

ICT Readiness for Education and Effective E-Learning System Approach in Myanmar

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Abstract

E-learning is the fast and essential method of delivering educational contents. E-learning can support one of the alternative ways of quality teaching and learning as well as lifelong learning. The paper argues for the establishment of a sophisticated e-learning system in Myanmar which integrates technology, pedagogy, and content. E-learning is an essential component for contemporary education, with many benefits for effective teaching and learning. In recognition of this, the government of Myanmar has made many attempts to provide ICT infrastructure and promote e-learning centers through policies and project initiatives. However, these have failed to substantially improve e-learning in Myanmar because of budget limitation, technical barriers, and lack of management technology integration. This paper draws on the rapid application development tools and open sources application to develop a new e-learning system for Myanmar which will achieve greater impact through an integrated system approach.

Keywords: *E-learning, ICT for Education, Education technology, Pedagogical Content Knowledge (PCK), Technological Pedagogical Knowledge (TPK), and Technological Content Knowledge (TCK), Rapid Application Development(RAD), Open Source*

1. Introduction

E-learning is defined as electronically mediated asynchronous and synchronous communication for the purpose of creating and performing knowledge. The technological foundation of e-learning is the Internet and digital computing technology. Actually, E-learning is a system where a people use a technology to learn anytime from anywhere. [2]

Today the e-learning concept, apart from technology, includes learning strategies and learning methods. E-learning can be defined through a theory-based framework that relates learning technologies,

instructional strategies, and pedagogical models. Debbagh's framework includes multiple dimensions such as the way people learn (Open/flexible way) with the learning strategy (collaboration, exploration, problem solving skills and also with technology.

E-learning systems are an evolving concept, rooted in the concept of Computer Assisted Instruction (CAI), Computer Based Training (CBT), Learning Management System (LMS), Self-directed Learning (SDL), Massive Open Online Courses (MOOC), and Shareable Content Object Reference Model (SCORM). All these concepts have two aspects in common: learning and technology. Nowadays, e-learning can also mean massive distribution of content and global classes for all the Internet users. [1, 3]

2. ICT readiness for Education and E-learning Situation in Myanmar

2.1. E-Governance ICT Master Plan

Myanmar government commits to develop ICT sector in Myanmar three ICT master plans covering 2001-2005, 2006-2010, and 2011-2015 and the last ICT Master Plan (2011-2015) action agendas are [5]

1. ICT Infrastructure
2. ICT Industry
3. ICT Human Resource Development
4. E-education

Ministry of Education (MOE) developed the thirty-year long term education development plan (2001-02 – 2030-31) in Myanmar according to national government policy, international EFA goal (Education for All 2000-2015) and 21st century education.

Currently, new e-Governance Master Plan (2016-2021) is being developed and the following areas are reviewed for developing a plan in line with sustainable development goals: [12]

1. ICT Technology
2. Chang Management

3. Government and Organizational
4. ICT Skill

2.2. Implementation of ICT for Education and E-learning

According to MOE's 30-year education development plan and e-Governance ICT Master Plan, the following actions were set up to create an e-Education that is endowed with dynamic knowledge and utilizing the technology for the following plan [10,11]:

1. Creation of the ICT infrastructure that facilitates e-Education
2. Establishment of ICT-based Facilities
3. Utilization of Electronic Data Broadcasting System for the Education Network
4. Introduction of VSAT system
5. Establishment of Wireless Link Video Conferencing System
6. Installing iPSTAR System
7. Initiating Computer Departments
8. E-Learning Initiative in Higher Education
9. Nurturing Teachers and Technicians for e-Education
10. Coverage of MOE Wide Area Network

Based on education's several key researches, MOE has taken steps to launch e-learning system and provide ICT infrastructures including satellite data broadcasting. Between 2000 and 2008, 740 e-learning centers were established, with 670 placed with high schools. In 2009, 33,947 schools were provided with ICT facilities such as multimedia classroom computers, video, and audio equipment but the frequency of ICT uses for teaching and learning was considered to very low. The first phase five year, 100 basic education schools have been provided iPSTAR communication system for Internet access in teaching and learning but this was also unsustainable after 2012 in some circumstance. [15, 16]

Significantly to promote ICT for education, MOE creates a PGDMA (Post-Graduate Diploma in Multimedia Arts) for teachers to apply in multimedia classrooms since 2000 but currently, most of those technicians do not have a chance to apply those ICT multimedia tools and education technologies in teaching and learning rather than applying in admin works at schools. In 2004, National ICT Awards for Education project has been initiated to promote students and teachers for teaching and learning with ICT in Education.

In 2015, MOE started "ICT for Education" project in 31 high schools under the "Connect to

Learn" programme partnering with UNESCO, Ericsson, and DFID. The project introduced mobile broadband platform and mobile applications for teaching/learning and initiated ICT-Pedagogy integration for the effective use of ICT for teaching and learning. After two years, the project evaluation highlighted that teaching with ICT has some advantages comparing with traditional teaching without ICT but there is a still lack of integration ICT Pedagogy in the curriculum and learning activities. [13]

2.3. Challenges of ICT Readiness for Education and E-learning System Development

As stated above in section 2.2, e-learning readiness in Myanmar is still gap even ICT infrastructures have been established and ICT for Education projects were being implemented since 2000. The main reasons are unsustain policy deployment and technical barriers including lack of technical knowledge, lower ICT skills, and poor people's interest. Specifically, the budget is limited for promoting ICT for Education and quality education even the policy is set up for the quality education and lifelong learning according to Sustainable Development Goal (SDG: 2016-2030). It can be challenge for the quality of education and continuous learning due to unaware of management technology and lack of ICT competency and system support.

It has also been found that e-learning readiness is unstable and the budget is not ready in the research of two CoE universities with Yangon Technological University (YTU) and Mandalay Technology University (MTU). The research shows e-learning knowledge is ready but e-learning infrastructure with computers and networks are not ready yet. [17]

According to the E-government Development Index Survey (EGDI-2018), Myanmar ranking is 157 out of 193 (0.3328 ranks) and E-participation is 181 out of 193. The internet users are 25.07%, broadband access users are 0.17%, mobile subscribers are 95.65%, wireless connectors are 56.3% and telephone landline users are 0.97%. [16] ICT for Development Index (IDI 2017) shows the ranking 135 assessing with ICT readiness (infrastructure and access), ICT use (intensity), and ICT capability (skills).

In summary, ICT readiness for education is comparatively low with other countries as well as the current policy deployment and ICT for Educations project implementation in Myanmar shows e-learning

systems are not ready and the quality of education and lifelong learning are challenges due to budget limitation, technical know-how barriers, poor people's interests, unaware of management technology and lack of system in the integration technology, pedagogy and technology.

To improve the country development and quality education in Myanmar, the government policy should encourage the sustainable development and system approach to invest and support the ICT infrastructure and Education Quality Improvement System (EQIS) to improve ICT access and ICT skills including E-learning platforms and digital literacy for 21st century learning and sustainable development goals. [4, 16]

3. Proposed E-Learning System Approach in Myanmar

In the past 10 years in the world, e-learning has increased in popularity. There are many benefits to e-Learning for both the learners and the institutes that are affordable, cost-effective, and sustainable way to increase knowledges and competencies. There are three main reasons to apply E-learning system in Myanmar due to cost-effective for developing the quality education system; the users' knowledge can be increased by the retention of technology; and users' competency will be improved by accessing with both web application and mobile responsive.

In this paper, I will argue to overcome the budget limitation and to ensure the quality education and lifelong learning by proposing the creation of effective e-learning system in Myanmar by applying open source technology, ICT pedagogy integration, and system approach with linking hardware and software technology management.

3.1. Effective E-Learning System Design

As I have argued in this section to develop e-learning system approach, it is an integration of technology, pedagogy, and content as a kind of management technology which is a systematic way of designing an effective use of hardware technology and software applications with learning objectives. It includes input, process and output phases as choosing the right learning resources tools for inputs, interactive learning activities with synchronous and asynchronous in the learning process, and the output which is to get the learning outcomes with different levels of cognitive skills and 21st century skills.

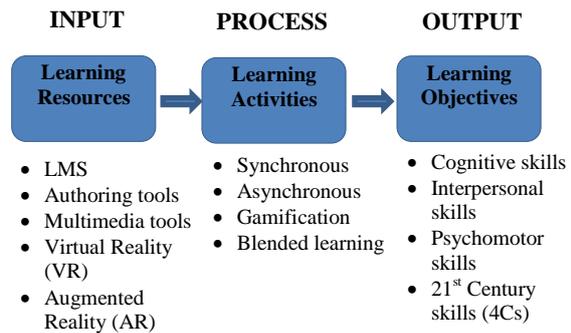


Figure 1. E-Learning System Design

3.1.1. Learning Resources

Learning resources are mainly inputs for developing E-learning system. It is very important to consider and choose the right tools to be relevant with learning process and learning outcomes. The proposed system will choose open source Moodle for Learning Management System (LMS) and H5P authoring tool for e-learning content development because they can support SCORM contents, multimedia interactive contents, learners registration and learning tracking records.

3.1.2. Learning Activities

Learning activities involve several methods for instance self-paced learning with synchronous and asynchronous, online/offline learning with mobile and web platform, learners' engagement with gamification learning, and mixing traditional classroom approach and online learning approach with digital platforms.

3.1.3. Learning Objectives

Learning objective is resulting learner outcomes. It can be assessable with different levels of skills development including Lower Order Thinking Skills (LOTS) and Higher Order Thinking Skills (HOTS) for learner' cognitive development as well as communication, collaboration, critical thinking, and creation skills for 21st century learning 4Cs.

3.2. E-Learning System Components and Standards

3.2.1. E-Learning System Components

This paper proposed the E-Learning system to comprise three main components with technology, pedagogy, and contents as educational researchers

Mishra and Kohler (2006) developed TPACK. This model is useful for educators as they begin to use digital tools and strategies to support teaching and learning. The proposed system is designed around the idea that content (what you teach) and pedagogy (how you teach) must be the basics for any technology (digital tools) that you plan to use in your classroom to enhance learning. [9,18]

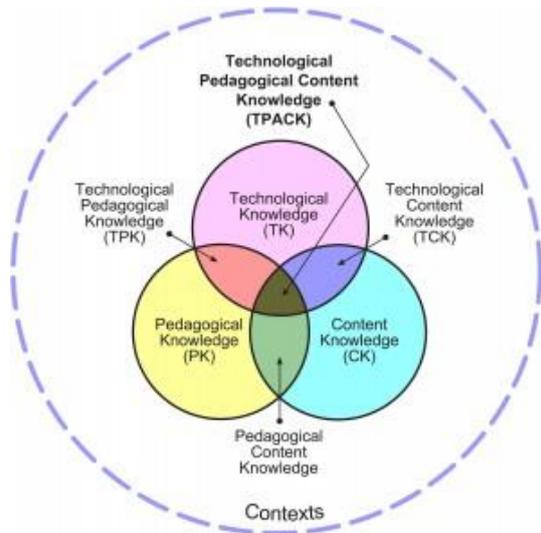


Figure 2. TPACK Framework [tpack.org]

The circles in the TPACK diagram represent content knowledge, pedagogical knowledge, and technical knowledge. The areas where the circles overlap where the three kinds of knowledge combine can be explained as follows:

Pedagogical Content Knowledge (PCK) is the knowledge that teachers have about their content and the knowledge that they have about how to teach that specific content. This specialized knowledge allows teachers to use the most effective methods for teaching specific content.

Technological Pedagogical Knowledge (TPK) is teachers develop to identify the best technology to support a particular pedagogical approach. For instance, if you want your students to work in collaborative groups (pedagogy) you might choose to have them share their learning in a wiki (a digital tool that is collaborative) or communicate what they have learned in a multimodal presentation using for example: PowerPoint, PowToon or Prezi (digital tool that allow students to present what they know).

Technological Content Knowledge (TCK) is the set of skills, which teachers acquire to help identify the best technologies to support their students as they learn content. For instance if you

wanted your students to recognize and understand the sequence of steps leading up to a hurricane (content) you would look for online hurricane tracking sites, allow them to find photographs that represented the formation of hurricanes and have them document the different stages in a timeline.

In a nutshell, e-learning system components will include [2,14]

- E-learning content (**Content**)
- E-tutoring, e-coaching, e-mentoring (**Pedagogy + Technology**)
- Collaborative learning (**Pedagogy + Technology**)
- Virtual classroom (**Technology**)

3.2.2. E-Learning Standards

E-learning standards are a set of common rules that apply to content, authoring software and Learning Management System (LMS).[7] These need to make sure for designing and developing content, deploying it across platforms, and ensuring interoperability across devices. E-learning technical standards will be used SCORM.

Table 1. ICT Integrated Pedagogy and Content E-Learning Standards

TPACK Framework	Knowledge	Tools
Technology	Learning Management System (SCORM supported LMS)	<ul style="list-style-type: none"> o Moodle o Blackboard o TalentLMS o ATutor
Pedagogy	Instructional Design	<ul style="list-style-type: none"> o ADDIE o ARCS Model o Agile Mode o Bloom Taxonomy
Content	Learning objective level (21st century learning skills 4Cs)	Authoring Tools <ul style="list-style-type: none"> o H5P o Captivate 2019 o Articulate story o iSpring

SCORM stands for Shareable Content Object Reference Model. It is a technical standard developed by the Advanced Distributed Learning Initiative (ADL) and it defines how e-learning courses interact with LMS to facilitate course tracking. SCORM

support to record elements such course completion, number of times a learner has accessed a course, time taken to complete the course, assessment scores and points. [6, 8]

3.3. Effective E-Learning System Approach

In the world, there are a lot of standards and tools for creating E-Learning system, the current paper will mainly focus on learning resources components as a foundation of system development that what kinds of open source technologies are effective for developing e-learning system in Myanmar. Other system components will follow with the research of education technologies for learning activities and 4Cs skills for learning outcomes.

The development of system is integrating with technology, pedagogy, and content as with TPACK framework for aiming to achieve the quality education. Therefore, the paper shows the right tool for technology is Moodle learning management system, pedagogy methods is to apply with ADDIE and Bloom taxonomy and the content development is H5P authoring tool.

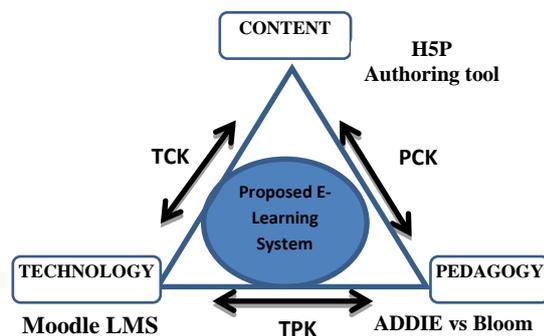


Figure 3. E-Learning System Development

For the technology framework with TCK and TPK, the Moodle LMS is chosen among the standards as mentioned above because it is open source and it also supports several types of SCORM version and multimedia, progress report other LMS's services. It also allows any type of e-learning contents such as html page, interactive video, voice activation, animation, and many assessment quiz types. The main reason to choose is it is fully open source with no cost and unlimited users registration and it can also be configured for security platform and mobile application but it may require the web server hosting cost for online Internet access and it can be totally free for localhost.

For pedagogy framework with PCK and TPK, it is better suit for using ADDIE instructional design for any LMS and Bloom Taxonomy teaching learning methods. It needs to link with content development authoring tools for learning outcomes. It includes the following steps with analysis, design, development, implement, and evaluation. It is most popular design and suitable for Bloom's taxonomy learning outcomes. It is easy steps by steps configuration in instruction design with pedagogy and clear setting learning outcome levels with Lower Order Thinking Skills (LOTS) and Higher Order Thinking Skills (HOTS).

For content development with TCK and PCK, H5P is chosen for open source and Adobe Captivate 2019 for proprietary software. They are both e-learning authoring tools which can create the several types of learning contents and assessment types such as interactive contents, animation videos, and comprehensive quiz creation by H5P and Adobe Captivate. In addition of Adobe captivate, it can support fluid boxes, TTS, simulation, Virtual Reality (VR). The other software like Articulate and iSpring, they are not single package application and they have different tools for completing single application depending on various comprehensive content development. Their prices are also higher than Adobe Captivate even most of content development features are similar and some are extra features in Adobe Captivate.

4. Proposed E-learning System Impact and Discussions

As mentioned above in the section 3, the effective e-learning system development was explained by integrating with technology, pedagogy and content based on TPACK framework as well as by managing technology with system approach. It used open source platforms and free authoring tools so that this system can be created with low cost or no cost for Myanmar as developing countries with limited budget.

The technologies are also really simple and easy to develop the e-learning system due to the Rapid Application Development (RAD) authoring tool and Content Management System (CMS). So, it is easy integrated with the tools and contents for creating learning activities and accessing learning outcomes by comparing with traditional teaching methods.

Such digital learning materials, interactive lessons, the assessment tools and Learning Management System (LMS) can be applied frequently and developed just-in-time (JIT) as much as the user requirement and at anytime from anywhere. So, it can support continuous learning and quality education due to user's attention and engagement, interactive and authentic lessons, deep understanding, and higher order thinking skills by education technologies while traditional/normal way of teaching or teaching with ICT without pedagogy integrated cannot support easily such kinds of benefits and results.

Table 2. E-Learning System Readiness Barriers and Solutions

Readiness Barriers	Solution	Reviews & Discussion
Budget and Cost limitation	Selected Moodle LMS to overcome the budget limitation	<ul style="list-style-type: none"> ○ Moodle LMS can support low cost and zero cost for system development ○ Unlimited user registrations
Technology Barriers	Used the e-learning authoring tool such as H5P	<ul style="list-style-type: none"> ○ H5P is HTML 5 technology and free open source ○ Easy to create interactive learning contents
Quality Education	Integrated ICT Pedagogy in the curriculum	<ul style="list-style-type: none"> ○ To support learning outcomes with 4Cs

5. Conclusions

This paper has proposed to develop the effective e-learning system approach by applying rapid application development and open source technologies to overcome the budget limitation and technical barriers in Myanmar as in the findings of the historical literature review on the implementation of education policies and projects from 2000 to 2017 and descriptive research on two COE universities in Myanmar. Actually, the proposed system approach is comprised with learning resources, learning activities and learning outcomes for creating the effective e-learning system for realizing the quality education and sustainable development learning. As this paper

has demonstrated, the proposed system development can be cost effective with low cost or no cost by using open source technologies, and the technical barriers can be reduced by using Rapid Application Development (RAD) and Learning Content Management System (LCMS) and the quality education and lifelong learning can be realized by integrating with ICT pedagogy in the curriculum for setting 21st century skills 4Cs and system approach.

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