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**Development of an effective Quality Assessment Model for Electronic Learning on
Connectivism in Thailand University**

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ABSTRACT

The advancement in the Internet and information technology (IT) has contributed to the development of novel instructional methods unconfined by the physical classroom and at the same time providing greater educational opportunity. An increasing number of tertiary educational institutions in Thailand have thus availed themselves of the technologies by substituting the conventional physical classrooms with virtual ones. Specifically, this research aims to propose a connectivism-based E-learning scheme designed for a virtual university setting. The development of the E scheme has taken into account the IT infrastructure, students' and instructors' computer literacy, self-learning culture and determination as well as economic consideration (i.e. cost-saving). The E learning scheme is expected to transform the way in which knowledge is imparted from the conventional brick-and-mortar classroom to a virtual environment whereby the resources requirement (i.e. commute time and finances) is minimal. In addition, the proposed scheme has been oriented toward the student-centered learning concept with which the E-based learners are empowered with selections of location, time and pace of their learning. The scheme also allows for the delivery of instruction and class materials as plain texts, graphics, audio and video; and for the instantaneous interactions between the instructors and learners. A total of 100 first-year university students were statistically divided into the experimental (36) and control (64) groups. The experimental group learned the subject and participated through the Internet-based (i.e. E) channels, while the participants in the control group were physically present in the classroom. In the experiments, both groups sat a test pertinent to the subject on the first day and retook the test on the final day of the course. In measurement of attitude and levels of satisfaction, both 100 participating students and a total of 66 instructors were asked to quantify their attitude and satisfaction by answering a set of questions on a scale of 1 to 5. The findings validate the effectiveness of the proposed E learning scheme as a viable learning mode with the achievement scores (E1/E2) of 81.53/80.10 and a positive correlation between the E implementation and the post-E achievement score ($p=.05$), while the control group's E1/E2 are 79.06/80.03. The mean satisfaction scores of the experimental and control groups are respectively 4.72 and 4.46, which are statistically significant ($p=.05$).

Keywords: E-Learning, asynchronous, e-evaluation, connectivism, blended learning, quality assessment

Introduction

It is undeniable that education plays a pivotal role in the human development and in laying the foundation for a strong social and economic system. Along with the more

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widespread Internet access and lower costs of IT technologies, efforts have been made to incorporate the technologies into the manners in which knowledge is imparted and class materials delivered with the goal to promote and increase access to education. The amalgamation of IT technologies and education has brought about electronic education (i.e. e-Education) in which the computer and Internet technologies are deployed as tools for learning, progress monitoring and evaluation; and also the materialization of a knowledge-based society [4].

In Thailand, e-Learning has been adopted and implemented at varying degrees at all levels of education from pre-school to tertiary. Specifically, at the tertiary level, many Thai universities and higher educational institutions have implemented the e-Learning concept with the establishment of virtual university alongside the conventional mode of instruction. The new mode of learning via Internet-based platforms (i.e. virtual-university platform) has been found to promote the effective learner-learner and learner-instructor interactions and exchange of ideas. Furthermore, the digital-based learning empowers the learners with the selections of time, location and pace for which knowledge is delivered and received and also potentially encourages life-long learning, a phenomenon that is termed “*connectivism*” by [10]. This mode of instruction also offers a benefit of real-time global library access and, at the same time, enables both instructors and learners to conduct online evaluations (e-Evaluation).

Research Problems and Objectives

The common issues facing every university and higher educational institutions encompass those of multiple instructors responsible for one same subject, possibly resulting in incongruence of instructional styles and content quality, and of budget constraints in the provision of adequate facilities. The first and second issues could be mitigated and addressed, respectively, with the adoption and implementation of e-Learning and the subsequent virtual university concept. The objectives of this experimental research are thus as follows:

1. To propose for subsequent full implementation the connectivism-based E learning scheme for a virtual-university ecosystem applicable to the undergraduate study.
2. To determine the effectiveness of the proposed E learning model by which comparisons are made between the achievement scores (E1/E2) under the pre- and post-E conditions and also between those of the experimental and control groups.
3. To examine the satisfaction levels of the participating students and instructors by which all participants are asked to quantify their levels of satisfaction on a scale of 1 to 5.

Research Conceptual Framework

The conceptual framework of the proposed Quality Assessment Model for connectivism-based E learning scheme covers the following (Fig. 1):

1. E-classroom: The establishment of an Internet-based learning setting or a virtual classroom with an emphasis on the quality class content and attractive presentation.
2. E-lab: The establishment of an online/virtual laboratory or workshop to supplement the virtual classroom for courses requiring operational training.
3. E-course template: The provision of online course templates whereby instructors are able to conveniently create the course syllabus and distribute online via download.
4. E-advisor: The provision of a channel through which the learners interact and/or secure an appointment with their respective advisors.

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5. E-tutoring: The establishment of another virtual classroom to provide the intensive supplementary classes for the students enrolling in the course. The E-tutoring classes are typically offered alongside the regular E-classes.
6. E-book/library: The establishment of a portal through which the learners are able to access textbooks, periodicals and publications of the university library.
7. E-journal: The establishment of a gateway through which the users are able to access and retrieve existing local and international research articles.
8. E-evaluation: The establishment of a platform on which both the instructors and learners are able to conduct online evaluations relevant to the course.

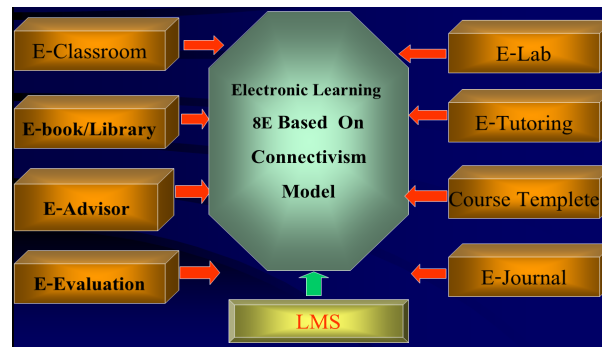


Fig. 1 The proposed Quality Assessment connectivism-based E learning model

Related Literature

In his dissertation *A Survey of Distance Learning*, Vincenzo Devito has defined the term *distant learning* as the use of information technology (IT) for information access and communication between the instructors and learners [1]. In his article *Learning Goes Online: How Companies Can Use Networks to Turn Change into a Competitive Advantage*, Brandon Hall of the US-based Cisco Research Institute noted that the implementation of e-Learning could save a company by 40% in overheads and 30% in time while increasing the learning efficiency by a minimum of 30% [5]. In [2], the authors reported that for an e-Learning project to be successful, participating learners are required to be disciplined and determined with regard to the course, and that e-Learning should be offered in conjunction with a regular class session. An online survey by *e-Learners.com* with regard to distance learning reported that distance learning has been proven to improve the learner's learning performance and attitudes toward online study [4].

System Development Approach to e-Learning

In the design and development of e-Learning, there are numerous techniques and system tools from which the developers can choose. In this experimental research, system analysis is carried out using the context (Fig.2) and dataflow diagrams of the system development life cycle (SDLC) technique. With the rapid advancement in the information and communication technologies, e-Learning or distant learning has become a reality as the learning can take place 24/7/7 (i.e. 24 hours, 7 days a week and on the world's seven continents). e-Learning or distant learning can take the form of synchronous and asynchronous learning.

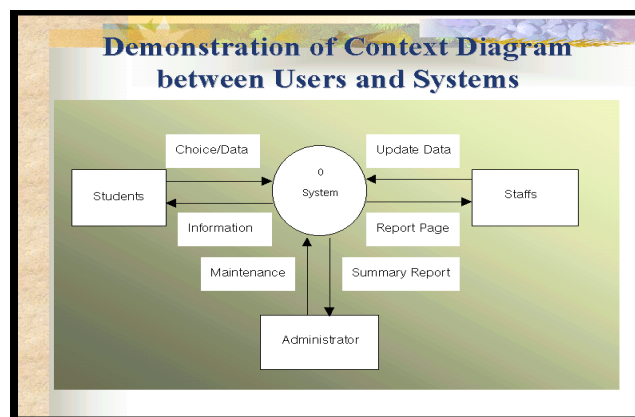


Fig. 2 The depiction of the context diagram of the experimental e-Learning system.

As the name implies, synchronous learning requires the “simultaneous” presence of the instructor and learners either in one same place (offline) or different locations via the Internet-based applications, e.g. voice over internet protocol (VOIP), text messaging, shared whiteboard, multi-user domain (MUD in which people interact with people or objects primarily within a specified domain), MOO (MUD, object-oriented in which a text-based online virtual reality system to which multiple users are connected at the same time).

In asynchronous learning, the learning takes place after-the-event (i.e. post-instruction) via the Internet, thus offering great flexibility with regard to the time and pace of the study. In addition, asynchronous learning enables those who are neither instructors nor learners but have interest in the topic or subject to access the database. Due to the *ex post* nature of this mode of learning, the applicable IT applications and platforms include webpages, web forums, webboards and e-mails.

In this experimental research, the creation of the online (i.e. E-learning) *Fundamentals of Information Technology* course follows the eight steps below:

Step 1: Define the course objectives.

Step 2: Determine learners’ knowledge and skills related to information technology.

Step 3: Design the course, including:

- Content
- Content priority
- Lengths of time required for individual chapter and the entire course
- Instructional method
- Instructional tools and media
- Evaluation method

Step 4: Identify e-Learning activities.

Step 5: Establish an e-Learning ecosystem.

Step 6: Outline an orientation session for the learners.

Step 7: Implement the e-Learning initiative in accordance with the plan.

Step 8: Conduct an evaluation.

Results and Discussion

A total of 100 first-year university students of Rajamangala University of Technology Thanyaburi (RMUTT) who enrolled in the *Fundamentals of IT* course were statistically divided into the experimental (36) and control (64) groups. The experimental group learned the subject and participated through the Internet-based (i.e. E) channels while

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the participants in the control group were physically present in the classroom. In determination of the achievement scores, both groups of students were given a multiple-choice-questions test relevant to the subject and the identical one on the first and final days of the course. In measurement of attitude and levels of satisfaction, both all of the participating students (100) and a total of 66 instructors were asked to quantify their attitude and satisfaction by answering a set of questions on a scale of 1 to 5.

The research findings validate the effectiveness of the proposed E learning scheme as a viable Internet-based learning mode with the achievement scores (E1/E2) of 81.53/80.10 and a significantly positive correlation between the E implementation and the post-E achievement score at the 5% significance level ($p=.05$). The control group's E1/E2 are 79.06/80.03. The mean satisfaction scores of the experimental (E learners) and control groups are respectively 4.72 and 4.46, which are statistically significant at the 5% significance level.

Descriptively, in the case of the learners, the findings indicated that students showed more interest in the subject due to the interactive nature of E learning and that higher learning performance could be achieved with a combination of the conventional and E learning methods. The asynchronous feature of the E learning mode has aided the students with a better understanding of the subject as they could revisit the lesson multiple times. In addition, the success of the E online learning could be enhanced with frequent and regular updates and upgrades of the content. More importantly, the degree of achievement with the E-learning implementation is largely conditional upon the adequate maintenance of the students' learning motivation.

The findings with respect to the attitudes and satisfaction of the instructors (66) who offered their thoughts on the E learning initiative showed that they are highly accepting (with a score of 4.56 out of 5.0) to the full adoption and implementation of the E8 learning mode by which all subjects are offered online, giving rise to a virtual university. A greater proportion of the instructor respondents are of the view that e-Learning could fully replace the conventional mode of instruction. In addition, the respondents pointed out that it is of paramount importance that the class content be constantly updated and the presentations be attractively multimedia. Nonetheless, to guarantee the success of the E learning initiative, it is imperative that the participating instructors possess basic IT knowledge and skills.

E-Learning Techniques

Based on research results, the researcher stated that the additional learning techniques have as followed:

- 1.To inform students in advance to learn through the web with specific URLs by e-mail
- 2.All document presentations are web-based.
3. Formal Discussions and seminar are debated on web using e-mail and videoconference.
4. Instructors post open-ended questions on the web.Then, students take change to answer those questions.
- 5.To brainstorm among students to work together in team in order to find the right answers.
- 6.Determine the task setting in each learning process.
- 7.Classroom evaluation by quizzes with multiple choices and questions.
- 8.Dynamic group discussion on given topics.

Evaluation on Development of Effective Quality Assessment Model Connectivism-Based e-Learning in Thailand

The researcher applied this E-Learning model to the course Rajamangala University of Technology Thanyaburi (RMUTT) in Thailand who enrolled in the *Fundamentals of IT*, the student evaluation results on web-based course have follows:

1. Students are so interested in online learning since it is an interactive learning.
2. When instructors combined e-Learning with traditional learning, the learning efficiency are in high level.
3. With learning through internet from classroom, students can gain understand the courses in high level.
4. The online learning can influence students in very high level when the online courses have often
 - a. update and upgrade.
5. One of the critical success factors for developing e-Learning is the method how to motivate student's attitude.

Attitude and Satisfaction of Instructors on E-Learning and Blended Learning

The researchers instructors as a case study. The results are :

1. A moderate number of instructors agreed on the idea of implementing e- Learning for every course. The interactivity between instructor and students is considered vital in many courses.
2. A moderate number of instructors agreed that e-Learning can replace the traditional classroom learning.
3. The research finding pointed out that the majority of instructors indicated that the e-Learning need to be continuously developed and improved in order to keep the course contents updated. Also, the web site should be made appealing by featuring with a lot of graphics and animation.
4. Instructors should know how to apply IT for their courses. Then, they can develop web-based courses.
5. The e-Learning management system will automatically monitor the students to access the web site and their studying behavior. It also generate pre-test and post-test.

E-Learning Content Evaluation and Analysis

In this research, the researcher analysis and suggest the way how to evaluate the web content as follows:

1. Identify the purpose of the courses.
2. Evaluate the identification of the web site. The information and illustrations on the homepage make students know what the content is all about, as does the front cover of the book.
3. Evaluation Authority
4. Evaluate the layout and design.
5. Identify the appropriate links to other web sites and resources.
6. Examine the text content of the web site, graphics, and audio, to conform with the overall concept.

The student evaluation will be done on both formative and summative basic, which include these 4 approaches :

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1. Evaluate the individual's grade for the course.
2. Peer-to-Peer evaluation : The reciprocal evaluation between the student and the chosen partner.
3. Continuous evaluation: The students are required to submit the assignments on the weekly basis.
4. Final course evaluation : The students are required to send the course evaluation via email.

Conclusion

This experimental research is concerned with implementation of a connectivism-based E-learning scheme for virtual tertiary education. The composition of the Es are E-classroom, E-lab, E-course template, E-advisor, E-tutoring, E-book/library, E-journal and E-evaluation. The findings revealed the effectiveness of the proposed E scheme with the achievement scores (E1/E2) of 81.53/80.10 for the experimental group (i.e. E-based learners) vis-à-vis 79.06/80.03 for the control group (i.e. under the conventional instructional method). The former group's level of satisfaction (4.72) is also statistically significantly higher than their counterparts' (4.46).

With the implementation of the E learning, the participating students' interest in the course increased and the large proportion of respondents concurred that the e-Learning mode is very effective as it allows the learners to access the content and class materials free of the constraints of time, location and frequency. Unlike the learners under the conventional instructional mode, the E-based learners are more participatory and engaged, resulting in the latter's improved learning performance.

The successful implementation of an e-Learning initiative necessitates a continuous upgrade of the technology and a constant update of content and class materials to maintain the appeal and attractiveness of this particular mode of learning. Notwithstanding, on the part of the learners, a strong will is a most vital component that dictates the degree of success of the e-Learning implementation, while the instructors are required to possess certain basic IT knowledge and skills.

Acknowledgments

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About the author



Miss Parinya Bannaphesat is a Thai national. She graduated *summa cum laude* from Sripatum University with a Bachelor of Business Administration (B.B.A) degree in 1999 and with a Master of Science degree in Information Technology (M.S.IT) in 2004. In 2014, she was awarded a Ph.D. degree in Educational Technology from Kasetsart University.

Her interest and previous research works lie in the area of IT applications, such as e-Learning, M-learning, e-Library, Virtual University and e-commerce. Currently, she is an instructor of the Faculty of Technical Education at Rajamangala University of Technology Thanyaburi (RMUTT).