Effectively using active and online learning to help students with weak retention of prerequisite skills succeed in intermediate financial accounting

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ABSTRACT

Many studies (Bonwell and Eison, 1991, Meyers and Jones, 1993, Raux, 2004, Smith and Meador, 2001) have shown that students retain more information when active learning is utilized in the classroom. Additionally, professional organizations and professional and corporate employers have been quite active over the past decade in indicating that they prefer to hire students that have learned how to learn actively, can think critically, and are adept at the second-level learning skills (critical thinking, communication skills, interpersonal skills, technical skills, and analytical skills). The experience of the authors has been that there is a growing number of students, particularly transfer students, entering intermediate level course work with weak and/or poor retention of prerequisite material.

This article examines the combining of two teaching methods, active learning and online learning, in an attempt to expose students to active learning, improving students' retention of new knowledge, and increase students' second-level learning skills. An in-class study using both active and online learning in intermediate financial accounting I was used to evaluate these teaching methods. This study evaluated whether a combination of active and online learning can be successful in increasing the students' knowledge base to an appropriate level while also enhancing retention. The results of the study provide support that the methodology was successful in both regards. Although the study was conducted in an accounting course, this methodology has the potential to be effective in many other disciplines.

Keywords: active learning, online learning, clickers, retention, intermediate accounting, financial accounting, teaching methods

1. INTRODUCTION

One of the primary objectives of a college accounting curriculum is the learning and retention of material learned for utilization in later courses and the student's subsequent career. Anecdotal evidence and the study in this paper suggest that many students enter intermediate financial accounting without retaining the appropriate prerequisite knowledge and skills from principles of financial accounting. This lack of retention could result from failure to initially master the material at the principles level or due to a failure to retain the prerequisite material. The study conducted in this paper attempts to determine if online learning tools and active learning may be used to overcome retention failure and enable students to succeed in intermediate financial accounting. The following sections illustrate why active learning and online learning are methods that may help students to master and retain the course material.

1.1 Why Use Active Learning Instead of Passive Learning

Information on average learning retention rates from the National Training Laboratories (NTL, 2006) in Bethel, Maine indicates that students retain as little as 5% from lectures and
10% from reading. This clearly demonstrates that the passive learning activities of reading
the textbook and attending lecture are not effective methods for helping students to retain
material. Even when the teaching methods are combined, such as a Power Point
presentation that is seen, heard, and read, the retention rate is only about 20%. However,
when a student learns by actually doing something, active learning, they retain about 75%.
If the student actually does something and then explains it to someone else, then the
retention rate increases to the 90% range.

Other studies (Bonwell and Eison, 1991, Meyers and Jones, 1993, and Raux, 2004) have
examined classroom learning methods and found that today's students learn more, retain
more, and more successful when active learning methods are employed in the classroom
instead of traditional passive learning methods. Smith and Meador (2001) found that
students using active learning methods in principles of financial accounting had statistically
higher grades (12.8% fewer D and F grades) and statistically lower drop rates (12% lower
drop rate) than students using passive learning methods.

The American Accounting Association's (AAA, 1986) Committee on Future Structure,
Content and Scope of Accounting Education (the Bedford Committee) called for accounting
education to take a much broader role than what is currently offered by most universities
today. Consider the following quote from the Bedford report: "There is little doubt that the
current content of professional accounting education, which has remained substantially the
same over the past 50 years, is generally inadequate for the future accounting professional.
A growing gap exists between what accountants do and what accounting educators teach....
Accountants who remain narrowly educated will find it more difficult to compete in an
expanding profession.... The Committee's analysis of accounting practice has indicated that
accounting education as it is currently approached requires major adjustments between now
education and felt so strongly that change was needed that they contributed five million
dollars to fund the Accounting Education Change Commission (1990). The Commission
called for significant changes in accounting education in several publications and funded of
innovations in accounting education programs at several schools.

These studies clearly indicate that professors need to increase the usage of teaching
methods that promote active and cooperative learning in order to achieve the goal of
increasing student retention. This requires some major changes in the "typical" accounting
class. Historically, accounting classes have been predominately a lecture format that
promoted passive learning by students. Many accounting students are introverted and
reflective and would prefer to be passive in the classroom, therefore, professors may need
to convince some students that active learning techniques will result in a better educational
experience.

These previous efforts have given us sufficient warning that accounting education must
change to meet future needs of students. The traditional passive classroom does not
facilitate learning, retention, or the development of second-level skills such as critical
thinking, communication skills, interpersonal skills, technical skills, and analytical skills.
Several of the above cited sources also emphasize the importance of students becoming
better life-long learners and active learning facilitates that objective (Meyers and Jones,
1993). Thus, passive learning methods need to be replaced with active learning methods.

1.2 Why Online Learning and Why Homework Managers
The only way that the instructor and the students can gauge whether or not the students understand the course material is via feedback. Traditional, passive, feedback is conducted via exams and quizzes. These sources of feedback are infrequent and do not encourage the student to do additional work to master the material as the feedback arrives too late and the student has already moved on to new material. Lectures do not provide adequate feedback either as the students are passive listeners instead of active participants. "Passive listening is a one-way communication that does not give the speaker feedback. For learning to be effective, a two-way process must exist so the send knows whether the message has been understood (McIntyre-Birkner and Birkner, 2001)."

"Clicker technology can dramatically alter the atmosphere in large lecture classes, transforming students from passive observers to engaged learners who interact with each other and with the professor (Loebbaka, 2007)." A poll of students using clickers in the classroom revealed that 90% of the students said clickers increase the instructors' awareness of their teaching effectiveness and 80% of the students said the clickers helped them to understand the material better (Loebbaka, 2007). Thus, clickers and online tools such as a homework manager can help to transform the classroom into an active learning environment and they also provide the instructor and the students with instant feedback. Instead of asking 'Any questions?' or 'Does everybody understand this?' instructors can have everybody in the class answer a question about the material and receive instant feedback by displaying the percentage of right and wrong answers (Carnevale, 2005). Both the instructor and the students can benefit from this feedback by seeing if the students understand the material as it is covered. If students understand the material, the instructor can confidently move on to the next topic. If students do not understand the material, the student can ask additional questions or the instructor can do additional classroom activities to help students master the material before moving on to new material.

Online, or web-based, learning is the use of online homework managers that can give students immediate feedback. The online homework manager "improves learning by increasing student effort, engagement, and course preparation ..." and results in "better-prepared students, more effective use of class time, enhanced discussions, and more in-depth learning." (Thomson Learning Corp, 2007) Online homework managers allow students to complete selected homework problems and receive instant feedback about whether their answers are correct or not. If the student's answer is incorrect, the homework manager can guide the student through a review of the appropriate textbook material and then allow the student to reattempt the problem. Homework managers also can provide students with additional upgraded practice problems, 24/7 tutoring, and vocabulary quizzes (WileyPlus, 2005). "In fact, students have came to expect these types of technologies, which are an extension of the materials they became accustomed to in their K-12 years (Skelly, 2007)."

Thus, both homework managers and online learning engage the student resulting in active learning replacing passive learning, which can result in an increase of retention rates by 55% (NTL, 2006). They also both provide the instructor and the students with instant feedback so that classroom and study time may be used more effectively.

2. LITERATURE REVIEW

There are many examples in the current literature demonstrating the success of active learning and online learning. These successes are taking place both at the college level and at the K-12 level. Some of these successes are reported below.
"Beyond Paper, Ink & Cardboard" (Skelly, 2006) reports the following: Online mathematics homework managers have led to increases from 19% (Gadsden State Community College) to 40% (Odessa College) in the number of students receiving a C or better in college math classes. A survey of students reported that 82% of students believed that they were better prepared for test after using an online homework manager. Another student survey (University of Illinois) reported that 64% of the students reported that clickers and online homework managers improved their understanding and retention of course material.

Another study at Georgia State University found that the use of an online homework manager increased college algebra pass rates by 37.5% and decreased drop rates by 40.7%. In pre-calculus the results were an increase in the pass rates of 29.7% and a decrease in the drop rates of 29.7% (Pearson Education, 2007).

Active learning is effective with younger students as well as college students. A class of 32 elementary school students was divided into two groups--active learning and passive learning. At the end of two weeks, the active learning students scored higher on a test of the material. The active learning students averaged 96% while the passive learning students averaged 62%. When given new math problems that stretched the students beyond material already covered in class, the active learning students were more comfortable and confident while the passive learning students complained that the new problem was too hard and gave up (Williamson, 2007).

Active learning was used in economics courses to help students learn to think like economists. The concepts of time value of money were covered in an assignment that calculated whether or not a college education was worthwhile financially. Students not only had to complete calculations but they had to communicate their findings with their classmates. This resulted in students having to make a well-formed argument to support their case. The students and instructor were both provided with instant feedback about student mastery of the material. Several of the students said "We learn economics in all of our classes here; in your class, we do economics. (Salemi, 2002)"

In an introductory psychology course students were divided into two groups. Group A was told that they would take an exam on the material and to study however they wanted in order to maximize their score. Group B was they would be responsible to teach the material to a student in Group A in order to help them maximize their score. Group B was told to study the material however they wanted in order to be able to teach it to their classmate. Upon return to class, both Group A students and Group B students took the same exam. The students who had studied to be able to teach the material to their classmates scored significantly higher than students who had studied to take the exam. This suggests that the preparation level for active learning is higher than for passive learning (Benware and Deci, 1984).

While these results are not from accounting courses, the results should transfer to accounting courses. The topic covered in the economics course, time value of money, is a common financial accounting topic. Also, the basic approach to learning math and financial accounting are similar. One must first understand the basic concept being studied and then learn to apply to concept to problems that are encountered. The psychology example supports the fact that requiring students to provide answers to other students' questions is an active learning activity.

3. THE NEW PEDAGOGY
The new pedagogy, which has been developed for the accounting classroom, is based on the old adage "When the student is ready, the teacher will appear." The two key elements of this new pedagogy are as follows:

* The student must assume primary responsibility for his/her learning experience.

* The professor's role becomes one of preparing the student to assume primary responsibility and facilitating that learning experience.

The primary objective is to have the student assume primarily responsible for their learning experience. This is problematic since most of their prior experiences in high school and college courses have not required them to take primary responsibility. Since this is a new concept to the students, the professor must provide the students with a detailed roadmap of how this is accomplished and explain in detail why it will be beneficial for them to adopt such primary responsibility.

The roadmap of how to take primary responsibility for your education and the concept of active learning must be thoroughly explained on the first day of class. For the method to be successful, students must understand their responsibilities, what active learning is and how it will be utilized, and why this pedagogy will be more beneficial to them than a traditional lecture format. Students must also be provided with a detailed syllabus that outlines everything that is required of them in order for them to be active learners. The syllabus must clearly state what chapters and/or units will be studied, the learning objectives should be clearly delineated, and it should be shown how each assignment/activity relates to a particular learning objective. Due to the fact that many students have not encountered active learning before, it is important that students understand how to become active learners and the importance of items such as attending every class, asking questions, participating during class, preparing for class, and checking email/Blackboard for between class communications. It is also important that all other administrative policies are fully explained so that students fully understand all of their responsibilities. This information should all be provided in the syllabus and covered on the first day of class.

The following instructions were provided to the students in the study and are extracted directly from the syllabus:

Perform the following for each Chapter.

* Read the main objectives on the syllabus before reading the chapter. The objectives that will be most heavily tested are in bold.

* Read each objective in the text then immediately handwrite the key concepts in your own words. (Please note that I am not suggesting that you copy words directly out of the text.)

* If you were not able to grasp the key concepts reread the objective and try again to summarize.

* If you are still unable to grasp the concepts write out a question regarding what you do not understand and bring it to class. These questions may be asked verbally or if you feel more comfortable you can give me written questions prior to class. During class, make sure that your questions are asked and answered to your satisfaction before attempting the quiz.
* When you finish the chapter read the author's summary of objectives to see if you caught the primary concepts. If you initially missed some important concepts add them to your synopsis. If you do not understand what you missed or why what you missed was important write a question and present it in class.

* Once you have read and summarized the key concepts the next step is to see if you can apply the concepts. I have provided you with exercises that will allow you to see if you can apply the concepts. It is critical that you do NOT look back at examples in the text when you attempt the exercises. If you do an exercise looking back at an example, you will not know whether you could have done the exercise without the text--and the text will not be available during exams and quizzes. I do not expect you to do all the exercises. It is important that you attempt at least one exercise for each objective before attending the first class on any given chapter.

* If you cannot apply the concepts without looking back you will need to reread the concept and try to apply it again without following the example.

* If you still are unable to complete the exercise then write a question about what part of the application is giving you trouble and bring to class.

* I will briefly lecture all key concepts and answer all questions brought to class before all quizzes. If a quiz is given on the first day of a Chapter, it will be on the reading and will be objective and primarily qualitative. If the quiz is given on the second day after I have answered questions on the exercises it will be similar to the exercises.

* The quizzes will be graded as follows:

  * Each quiz will be graded--, and

  * You will be awarded two points for each quiz that you score 75 or higher to a maximum of 20 points--20 points will result in a 100 for a quiz grade; 16=80; 12=60, etc.

The incentive for the student taking on such responsibility is that grades are heavily weighted (25-40% of class grade) on class participation and quizzes, which are dependent upon doing what is outlined. The syllabus also outlined the attendance policy, class interaction expectations, all assignments, grading explanations, email expectations, academic integrity policy, and the learning objectives for the course overall and for each assignment.

There are other major things that the professor has to do in addition to preparing a detailed syllabus:

* Develop a community of learning

* Have Mini-lectures prepared on all learning objectives

* Answer fully all student questions

* Provide students with exercises to be done in class (both individual and group)

* Review any requested homework assignments, and
* Summarize all relevant learning objectives.

The community of learning is developed by:

* Displaying a genuine interest in students and their learning experience

* Being accessible to students

* Giving students opportunities to provide feedback on the pedagogy, and

* LISTENING and being willing to make adjustments.

It is also crucial that the professor models the skills that he/she wants the students to develop. This can be done as follows: though instruction and mini lectures display how to share what we know; be a role model by being prepared and professional in the classroom, and by mentoring our students by letting them know how we expect them to conduct themselves.

Another critical factor is that the professor must also respect diversity. Diversity must be respected in that students have diverse backgrounds and different talents and learning styles. We also must respect that students have different goals and objectives. This can be especially difficult as not all students want to learn all they can or get an "A." Once you have recognized the types of diversity, it is crucial that you respect such differences.

4. HYPOTHESIS AND METHODOLOGY

4.1 Hypothesis 1

The first hypothesis is that many students enter intermediate financial accounting under prepared because either they have not learned or not retained the necessary prerequisite skills necessary to succeed in the course. At the beginning of the intermediate financial course, the typical review of accounting principles was conducted by covering the first three chapters of the intermediate book. Then, in order to test this hypothesis, students were given a previously administered departmental final exam from principles of financial accounting. This tested whether or not the students have the necessary prerequisite skills to succeed in the intermediate financial accounting course. Forty students took this pretest, the students were traditional juniors, however, 90% of the students had transferred from a twoyear school. The results of the pretest are in table 1.

Only one student scored a passing grade on the pretest. Considering that these results occurred after students had already reviewed the principles of financial accounting material, the pretest supports the hypothesis that many students are under prepared for intermediate financial accounting. Thus, a plan of action must be developed that will help students to succeed even though their prerequisite skills are weak.

4.2 Methodology

The methodology (plan of action) developed to rectify this situation combines the active teaching/learning methods (including clickers) described above with online learning. The online learning homework manager selected to use was WileyPlus (formerly eGradePlus) a product of John Wiley and Sons, Inc. WileyPlus is a powerful online tool that provides an
integrated suite of teaching and learning resources in one easy-to-use website. Although this was an intermediate financial accounting course, students purchased the principles of financial accounting (introductory course) homework manager since the problem was with their prerequisite skills. The students were told on the first day of class that the first three weeks would be spent using the first three chapters of the Intermediate text to review principles of financial accounting and that they would then be re-tested on their knowledge of this prerequisite material.

The features of WileyPlus include many presentation, preparation, assignment, and assessment tools. When students log into the website their home page includes the following sections: class section announcements (for instructor announcements); class section documents (for distribution of materials to students); system announcements (administrative information from the website); read, study & practice (online textbook, supplemental readings, tutorials, demonstration problems, self-tests, and learning activities); assignments (readings, homework, quizzes, and tests), and a grade book.

Three weeks (6 classes) were allocated to remedial work. The work plan was organized so that many of the intermediate concepts could be covered simultaneously with the review of the principles of financial accounting material. This was required so that all intermediate financial accounting I topics would be covered during the semester. The use of active learning and the online homework manager would maximize the potential for student effort outside of the classroom and also maximize the efficiency of the allotted class time for the best improvement of student knowledge and retention.

The following explains how active learning was used in the course:

* A detailed plan of action was prepared and distributed.

* There was a very limited use of lecture during the class meetings. The primary learning technique involved students asking questions that were answered by other students when possible or by the instructor. Requiring students to be prepared to answer other students' questions is a successful active learning technique as reported in the National Training Laboratories (2006) study and the Benware and Deci (1984) study.

* All homework was assigned using the web-based courseware. The assignments included: readings of specific chapters for each class, assignment of exercises on the critical concepts, and assignment of review assignments (such as tutorials, demonstration problems, and self-tests).

4.3 Hypothesis 2

The second hypothesis is that the combination of online and active learning would help the students master the prerequisite material. To test this hypothesis, the students were re-tested on the prerequisite material at the end of the three week review period (as described in the methodology section). The posttest was a similar but different previously administered departmental final exam from principles of financial accounting. The same forty students took the posttest with the results in table 2.

The mean score increased by 63.05%. After the review period, 90% of the class had a passing score as compared to only 2.5% before the review period. These results support the
hypothesis that online and active learning helped the students to master the prerequisite material.

4.4 Hypothesis 3

The third hypothesis is that the combination of online and active learning would help the students to retain the material once mastered. To test this hypothesis, the final course grades were compared to the pretest and posttest grades. The students were required to continue using active learning techniques for the remainder of the semester. Students were also encouraged, but not required, to continue to use the online homework manager for the remaining intermediate financial accounting concepts that were covered in the principles of financial accounting homework manager. A comparison of the final grades to the pretest and posttest grades is in table 3. Thirty-four students completed the course and six students dropped the course.

Comparison of the various grades shows that while retention was not 100%, there is definitely some retention of the prerequisite material by the students as well as significant mastery of the new material.

5. CONCLUSIONS AND SUGGESTIONS FOR ADDITIONAL RESEARCH

Based on a comparison of the results of the pretest to both the posttest and the final grades, one may conclude that the combined use of online and active learning can be an effective method to help students with weak prerequisite principle level skills to succeed in intermediate level financial accounting courses. A major caveat is that the students must be willing to participate in the online and active learning methods which both require the student to changed their learning habits and to put forth a large effort outside of the classroom. The pretest can be a great motivator because it shows each student how prepared (or unprepared) they are for the intermediate level material. When the students realize that they are not properly prepared and are given help to catch up, most students will be motivated to put forth the work necessary to catch up in order to succeed.

Another advantage of the methods used in this study is that in a relatively short time period, the majority of the class had acceptable levels of the prerequisite skills. This prevents the instructor from having to slow the course down to help under prepared students catch up. Thus, the course can proceed at a pace that allows all required course material to be covered.

Future research could replicate this study with the following improvements: Include a larger student sample. Teach some students using active learning and some using passive learning in the intermediate financial course to see if student mastery (posttest) and retention (final grades) are significantly different. Teach some students using active learning and some using passive learning in the principles of financial accounting course to see if retention of prerequisite skills are different on the pretest. Extend the study to include the second intermediate financial accounting course to allow for a pretest in that course to better study the retention of prerequisite principles skills.

REFERENCES


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TABLE 1: RESULTS OF THE PRETEST

<table>
<thead>
<tr>
<th>Description</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Score</td>
<td>50.63%</td>
</tr>
<tr>
<td>Median Score</td>
<td>51.00%</td>
</tr>
<tr>
<td>High Score</td>
<td>73.00%</td>
</tr>
<tr>
<td>Low Score</td>
<td>22.00%</td>
</tr>
<tr>
<td>Letter Grade of A</td>
<td>0 students (0%)</td>
</tr>
<tr>
<td>Letter Grade of B</td>
<td>0 students (0%)</td>
</tr>
<tr>
<td>Letter Grade of C</td>
<td>1 student (2.5%)</td>
</tr>
<tr>
<td>Letter Grade of D</td>
<td>5 students (12.5%)</td>
</tr>
<tr>
<td>Letter Grade of F</td>
<td>34 students (85%)</td>
</tr>
</tbody>
</table>

TABLE 2: RESULTS OF THE POSTTEST

<table>
<thead>
<tr>
<th>Description</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Mean Score</td>
<td>82.55%</td>
</tr>
<tr>
<td>Median Score</td>
<td>82.00%</td>
</tr>
<tr>
<td>High Score</td>
<td>98.00%</td>
</tr>
<tr>
<td>Low Score</td>
<td>62.00%</td>
</tr>
<tr>
<td>Letter Grade of A</td>
<td>11 students (27.5%)</td>
</tr>
<tr>
<td>Letter Grade of B</td>
<td>13 students (32.5%)</td>
</tr>
<tr>
<td>Letter Grade of C</td>
<td>12 student (30%)</td>
</tr>
<tr>
<td>Letter Grade of D</td>
<td>4 students (10%)</td>
</tr>
</tbody>
</table>
Letter Grade of F 0 students (0%)

TABLE 3: COMPARISON OF FINAL GRADES TO POSTTEST AND PRETEST GRADES

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Pretest Grade (n = 40)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0 students (0%)</td>
</tr>
<tr>
<td>B</td>
<td>0 students (0%)</td>
</tr>
<tr>
<td>C</td>
<td>1 student (2.5%)</td>
</tr>
<tr>
<td>D</td>
<td>5 students (12.5%)</td>
</tr>
<tr>
<td>F</td>
<td>34 students (85%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Posttest Grade (n = 40)</th>
<th>Final Grade (n = 34)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 students (27.5%)</td>
<td>7 students (20.6%)</td>
</tr>
<tr>
<td>13 students (32.5%)</td>
<td>10 students (29.4%)</td>
</tr>
<tr>
<td>12 students (30%)</td>
<td>8 students (23.5%)</td>
</tr>
<tr>
<td>4 students (10%)</td>
<td>7 students (20.6%)</td>
</tr>
<tr>
<td>0 students (0%)</td>
<td>2 students (5.9%)</td>
</tr>
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