We proposed to enhance the student learning experience by integrating accounting theory with the application of it through a team-based problem solving. In this report we provide results of the project by discussing the learning issues, the procedures, learning outcomes, and limitations. We also provide implications of our project to other subject area. Finally, we provide some suggestions that we have learned throughout the project.

Students were given a team-based project in which students discuss and solve a set of key problems on a team-basis and produced teaching video clips for selected questions. The submitted teaching video clips were evaluated and reviewed by the instructor. High quality teaching videos were chosen and posted on Blackboard for the future students.

1. Learning Issue

As one of the most challenging courses in accounting Intermediate Accounting (ACCT 301 & ACCT 302) requires not only quantitative skills but also solid understateing of accounting concepts. It also requires students to spend considerable amount of time to practice and study. It has been a long-standing problem that many students struggle in Intermediate Accounting. According to the recent data, approximately half the students registered for Intermediate Accounting I (ACCT 301) fail in the assessment test indicating a large proportion of students do not possess basic knowledge of Principles of Accounting and thus are not ready to take Intermediate Accounting. Many students don’t understand the concept of accounting cycle they learn in Principles of Accounting fully. In addition, many students lack in quantitative skills and fail to successfully understand time value of money concept.

It is a common belief that practicing a variety of key questions of Intermediate Accounting is a best way to understand the complex accounting theories. However, solving accounting problems alone is challenging for most students, especially for poorly performing ones. This is because classroom learning is limited due to quantity and time constraints. Therefore, out of class learning such as visiting office hour, group study, and tutoring becomes very important for low performing students. However, the learning resources outside classroom is often limited though they are very effective. Resource for tutoring is limited and not available to all students. Peer education service at ODU has been a great learning resource, but only one student tutor covers all upper level accounting courses including ACCT 301 & ACCT 302. This, students have not been able to receive a timely tutoring service because normally there is a long waiting list.

Given the problems and limitation of the resource, we propose to enhance the student learning experience by integrating accounting theory with the application of it through a team-based problem solving. Specifically, students are given a team-based project in which students discuss and solve a set of key problems on a team-basis and produce teaching video clips for all questions. The submitted teaching video clips were reviewed by the instructor. Some video clips
were chosen and posted on Blackboard and have been available to all students in later semesters. The database of teaching video clips will be a great source of learning basic concepts of Intermediate Accounting for the current as well as future Intermediate Accounting students.

2. Approach

In the beginning of the semester, students were asked to form a group of three or four students. Each group received a team project which is composed of problem solving of ten computational questions and production of teaching videos of explaining those questions. Each team is supposed to submit written solutions as well as teaching video clips. All submitted video-taped clips were evaluated by the instructor and shared with other students through Blackboard. As the course is repeated, quality of videos were improved as more videos were accumulated.

Each semester we created a problem set which contains ten questions about Time Value of Money (See Figure 1 for example).

Figure 1. Sample Problem Set for Team-based Project: Creating Teaching Videos

Team-based Project: Creating Teaching Videos

1. Objective
It is well known that teaching is such a powerful tool for cementing your understanding of a subject. The best test of whether or not you really understand a concept is trying to teach it to someone else. Teaching calls for complete understanding of the concept. Teaching also forces you to communicate their thoughts clearly and precisely. Your ideas will never be more effective than your ability to make others comprehend them. Teaching helps you develop the extremely important skill of describing ideas well enough for others to use them.

In this assignment, you need to solve all questions provided in the following page. Then pick two questions (one from Q1-Q3 and the other from Q4-Q6) and create two teaching video clips showing how to solve the questions you picked. This assignment can be done either individually or on a team-based. Each team should not have more than three people. If you form a group you should email me the names of all group members immediately. Once you pick two questions you can send your answers for those questions by email before you make the video clips to receive my confirmation that your answers are correct.

2. Technology
In case you use your personal computer (Desktop or Laptop) you can use Camtasia Studio (http://www.techsmith.com/camtasia-whats-new.html) as a source of videotaping. You can also create a power point slides and add your voice. Tablet PC can be a useful tool as well. There are many free apps such as Explain Everything (http://www.explaineverything.com) and Notability (http://bit.ly/PwNNAJ) which helps you to create a teaching video clips. You can also use any other technology you are familiar with. You can borrow Ipad from the Perry library. After you create video clips upload the files on Youtube. Each video clip should not be over five minutes. Then email me the link. After reviewing each clip several clips will be posted on Blackboard to be used to the entire class.
3. Some examples of videos
An investor purchases a 3-year, $1,000 par value bond that pays semiannual interest of $40. If the semiannual market rate of interest is 9%, what is the current market value of the bond?
http://www.youtube.com/watch?v=GREWCmnQIN4

DON Corp. is contemplating the purchase of a machine that will produce net after-tax cash savings of $20,000 per year for 5 years. At the end of five years, the machine can be sold to realize after-tax cash flows of $5,000. Interest is 12%. Assume the cash flows occur at the end of each year. Calculate the total present value of the cash savings
http://www.youtube.com/watch?v=F5T-RBWXQo

4. Evaluation
Your homework score will be based on correctness of your answers (3 pts.) as well as quality of your video clips (6 pts). Poor quality videos won’t get any credits.

5. Questions
5-1. Emma Watson will deposit $5,000 into a money market sinking fund at the end of each year for the next five years. How much will accumulate by the end of the fifth year if the sinking fund earns 9% interest?

5-2. An investor purchases a 3-year, $1,000 par value bond that pays semiannual interest of $40. If the semiannual market rate of interest is 9%, what is the current market value of the bond?

5-3. How much must be deposited at the beginning of each year in order to accumulate to $10,000 in four years if interest is at 9%?

5-4. Determine the combined present value as of December 31, 2011, of the following four payments to be received at the end of each of the designated years, assuming an annual interest rate of 9%.

<table>
<thead>
<tr>
<th>Payment</th>
<th>Year Received</th>
</tr>
</thead>
<tbody>
<tr>
<td>$5,000</td>
<td>2012</td>
</tr>
<tr>
<td>6,000</td>
<td>2013</td>
</tr>
<tr>
<td>8,000</td>
<td>2015</td>
</tr>
<tr>
<td>9,000</td>
<td>2017</td>
</tr>
</tbody>
</table>

5-5. Touche Manufacturing is considering a rearrangement of its manufacturing operations. A consultant estimates that the rearrangement should result in after-tax cash savings of $6,000 the first year, $10,000 for the next two years, and $12,000 for the next two years. Interest is at 12%. Assume cash flows occur at the end of the year. Calculate the total present value of the cash flows.

5-6. DON Corp. is contemplating the purchase of a machine that will produce net after-tax cash savings of $20,000 per year for 5 years. At the end of five years, the machine can be sold to realize after-tax cash flows of $5,000. Interest is 12%. Assume the cash flows occur at the end of each year. Calculate the total present value of the cash savings.
Time Value Money was chosen as a main source of practice questions for several reasons. First, Time Value of Money is a key concept in accounting and finance. Mastering the concept is key success factor in Intermediate Accounting because the concept applies to nearly all topics in financial accounting. Second, although the Time Value of Money concept is very important, students generally struggle on this topic. According to the past data in ACCT301, there is a large gap in student performance on the questions about Time Value Money. This suggests that learning videos may be mostly effective to the lower performing students and thus reduce the performance gap in class. However, the choice of Time Value of Money does not mean that the peer educational videos on other topics are not effective. We changed some problems every semester to cover various topics of Time Value of Money.

Camtasia Studio (http://www.techsmith.com/camtasia-whats-new.html), which provides a free 30 day trial version was a primary source of creating videos. However, as shown in Figure 1 students were also advised to use software smart phone, tablet PC, laptop, or to get an assistance from CLT for video recording.

Due to some technical limitations of Blackboard Youtube.com was chosen as a main place to post videos. Once videos are posted on Youtube.com, the instructor solicit high quality videos and post them on Blackboard as shown in Figure 3.

Figure 2. Sample Teaching Videos
On January 1, 2003, Servicemaster Co. issued $100,000, 10% bonds with interest payable semiannually, due in three years. How much would the bonds sell for if the annual market interest rate is 18%?

Figure 3. Teaching Video Database on Blackboard
4. Project outcomes

The project aims to attain following learning outcomes.

First, the solution will promote team-based learning. More prepared students will enhance their understanding of accounting concepts and skills through a discussion with other team members and less prepared students will learn and obtain help from their peers in the study group. Students will have opportunities to formulate their own questions, discuss issues, explain their viewpoints, and engage in cooperative learning by working in teams on problems and projects. This team-based cooperative learning enhances the value of student-student interaction and results in various advantageous learning outcomes.

Second, students can reinforce their knowledge obtained cooperative learning in teams by making a teaching video clips. It is well known that teaching is such a powerful tool for cementing students’ understanding of a subject. The best test of whether or not a student really understands a concept is trying to teach it to someone else. Teaching calls for complete understanding of the concept. Teaching also forces students to communicate their thoughts clearly and precisely. Students’ ideas will never be more effective than their ability to make others comprehend them. Teaching helps students develop the extremely important skill of describing ideas well enough for others to use them. This learning-by-teaching concept is well suited to a team-based production of teaching video clips.

Third, a database of problem-solving video clips will help other students review accounting concepts. In a few semesters the database will store many high quality teaching video clips which will become an important source of learning Intermediate Accounting.

In this section, we report the actual outcomes of the project and evaluate them by discussing whether the proposed learning outcomes have been attained.

4.1. Effect on class performance

Class performance was evaluated in various aspects. Since we focused on the Time Value of Money topic, we mainly evaluate student performance on assignment and tests. Combined performance of students who took ACCT 301 in spring 2012 & 2013 is presented below. Class in spring 2012 is used as a control group since the project was not given to the students in this class. Class in spring 2013 was given the project. By comparing the class performance between these two classes we can reasonably examine the effect of the project on students’ academic performance. Figure 4 shows a chart of students’ performance for class which was not given the project for each learning objective in the Time Value of Money chapter. Figure 5 shows a chart of performance for class which was given a project. As shown in Figure 4 & Figure 5, class performance is significantly improved for class that created teaching videos on a team-basis. Specifically, the overall class performance for all learning objective has improved from 55% to 64%. Among various learning objectives Basic Concepts, Valuing a Single Cash Flow Amount, and Basic Annuities are the most improved ones. This result is particularly interesting because video projects are mainly focused on these learning objectives suggesting that the video project helped student learning and improved overall class performance significantly.
Overall, the team-based video project seems to have a significant positive effect on student academic performance and thus attains the learning goal of the project.
4.2. Effect on group study

As a requirement of the project students formed a group to solve the problems and produce teaching videos. Each group was required to submit at least two teaching videos. In general, students seating nearby formed a group and thus each group had different students in terms of academic performance and skill so that low performing students learn from the peer(s) in the group throughout the project. It is observed that even after the end of the project students tend to study based on a group formed for the project until the end of the semester. This tendency is expected to help both high and low-performing students. Low-performing students learn from their peers through group study while high-performing students reinforce their knowledge through helping out their low-performing group members. This synergy effect is shown on the class performance in the final exam. Compared to class without the team-based video project, class performed the team-based project performed significantly better in the final exam. The mean (median) class average for class performed the team-based project performed was 71.5% (72.3%) while the mean (median) class average for class not given the project was 68% (68.5%).

![Figure 7: Class Performance in the Final Exam](image)

4.3. Effect on other accounting class

The concept of learning by teaching using video clips attracted interests from other accounting faculties. Professor Yoshie Lord, an assistant professor in accounting, adopted the same teaching pedagogy in her strategic cost accounting class for MA in accounting students. Prof. Lord required students to produce longer teaching videos than those in our project. As shown in Figure 7, quality of students teaching video is very high such that it can be very useful to other students. Prof. Lord gave us a feedback that overall students like the project very much and their performance has also been improved. In conclusion, the case of Professor Lord’s class shows that team-based learning through students’ teaching video clips can be extended easily to other accounting courses. Also the case suggests that we can construct an even bigger database of student videos including various accounting courses.
Figure 7. Student Teaching Video in Other Course

http://www.youtube.com/watch?v=MwTpdbm1r8

5. Limitations and Suggestions

In this section, we discuss some limitations of the project and provide our suggestions to enhance the quality of the project and maximize student learning experience.

5.1. Lack of understanding technology

Different from our expectation that the students would use various technologies to make teaching videos they mainly used Microsoft PowerPoint as the main source of video production. The main reason is Microsoft PowerPoint is the easiest tool to create teaching videos. In addition, students are not aware of other technologies available in PC, internet, or tablet PC. Some students are not familiar with technology didn’t even know how to create teaching videos using Microsoft PowerPoint. Also due to limited resource technical support was limited to these students. We believe that it would be great if information about how to create teaching videos using various technologies is available on the TLC website. Such information will be also useful to many instructors who want to create videos for online courses.

5.2. Where to store the videos?
The challenging issue is that there is a copyright problem. This is why we asked students to post videos on Youtube.com which is a public site and thus free from the copyright problems. However, we noticed that some students delete their videos after the final exam. This problem makes it hard to construct a database of teaching videos in the ODU computing system.

5.3. Need for cooperation with the peer education service center

One suggestion is that we can cooperate with the ODU’s peer education service center. The peer education service center hires a couple of students to provide a tutoring service to students taking upper level accounting courses. Since students who seek tutoring service tend to ask similar questions the center can create a database of teaching videos of FAQs. This will save the center’s resource drastically and the tutors can provide their service to more students.

6. Expense report

<table>
<thead>
<tr>
<th>Itemized Expenses</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Budget Item</strong> (equipment, personnel, software, etc.)</td>
<td>Qty</td>
<td>Total Cost</td>
</tr>
<tr>
<td>Camtasia Studio/Snagit Bundle</td>
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<tr>
<td>Books and Supplies</td>
<td></td>
<td>300.00</td>
</tr>
<tr>
<td>Jong C. Park - summer stipend 2012</td>
<td>800.00</td>
<td>800.00</td>
</tr>
<tr>
<td>Yin Xu – summer stipend 2012</td>
<td>800.00</td>
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</tr>
<tr>
<td><strong>Total</strong></td>
<td>2,978.00</td>
<td>2,978.00</td>
</tr>
</tbody>
</table>
Appendix: Selected Teaching Videos (Links are imbedded on the screenshot)

Touche Manufacturing is considering a rearrangement of its manufacturing operations. A consultant estimates that the arrangement should result in after-tax cash savings of $6,000 the first year, $10,000 for the next two years, and $12,000 in the third and fourth years. The arrangement is expected to last five years. (Assume cash flows occur at the end of the year; calculate the present value of the cash flows.)

> Identify the pertinent information from the problem:
  > Cash Flows: Year 1 - $6,000, Year 2 & 3 - $10,000, Year 4 & 5 - $12,000
  > Interest (i) - 12%
  > Number of periods (N) - 1 to 5, based on the year of the payment.

> Now using the Present Value of $1 table (Table 2), find the appropriate value from the table.

Analyzing the Problem

**Question phrasing**
- $20,000 per year for 5 years
- Cash flows occur at the end of each year
- Machine can be sold in 5 years for $5,000
- Interest is 12%

**Translation**
- Annuity =$20,000
  - n=5
- Ordinary Annuity
- Single cash flow
  - i=12%

Problem

How much must be deposited at the beginning of each year in order to accumulate $10,000 in four years if interest rate is at 9%?

> Identify the pertinent information from the problem:
  > FV = $10,000
  > i = 9%
  > N = 4

Now using the Future Value of an Annuity Due table (Table 5), find the appropriate value from the table.

On January 1, 2011, you are considering an investment that will pay $12,500 a year for 5 years beginning on December 31, 2015. If you require a 9% return on your investments, how much are you willing to pay for this investment?

Break it into parts

- First step...
- Principal amount
  - Single sum

- We know the future value and need to find the present value
- Interest is semianual over 3 years
- Compounding periods - 6 times (6)
- Interest annually, for the market is 10%, semiannually it is 5%

- PV of $1 (Table 2)
  - 6 periods, 5%

- Multiply the factor with the principal amount of $12,500
  - $12,500 * 0.73028
  - $9,128