Information and Communication Technology for Social Development

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Table of Contents

Page

iii Foreword (HE Kusmayanto Kadiman, State Minister of Research & Technology, Republic of Indonesia)

1 Introduction (Apichai Sunchindah, Executive Director, ASEAN Foundation)

5 1) Researching and Evaluating ICT for Social Development (Colin Latchem)

21 2) Building Collaborative Open & Distance Learning Research (Jon Baggaley, Tian Belawati & Naveed Malik)

29 3) Best Practices for Capacity-Building in Cambodian Distance Education (Doung Vuth, Chea Sok Huor & Chhuon Chan Than)

39 4) Evaluation Needs of Medical Distance Education in Mongolia (D. Amarsaikhan & S. Oyun)

45 5) Using Open-Source Software for Open and Distance Learning (Batpurev Batchuluun)

55 6) Innovative ICTs in the ASEAN Region (Felix Librero)

69 7) Viability of SMS Technologies for Non-Formal Distance Education (Angelo Ramos)

81 8) Using SMS Methods to Combat Avian ‘Flu (Bambang Wijayanto)

93 9) Instructional Design Training for ICT-Based Distance Learning in Asia (Felix Librero)

99 10) Summary: Establishing a Collaboratory as an Infrastructure for International ICT Research (Jon Baggaley & Eddy Bahfen)

111 List of Symposium Delegates
Chapter 5

Using Open Source Software for Open and Distance Learning

Batpurev Batchuluun & Uyanga Sambuu

Introduction

The demands on higher education in Asia require a fundamental change in direction. Information and communication technologies (ICT) facilitate that change. In e-learning, open-source software (OSS) providing cost-free learning platforms have paved a new road revolutionising teaching and learning methods. OSS e-learning platforms have been found to be valuable, extensible, versatile and powerful tools that can assist in many educational tasks, and in many organisations. Many functions can be built into OSS packages, even when they are primarily designed for learning (content) management. Distance education (DE) methods using OSS is being rapidly developed in most Asian countries. In this chapter, we discuss ways in which OSS instruction can be designed and implemented.

What is OSS?

OSS is software whose licenses give users the freedom to run the program for any purpose, to study and modify the program, and to redistribute copies of the original or modified program without having to pay royalties to their original developers. The market share of OSS is constantly increasing, and in many markets is now significantly higher than commercial software. Nowadays, OSS can be the most reliable software, with the best performance, and superior security. It is feasible that the openness of open-source code may aid attacks upon it, since hackers can discover flaws in it with step-by-step precision. The more bugs that are revealed and fixed, however, the more secure the software becomes.

A major advantage of OSS is the cost of ownership, usually far less than that of proprietary software, especially as the number of competing platforms increases. Adopting any ICT approach is likely to be expensive, involving costs for infrastructure, software, and training (Wheeler, 2005). We can reduce these costs by focusing on OSS rather than proprietary software. Many aspects of the hardware infrastructure cannot benefit from OSS. For example, a leased line Internet connection will cost the same regardless of the software used on it. However, other areas can see significant cost benefits. Users of Linux-based servers as opposed to commercial options, for example, can greatly reduce the cost of the multiple servers they require for web, email, file, print, and firewall. These savings occur in two forms: firstly, there is no need to purchase licenses for the operating systems; and secondly, since the operating systems can be configured for the specific job at hand, it is possible to operate a lower specification machine than comparable commercial alternatives require. The biggest cost saving is in the acquisition of the software itself. With no license fee to pay, OSS is free, and in many cases without restriction of use or modification. An organisation can customise its OSS for its own needs, an extremely costly, if not impossible, option with most commercial software.

Using OSS in Distance Education

Hundreds of commercial and non-commercial DE applications are now available. Leslie (2004) has identified over 50 such systems based on OSS alone. This number would increase dramatically if we could add the software developed locally for particular institutions, and not made publicly available. In addition to those described above, the advantages of using OSS in DE include the low costs of students’ home systems, and the fact that the software tends to run well on older hardware, which makes is appropriate for school networks, and the developing world.
Considering the economic savings and technological advances being made in OSS, the current research project was designed to assess the advantages of adopting OSS learning (content) management software for DE in Asian institutions.

**SWOT Analysis of OSS**

1) **Strengths**

*Construction of course content:*

- OSS allows the delivery of multimedia content;
- archiving of course materials;
- quality control measures;
- types of course: adult education, general studies, language education, etc;
- timely content: course material can easily be updated;
- high efficiency of information delivery; and
- SCORM compliance (shareable learning materials).

*Teaching and learning:*

- OSS is available for use in project-based, inquiry-based, multitasking, individual/collaborative learning;
- routines to record and monitor student and educator performance;
- keeping track of student assessment: records (e.g., exam results), are kept in the database;
- dissemination (the sharing of core course content and new research findings improves the quality of all education);
- convenience and flexibility: flexible teaching and learning;
- scalability: the extent to which the software can be adapted to the needs of student groups and organisations of different sizes;
- learner-centred design logic; and the availability of additional OS modules from other developers.

*Communication:*

- OSS allows communication among teachers, students, between teachers and students, and with parents;
- understanding of legal and ethical issues;
- ability to collaborate effectively;
- community building: DE allows students to engage in discussion with one another; virtual communities are built in cyberspace; and
- communicate with system developers.

**Cost of education:**

- OSS reduces expenditure on course books and printing;
- ensures timely dissemination of incidental or urgent information;
- submission and automated marking of student assignments;
- delivery of courses as part of DE programmes;
- lower costs for students: travel expenses and time can be saved by remote DE students;
- eliminates the cost of commercial LMS systems; and
- reduces the cost of developing additional modules.

**Business opportunities:**

- Due to the number of students that can enroll in a distance learning program, DE using OSS may be profitable; business opportunities are created for Internet portals, universities, and software vendors.
- OSS code can be released for commercial purposes to help pay other educational costs.

2) **Weaknesses**

**Policy:**

- There are no detailed OSS policy regulations as yet; and
- many government, including that of Mongolia, have not yet declared their support for OSS.

**Course content:**

- There is currently a lack of OSS content developers; and
- time and energy are required for converting hard-copy materials into electronic formats.
Infrastructure development:

- There is currently a lack of infrastructure support for OSS; and
- a lack of ICT professionals skilled in OSS programming.

Technology:

- OSS is not widely used or accepted in many Asian countries (e.g., Mongolia), and only a few companies are currently using it;
- there are difficulties in determining true costs of ownership;
- there is little technical/user documentation as with commercial software; and
- regional localisation of OSS is difficult.

3) Opportunities

Policy:

- Detailed OSS policies and documentation are needed; and
- collaboration must be fostered among corporate, academic and educational organisations.

Dissemination:

- The Internet can transfer large volumes of information to multiple, distributed recipients at low cost.
- Even in situations where Internet connections are not available for geographical and economic reasons, CD and DVD materials can be used to distribute OSS-related information.

Teaching and learning:

- OSS methodology guides should be developed and disseminated for educators;
- educators and content developers should be prepared for OSS use through training programmes; and
- OSS experiences should be widely shared.

Technology:

- OSS should be customised and localised; and
- code openness facilitates bugs finding and fixing.

4) Threats

Technology:

- OSS developers may cease their ongoing source code development; and
- OSS could become more vulnerable to attack than commercially developed software.

Selection and customisation of Moodle software in Indonesia, Viet Nam, Mongolia and Sri-Lanka

Farrell (2003) ranked ATutor, DotLRN, ILIAS, LON-CAPA, and Moodle highly for DE purposes, out of 35 open-source learning management systems (LMS). With COL’s approval, the PANdora project adapted the same survey instrument for a semi-formal study of teachers, students, and educational administrators’ favourite learning management system software. Moodle emerged as the clear LMS leader in their perceptions and experience. The research team is currently customising Moodle for use as a DE and campus-based tool in their institutions. The latest release of Moodle is being used - 1.5.4 (2006-05-30), available from: http://download.moodle.org/modules/

a) Moodle modules customised to date:

<table>
<thead>
<tr>
<th>Module</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Student workload</td>
<td>This module allows teachers to determine the readability (fog index) of any text assignment that s/he submits.</td>
</tr>
<tr>
<td></td>
<td>- URL: <a href="http://www.elearning.mn/eng/lms/">www.elearning.mn/eng/lms/</a></td>
</tr>
</tbody>
</table>
2) SMS
This module allows users to use SMS alerting functions for upcoming examination deadlines.
- URL: www.pandora-asia.org

3) Viet Namese Unicode converter
This module allows users to convert Viet Namese win-1258 encoded content to UTF-8 encoded content.
- URL: www.netnam.vn

b) Moodle's main modules:

<table>
<thead>
<tr>
<th>Module</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Appointment</td>
<td>This is a simple module that allows appointments to be made for a given week or topic.</td>
</tr>
<tr>
<td>2) Assignment</td>
<td>Assignments allow the teacher to specify a task that requires students to prepare digital content (any format) and submit it by uploading it to the server.</td>
</tr>
<tr>
<td>3) Book</td>
<td>Makes it easy to create multi-page resources with a book-like format. This module works very well - the only reason it is not yet standard is that it must be converted to a multi-page resource type.</td>
</tr>
<tr>
<td>4) Chat</td>
<td>The Chat module allows participants to have real-time synchronous discussion via the web.</td>
</tr>
<tr>
<td>5) Choice</td>
<td>A choice activity is simple - the teacher asks a question and specifies a choice of multiple responses.</td>
</tr>
<tr>
<td>6) Dialogue</td>
<td>This module allows students/teachers to start two-way dialogues with others. The functionality of this module has been taken over by the new Messaging feature in Moodle 1.5, and the module will be removed in Moodle 1.6.</td>
</tr>
<tr>
<td>7) Exercise</td>
<td>This module is like a workshop without the peer assessment: more advanced form of Assignment. The functionality of this module may eventually be integrated into the Assignment module.</td>
</tr>
</tbody>
</table>

8) Flash
The Flash activity module allows developers to embed their movies in Moodle in an integrated way, so that they can take advantage of the grade book, backup/restore and so on.

9) Forum
Discussion forums can be structured in different ways, and can include peer rating of each posting.

10) Glossary
This module allows a dictionary or list of definitions to be maintained.

11) Hotpot
This module allows quizzes created by the Hot Potatoes software to be integrated into Moodle as activity modules.

12) Journal
The teacher asks the students to reflect on a particular topic, and the students can edit and refine their answers over time. This module has been replaced by the new Online Assignment sub-module.

13) Label
This module allows inserts of text and graphics among the other activities on the course page.

14) Lesson
This module allows a series of pages to be entered. Each page can have a question at the end, and can lead to any other page.

15) Object
This activity module allows easy incorporation of learning objects from a UK materials repository into a Moodle site. The module is provided in this form as a temporary measure. Future versions of it will be rewritten to make them part of the Resource Repository sub-module.

16) Questionnaire
Based on phpESP, this module allows custom surveys to be created.

17) Quiz
This module allows the teacher to design and set quizzes with a wide range of question types.

18) Resources
Resources are content - information the teacher wants to bring into the course.

19) Scheduler
This module allows students to schedule one-on-one time with the teacher.
20) SCORM A module to load and play SCORM-compliant content packages. Currently supports SCORM 1.2.

21) Survey The Survey module provides a number of verified survey instruments that have been found useful in assessing and stimulating online learning.

22) TUI The Test of Unconscious Identification is a psychological test. Tests of this kind are popular in current psychology.

23) WebWork This is a collection of scripts in PHP and Perl to allow Moodle to communicate with WeBWorK, a system for testing mathematics. The installation is currently recommended for advanced users only.


25) Workshop A Workshop is a peer assessment activity with a huge array of options. It allows participants to assess each other’s projects, as well as exemplar projects.

Conclusions

Utilisation of OSS in the education system, especially in DE, has rapidly gained momentum throughout the world, and it is now a convenient time to introduce and utilise OSS-based distance education in the Asian context. We recommend the need to:

1. foster wide utilisation of OSS for DE across Asia, and specifically among the partner countries in this project;
2. to develop policy documentation for using OSS in DE;
3. conduct research into the use of OSS in DE;
4. learn from the best practices of using OSS for DE in other parts of the world;
5. conduct tests with specific groups and create a replicable model for introducing OSS-based DE;
6. customise OSS-based DE systems to the Asian situation;
7. organise training for teachers and tutors, to provide them with the technological skill for developing OSS-based DE; and
8. foster active collaboration between professional, academic and educational organisations in developing OSS-based DE systems.

References

