Pedagogy Enhancement with Mobile Learning: A Case Study of the University of the Thai Chamber of Commerce

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Abstract—This paper shares a success story of the planning, development, and evaluation of a hybrid learning pedagogy, called iHybrid, adopted at the University of the Thai Chamber of Commerce (UTCC), one of leading private universities in Thailand. The university deployed a cloud-based learning platform, which has accommodated the 21st century learning concept that everyone can learn anything, anytime, anywhere via mobile devices. Since 2011, all new students were given an iPad and are able to access three online resource pools including E-Learning System, Virtual Learning Environment (Moodle) and iTunes U. Currently, 410 lecturers (80%) and more than 10,000 students (60%) have joined the iHybrid program. Drawing on both CTE perspectives and student feedback, the paper describes successful transformation process, proposes an iHybrid framework and a learning model, reports adoption results, assimilates success factors, discusses some issues, and assesses the implications for future offerings of all courses through the iHybrid mode.

Keywords—Pedagogy Enhancement; M-Learning; Case Study; Blended Learning; iTunes U; iPad, UTCC.

I. INTRODUCTION

University of the Thai Chamber of Commerce (UTCC) is one of Thailand’s leading private universities, that plays a significant role in grooming students to sharpen Thailand’s economy. Each of the 17,000 students is enrolled in one of 46 undergraduate programs found in ten schools: the School of Business Administration, Accountancy, Economics, Science and Technology, Humanities and Applied Arts, Communication Arts, Engineering, Law, College of Entrepreneurship and International College. The university provides a variety of undergraduate and graduate programs to Thai and international students. UTCC is the first university in Thailand that has adopted cloud computing for education with iTunes U and the number of usage is rapidly growing. As of 2015, it is ranked 9th in the world for universities with highest number of iTunes U activities and courses after six months of adoption. UTCC’s lecturers can utilise iTunes U courses to give each class a customised learning experience and students can learn with deep understandings and have meaningful educational experiences with their iPad.

Achieving the goals in providing effective online learning resources, there are two main administrative offices acting as backbones for the success of UTCC e-learning adoption: Office of Computer Services (OCS) and Center for Teaching Excellence (CTE). The OCS provides front-end computing services and support including network, infrastructure and hardware installation. As for the CTE, the center provides pedagogy improvement plan, technology training and course digitisation services.

Teaching and learning at the university has transformed continually since the introduction of online learning in 2006. Such transformation allows students and lecturers to be asynchronously connected anytime and anywhere without being co-location and time-bound. Since 2006, UTCC has been through 3 phases of transformation: hybrid learning 1.0, 2.0 and iHybrid accordingly. The following subsections briefly describe stages 1.0 and 2.0.

A. Hybrid Learning 1.0 - Blended learning

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<th>Learning Method</th>
<th>Online</th>
<th>Face-to-Face</th>
</tr>
</thead>
<tbody>
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<td>Content</td>
<td>What</td>
<td>Why &amp; How</td>
</tr>
<tr>
<td>When</td>
<td>Before &amp; After Class</td>
<td>In-Class</td>
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<td>Where</td>
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<td>Classroom</td>
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Fig. 1. UTCC Hybrid Learning 1.0 Concept [9]

In 2006, the university invested in network infrastructure that can efficiently accommodate a vast number of concurrent users. Additionally, it provided each of their lecturers and students a notebook and introduced an E-learning and blended learning concept to the community [9]. Lecture materials of approximately 700 courses were uploaded to an E-learning system developed by the Office of the Commission on Higher Education.
Education with Thailand Cyber University Project\(^1\). Such practices were then executed, evaluated and improved for the next three years. UTCC called this practice “Hybrid Learning 1.0” - an integration of face-to-face learning experiences with online learning materials (see Fig. 1). Nevertheless, this solution neither support wireless access via mobile devices nor provided interactive learning activities except for the upload and download of course materials.

B. Hybrid Learning 2.0 - Interactive Classroom

In order to keep pace with technology advances and increased competitive advantage, UTCC’s management decided to introduce interactive learning concept in 2008, calling it “Hybrid Learning 2.0” - a collaborative learning environment which supported critical, creative and complex interpersonal thinking skills and teamwork development [3]. The Hybrid Learning 2.0 had five major components (see Fig. 2) including self-paced learning, face-to-face learning, online collaborative support, actively responding assessment and electronic support system [9]. The university has sought partnership with Microsoft of which Cloud technology (i.e. Office Web Apps and SkyDrive) allowed both synchronous and asynchronous interaction among lecturers and students. Microsoft provided both software and services to UTCC. With an availability of centralised distribution system and connection scalability, lecturers were able to distribute course materials in the cloud to a maximum of concurrent 20,000 devices. Thus, students could easily access materials when needed, sought relevant information and prepared for upcoming classes. In addition, such partnership provided all students with Microsoft’s software, which can be carried on after graduation. At this time, new students were given a netbook instead of a notebook.

II. RELATED WORK AND THEORY

iHybrid learning adopts two learning models including the Technological Pedagogical and Content Knowledge (TPACK) and the Substitution Augmentation Modification Redefinition Model (SAMR); and deploys two learning management systems – Moodle and iTunes U.

A. TPACK

TPACK [7] is a framework that identifies the knowledge teachers needs to teach effectively with technology. TPACK was based on Lee Shulman’s construct of pedagogical content knowledge (PCK) to include technology knowledge (Fig. 3).

Fig. 3. TPACK framework (Courtesy of http://tpack.org)

Fig. 4. SAMR model (Courtesy of http://www.hippasus.com)

This paper focuses on describing UTCC’s success story, which lies in the current phase of learning transformation, that is, the 3.0 phase called “iHybrid learning”, which sees UTCC switching devices from netbooks to iPads and using iTunes U and Moodle to complement the learning pathway. In doing so, the following section starts with an explanation of underlying learning models and learning management systems. Then, we explain the development process and propose iHybrid framework and learning model in Section III; describe adoption results in Section IV; discuss success factors and adoption issues in Section V; and finally conclude the paper along with address open issues and state future research direction in Section VI.

\(^1\) Thailand’s UniNet governing institution (http://lms.thaicyberu.go.th/OfficialTCUen/main/main2.asp)
The interaction of these bodies of knowledge, both theoretically and in practice, produces the types of flexible knowledge needed to successfully integrate technology use into teaching.

B. SAMR

SAMR, introduced by Puente dura [11], describes technology integration through four levels (see Fig. 4). It also shows a progression that adopters of educational technology often follow as they progress through teaching and learning with technology. Each level can be applied to a lesson or activity that incorporates technology, moving from a use that simply replaces existing classroom resources (Substitution) to activities that create new tasks, not possible without technology (Redefinition).

C. Moodle

Moodle, created by Martin Dougiamas in 1999, is based on collaborative learning, in which a lecturer creates a student-focused environment that helps them build up knowledge and skills [2, 9]. In addition to the function to create course contents, Moodle offers seven other functions including assignment submission, forum for discussion, chat for instant messages, glossary, survey, Online quiz and Wiki module.

D. iTunes U

Launched in 2007, iTunes U is a part of Apple’s iTunes Store dedicated to free distribution of educational materials by universities and institutions around the world [5]. Once approved by Apple Inc., member institutions are given their own site and make use of iTunes Store infrastructure. iTunes U offers advantages over Moodle because it uses push notification technology and is available to anyone who can access the Internet and has a token to enroll to a course (In contrast to Moodle that only university members and students can enroll). According to Rugg [1], iTunes U provides portable, on-demand, downloadable, self-contained, episodic contents, which can be organised in a logical manner.

III. THE DEVELOPMENT PROCESS

Foreseeing that the future is about being portable, UTCC has switched the official device from notebooks/netbooks to iPad in 2011, calling it the iPad 1:1 Program. The university completely succeeded this Program in 2014 when iPads were given to all students.

Then, it became quickly apparent that if the iPads were to transform learning at UTCC, several changes were needed. This section describes the iHybrid development process that consists of four overlapping tasks: running a two-phase pilot program; upgrading network and infrastructure; training faculty and redesigning curriculum. The following subsections describe them in details.

A. Running Two-Phase Pilot Programs

iHybrid officially began in 2013 after the university has succeeded in building the eClassroom with Moodle. CTE recruited a few iChampions among the faculty to pilot new ways of teaching and learning with an iPad. In particular, the lecturers would post materials into their online courses on eClassroom and assigned their students to incorporate such materials in learning process and small group discussion. Insights gathered from iChampions helped in shaping the shared vision for learning and involved them into continuing professional development program.

28 iChampions were then recruited to work with CTE and Apple Educators from Apple South Asia (Thailand) in order to transform their courses from pure lecturing to interactive learning using an iPad and its applications. Specifically, lecturers designed students’ learning experiences that involve a variety of activities and embedded frequent assessments into students’ learning pathway in order to evaluate students’ learning achievement. At the end of the pilot program, iChampions found that learning with an iPad could offer a wide array of tools for learning and teaching, far beyond the spreadsheets and slide shows that they were used to. Following this success, UTCC’s President then accelerated the iChampions from pilot programs to an all-school effort where iChampions became role models for other lecturers during the next phase of adoption.

B. Creating flexible learning environmnet to support teaching and learning innovation

At the time, UTCC’s existing classrooms were designed for traditional lecturing, not for interactive learning. The network was not ready to accommodate twenty thousands of mobile units concurrently running interactive applications. Hence, the university through CTE and OCS had invested in building new facilities and renovating IT infrastructure, which includes:

- Installing more than 200 of 802.11ac WIFI access points all over campus, including in the garden, the library, and the student union, as well as all classrooms.
- Installing Apple TVs in all classrooms – This has served to untether the faculty so that they may teach from their iPads anywhere in the room. It has enabled students to present on the big screen from their seats, thus moving the locus of control to students. It has allowed lecturers to present students’ work on the big screen and teach from their immediate mistakes.
- Increasing core network capacity – The university has installed bier optic connections between the 22 buildings on campus, increased bandwidth to the ISP, and installed new routers and switches as necessary to accommodate thousands of concurrent mobile devices.
- Building a private cloud for teaching and learning infrastructure where lecturers use iTunes U in distributing study materials to students and Moodle for online learning activities inside and outside of classroom; Creating Mahara for student portfolios and local Wikipedia for knowledge sharing.

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2 Faculty members who joined the pilot iHybrid program
Setting up a single account to sign on to all network services for faculty and students.

C. Providing relevant and timely professional development

UTCC realised that the kind of educational and technical transformations would involve new way of thinking. Hence, the university began a professional development program, led by CTE. Thus far, UTCC has carried out the following activities:

- 410 faculty members, accounted for 80% of lecturers, were introduced the concepts of Education 3.0 [4], delivered by James G. Lengel⁵ himself. This effectively helped them realise the needs for change at UTCC. As a result, they voluntarily joined the iHybrid program and attended a 2.5-day iPad and iTunes U workshop.
- CTE has offered various teaching and learning with the iPad workshops tailored for lecturers in each school.
- CTE has appointed 18 Technology Integrators (TIs)⁶; each takes care of approximately 22 lecturers. Their tasks are to provide subject-specific consultation to faculty members in order to assist them in course planning and development of new tools and interactive approaches for teaching and learning based on the iPad.
- Apple Regional Training Centre (Apple RTC)⁷ was founded as a learning hub within the university to promote collaboration and sharing of resources and iHybrid practices.

D. Curriculum Redesign

Concurrent with the iPad 1:1 Program, CTE experimented with Moodle and iTunes U as well as explored TPACK and SAMR models [8]. CTE eventually proposed an iHybrid framework (see Fig. 5) that promised to do a better job of teaching and learning as it has enriched student’s experience with interactive learning and new forms of assessment via iPad and Apple TV.

Instigating the iHybrid framework, CTE created a standard template (see Fig. 6) for organising and delivering course materials, which is embedded in UTCC’s iTunes U. The template consists of four parts: objectives of the lesson, a list of activities students must accomplish before class, a list of activities students must carry out during class, and assignments to complete after class.

![Fig. 6. A standard template for UTCC courses in iTunes U (Courtesy of UTCC’s CTE)](image)

![Fig. 7. iHybrid model (a combination of TPACK, SAMR and UTCC’s five learning strategies)](image)

To redesign their courses, lecturers were recommended to use the standard template (Fig. 6) for their iTunes U courses as well as followed the iHybrid framework (Fig. 5). Additionally, lecturers examined five learning strategies suggested by UTCC. These strategies include mobile computing, online social networks, open content, online learning and collaborative environments [8].

Specifically, lecturers began by examining course syllabus, particularly, focusing on the content and learning objectives in order to design interactive learning experiences for students. With an integration of technology into the classroom, they then looked for digital opportunities of the before/during/after class activities through five learning strategies, reconsidered the performance, and thought of new forms of authentic assessments. For instance, during class, students use social media to discuss and to produce/aggregate contents by sharing, liking and commenting [8]. With appropriate assessment, not only multiple-choice exams but also projects

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3 Lengel is an Apple Distinguished Educator, who works closely with Apple to lead innovation in education.
4 As of May 2015, six of TIs are acknowledged as certified Apple Education Trainers.
5 http://www rtc.utcc.ac.th
and practical work products judge student progress. TPACK and SAMR models then were used to assess the level of technology used in learning activities (for more details on how to use SAMR and UTCC’s five learning strategies to design content, interactive activities and assessments, see [8]).

Attempting to illustrate the abovementioned curriculum redesign practices, we derive and propose an iHybrid model (Fig. 7) that could be used to describe the combination of TPACK, SAMR and five core learning strategies adopt at UTCC for the development of iHybrid learning.

IV. ADOPTION RESULTS

The university collects quantitative data from surveys, as well as qualitative evidence from walkthroughs and interviews.

A. Quantitative Results

1) Student Performance – UTCC surveyed 843 students, during August - December 2014, to ascertain their academic performance with iHybrid and to learn what kinds of learning activities they have experienced. Survey results are as follows:

![Survey Results](image)

- Most students used the iPad in five or six of their courses; this accounted for over 70% of their registered courses per semester.
- The iPad was used for productive activities including question-and-answer session in class, online quizzes, group projects, student presentations (see Fig. 8).
- Students reported that they could not only remember and understand course contents better with the iPad but also get to have a variety of higher learning outcomes including an ability to analyse, evaluate, and co-create course contents [6].

2) iTunes U Statistics from Apple – UTCC periodically check traffic on iTunes U. The most recent report shows that:

- Currently, there are more than 600 active courses available on iTunes U with more than 10,000 of UTCC faculty and students enrolled.

- There are quite a few large courses with high volume of traffic (e.g. Mathematics and Statistics for Daily Life and Features of Modern Thai Language) equipped with more than 100 learning materials including readings, data collections, worksheets, online discussions, research reports, and textbooks.

As of April 2015, UTCC is ranked 9th in the world for universities with highest number of iTunes U courses and activities.

B. Qualitative Remarks

1) Teaching/Learning Improvement – Every six months, the university would conduct a day-long photo learning walkthrough as to document the teaching/learning progress through photographs and video clips of students at work, taken in the classrooms, hallways, library, and garden. The university then carefully examines these images, looking for evidence of the iHybrid principles as to provide university’s leadership with details on the current state of iHybrid and use it as compelling evidence of success for UTCC.

2) Insights – Lecturers reported that the iPad offers a wide array of tools that enable various kinds of interactive learning experience both inside and outside classroom. In addition, it allows flexible teaching methods. Students indicated that they learn best when their curriculum is linked to real-world skills, and are assessed through real-world problems and projects.

V. DISCUSSION

In 2015, UTCC has become one of a few Apple Distinguished Schools, and therefore, has positioned itself to be an academic leader in the 21st century. Evidently, the university reacts to technological change by constantly upgrading learning models and continually assessing student performance and satisfaction. For UTCC, iHybrid Learning is effective because the solution facilitated both synchronous and asynchronous conditions for open dialog, critical debate, negotiation and agreement among users to support learning presence, resulting in deep understandings and meaningful educational experiences [3]. Student’s learning has been transformed through curriculum redesigning supported by iTunes U and Moodle, and through the use of effective instructional practices supported by chosen technologies.

Success in pedagogy enhancement with mobile learning at UTCC is not only about the right combination of technologies or increasing access to learning materials but also about management vision and a few other important factors. We assimilate these factors and discuss an adoption issue in the next subsections.

A. Success Factors

1) Leadership - UTCC’s management communicated a clear institutional direction and campaigned for university-wide hybrid learning policy. As a result, it has reached and is being embraced by a large number of lecturers and students across university. Specifically, the university’s president made clear the new learning policy to faculty, staff and the
governing board. The governing board provided financial support to invest in iPads, network infrastructure, and personnel.

2) Planning - There are two levels of planning: strategic and operational planning. At strategic level, the university with support from OCS and CTE identified the needs and goals of hybrid learning as well as assessed available resources and estimated potential costs of new investments, if any, for technology and infrastructure. At operational level, CTE derived an action plan, which involved communication and promotional strategies, administrative support, course development, training and assessment process. As for OCS, it formulated an action plan, which involved infrastructure and technology management and technical assistance.

3) Level of support by partners - For each transformation phase, UTCC was fully supported by established partners including Microsoft and Apple. These partnerships help saving cost, time and efforts in the development of iHybrid.

4) Extensive training and support for teaching faculty - CTE has offered a series of workshops, training courses and course development assistance to teaching faculty. CTE’s course development team has helped with course redesign, contents and media selection as well as preparation for the creation of course materials in the new format.

5) Appointing technology integrators (TIs) - TIs’ duty is to communicate iHybrid policy and practices, facilitate course construction, recommend relevant tools for each course, help with designing activities and assessments, and report issues raised by faculty members to CTE. Additionally, challenges and opportunities addressed by TIs are put to the feedback loop, resulting in continual improvement.

B. Adoption Issue – Management of Multiple Resource Pools

As much that UTCC wants to solely based on one main learning environment, that is, the iTunes U, the current version still lacks all but one necessary function provided by Moodle (see the list in Section II - C). As a result, involving parties have to use multiple resource pools and manually manage their associations. Although this issue is considered a major iTunes U’s drawback, the working team has decided to switch to iTunes U because the advantage of high level of interactivity outweighed the lack of functionalities. Hopefully, iTunes U will eventually provide necessary features. To deal with iTunes U’s lack of features, a researcher [5] suggests a few approaches such as appointing content coordinator for each course to take care of assignment submission.

VI. CONCLUSION AND FUTURE WORK

This paper shares successful pedagogy enhancement with mobile learning at UTCC by elaborating four overlapping processes, which consist of (1) running a pilot program, (2) renovating network infrastructure, (3) providing extensive training and support, and (4) redesigning curriculum. In addition, the paper lists five iHybrid success factors including leadership, planning, partners’ support, faculty training, and having TIs. It briefly explains how TPACK and SAMR models were used as basis to formulate an iHybrid framework and to derive an iHybrid learning model. Positive preliminary survey results and descriptive statistics from Apple promise that the framework and the model are practical and effective. These contributions could be useful as a roadmap and guidelines for practitioners and educators who aim to enhance learning pedagogy with hybrid and mobile learning at their institutions.

Future studies include using SAMR [11] to systematically assess the use of technology in learning enhancement and transformation as well as using Bloom’s revised taxonomy [6] to assess students’ levels of cognition in order to evaluate the success of teaching and learning outcomes. Results of such studies will then be used to further confirm and improve the iHybrid model. Qualitative data has yet to be empirically analysed and reported to the learning community. Additionally, studies should be conducted to find the best way to effectively manage multiple resource pools.

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