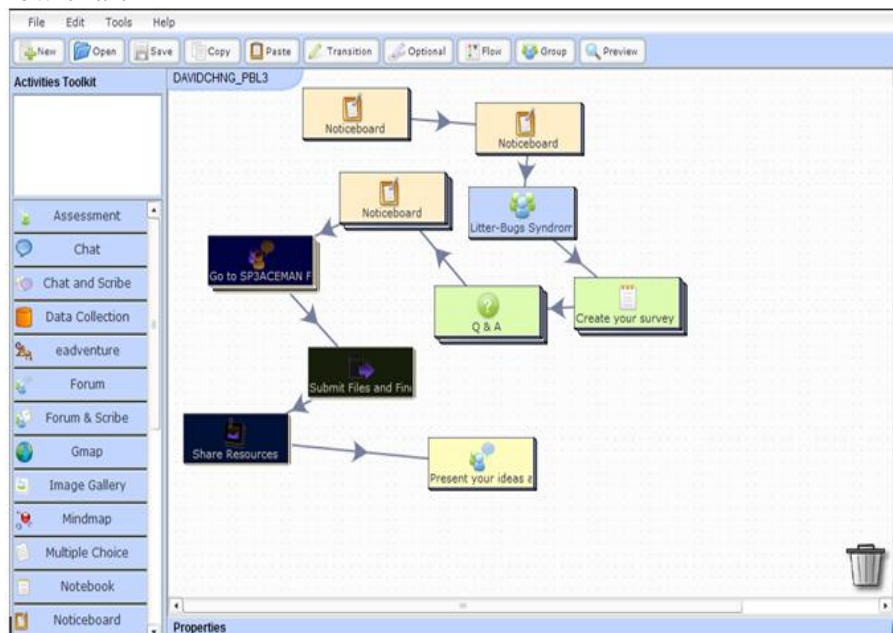


Figure D(2). Learning Activities Management System (LAMS) flowchart for Form 4 mathematics topic on ‘Litter-bugs Syndrome’

(3) SPACEMAN PROJECT\_PFS (MS-Word file for sample POSITIVE tool uploaded onto forum)

**Teacher's Guide for Project/problem-based Learning (P<sup>2</sup>BL) Support Tool via POSITIVE Rubric**

Title/Curriculum: (Biology/Chemistry/Physics/Maths/General Science) Additional Mathematics

Prepared for: Form/Year 4 By: CHING YEANG SOON, VIJAYA A/P ARJUNAN AND LING JIA YI

<p><b>P<sup>2</sup>BL via POSITIVE guide</b></p> <p>(Planning procedure or project/problem-based (P<sup>2</sup>BL) process)</p> <p>Planning the Procedures in carrying out thoughtfully planned P<sup>2</sup>BL teaching and learning process with preview of investigation cycles</p>	<p><b>Problem-based Learning (PBL)</b></p> <p>Scenario or problem case adapted from curriculum (Science/Maths) (Form/Year):</p> <p>(i) Topic: Litter-bugs Syndrome</p> <p>(ii) Scenario (E.g. You are...): As the president of Student council, you are asked by the principal to study the problem of littering in school.</p>	<p><b>[Objectives of learning]</b></p> <p><b>Objectives and Organization</b> considering diverse learning styles and socio-cultural background</p> <p><b>[Organization of team member's roles for cooperative learning]</b></p>	<p>Objectives and Outline of issues from scenario</p> <p>(i) Learning/social skills objectives:</p> <p>(a) Cognitive and psychomotor: Interviewing students, weighing, measuring, calculating</p> <p>(b) Affective: interpreting data, comparing data, formulating and reasoning.</p> <p>(ii) Outline of issues from scenario/case: The school has always been plagued with rubbish being thrown everywhere and this projects wishes to know what factors causes this to happen?</p> <p>E.g. Reader, Resource procurer, Experimenter, Gatekeeper, Moderator, Writer/Reporter, etc.</p>
<p><b>[Skills in scientific investigation]</b></p> <p>Skills in experimentation, e.g. scientific (process/manipulative) and ICT or technology skills (to explore digital resources)</p> <p><b>[Skills in using ICT]</b></p> <p>Find links to URL's for skill training sites.</p>	<p>Scientific/hypothesis, variables, lab work)</p> <p>(i) Viable hypothesis: Family background may influence the litter bugs syndrome.</p> <p>(ii) (a) Dependent variable (DV): Age, Class, Race</p> <p>(b) Independent variable (IV): Sex</p> <p>(c) Controlled variable (CV): Students in Penang Free School</p> <p>(iii) Laboratory activities: Class room activities, Outside of classroom.</p> <p>E.g. Internet, multimedia, graphic tools</p> <p>E.g. Learning Activity Management System (LAMS) Electronic spreadsheets, Forum, PowerPoint presentation and website.</p>	<p><b>[Information gathering]</b></p> <p><b>Information/data gathering</b> and resources/facilities/support procurement via cooperative role taking</p> <p><b>[Resources for learning issues]</b></p>	<p>Facts and questions raised to know about issue</p> <p>(a) Key facts in scenario (list at least 3): Age, Race and Academics</p> <p>(b) Questions raised to know more about issue: Does age or race or the type of class the students are in influence them to behave in a certain manner?</p> <p>(c) Does family background/location has any influence on their thinking and reasoning?</p> <p>Non-digital (book, journal, etc) or digital Book on psychology, Human behaviour, Pedagogy, Statistics.</p>
<p><b>[Training of HOT/PBS skills]</b></p> <p>Training and Transfer of learning via Higher Order Thinking (HOT) and problem-solving (PBS) skills</p> <p><b>[Transfer of HOT or Reporting]</b></p> <p>Reporting final project, e.g. Introduction, Literature, Methods, Findings, Conclusion</p>	<p>Critical/creative, logical and reasoning skills</p> <p>(i) Challenge/Targeted outcome: Interpreting the data, presenting the outcomes and solving the problem by suggesting solutions.</p> <p>(ii) Questions, etc. to stimulate HOT: Compare and contrast how age or race may be a determining factor in the Litter-bugs syndrome.</p> <p>How would you suggest to educate the school concerning littering in school. Create a campaign that will bring about the awareness of littering related to health issues.</p> <p>Final project presentation flow:</p> <p>Chapter 1: Introduction Chapter 2: Planning Chapter 3: Searching for Literature Chapter 4: Activities Chapter 5: Discussions Chapter 6: Presentations and Actions.</p>	<p><b>[Involvement]</b></p> <p><b>Involvement</b> actively in various context</p> <p><b>[Incorporation of PCK]</b></p> <p><b>Incorporating pedagogical-content knowledge (PCK)</b></p>	<p>Setting (e.g. classroom, field, etc.) and time line</p> <p>(i) Interaction setting: Discussion - Actions - Searching for Literature backup - Discussions - Presentations - Action and Recommendations</p> <p>(ii) Timeframe or timeline for completion: 3 to 4 weeks</p> <p>Learning areas/curricula/pedagogy/reference</p> <p>(iii) Learning areas from curriculum with integration of pedagogy: Statistics, Moral Values, Civic Education and Psychology</p> <p>(iv) Reference source during case presentation: Statistics - Measures of Central Tendency, Moral and Civic Education and Internet Resources.</p>
<p><b>[Values/motivation in STES]</b></p> <p>Values emphasis and inculcation of positive attitudes/interests/motivation (ADM) towards Science, Technology, Environment, Society (STES)</p>	<p>Values emphasis and motivational aspects</p> <p>(i) Values/attitudes in science and its interrelation with technology, environment and society: Does family background and peer groups pressure have something to do with it.</p> <p>(ii) General notes and other aspects that motivate further investigation: Perhaps the general care-less attitude of the students nowadays.</p>	<p><b>[Evaluation, Exchange]</b></p> <p><b>Evaluation</b> as assessment, <b>Exchange</b> of ideas, experiences, <b>Enrichment</b>, <b>Everlasting Exposure</b></p> <p>List out links to the sites for on-line evaluation rubric.</p>	<p>Evaluating process/product and dissemination</p> <p>(d) Process of learning and activities: Collaborative and Cooperative Learning, Hands-on, and contextual learning that includes some aspects of multi-intelligent cognitive activities.</p> <p>(e) Product or final learning output: Enrichment, Exposure, Self-awareness, Self-motivation and Civic minded</p> <p>(f) Mode for dissemination or exchange: Internet, Forum (SP3AMAN) and website, Posters and recommendations of findings to the School Administrators.</p> <p>E.g. <a href="http://rubistar.4teachers.org/">http://rubistar.4teachers.org/</a> <a href="http://mgcpp-matematik.kdu.edu.my">http://mgcpp-matematik.kdu.edu.my</a></p>