ADAPTIVE LEARNING FOR ONLINE ACCOUNTING COURSES

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ABSTRACT

This paper is a study of students' achievement in the Comprehensive Final Exams on online intermediate accounting courses with and without the use of adaptive learning technology. The Comprehensive Final Exam scores of courses without the adaptive learning component will be compared with those classes with integrated adaptive learning technology. The results of the Comprehensive Final Exams will be analyzed in terms of percentage of questions correctly answered on the exam by the students tied up to the Course Learning Outcomes (CLOs) for the courses. The results were indicative of improvements in students' performance in the Comprehensive Final Exams when using the adaptive learning technology. However, adaptive learning is at its infancy in the accounting department. More data need to be collected to be able to determine if the use of adaptive learning truly improve students' learning in the intermediate accounting courses

THEORETICAL CONSTRUCT

Adaptive Learning

"Adaptive learning is a more personalized, technology-enabled, and data-driven approach to learning that has the potential to deepen student engagement with learning materials, customize students' pathways through curriculum, and permit instructors to use class time in more focused and productive ways. Adaptive learning aims to make a significant contribution to improving retention, measuring student learning, aiding the achievement of better outcomes, and improving pedagogy" (Newman, 2013).

"If adaptive learning solutions are implemented at scale, then they have the potential – at least theoretically – to produce a higher-quality learning experience (as measured by student engagement, persistence, and outcomes) at potentially reduced cost by making high-quality instruction more scalable" (Newman, 2013)

"Researchers of the Education Growth Advisors (EGA), a strategic advisory and consulting firm and investment bank focused exclusively on the education sector, divided adaptive approaches into two categories: "Facilitator-driven" systems provide instructors with actionable student and cohort profiles, typically via a dashboard; while "assessment-driven" platforms provide dynamic adjustments to the instructional content as students interact with it. Facilitator-driven systems provide information that instructors act upon; assessment-driven systems make their own adjustments and allow students to move through the course individually or in a group, without instructor interaction. The two approaches are not mutually exclusive, Newman said, and both might be found in a single product or system offering" (Waters, 2014).

Engagement Theory

Kearsley (2000) in his Engagement Theory posits that the learner must be actively engaged in a meaningful task to achieve effective learning. It states that all learning must have three important characteristics: (1) collaboration or the interaction among students, teachers, and subject-matter experts via e-mail, discussion forums, and conferencing, (2) problem-based, which means that all student activities involve completing assignments or projects rather than just taking tests or exams, and (3) authenticity where all course materials and activities are realistic and directly related to the student's interests.

Andragogy

Andragogy is the art and science of helping adults learn (Lee, 1998). Lee's article stated that Malcolm S. Knowles (who died in 1997 at the age of 84) was considered the father of adult education and was one of the strongest advocates of andragogy. Andragogy focuses on the characteristics of adult learners and a set of assumptions for most effectively teaching adults: *self-concept, experience, readiness to learn, orientation to learning, and motivation*. The

essence of the theory is that the adult learners need to be self-motivated and to be active participants in their own learning (Knowles, 2005).

Purpose of the Study

This paper intends to document the experience in teaching/learning intermediate accounting courses using adaptive learning technology with the objective of enhancing the learning experience and performance of students in online courses.

Methodology

The Comprehensive Final Exam scores of three intermediate accounting courses without the adaptive learning component will be compared with those classes with integrated adaptive learning technology. The results of the Comprehensive Final Exams will be analyzed in terms of percentage of questions correctly answered on the exam by the students tied up to the Course Learning Outcomes (CLOs) for the courses (www.nu.edu).

The Process

The process consisted of discussions with the adaptive technology representative on how to integrate it into the university online platform. An instructor who has been successfully teaching online intermediate accounting courses was selected to make the changes in the Master Templates of the three courses. This required pairing of the course to the adaptive system. Training was conducted, resource persons identified to assist in the integration. The conversation started in May 2015. The instructor assigned completed the modifications. On September 2015, the first intermediate accounting course ACC410A with adaptive learning technology WileyPlus was launched. The pilot went smoothly. The adaptive learning tool was successfully used in the next two intermediate accounting courses, ACC410B and ACC410C.

In this study, the students were assigned chapters and required to study in advance. The reading is a purposeful reading because the students are reading to answer questions consisting of multiple choice questions and problems. Students may avail of pages of the book which contains the discussions on the topic to help the students comprehend the materials and enable them to practice in a meaningful way. In the graded practice, student are required to answer questions in multiple choice questions, filling the blanks or true or false questions and when the student answers incorrectly, the program provides supplemental materials and more practice on the specific topic. This activity is graded to provide assurance that the student has read the assigned chapter/chapters before coming to class. This promotes more active participation by students and engagement in the learning process. The homework is graded automatically and detailed solutions presented. To prevent student from copying form one another, the assigned exercises or problems can be algorithmic which means that the numbers changes for each student and for each attempt by the student. To minimize cheating, the quizzes and exams are randomized and can be taken for one time only and for specific time period.

Assessment Results

The Accounting Department was the first to use the new platform purchased by the university. The transition to the new platform was challenging. In addition, on September 2015, the Accounting Department decided to pilot the use of WileyPlus (Riddle, 2013) adaptive learning technology in its intermediate accounting courses ACC410A, ACC410B, and ACC410C which is integrated into the new online platform. Master Templates were modified to jive with the adaptive system. Data for analysis consisted of courses taught from October 2014 to August 2015 without adaptive technology with the courses taught from September 2015 to November 2015 with integrated adaptive system. Comprehensive Final Exam scores were compiled and analyzed in terms of students' performance as a percentage of questions answered correctly on the exam.

Course Learning Outcomes (CLOs) for ACC410A (www.nu.edu):

Upon successful completion of this course, students will be able to:

1. Explain the environment in which corporations operate, emphasizing events and other factors that   determine generally accepted accounting principles.
2. Analyze the objectives of general purpose financial statements (Balance Sheet, Income Statement, and Statement of Cash Flows), stressing articulation among statements, including discussion on qualitative characteristics, assumptions, concepts, elements, broad and detailed principles, and modifying conventions and disclosures.
3. Discuss and apply accounting theory as it relates to revenue recognition in special situations such as long-term contracts, installment sales, franchises, and consignments.
4. Apply generally accepted accounting principles for cash, its composition, balance sheet presentation including preparation of bank reconciliation and adjusting entries, and other internal control procedures for safeguarding cash.
5. Compute estimated uncollectible accounts receivable using the allowance method (balance sheet emphasis and income statement emphasis), prepare adjusting entry, and analyze the effects of the adjustment on the financial statements.
6. Compute the ending inventory, cost of goods sold, and net income under the various alternative cost flow assumptions (FIFO, LIFO, Average - periodic and perpetual), and explain the reason for management choice among alternative methods.
7. Explain the principle supporting the use of inventory valuation based on the lower-of-cost or market and its proper accounting application, compute inventory under Dollar-Value-LIFO method and determine the rationale for the use of such method.
8. Apply appropriate method to estimate ending inventory using gross profit method and retail inventory method.

A total of forty eight (48) students' scores in terms of percentage of questions answered correctly were utilized in the study. The results were indicative of improvement in the scores with the use of WileyPlus. There were three classes without WileyPlus with forty one (41) students and one class with WileyPlus with seven (7) students. The classes were taught by the same instructor. In the analysis, CLO 3 appears to be requiring attention. The questions need to be examined. The topic on CLO 3 is Revenue Recognition which has just been revised by

FASB. There is a possibility that the instructor is new to the changes and was unable to clearly explain the topic to students. More data need to be collected to determine if indeed the use of Wiley Plus really improves students' learning performance.

ACC410A Comprehensive Final Exam Score Summary				
Month	**Sep-15**	**Mar-15**	**Jan-15**	**Nov-14**
Delivery Mode	**Online: WileyPlus**	**Online: Hard Copy Text**	**Online: Hard Copy Text**	**Online: Hard Copy Text**
Number of students that completed the exam	7	15	8	18
Percentage of questions answered correctly on the exam for all CLO, for all students	83%	70%	63%	74%
Percentage of questions answered correctly				
CLO 1	89%	92%	72%	92%
CLO 2	100%	90%	69%	86%
CLO 3	68%	60%	59%	53%
CLO 4	71%	73%	63%	88%
CLO 5	75%	58%	53%	57%
CLO 6	96%	67%	69%	81%
CLO 7	82%	55%	59%	68%
CLO 8	86%	62%	59%	68%

Course Learning Outcomes (CLOs) for ACC410B (www.nu.edu):

Upon successful completion of this course, students will be able to:

1. Apply generally accounting principles for plant assets at acquisition, subsequent transactions, capitalization of interest costs during construction, disposal, and financial statement presentation.
2. Compute depreciation under various acceptable methods and provide rationales on the incentives for choosing them, account for impairments, and compute depletion of natural resources.
3. Apply generally accepted accounting principles for intangible assets, including impairments, and amortizations as applicable.
4. Differentiate current from long-term liabilities, contingent from estimated liabilities, and apply accounting treatment appropriate to such liabilities. Compute the price of a bond issue and properly record bond issuance (at par, premium or discount), interest payments and

accruals, amortization of bond premium/discount, bond extinguishment, and financial statement presentation.
5. Differentiate between capital and operating lease and apply appropriate accounting for each type of lease.
6. Apply proper accounting treatment for the issuance of various forms of capital stock, purchase and sale of treasury stock (cost and par value methods), retirement of callable and redeemable stock, and conversion of convertible preferred stock including journal entries, balance sheet presentation, and rationale for each alternative method.
7. Properly account for cash dividends, property dividends, stock dividends, liquidating dividends, scrip dividends, stock splits, stock option plans, and stock appreciation rights and explain the concepts supporting each item.

ACC410B Comprehensive Final Exam Score Summary			
Month	**Oct-15**	**Apr-15**	**Dec-14**
Delivery Mode	**Online: WileyPlus**	**Online: Hard Copy Text**	**Online: Hard Copy Text**
Number of students that completed the exam	**9**	**18**	**15**
Percentage of questions answered correctly on the exam for all CLO, for all students	**81%**	**67%**	**78%**
Percentage of questions answered correctly			
CLO 1	89%	64%	72%
CLO 2	81%	65%	77%
CLO 3	83%	78%	75%
CLO 4	72%	76%	80%
CLO 5	72%	66%	80%
CLO 6	78%	54%	73%
CLO 7	89%	64%	87%

Forty two (42) students' scores were used in the study, thirty three (33) for without WileyPlus and nine (9) for with WileyPlus adaptive learning technology. The results were indicative of dramatic improvement on the scores in the Comprehensive Final Exam with the WileyPlus. However, due to the small number of data, generalization cannot be made yet. The department will continue to track assessment scores.

Course learning Outcomes (CLOs) for ACC410C (www.nu.edu):

Upon successful completion of this course, students will be able to:

1. Apply generally accounting principles for plant assets at acquisition, subsequent transactions, capitalization of interest costs during construction, disposal, and financial statement presentation.
2. Compute depreciation under various acceptable methods and provide rationales on the incentives for choosing them, account for impairments, and compute depletion of natural resources.
3. Apply generally accepted accounting principles for intangible assets, including impairments, and amortizations as applicable.
4. Differentiate current from long-term liabilities, contingent from estimated liabilities, and apply accounting treatment appropriate to such liabilities. Compute the price of a bond issue and properly record bond issuance (at par, premium or discount), interest payments and accruals, amortization of bond premium/discount, bond extinguishment, and financial statement presentation.
5. Differentiate between capital and operating lease and apply appropriate accounting for each type of lease.
6. Apply proper accounting treatment for the issuance of various forms of capital stock, purchase and sale of treasury stock (cost and par value methods), retirement of callable and redeemable stock, and conversion of convertible preferred stock including journal entries, balance sheet presentation, and rationale for each alternative method.
7. Properly account for cash dividends, property dividends, stock dividends, liquidating dividends, scrip dividends, stock splits, stock option plans, and stock appreciation rights and explain the concepts supporting each item.

In ACC410C, a total of eighteen (18) students were included in the analysis, five (5) for the course with adaptive learning and thirteen (13) students the course without. The percentage of students correctly answering the Comprehensive Exam questions were the same for the intermediate accounting course with and without adaptive learning technology. Only two courses were available for analysis since the start of the new platform. As more courses are taught using the adaptive program as, the accounting department will be in a position to ascertain if the adaptive system contributes to enhancing students' learning performance.

ACC410C Comprehensive Final Exam Scores Summary		
Month	**Nov-15**	**May-15**
Delivery Mode	**Online: WileyPlus**	**Online: Hard Copy Text**
Number of students that completed the exam	**5**	**13**
Percentage of questions answered correctly on the exam for all CLO, for all students	**77%**	**77%**
Percentage of questions answered correctly		
CLO 1	85%	87%
CLO 2	75%	71%
CLO 3	65%	75%
CLO 4	70%	77%
CLO 5	80%	81%
CLO 6	75%	62%
CLO 7	90%	88%

CONCLUSION

The results of the analyses of scores for correctly answered final exam questions for the three intermediate courses were indicative of improvements of students' performance on two courses, ACC410A and ACC410B, for ACC410C, the results were the same. However, the use of adaptive Learning in the accounting department of the university is at its infancy. More data need to be collected and analyzed to determine if the adaptive learning technology truly improves teaching/learning performance. While, adaptive learning provides a more personalized learning experience for students and frees the instructor to devote more time to other aspects of teaching including more in- depth analysis of student's performance and more focus on student retention, adaptive learning strategies are to be construed as supplements to teaching, not a replacement for the teacher.

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