Building LAMS supported blended-learning communities:

Challenges in promoting thinking skills and attitudes for sustainable living

by

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Regional Centre for Education in Science and Mathematics
Ministry of Education Malaysia

SEAMEO Borderless
To ensure e-learning could be conducted efficiently to minimize barriers with optimum knowledge construction opportunities in an ever expanding global learning community.

Recent advancement and global trends of ICT in teaching and learning

Use of interactive multimedia and increased reliance on new interactive ICT.

The irony of technological advancement also creates debates over various ethical and controversial issues, prompting the concerns of technology experts and academics to explore ways to manage e-learning.

Constantly changing technological innovations and large number of multimedia titles.

Increasing networking of computers for communications, research and remote collaboration.
RECSAM as one SEAMEO centre providing in-service training for participants from diverse background:
Scenario and concern in the region

The increasingly global world with learning in the borderless world is often linked with participatory inquiry knowledge construction involving contextual problem-solving activities using interactive digital tools for blended learning.

Objectives of this presentation

(1) To report on RECSAM’s initiative as regional centre of excellence for science and mathematics education to promote blended mode of teaching and learning activities.

(2) To illustrate exemplary learning designs using LAMS-supported platform to promote thinking skills and attitudes towards sustainable living.
The most recent to develop OERs for borderless learning platforms
(B) SEAMEO Borderless School

OVERVIEW AND OBJECTIVES

A Borderless School is the school that prepares students to become global players who are enterprising, creative, innovative, equipped with 21st century skills and lifelong learners in cross-cultural learning environment. It is an area identified under the vision of Golden SEAMEO in the next decade. The learners from diverse background are expected to be actively involved in sharing resources through blended mode learning environment rich with easy access information mainly from Open Educational Resources (OER) including interdisciplinary and cross-curricular studies. Three essential skills to be developed from early education include thinking, technology and living (work and survival) skills.

Pilot phase (2013 to 2014):

The Borderless School project started in 2013 and continued in 2014 with piloting of instruments and trialling of e-platforms involving several groups of science and mathematics educators who provided feedback to improve the instruments and refine the Borderless School framework.
Phase 1 (2015 to 2018):
For the next three years from 2015 to 2018, two main implementation strategies are expected to be completed in collaboration with SEAMEO sister centres, national and international educational network and linkages. These include the preparation of curriculum resources and stable e-learning and/or m-learning platforms in at least five SEAMEO member countries with technological support. Among the suggested activities include:

1. Developing cross-curricular and interdisciplinary studies to promote thinking and life skills in all subjects integrating Information and Communication Technology (ICT);

2. Producing resources incorporating blended learning to promote cross-cultural understanding in all subjects using inquiry-based learning approaches such as Project-based Activities (PBA) and Problem-based Learning (PBL);

3. Developing responsive and interactive web-portals incorporating e.g. ‘Learning Activities Management System’ (LAMS) and/or other technological tools;

4. Conducting colloquia/seminars/workshops using blended learning approaches to share knowledge and disseminate findings as well as enhance thinking, technology and life skills of all stakeholders, to name a few.

5. Monitoring and evaluating the project implementation yearly with mid-term review in 2018.
Literature Review

Global trends in science education

- Social constructivist learning for knowledge construction and capacity building
- More student-centered learning and with greater learners’ autonomy
- More collaborative learning and working in Community of Practice (CoP) guided by More Knowledgeable Others (MKO)
- More Project/problem-based Learning solving real life problems
Theories (explaining nature and philosophy of BS)

Sociocultural framework [Community of Practice (CoP) (Lave & Wenger, 1991); More Knowledgeable Others (MKO) (McConnell, 2000; Larkin, 2002); Situated learning (Wenger, 2000)]

Experts in CoP from diverse socio-cultural backgrounds and expertise were involved in curriculum re-writing and editing to prepare Open Educational Resources (OER) for Borderless learning using various digital tools and platforms such as ‘Learning Activity Management System’ (LAMS) under 4 main focus areas:

<table>
<thead>
<tr>
<th>Curriculum rewriting (19-20/6/2014)</th>
<th>Curriculum editing and uploading (1-3/10/2014)</th>
<th>Advisor/Reviewer and/or Editor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Writer (&amp;SEAMEO)</td>
<td>Editor/Proofreader</td>
<td>Attending (1)&amp;/or(2)</td>
</tr>
<tr>
<td>Co-Writer/Editor</td>
<td>ICT-based Lesson Designer</td>
<td>On-line (1)&amp;/or(2)</td>
</tr>
</tbody>
</table>

1. Telecare/Telehealth
2. DR RED and Climate Awareness
3. Conservation and wise use of resources
4. Sustainable Energy for All (SE4ALL)
List of draft output from the first workshop (19-20 June 2014) and SS1381 regular course participants (May 2014)
Interdisciplinary curriculum from SAW to BORDERLESS

Suggested Topic I: Telecare/Telehealth

Enhancing Lifelong Borderless Learning: Interdisciplinary and cross-cultural studies for SEAMEO Borderless School

A Borderless School is the school that prepares students to become global players who are enterprising, creative, innovative, equipped with 21st century skills, and lifelong learners in cross-cultural learning environment. It is an area identified for the aspiring vision of Golden SEAMEO. The learners from diverse background are expected to be actively involved in sharing resources through blended mode learning environment rich with easy access information mainly from Open Educational Resources (OERs) including interdisciplinary and cross-curricular studies. Three essential skills to be developed from early education include thinking, technology and life (work/entrepreneurial and survival) skills. The four main areas of curricula for Borderless School are: (1) Telecare; (2) DR RED and climate awareness; (3) Conservation and wise use of resources; and (4) SE4ALL. The units that are developed under these four main areas will not only serve as basic education suitable for students between 10 to 18 years old, but also can be adapted with suggested enrichment activities to promote lifelong borderless learning through challenging Project-based Activities (PBA) and Problem-based Learning (PBL) incorporating ‘Technology-enhanced Learning’ (TEL) including various blended learning activities among stakeholders in the Community of Practice (CoP)

‘Telecare’ is the curriculum topic aims at providing basic information required for an individual to live healthily with awareness of the importance of healthy lifestyle and the common diseases caused by unhealthy lifestyles. Three main units that are adapted from ‘Science Across Asia Pacific’ (SAAP), part of ‘Science Across the World’ (SAW) curriculum are namely ‘Drinking water’ (Book 1), ‘What do you eat’ (Book 1) and ‘Diseases: Cause, Cure and Care’ (Book 3).

Figure A(ii)(a). Template prepared in Google.doc for the development and on-line editing of curriculum for (1) Telecare

[URL: https://docs.google.com/document/d/1BlG8PNWA3UZVkJDbsy4bBQSBQLNQbBDYDgA7ZgMs__4/edit]
Exemplary lesson ideas to be incorporated with blended learning activities: Flowchart using ‘Learning Activities Management System’ (LAMS) on ‘Drinking Water’ presented by **Linda Toh** (Penang Free School Excellent teacher)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noticeboard</td>
<td>1. Give instructions to students what to do.</td>
</tr>
</tbody>
</table>
| Share Resources | 1. URL of drought  
               | 2. URL of Climate Change  
               | 3. URL of Penang Water Authorities Webpage                              |
| Assessment     | 1. Prepare 5 MCQ.  
               | 2. Prepare 2 matching pairs questions.  
               | 3. Prepare 3 true-false questions.  
               | 4. Prepare 1 short answer question.                                       |
| Web Conference | 1. Ask students to sign up and participate in the web conference.           |
Noticeboard

Title:
Noticeboard

Content:
Scenario
There has been a hot spell the past few months and the water in the reservoirs has reached a critical level. If the rate of water consumption is continued, our taps would run dry. Find out what the causes of this situation are and what you can do to help cope with this problem.
Other **problem scenario** faced in many cities that can be posted on Noticeboard: E.g. **all types of pollution!**

(Ng, et al., 2007)
Sharing photos or resources on issues about Dwindling of water resources
(1) Challenges to promote Thinking Skills considering the aspects such as,

Ability to promote students’ skills in:
- organising information and making logical inferences
- pattern recognition
- sequential thinking skills and thinking diagram
- mental flexibility
Ability to **categorise options** (e.g. push, pull, lift, slide, pour, etc.)

*strategic attack*

*creative thinking*

*deductive reasoning*

*visualisation* (e.g. futuristic thinking, the story by Ria about water scarcity) and *spatial reasoning*

*critical perception*
Current Trends, Issues, Concerns and Challenges in Science Education: A Paradigm Shift in Science Teaching and Assessment

**Traditional Views**
- **Paper and pencil**
  - Emphasis on product(s) of learning and ‘correct’ answers

**Current Perspective**
- **Alternative methods**
  - Emphasis on *thinking* and *process of learning*
  - Portfolio
  - Project
  - Self-assessment
  - Journal
  (emphasizing ‘learning by doing’

Assessment
1. A change of one or two degrees in global average temperatures can cause a reduction in the yield of crops currently grown.

   Answer:
   - True
   - False

2. Emissions of carbon dioxide from human activities do not have a big impact on Earth's climate.

   Answer:
   - True
   - False

3. In Malaysia, the hot spell has also contributed to more cases of dengue fever as it speeds up the life cycle of the aedes mosquito that carries the virus and enhances replication of the pathogen, experts say.

   Answer:
   - True
   - False
Interdisciplinary curriculum from SAW to BORDERLESS
Suggested Topic 2: DR RED and Climate Awareness

‘Disaster Risk Reduction Education’ (DR RED) is the curriculum topic aims at providing awareness of current global issues related to Disaster Risk Reduction (DRR) and educating the public the importance of DRR for sustainable living. Four units that are adapted from ‘Science Across Asia Pacific’ (SAAP), part of ‘Science Across the World’ (SAW) curriculum including ‘Disappearing wetlands’ (Book 3), ‘Tropical forest’ (Book 2), ‘Acid rain over Asia Pacific’ (Book 3) and ‘The impact of global warming’ (Book 2).
Exemplary lesson ideas to be incorporated with blended learning activities: Flowchart using ‘Learning Activities Management System’ (LAMS) on ‘Climate Change’ presented by Boey Mei Li (Sri Mutiara Secondary School Excellent teacher)
Accelerated natural disasters with drastic changes in climate patterns

Forests and other ecosystems are disappearing …
Global fish stock is dwindling …

Loss of Habitats and Biodiversity …

Only when the last tree has died, the last river has been poisoned and the last fish has been caught, …will we realize that we cannot eat money….  
- Cree Proverb
Sustainable living is fundamentally the application of sustainability to lifestyle choice and decisions that meets the present ecological/environmental, societal, and economical needs without compromising these factors for future generations.

(2) Challenges to promote attitudes for sustainable living considering the following:

- **Sustainable living** is fundamentally the application of sustainability to lifestyle choice and decisions that meets the present **ecological/environmental**, **societal**, and **economical needs** without compromising these factors for future generations.
Current Trends, Issues, Concerns and Challenges in Science Education: *Paradigm Shift in Science Teaching and Learning*

**Traditional Views**
- Rote and receptive learning

**Current Perspective**
- Discovery and inquiry
  - process skills
  - higher-order thinking (HOT) skills
  - problem solving

*(emphasizing ‘learning by doing’)*
Current Trends, Issues, Concerns and Challenges in Science Education: *Paradigm Shift in Science Teaching and Learning*

**Traditional Views**

- Rote and receptive learning

**Current Perspective**

- Discovery and inquiry (emphasizing ‘learning by doing’)
  - Process skills
  - Higher-order thinking skills
  - Problem solving

**Creative thinking skills**

- Brainstorming
- Visualizing
- Inventing
- Associating relationships
- Inferring
- Predicting
- Hypothesizing
- Making analogies
- Dealing with ambiguity
Current Trends, Issues, Concerns and Challenges in Science Education: Paradigm Shift in Science Teaching and Learning

Traditional Views

Creative thinking skills
- Brainstorming
- Visualizing
- Inventing
- Associating relationships
- Inferring
- Predicting
- Hypothesizing
- Making analogies
- Dealing with ambiguity

Critical thinking skills
- Attributing
- Comparing/Contrasting
- Classifying
- Sequencing
- Prioritizing
- Drawing conclusions
- Determining cause/effect
- Analyzing for assumptions
- Evaluating

The year 2000 and above
Lessons Learnt and Future Direction

(1) Preparing more LAMS supported blended-mode learning design incorporating plethora of teaching and learning pedagogies e.g. use of concept map to elicit prior knowledge, etc.

(2) Anchoring the learning design with social constructivist and socio-cultural framework

(3) Keeping abreast with current trends and in line with SEAMEO Borderless School as well as Malaysian 2013-2025 Education Blueprint

(4) Sharing more values-based resources to promote thinking skill and sustainable living

(5) Conduct R&D activities for the initiatives

(6) To solve technical problems related to LAMS, seek advice to imbibe into centre’s Moodle, etc.
For example, other ESD-related topics with more resources provided in the recent work of LAMS supported learning design on topic ‘Deforestation’.

**Figure 3.** Pictures of forest fire, haze, Air Pollution Index (API).
**Social constructivism**

- **Motivation** (Amabile, 1983; Bandura, 1977; Cabanilla et al., 2005; Cohen, 2000; Erickson, 1969; Gable, 1994; Spavold, 2005, etc.)

  - Informed motivation

- **Metacognition** (learning to learn for life skills)

  - Active control on thinking

- **Higher Order Thinking (HOT)** (Bloom, 1971; Carter, 2005; Gardner, 1993; Torrance, 1974; Trefinger, et al., 2002, etc.)

**Sociocultural framework**

**Process: Implementation strategies based on the concept of Borderless School (BS)**

- **Borderless School Blueprint** is anchored on innovative **Lifelong learning (L3)** concept with the outline of...

- **Objectives/Organization** (considering diversity of learners’ background) of blended learning activities...

- **Rich in cross-curricular/interdisciplinary pedagogical content knowledge and cross-cultural studies**...

- **Derived from values-based research on ICT advancement and globalization with**...

- **Educational opportunities including exchange, enrichment and everlasting exposure from environment** that...

- **Results in producing a wide and diverse groups of talented generation who are**...

- **Lifelong learners** with diverse learning styles who are self-paced/self-accessed/self-directed/self-motivated,....

- **Enterprising**, creative, innovative, futuristic and fully equipped with 21st century...

- **Skills** (a) thinking (HOT, problem-solving (PBS)); (b) technology; (c) life (work & survival) & always...

- **Striving forward as successful producers of new knowledge with ability to build relationships across national borders in an ever challenging world!**

**Output: Expected outcome or Product of BORDERLESS**

- (A) **Lifelong learners in ‘Borderless School’** evaluated by instruments

  - Teaching and learning strategies using ICT tools

  - Contextual problems to be solved by learners

  - Lab, field work, camping

  - Constructivist teaching (e.g. PBL/PBL/PBL, Q&A, interactive input, etc.)

  - Blended learning: Face-to-face & contextual

  - Web surfing & conferencing

  - Interactive e-portals/portals

  - Multimedia (audio and visual tools)

  - Simulations and virtual laboratory, digital library

  - Web 2.0 tools, game-based learning, 3-D animations

  - Mobile (m-) learning

  - ODL accessible to rich OER/Open Educational Resources

- (B) Cases of the effect of BORDERLESS on HOT and motivation

  - (i) Learners with motivation are:

    - Self-accessed/directed;

    - Enterprising: Resourceful/bold/energetic/risk taking, with purposeful or industrious undertaking;

    - Task/achievement/informed motivation towards subjects e.g. science related studies/careers

    - Lifelong learners in all aspects and interdisciplinary knowledge

  - (ii) Learners have HOT skills below:

    - Critical/creative/innovative with deep thinking skills for the future

    - Higher cognitive thinking level (HCTL) including conceptual and procedural knowledge and/or skills.

    - Integrative/reflective/logical

    - Scientific (process/manipulative)

    - Problem-solving skills (PBS)

    - Awareness, self-appraisal, active control on own thinking (metaskills)

**Figure A(i): The conceptual framework for the ‘Lifelong Borderless Learning’**

(Ng, 2014)
Eleven shifts to transform the system

1. Provide equal access to quality education of an international standard
   - Benchmark the learning of languages, Mathematics and Science to international standards
   - Launch new Secondary (KSSM) and revised Primary Curriculum (KSSP) in 2017
   - Revamp examinations and assessments to increase focus on testing higher-order thinking skills by 2016
   - Raise quality of preschools and push to 100% enrolment by 2020
   - Move from 6 to 11 years of compulsory schooling, starting at age 6; supported by retention initiatives and job-ready vocational training
   - Increase investment in physical and teaching resources for students with specific needs

2. Ensure every child is proficient in Bahasa Malaysia and English language
   - Introduce a common Bahasa Malaysia curriculum at the primary level, with earlier intensive remedial support for students that struggle to allow for removal of panic-trap class
   - Expand the LINUS programme to include English language literacy
   - Upskill English language teachers and expand opportunities for greater exposure to English language
   - Encourage every child to learn an additional language by 2025

3. Develop values-driven Malaysians
   - Strengthen civic elements by making community service a pre-requisite to graduation by 2017
   - Enhance Islamic and Moral Education with greater focus on core values and underlying philosophies of major religions by 2017
   - Develop students holistically by reinforcing requirement to participate in 1 Sport, 1 Club and 1 Uniformed Body
   - Enhance and expand RMUP from 2016 to facilitate interaction across school types, ethnicities and socio-economic groups

4. Transform teaching into the profession of choice
   - Raise entry bar for teachers from 2013 to the higher tier 30% of graduates
   - Upgrade the quality and personalisation of CPO from 2013 with greater focus on school-based training
   - Focus teachers on their core functions of teaching from 2013 by reducing administrative burden
   - Implement competency and performance-based career progression by 2016
   - Enhance pathways for teachers into leadership, master teaching and subject specialist roles by 2016
   - Peer-led culture of evaluation and certification process by 2025

5. Ensure high-performing school leaders in every school
   - Competency-based selection criteria and enhanced succession planning processes for principals from 2013
   - New Principal Career Package rolled out in waves from 2013, with greater support (for example via coaching, on-boarding programmes), greater operational flexibility for school improvement, curriculum and co-curricular planning, and sharper accountability for improving student outcomes
Comparison of Malaysia’s PISA 2009+ ranking against other countries

TIMSS and PISA International Assessments

TIMSS is an international assessment based on the Mathematics and Science curricula of schools around the world. It assesses students in Grades 4 (the Malaysian equivalent is Year 4) and 8 (the Malaysian equivalent is Form 2) along two aspects: content such as algebra and geometry, and cognitive skills, namely the thinking processes of knowing, applying, and reasoning. The test was first administered in 1995. Today, over 59 countries participate in the assessment which is conducted every four years. Malaysia has participated in TIMSS since 1999, although only with Form 2 students.

PISA, co-ordinated by the OECD, is another widely recognised international assessment. Conducted every three years, PISA aims to evaluate proficiency in Reading, Mathematics, and Science in students aged 15 years old. Its focus is not on curriculum content, but on students’ ability to apply their knowledge in real-world settings. Participant countries extend beyond OECD members, with 74 countries taking part in the most recent assessment in 2009. Malaysia participated for the first time in 2010, as part of the 2009 PISA assessment cycle.
Eleven shifts to transform the system

**EMPOWER JPNs, PPDs, AND SCHOOLS TO CUSTOMISE SOLUTIONS BASED ON NEED**

- Accelerate school improvement through systemic, districted programmes in all states by 2014
- Allow greater school-based management and autonomy, including greater operational flexibility over budget allocation and curriculum implementation, starting with the best performing and most improved schools
- Ensure 100% of schools meet basic infrastructure requirements by 2015, starting with Sabah and Sarawak
- Provide internet access and virtual learning environment via 1 RestartNet for all 10,000 schools by 2013
- Augment online best practices content starting with a video library of best teachers delivering lessons in critical subjects in 2013
- Maximise use of ICT for distance and self-paced learning to expand capacity and allow for more customised learning
- Empower JPNs and PPDs through greater decision making power over budget and personnel while also holding them accountable for concept KPIs from 2013
- Deploy almost 5,000 more personnel from Ministry Office, JPNs, and PPDs to better support schools by 2014
- Strengthen leadership capabilities in principal 150+100 leadership roles from 2013
- Strengthen key central functions and rationalise structure of Ministry from 2016

**LEVERAGE ICT TO SCALE UP QUALITY LEARNING ACROSS MALAYSIA**

- Equip every parent to support their child’s learning via a parent engagement toolkit and online access to their child’s in-school progress (SAPS system)
- Invite every PBG to provide input on contextualisation of curriculum and teacher quality from 2016
- Expand Trust School model to 500 schools by 2015 by including alumni groups and NGOs as potential sponsors

**TRANSFORM MINISTRY DELIVERY CAPABILITIES AND CAPACITY**

- Link every programme to clear student outcomes and annually rationalise programmes that have low impact, align to government’s overall shift towards outcome-based budgeting
- Capture efficiency opportunities, with funding reallocated to the most critical areas such as teacher training and upskilling

**PARTNER WITH PARENTS, COMMUNITY, AND PRIVATE SECTOR AT SCALE**

- Publish an annual public report on progress against Blueprint targets and initiatives, starting for the year 2013
- Conduct comprehensive stock-takes in 2015, 2020 and 2025 to ensure Blueprint remains relevant by incorporating stakeholder feedback and accounting for an ever-evolving external environment
Conclusion

21st century students should be equipped with *essential skills for sustainable living*.

These include *thinking, living and technology skills* that are also emphasized in SEAMEO ‘*Borderless School*’ (BS), i.e. ‘*a school that prepares students to become global players who are enterprising, creative, innovative, equipped with 21st century skills, and lifelong learners.*’

It is high time BS was identified as one of the 10 focus areas in Golden SEAMEO for the next decade.

It is thus our duty as educators to be part of the team to facilitate these groups of global players towards achieving the aspiration of the nation!
Thank you