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Transformation from Classroom to Online Teaching/learning for a Business Computer Literacy
Course: An Empirical Study

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ABSTRACT

An empirical study describes the continuous improvement process to effectively teach a business computer literacy course over half century. The ultimate goals of this constant transformation are to meet the business requirements, to encounter higher education institute limited resources, and to adopt most effective online teaching/learning approach for reaching student's learning objectives.

KEYWORDS: Online Learning, Self-Directed Learning, Teaching/Learning Strategies, Learning Motivation, and Business Computer Literacy

INTRODUCTION

The affordable and advancement of information and communication technologies have cultivated a new form of virtual environment for a variety of online teaching/learning approaches in the current Internet information age. Higher education institutions have quickly embraced and incorporated this online teaching/learning approach into its traditional classroom teaching/learning approach. Various online teaching/learning approaches have become an important and permanent part of educational tools for its ability to communicate and educate mass number of students at anytime and anywhere in the universe.

The College of Business Administration (CBA) is constantly searching for some effectiveness and cost saving teaching/learning approach. It has driven a process to change an undergraduate computer literacy course from a traditional face-to face classroom course to a new virtual online course. This empirical study reviews a three-stage transformation process of a computer literacy course that the CBA has experienced in terms of teaching/learning approach and course contents from the 1970s until now. Some benefits and disadvantages associated with the online teaching/learning are discussed from the perspective of three CBA's major stakeholders including student, faculty and administrator.

COMPUTER LITERACY CURRICULUM REVIEW AND ITS TEACHING/LEARNING APPROACH

Not long after invention of computer in 1940s, big business organizations started to form processing centers for handling its time consuming mass data operations via computer's fast calculation power. At that time, most staff members of the business data processing center were computer science graduates with excellent education and experience in improving speed and power of computer systems. Unfortunately, this type of data processing staffs lacked business background to produce reports that would help management decision-making process. An urgent need appeared in business fields to have business graduates who could integrate computer powers and business data analyses for management to gain a competitive edge. This need nourished the birth of Management Information Systems degree and a starting point for offering computer literacy course in business schools during 1970s.

Stage 1: Third Generation Computer Languages via Teacher-pushed Classroom Learning

(1970s – early 1990)

The CBA had offered a MIS 5 “Introduction to Management Information Systems” course as one of its undergraduate lower division requirements in the early 1970s. The major objective of this course was equipping business students with abilities “to identify and produce some critical management information via computer for helping decision making in different levels of management.”

Two components of this three-unit semester course included five weeks of programming language practice and ten weeks of computer information systems usage in business. The objective of the programming language practice was to equip students with a fundamental understanding of programming logic such as (input, output, if/then/else, loop and case, etc.) used in building business information systems. The programming language in the course evolved from FORTRAN for mainframes during 1970s to BASIC for small computers in 1980s and Visual BASIC for mini-computer systems in early 1990s. The changes in programming language from one to another was to reduce the learning curve difficulty for students. The second component was to inform students with processes and issues of building a business information system including analysis, design, implementation, usage, crime, security, ethics, and social impact, etc. Over years, business information systems have expanded from basic data processing systems for routine operations to decision support systems for decision-making and expert systems for educating individuals with accumulated expert knowledge.

A teacher would demonstrate programming examples and explain information system concepts by either writing on a blackboard or displaying via transparencies and overhead projector in a classroom. Students would study information system concepts by reading teacher-assigned textbooks and practicing teacher-assigned programs via a dummy terminal connected to a computer and obtaining their outputs in a computer laboratory. Students were given paper and pencil exams in a format of true/false questions, multiple choices, short programming questions, essay and discussion questions in a classroom. An appropriate descriptive name of this instruction is teacher-pushed classroom teaching/learning approach since a teacher delivers knowledge, assign assignments, and gives exams to push student learning in a classroom environment.

Stage 2: Microcomputer Literacy via Classroom Teacher-pushed Classroom Learning Approach (early 1990 – 2008)

MIS 5 was running smoothly and achieved its intended teaching/learning objectives until early 1990s for the following reasons. The invention of fast, powerful and inexpensive microcomputers had extended computer ownership to small businesses and individuals. Microsoft had successfully dominated microcomputer software market by bundling operating systems, word processing, spreadsheet, database management systems, and presentation graphics, etc. into its low cost Microsoft Office Suite. The affordable price tag, easy to learn and simple feature of this software suite together with the low cost microcomputer had leveled the playing ground for small businesses to have same computing power for its business needs as big organization. Right away, the medium and large businesses instantly captured the capability of microcomputer by creating workstations to increase their employee’s productivity. Meanwhile, the power of advanced information technology nourished numerous creations of innovative and useful applications for sophisticated business operations and decisions. The group decision support systems, executive support systems and artificial intelligence etc. were developed to assist management dealing with both structured and unstructured strategic decisions. E-commerce, supply chain management systems, enterprise resource planning systems, customer-relationship management systems, data warehouse etc. were integrated

together as an enterprise application to facilitate and interconnect various business functions to get ahead in the current global and steep competition environment.

It was clear to the Management Information Sciences (MIS) Department that it was impossible to pack programming language of big computer, microcomputer software, newly developed information technologies, and business enterprise information systems into a single three-unit semester course as well as achieve its teaching/learning objectives defined nearly twenty years ago. In addition, MIS faculty also felt that business freshmen might not be able to understand concepts and usefulness of advanced information technologies and enterprise information systems without first having some fundamental knowledge related to their majors.

Therefore, MIS faculty divided MIS 5 into two courses named MIS 101 Computer Information Systems for Management and MIS 1ABC Computer Literacy. The MIS 101 was an upper division three-unit semester course that focused on introduction of various information technologies, systems, management and social issues to provide students with fundamental knowledge in MIS fields. It was also believed that students would appreciate usefulness of database management systems if it was introduced in the MIS 101 via a term project using Access as a data analytic and information reporting tool.

The MIS 1ABC was a lower division "Credit" or "No Credit" course that had three five-week one-unit sub courses. MIS 1A Microcomputer Hardware and Systems Software covered hardware components, operating systems, Internet browser, and e-mail system that was scheduled for the first five-week in a semester. The MIS 1B Spreadsheets offered in the second five-week and concentrated on constructing a worksheet for analyzing business data and operations. The MIS 1C Word Processing and Presentation Graphics covered creating different documentations and slide shows that was scheduled for the last five-week. Microsoft Office was adopted as MIS 1ABC software for its inexpensive educational price tag and popularity in business fields. Students had to complete every sub course with a "Credit" grade before declaring a majoring in CBA. Students could take all three-sub courses in a semester or over several semesters. There were about 10 to 12 sections with 30 students each to meet course demands per semester. It would not be a cost/benefit justified option to staff this course with qualified faculty. A more optimal alternative was hiring graduate students to teach these courses. Graduate students from MIS Master Program having proficient computer literacy skills with excellent oral and written abilities were hired as teaching assistants to teach these courses. A full time faculty with one course reduction in teaching load per semester would serve as course coordinator to oversee these teaching assistants.

There was not enough computer laboratory to accommodate every section's hands-on teaching/learning needs. Therefore, two types of classrooms including an electronic classroom and a computer laboratory were alternately scheduled for every section in a week. At first class meeting, teaching assistants delivered their lecture via a microcomputer connected to an overhead projector in the electronic classroom. Then, students had hands-on practices to reinforce their learning of lecture portion via microcomputers in a computer laboratory. Practices were placed in order to assure a uniformity of academic standards and learning objectives achieved by all teaching assistants. Two mandatory meetings were scheduled every five weeks and a common 50 minutes hands-on final exam was implemented. Learning materials and responsibilities of preparing, testing and distributing final exam among teaching assistants were discussed and determined in first meeting. To reduce cheating, two versions of final exam with similar questions were finalized in second meeting. Exchange of teaching experiences and enhancing teaching performances were also topics of discussion in both meetings. The final exam was then copied to student's disk that was submitted to teaching assistants at the beginning of each sub course.

Students took their hands-on final exam proctored by teaching assistants using microcomputers in a computer laboratory at last class meeting of each sub course. Teaching assistants used microcomputers to grade final exam answers that were saved on student disks. The one unit

credit would be given to students if they scored 70 points or higher on their final exam. The graded student exam disks were kept by the MIS Department for a year not only to reduce the chance of dishonesty of subsequent students, but also to allow a review of any student grade grievance and/or appeal.

In this stage, some evolutions had occurred that included course material change (from third generation computer languages to microcomputer software), classroom change (from traditional blackboard to a combination of electronic classroom and computer laboratory), and exam format change (from paper and pencil to computerized hands-on). Never the less, teaching assistants were still responsible for delivering knowledge, assigning assignments, and giving exams to push student's learning. Basically, it was still a teacher-pushed classroom teaching/learning approach.

Stage 3: Computer Literacy via Three Online Teaching /learning Approaches (2008 – present)

Starting 21 century, there are several factors causing acceptance and popularity of online teaching/learning approach in the higher education institute. First, costs of the modern information and communication technologies including various hardware, software and internet service provider have been constantly and dramatically reduced to a very affordable level. That has extended ownership of a complete communication and computer systems from the institution to individuals such as students.

Second, daily communicating between distance individuals via various Internet social and/or multiplayer game networks has been a widespread life style (Piccoli, Ahmad, & Ives, 2001; Wyss, Lee, Domina & MacGillivray, 2014). These online leisure interests and entertainments have especially trained young generation as a group of skillful interactive human-computer users and learners (Schrader, 2008). Consequently, most college students have ability and capability to take a distance online teaching/learning course via Internet with no or minimum problems.

Third, administration of higher education institutes always have to figure out the best utilization of their limited resources. The online teaching/learning approach enables administration to reduce their instructional cost, maintain curriculum quality, and educate a mass number of students (Ozdemir & Abrevaya, 2007). Therefore, the online teaching/learning approach has become a common instructive method in higher education institutions.

Fourth, several reputable college textbook publishers have created online teaching/learning materials named courseware. This has relieved the online course material building burden from teachers (Ellis, Hughes, Weyers & Riding, 2009; Young & Ku, 2008). The courseware has tools for teachers to monitor and evaluate their student's learning progress. Furthermore, it offers students with interactive lesson, assignment, project and instant feedback (Schult, Schult, & Round, 2008; Simmering, Posey, & Piccoli, 2009).

Under these educational environments of the Internet era, the CBA also adopted online teaching/learning approach to balance its instructional costs and learning objectives in some courses. MIS 1ABC was a perfect course to start this online teaching/learning approach for several reasons. First, it could accommodate its high enrollment of 500 students per semester without any additional physical facilities on campus. Second, only one experienced faculty with one-course load reduction could provide necessary guidance, encouragement and problem solving for students. Third, the CBA could realize extra cost savings (\$10,000 per year) by eliminating teaching assistants. Fourth, several reputable college textbook publishing companies already had computerized and interactive courseware ready to be evaluated and implemented. Finally, positive and supportive survey responses from MIS 1ABC students of their capability and attitude toward an online course cleared the way. MIS 1ABC has transformed from a traditional teacher-pushed classroom teaching/learning approach using

technology equipped electronic classroom and computer laboratory to MIS 123 as an online teaching/learning via interactive courseware and Internet (Tsai, Ogilby, & Xiong, 2016). MIS 123 has kept Microsoft Office as its course materials. There are three major course objectives. First, it aims to equip students with fundamental computer skills required in taking further business courses. Second, it intends to provide students with life-long and self-learning abilities. Third, it attempts to enhance career opportunities for students in business professional fields.

Courseware was selected as an online teaching/learning instrument to deliver course materials for following reasons. First, it had every subject with interactive hands-on learning and instant feedback mechanisms for students. Second, it came with an affordable purchase price to minimize student's financial burden. Third, it provided a set of useful monitor and evaluation tools for instructor. Last, a local technical support staff was available for the course in addition to its online and telephone supports.

A syllabus for each sub course was created to provide students with the necessary information including course learning objectives and contents, required Courseware code, registration steps, technical support, online learning methodology, steps for taking lesson and assignment, final exam date, procedures and regulations, course grade, and communication with course instructor.

Lessons and hands-on assignments were always available for students. Students had their own choices to take each lesson in three different Courseware learning formats that included listening to word-by-word description of a task, watching systematic demonstration of a task, and practicing step-by-step to complete a task. Parameter settings of assignments were 30 attempts per assignment, no time limit on each attempt, hints after entering a wrong answer, and printing capability.

A 30-question and hands-on final exam was scheduled for each sub course on the last Friday of every fifth week. The parameters for taking the final exam were only one attempt per exam per student, 50-minute time limit, 30 attempts for each question, no hints for entering a wrong answer, random question sequence, and no printing capability. Students required to sign up one of twelve scheduled final exam time slots in a CBA computer laboratory to avoid any last minute confusion and overcrowded computer laboratory situations. Several practices were implemented to avoid any type of misconducts during the final exam. First, lesson and assignment were not available during the final exam date. Second, no electronic device, book, note or online help was allowed during the final exam. Third, Students could only take their final exam under a supervised testing environment of a CBA computer laboratory where a proctor checked student's identification card against the sign-up time list and monitored every exam activity via a control station.

I. Student-pulled Online Teaching/learning Approach

During first several semesters, students enrolled in each sub course had five weeks to study online lessons and drill assignment at their own pace, time and place without any scheduled classroom meeting on campus. The entire studying process solely depended on student's motivation and commitment to achieve their learning objectives without any facilitation from the course instructor. Course instructor acted as a course administrator to define structure, prepare syllabus, submit grade, answer question, and solve problem. Students had total control of when to study, where to study, how to study, and their studying pace of Courseware over the Internet. In other words, students had to pull themselves together to figure out their entire learning process without any guidance and/or push from the course instructor. Student-pulled online teaching/learning approach is then a proper name to describe this online teaching/learning format.

Furthermore, it would be an underutilization of the computer laboratory resource if it was only scheduled for three online final exams and idled other twelve Fridays during a semester. Therefore, a pilot study of an unsupervised (student-governed) testing environment was conducted. That allowed students to take their online final exam anytime and anywhere between 8 a.m. to 4 p.m. on the last Friday of each sub course. The statistical hypothesis finding was no significant change in terms of learning behaviors (lesson and assignment) and achievement (final exam) comparing with the supervised testing environment. The student-governed testing has been adopted for MIS 123 since then that enhanced the meaning of student-pulled online teaching/learning approach (Tsai, 2016).

Lesson completion rate and assignment correction rate were two indicators to measure learning behavior and accountability of each student. The achievement measurement was final exam score that was recorded as a student's sub course grade. Students could earn one unit credit of a sub course if their final exam score was 70 points or higher. During these semesters, average lesson completion rate was 69% and average practice correction rate was 71%. The average final exam score was 76. Average dropout rate was 20% and average passing rate was 53.6%. It was also disclosed from performance records that close to 70% of students did not start to take their lesson and work on assignment until the last 4 to 5 days before final exam date.

These undesirable overall learning behavior and achievement might be caused by most students enrolled in the course were freshmen. Typically, their learning experiences did not prepare them to be self-discipline and/or self-motivated pupils in an isolated student-pulled online teaching/learning environment (Tsai, Ogilby, & Xiongn, 2016).

II. Teacher-stimulated Online Teaching/learning Approach

MIS 123 has then moved to a teacher-stimulated online teaching/learning approach where the instructor implemented stimulation strategies to motivate student's online learning engagement. One of three stimulation strategies was implemented to find the most promising one in the following semesters. In first semester, strategy 1 rewarded 20 extra final exam points if students completed every lesson before the final exam date. Hopefully, students would engage in studying lesson and prepare for passing their final exam because the stimulation strategy. Strategy 2 was implemented in the following semester. Students could earn 10 extra final exam points if they completed every lesson on time and another 10 extra final exam points if they obtained 70% correction rate of assignment before the final exam date. This strategy attempted to improve student's learning behavior and achievement via encouraging students to study lesson and practice assignment. Under strategy 3, 20 extra final exam points were given to students if they have achieved 70% correction rate of their assignment before the final exam date. This strategy intended to inspire students enhancing their knowledge by doing assignment and getting a better outcome of their learning behavior and achievement.

No surprising, findings of two-tailed hypothesis testing indicated that learning behavior (lesson or assignment) and achievement (final exam) of every strategy under teacher-stimulated online teaching/learning approach were statistical significant better than student-pulled online teaching/learning (Tsai, 2016). Any stimulation strategy could sway students toward a better learning behavior and achievement regardless the learning subject.

It is interesting to report that strategy 3 produces the highest leaning achievement and the highest passing rate. Students are better prepared to pass final exam by more likely to work on their assignments for getting 20 extra points. Strategy 2 with rewarding 10 points each of completing lesson and assignment is a weaker strategy comparing with strategy 1 and 3. Students feel that it is not worthwhile for them to take lesson and do assignment with a low rewarding points. The average passing rate is 62.4% and dropout rate is 20%. The passing rate has improved 7.8% but dropout rate stays the same under the teacher-stimulated

teaching/learning approach. This is still caused by students lacking strong self-discipline to study course material and practice assignment in the isolated learning environment. These low passing rate and high dropout rate have become two critical issues needed to be addressed in the online teaching/learning environment. Currently, a teacher-pushed online teaching/learning approach has been implemented with attempt to conquer these two concerns.

III. Teacher-pushed Online Teaching/learning Approach

The teacher-pushed online teaching/learning approach is utilizing the traditional teacher-pushed teaching/learning format but delivering course material via interactive Courseware and Internet. Under this approach, instructor adopts and implements some learning strategies to regulate, guide and stimulate student's learning process for obtaining a better learning behavior and achievement.

During the semester, each sub course's lesson and assignment are divided into 5 equal parts for students to regulate them evenly pacing their study within 5-week sub course period. A revised syllabus includes these two extra predetermined weekly lesson and assignment schedules. The assignment correction rate is counted as 20% (20 Points) of sub course grade. Therefore, students are pushed to study weekly lesson and complete weekly assignment for a part of their sub course grade. Furthermore, weekly announcement is posted on Monday that urges students to do their weekly assignment as soon as possible for avoiding falling behind. An email with the same announcement information is also sent to students as a reinforcement reminder. These new practices not only constantly notify students regarding assignment due date, but also guide students for establishing an evenly studying habit according to lesson and assignment schedules without last minute studying crash.

Furthermore, an assignment completion rate report is generated on every Thursday night. Based on the report, a warning email is sent to those students without a 100% assignment completion rate. This warning email also function as a second push from course instructor to students for completing their assignment within the next three days. A second assignment completion rate report is generated right on the deadline for calculating 20% of sub course grade.

In general, the first assignment completion rate report shows that less than 25% of students has completed their assignment on Thursday night. The second report indicates that around 80% of students has completed their assignment on midnight of Sunday. In other words, there are about 20% of students do not care to do any assignment for preparing their final exam.

The passing score is still 70 points or higher that is a weighted sum as 80% of final exam score and 20% of average assignment correction rate. This passing score criterion will allow those students to earn one unit credit as long as their final exam score is 88 points or higher without earning any extra points from doing assignment.

Two-tailed hypothesis testing is calculated for the teacher-pushed online teaching/learning approach and strategy 3 of teacher-stimulated teaching/learning approach since both have 20 extra final exam points from completing assignment with two different acquiring methods: mandatory or choice. Without any surprising, learning behavior of students measured by average assignment correction rate of every sub course is statistically significant under the teacher-pushed online teaching/learning approach since it is a part of sub course grade.

Contrarily, average lesson completion rate for measuring learning behavior of students shows no statistical significance since it is not a part of the sub session grade for both approaches. The learning achievement of students via average final exam score does statistically show a significant improvement under teacher-pushed online teaching/learning approach. These results contribute to the higher average assignment correction rate that makes students well prepared for their final exam (Tsai, 2016).

The average passing rate has a big jump to 82.7% that is more than 20% increasing. However, the average dropout rate still stay at 20%. It is interesting to note that the average drop rate is corresponding to the overall 20% of students do not put in any time and effort to do the assignment for preparing the final exam. This might be caused by two major factors including each sub session is a 1-unit independent "Credit" and "No Credit" course; and receiving a "No Credit" will not affect a student's grade point average (GPA).

In general, these weekly assignment schedule, announcement notice, email reminder, and mandatory assignment are strong stimulation pushes from instructor to generate a better learning behavior and achievement of students. Without doubt, some students with a low self-discipline and studying motivation do require consistent pushes from instructor to regulate and stimulate their learning process so they can obtain a better learning behavior to reach a desirable performance achievement. The teacher-pushed online teaching/learning approach is the most promising one to obtain better teaching/learning objectives experienced by CBA. Nevertheless, there are still rooms to incorporate some effective teaching strategies to motivate student's online learning for reducing dropout rate and increasing passing rate (Tsai, 2017).

IV. Benefits and Disadvantages

The online teaching/learning approach as with other types of teaching/learning method has various pros and cons that have been experienced by the CBA's three principal stakeholders including students, faculty and administrator.

From the student side, numerous benefits include (1) enabling the extension of this self-learning experience to further seek new skills and knowledge in any field via information and communication technologies; (2) utilizing the computer literacy materials in other classes to improve performance; (3) enhancing students' career opportunities by possessing the computer literacy and proficiency; (4) having the freedom and convenience to learn a subject material at any pace, anytime and anywhere; (5) spending less money for the courseware registration code than a paper textbook; (6) saving time and gas from not needing to commute to the campus. On the other hand, the disadvantages for the student are (1) requiring a self-motivated and disciplined personality to master the course materials; (2) lacking direct and organized teacher guidance to perform well; (3) missing social face-to-face interactions and/or discussions with other classmates or teacher; and (4) incurring the cost of their own computer system and an Internet connection.

From the faculty side, the advantages comprise (1) saving the 3 hours per week of lecture time in the classroom; (2) virtual teaching efforts via email, online announcements, and discussion tools to guide and encourage student learning; (3) reducing time and effort by using courseware's ready-made lessons, assignments and final exams; and (4) lessening the tedious grading and reporting of student performance through the evaluation facilities in the courseware. Some drawbacks for the faculty comprise (1) very few or no personal contact with students even with three office hours per week; (2) extensive efforts to immediately and constantly respond to individual students' emails for solving different problems from 8 a.m. to 10 p.m. a day, 5 to 7 days a week; (3) inflexibility of changing the course contents to fit an individual student's learning needs; and (4) depending on the courseware publisher's technical support to solve individual student's computer system problems including hardware, software and network. The administration side enjoys (1) less instructional expense of hiring qualified teaching staff; (2) less overhead for the classroom usage and required facilities; (3) educating and reaching a mass number of the student population without time and place restrictions; and (4) a decreased administrative work load to assign and satisfy individual faculty's scheduling request and classroom. On the other hand, the administration needs to commit to and provide support for the most up to date information and communication technologies, which can be quite expensive (Tsai 2017).

CONCLUSION

Four issues are presented in this CBA computer literacy course case study. First, the teaching/learning approaches and course contents over the past four decades have been modernized to meet needs of businesses and revised to utilize the most current information and communication technologies. Second, the evolution has been described from the teacher-pushed classroom teacher/learning approach to the teacher-pushed online teaching/learning approach via an interactive Courseware and Internet. Third, measurements to evaluate learning behavior and achievement of students including lesson completion rate, assignment correction rate and final exam score have been presented. Last, the descriptive discussion of hypothesis testing findings intend to gain insight of learning behavior and achievement of students and to uncover the most promising online teaching/learning approach.

As online teaching/learning becomes an important part of college education system in the current digital era, educators need to conduct further research in order to refine the online teaching/learning experience so that students can perform well under current constraints and environments. The suggested future research areas are search of some critical success factors to balance different needs for three stakeholders in an online teaching/learning environment. Students require skills, knowledge and career opportunity. College administrators like to have low educational costs, low dropout rate, and high passing rate. Course instructors want to reach their teaching objectives and learning outcomes. Therefore, it is urgent to find some teaching strategies for improving dropout rate and passing rate and to discover some stimulation strategies for motivating, guiding, engaging, and monitoring students in their learning process under an online learning and achievement of the digital era.

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