TREND AND FUTURE OF THAILAND e-LEARNING STRATEGY

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ABSTRACT

This paper presents the summary of the brainstorm session of Thailand e-Learning Community Forum for developing a coherent strategy for e-Learning in Thailand as an e-Learning roadmap of Thailand. The roadmap reflects the needs that were discussed of a multidisciplinary group of leading experts, researchers, educators and business representatives, and defines the priority areas for future research including roadmap of learning management system and e-Learning management system and e-Learning content technology. The roadmap indicates a tendency growth which summarized from the future requirements of e-Learning usage in Thailand, and it could be a good guideline for far-sighted working plan.

Keywords

1) INTRODUCTION

Since the Internet is widespread used all over the World, people get reach to the source of information easier. The benefits of the internet are taken in many ways such as e-mail, e-commerce and e-Learning. Education opportunity was broadly increased with e-Learning. Open Source Software Development and Promotion Project (ODP) of National Electronics and Computer Technology Center (NECTEC), Thailand organizes two discussion sections to establish important guidelines for e-Learning development; Learning Management System (LMS) technology and contents technology. These guidelines are a direction of Thailand e-Learning technology that has effect on cooperation in e-Learning research and development.

Figure 1: The percentage of the seminar attendances.

On July 27, 2007, 234 e-Learning users attended Thailand e-Learning Community Forum. Figure 1 shows the percentage of the seminar attendances including students, instructors, system administrators and experiences users of e-Learning system. They are from several organizations such as...
educational institution, government sectors, private enterprises, telecommunication organizations etc.

The attendances were divided into three LMS discussion groups and six e-Learning contents discussion groups. Everyone in the seminar was encouraged to share their opinion and experience in e-Learning usage.

Moreover, we can collect requirements to enhance e-Learning system and content. The requirements were divided into three periods. Short-term, medium-term, and long-term requirements are expected to be completed in year 2008-2009, 2010-2011, and after 2012, respectively.

2) THE DIRECTION OF LEARNING MANAGEMENT SYSTEM

Requirements for Learning Management System are divided into three periods. All periods are separately shown in tables respectively.

2.1) Short-term Requirements

The requirements for short-term plan, supporting solutions and technology applications are shown in Table 1.

Table 1: Short-term requirements of Technology Roadmap: Learning Management System

<table>
<thead>
<tr>
<th>User’s requirements</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>N1-1: Quality and free e-Learning System</td>
<td>S1-1: Open Source (for N1-1)</td>
</tr>
<tr>
<td>N1-2: Fast access in anywhere and anytime</td>
<td>S1-2: Accessibility Tools (for N1-3)</td>
</tr>
<tr>
<td>N1-3: Accessible for disable students</td>
<td>S1-3: Distributed Delivery System (for N1-2)</td>
</tr>
<tr>
<td>N1-4: High security</td>
<td>S1-4: Authentication System (for N1-4)</td>
</tr>
<tr>
<td>N1-5: Item Bank /Item Pool</td>
<td>S1-5: Security System (for N1-4)</td>
</tr>
<tr>
<td>N1-6: Student Evaluation</td>
<td>S1-6: Item Bank /Item Pool System (for N1-5)</td>
</tr>
<tr>
<td>N1-7: Data Backup System</td>
<td>S1-7: Backup System (for N1-7)</td>
</tr>
<tr>
<td>N1-8: Competency/ Evaluation</td>
<td>S1-8: Competency/ Evaluation (for N1-6)</td>
</tr>
</tbody>
</table>

In short-term period, users require free e-Learning systems with high quality. Open Source LMS is used for support this requirement and Web 2.0 technology is concerned. Fast accessible in anywhere and anytime is the second demand. Distributed Delivery System is solution which helps to meet the demand, while sustaining technologies for the need are XDSL Technology, Peer to Peer, Multicast and Web Service.

The third requirement in short-term is accessible for disable users such as blind students. The solution is Accessibility tools, and technology support for the need is Accessibility Technology such as Text to speech technology. High security is the forth requirement. Authentication System and Security System are solutions, and Security System is the technology support for the need.

Fifth, the users require Item Bank or Item Pool for collect a large amount of examination questions. The solution is Item Bank/Item Pool system with using Security as technology. Student Evaluation is sixth necessity in the period. Supporting solution is Competency and evaluation, while Bloom Taxonomy is one of supported technology. The last need is Data Backup System which needs Backup System for solution and Database Technology and Open Source Software are technology applications.

2.2) Medium-term Requirements

Table 2 shows two requirements during medium-term. The users needed LMS cooperation support which is not only for content sharing but also user and information sharing. Wrappers which allow incompatible
functions can cooperate. Moreover, **Web Service** is a technology which supports the idea.

Another need in this period is **accessible from mobile device at anywhere and anytime**. **Ubiquitous Learning** is the solution which supported by **Web Service**, **Mobile Technology**, and **Embedded System** as Technology Applications.

Table 2: Medium-term requirements of Technology Roadmap: Learning Management System

| User’s requirements | N2-1: LMS cooperation support  
| N2-2: Be able to learn anywhere, at anytime with mobile device |
| Solutions          | S2-1: Wrapper (for N2-1)  
| S2-2: Ubiquitous Learning (for N2-2) |
| Technology Applications | T2-1: Web Service (for S2-1, S2-2)  
| T2-2: Mobile Technology (for S2-2)  
| T2-3: Embedded System (for S2-2) |

2.3) Long-term Requirements

In long-term period, there are more requirements than medium-term period shown in Table 3. The first one is **effective and reliable evaluation on LMS**. Supporting solution is **e-Assessment**, while technology applications are **user modeling technology** and **tracking model**.

Table 3: Long-term requirements of Technology Roadmap: Learning Management System

| User’s requirements | N3-1: LMS which support effective and reliable evaluation  
| N3-2: One-time login among LMS  
| N3-3: Searchable for expert  
| N3-4: Virtual Classroom LMS  
| N3-5: Standard LMS examination |
| Solutions          | S3-1: e-Assessment (for N3-1)  
| S3-2: Central Authentication System (for N3-2)  
| S3-3: e-Profile (for N3-3)  
| S3-4: Digital Ecosystem (for N3-4)  
| S3-5: Assessor System (for N3-5) |
| Technology Applications | T3-1: User Modeling Technology (for S3-1, S3-3)  
| T3-2: Tracking Model (for S3-1, S3-3)  
| T3-3: Single Sign on (for S3-2)  
| T3-4: Security Technology (for S3-3)  
| T3-5: Open Source Software (for S3-4, S3-5) |

The Second user’s requirement is **one-time login among LMS** which users can use only one username, password and profile for log in all LMS they registered which is supported by **central authentication system** as solution and **single sign on technology application**. The third requirement is **searchable for expert** that user can find persons who are expertise in the topics they interested on the system. Appropriated solution is **e-Profile** on the system supported by user modeling technology, tracking model and security technology.

**Virtual classroom LMS** is another requirement in this period. That needs the user’s interface of LMS seems like classroom environments. **Digital ecosystem** is supporting solution, **Open Source software** is technology application. Last, the user’s requirement is **standard LMS examinations** which indicate whether one LMS created according to a standard or not. Solution supports for the requirement is **assessor system** which **Open Source software** is supporting as technology application.

3) THE DIRECTION OF CONTENT TECHNOLOGY

Assembled user’s requirements are also divided into three groups. After that, the attendance discussed solution and technology application with could support the requirements as follow.

3.1) Short-term Requirements

There are eight requirements supported by seven solutions and eight applications show in Table 4.

Table 4: Short-term requirements of Technology Roadmap: Content Technology

| User’s requirements | N1-1: Free of charge, Easy to use Authoring Tools  
| N1-2: Easy and Clear Instruction Design  
| N1-3: Content can be used in many platform or LMS  
| N1-4: Interesting learning contents  
| N1-5: Rectified learning contents  
| N1-6: Large amount of learning contents  
| N1-7: Learning content resource center  
| N1-8: Sharable learning content |
| Solutions          | T1-1: User Modeling Technology (for S1-1, S1-3)  
| T1-2: Tracking Model (for S1-1, S1-3)  
| T1-3: Single Sign on (for S1-2)  
| T1-4: Security Technology (for S1-3)  
| T1-5: Open Source Software (for S1-4, S1-5) |
| Technology Applications | T1-1: User Modeling Technology (for S1-1, S1-3)  
| T1-2: Tracking Model (for S1-1, S1-3)  
| T1-3: Single Sign on (for S1-2)  
| T1-4: Security Technology (for S1-3)  
| T1-5: Open Source Software (for S1-4, S1-5) |
The users require authoring tools which are free of charge and easy to use during year 2008-2009. There are three solutions which could support the need that are Open Source authoring tool, instruction design and content template. Each solution is supported a few technology applications which are web technology supports Open Source authoring tool and content template, XML supports Open Source authoring tools and Bloom Taxonomy supports instruction design.

The second requirement in this period is that the users need easy and clear instruction design. To meet the need, solutions are content meta-data, sharable content object and instructional design which supported by technology applications that are web technology, Bloom Taxonomy, XML, learning standard such as Sharable Content Reference Model (SCORM) [SCORM], International Metadata Standard (IMS) [IMS] and Content Object Repository Discovery and Registration Architecture (CORDRA) [CORDRA]. The third requirement is portable content that able to be used in many platforms (or LMS). The solutions for the need are sharable content object, content template and content meta-data which are supported by web technology, XML, e-Learning standard (such as SCORM), IMS and CORDRA.

Interesting learning content is the forth need of the users who attended the seminar. Solutions which support the requirement are interactive content, instruction design and content template, and technology applications are web technology, Bloom Taxonomy, and Flash technology. Rectified and reliable content are needed. Solutions which support it are sharable content object and instruction design. The sixth requirement is that the users need large amount of learning contents supported by repository system which technology applications are learning standard, XML, web technology, IMS and CORDRA.

The last four requirements are learning content resource center, sharable learning content, one standard learning content, and national license learning authoring tools.

Learning content resource center needs repository system as the solution which supported by high capacity storage technology, web technology, XML, e-Learning standard, IMS and CORDRA. While there are some relationship between sharable learning content and one standard learning content that supported by learning content meta-data and sharable learning object as the solutions and web technology, XML, e-learning standard, IMS and CORDRA as technology applications, though one standard learning content is also supported by repository system as a solution. The last short-term requirement of e-Learning users in Thailand is that the users need national license e-Learning authoring tools that allow learning object creators in Thailand produce content with low budget and cost. Open Source authoring tool support the need as a solution, and web technology and XML could be technology applications.

### 3.2 Medium-term Requirements

During year 2010 and 2011, there are five requirements for e-learning content show in Table 5.
First, users need learning content to be accessible for learning or mental disability students for equality. Dynamic content and accessibility tool support the requirement as solutions which supported by technology application; accessibility technology, web technology and human computer interaction.

Table 5: Medium-term requirements of Technology Roadmap: Content Technology

<table>
<thead>
<tr>
<th>User’s requirements</th>
<th>N2-1: Learning or Mental disability students accessible</th>
<th>N2-2: Responsible learning content</th>
<th>N2-3: Instruction Media Retrieval System</th>
<th>N2-4: Piracy Prevention System for learning content</th>
<th>N2-5: Automatic learning media editor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solutions</td>
<td>S2-1: Dynamic Content (for N2-1, N2-2)</td>
<td>S2-2: Interactive Content (for N2-2)</td>
<td>S2-3: Search Engine (for N2-3)</td>
<td>S2-4: Open Source Flash (for N2-2)</td>
<td>S2-5: Accessibility tools (for N2-1)</td>
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<td></td>
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<td></td>
<td></td>
<td>S2-6: Digital Right Management System (for N2-4, N2-5)</td>
<td>S2-7: Digital Right Management</td>
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<td></td>
<td>Clearing House (for N2-4, N2-5)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>S2-8: Digital Identifier (for N2-4, N2-5)</td>
<td>S2-9: Automatic Courseware Construction</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(for N2-6)</td>
</tr>
<tr>
<td>Technology</td>
<td>T2-1: Web Technology (for S2-1, S2-2, S2-3, S2-4)</td>
<td>T2-2: Human computer interaction</td>
<td>T2-3: Web Crawler (for S2-3)</td>
<td>T2-4: DRM (for S2-6, S2-7)</td>
<td>T2-5: Encryption (for S2-6, S2-7, S2-8)</td>
</tr>
<tr>
<td>Applications</td>
<td></td>
<td>(for S2-1, S2-5)</td>
<td>T2-6: Water Mark (for S2-8)</td>
<td></td>
<td>T2-7: Trusted Platform Module (for S2-6, S2-7)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>T2-8: XML Security (for S2-6, S2-7, S2-8)</td>
<td></td>
<td>T2-9: Accessibility Technology (for S2-5)</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>T2-10: Text to Speech (for S2-5, S2-9)</td>
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<td></td>
<td></td>
<td></td>
<td>T2-11: Pattern Recognition (for S2-9)</td>
</tr>
</tbody>
</table>

Responsible learning content which make learners pay more attention is the second requirement. Supporting solutions for this requirement are interactive content, dynamic content and open source flash, while the technology applications are web technology and human computer interaction. Third, instruction media retrieval system is needed for helping the users to search for some media that instructors or learning content producers can add it as a part of learning contents. To support the requirement, search engine is required as solution, and web crawler is technology application for the need.

Piracy prevention System for learning content and automatic learning media editor are two last requirements in medium-term which are supported by Digital Right Management (DRM) Clearing House, DRM system and digital identifier are solutions, while DRM, encryption, water mark, Trusted Platform Module and XML Security are technology application for the requirement.

3.3 Long-term Requirements

There are five requirements for year 2012 and more show in Table 6.

Table 6: Long-term requirements of Technology Roadmap: Content Technology

<table>
<thead>
<tr>
<th>User’s requirements</th>
<th>N3-1: Multi-lingual content</th>
<th>N3-2: Automatic adaptive learning content</th>
<th>N3-3: Visual reality experimental and learning content</th>
<th>N3-4: Intelligence content searching system</th>
<th>N3-5: Distributed Repository</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solutions</td>
<td>S3-1: Adaptive presentation (for N3-2)</td>
<td>S3-2: Machine Translation system (for N3-1)</td>
<td>S3-3: Visual Reality Tools (for N3-3)</td>
<td>S3-4: Semantic Search (for N3-4)</td>
<td>S3-5: Simulation Tools (for N3-3)</td>
</tr>
<tr>
<td></td>
<td>S3-6: Content Delivery System (for N3-5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technology</td>
<td>T3-1: Artificial Intelligence (for S3-1, S3-4, S3-5)</td>
<td>T3-2: Knowledge based Technology (for S3-1, S3-2, S3-4, S3-6)</td>
<td>T3-3: Natural Language Processing (for S3-2, S3-4)</td>
<td>T3-4: Image Processing (for S3-3, S3-5)</td>
<td>T3-5: Simulation, 3-D technology (for S3-3, S3-5)</td>
</tr>
<tr>
<td>Applications</td>
<td>T3-6: Web Service (for S3-6)</td>
<td>T3-7: Semantic Web Technology (for S3-4)</td>
<td></td>
<td>T3-8: Computer Graphics (for S3-3)</td>
<td></td>
</tr>
</tbody>
</table>
Multi-lingual content which allow students learn contents in difference languages is the first requirement. Machine translation which supported by artificial intelligence and knowledge based technology as technology application is the solution for the requirement. The second requirement is automatic adaptive learning content which supported by adaptive presentation as solution and artificial intelligence and knowledge based technology are technology application.

Virtual reality experimental and learning content is next requirement which let the students learn from simulated situations. Solutions for the requirement are virtual reality tools and simulation tools that artificial intelligence, image processing, simulation, 3-D technology and computer graphics support the solutions as technology applications.

The last two requirements are intelligence content searching system and distributed repository. Solution for intelligence content searching system is semantic search, and technology applications are artificial intelligence, knowledge based technology, natural language processing and semantic web technology. While, distributed repository's solution is content delivery system, and its technology applications are knowledge based technology and web service.

4) CONCLUSION

In this paper, we propose the direction of an e-Learning roadmap in Thailand as a guideline for further research and development. The roadmap is the result of the discussion among e-learning expertise community. It provides the requirement, solution, and supported technology as well. Even though it is neither a plan nor a milestone of any organization or countries. Requirement occurring in the discussion including both LMS and content technology can be represented the need of the e-learning in Thailand. According to this 5-year-roadmap, efficient e-learning components will be ready for e-learning community in Thailand.

REFERENCES


