

6-2017

Application of Flipped Classroom Techniques in Online Education: Experience with an Introductory MIS Course

Amy Rutledge
Oakland University, rutledge@oakland.edu

Vijayan Sugumaran
Oakland University, sugumara@oakland.edu

Follow this and additional works at: <http://aisel.aisnet.org/mwais2017>

Recommended Citation

Rutledge, Amy and Sugumaran, Vijayan, "Application of Flipped Classroom Techniques in Online Education: Experience with an Introductory MIS Course" (2017). *MWAIS 2017 Proceedings*. 39.
<http://aisel.aisnet.org/mwais2017/39>

This material is brought to you by the Midwest (MWAIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in MWAIS 2017 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

Application of Flipped Classroom Techniques in Online Education: Experience with an Introductory MIS Course

Amy Rutledge

Department of Decision & Information Sciences
School of Business Administration
Oakland University
Rochester, MI 48309
rutledge@oakland.edu

Vijayan Sugumaran

Department of Decision & Information Sciences
School of Business Administration
Oakland University
Rochester, MI 48309
sugumara@oakland.edu

ABSTRACT

Online education has become popular and educational institutions are offering many online courses, with many esteemed universities offering degree programs that are completely online. With its rise in popularity, there is also a growing concern as to whether online courses provide the same level of student understanding and opportunities for interactive learning. Similar to online education, even in the face-to-face delivery mode, there are interesting developments such as “flipped classroom” which facilitate more interaction and engagement with students through technology. This paper investigates whether flipped classroom techniques would have the same effect in an online course. One would argue that online courses are themselves already a flipped classroom because the content is online as it would be for the classroom learner. However, one of the ideas central to the flipped classroom is preparation *prior to* lecture and homework assignments. By engaging the student through question-embedded video and forcing that preparation prior to working with the homework, our initial experience indicates when flipped classroom techniques applied to an online course further increases student understanding.

Keywords

Online courses, flipped classroom, introductory MIS course, computer based training, question-embedded video, computer science education

INTRODUCTION

Online education has become a major focus for higher education and it will only become more important as the years go on (Martin, 2012; Wang et al., 2011). Ensuring that the quality of online instruction meets that of the traditional classroom instruction seems to be a challenge for most (Isken, 2014). The flipped classroom approach has gained popularity in recent years because it is an effective way to leverage classroom time, but it has primarily been applied to traditional face-to-face courses. Its effectiveness as a teaching approach has led some to investigate how it could be applied to the online classroom. So, then, how does one combine the salient features of a flipped classroom approach to the online environment?

At Oakland University, we annually teach sixteen sections of Management Information Systems 100 (MIS 100) – a basic Microsoft Office course required by all business majors. Three of the sixteen sections are taught as online courses while the others are taught face-to-face as hands-on courses in a computer lab. It became apparent that the outcome of the online instruction was not equal to that of the face-to-face courses. A far larger proportion of students failed the online courses entirely. Furthermore, a larger proportion of students scored lower on some of the more difficult assignments – namely Microsoft Excel assignments.

In this paper we describe the past and current course structure for both face-to-face and online instruction followed by a brief review of current online and flipped classroom literature. Next, we discuss the application of the flipped classroom approach to our online courses and its outcome when compared to its equivalent face-to-face sections. Finally, we conclude with a discussion of lessons learned and other possible methods to further improve instruction for the online course.

LITERATURE REVIEW

When looking at the traditional classroom versus an online one, we must consider the differences in the effectiveness of learning. Do students in the online class learn as much as those in the traditional classroom or is the online class less effective? DiRienzo and Lilly (2014) undertook an empirical study to evaluate the effectiveness of student learning based on the type of delivery method employed for teaching. The estimation results from both the regression models indicate that the mode of

delivery whether online or face-to-face does not have any significance on the test score. The contrasting results from the earlier studies that indicated lower effectiveness of the online courses against face-to-face are suggested to be influenced by some other factors other than the delivery mode.

The Flipped Classroom is a relatively new classroom technique. Also called the inverted classroom, according to Gage, Platt, et al, “inverting the classroom means that events that have traditionally taken place inside the classroom now take place outside the classroom and vice versa... The general principle is to provide a menu of options for the students to use in learning. The instructors focus on the desired outcome (for instance, having the student prepared for discussion) and allow the student to choose the best method to reach that outcome” (2000). Many articles have been written about its application to the traditional classroom (Stone, 2012). Bishop and Verlenger (2013) describe in their paper a survey of the various research on the subject. The existing studies suggest that in general, students have an overall positive perception about flipped classrooms. Though in-person lectures are preferred over video lectures, there is a stronger preference for interactive classroom activities over these lectures. Studies show that there is a link between activities such as interactive classroom activities which engage the student and increased student learning (Carini, 2006). It is also suggested that a flipped classroom may improve student learning as compared to a traditional classroom setup. In a flipped classroom, videos and other content are posted online for students to prepare ahead of time. In the traditional classroom, it is evident when a student is unprepared and has not engaged with the material. In the online classroom, this preparation is not as easily tracked and is not evident until the homework grades are calculated. Hence, there is a great need to ensure that students go through the online videos and understand the content before they attempt to do the homework. The typical videos that focus more on delivering the content effectively, can be augmented with questions and get correct answers from students before they continue with the rest of the video. Thus, using the salient features of the flipped classroom techniques, the online class student engagement and performance can be improved by using question-embedded videos as a major vehicle for content delivery.

While several studies have investigated the effectiveness of flipped classroom techniques in face-to-face classes, their use in online courses have not been empirically studied. Thus, this paper addresses this gap and attempts to apply flipped classroom techniques which engage the online learner. We examine their effectiveness by comparing student performance in exams and assignments.

FACE-TO-FACE COURSE

MIS 100 has been taught in the traditional classroom using 45-seat computer labs since 2008. Computer labs allow instructors to employ a hands-on approach to the course. Straight lectures have been kept to a minimum to take full advantage of the computers during class time.

We have been using an online course tool, MyITLab – a Pearson product, for more than seven years. The tool has allowed us to apply a flipped classroom approach to the face-to-face courses through online simulation trainings that simulate the Microsoft Office environment. Students are asked to read and prepare ahead through the simulation trainings for the lesson that will take place in the classroom. The hope is that students have been exposed to all of the skills that will be taught in the classroom whether they fully understand them or not. Furthermore, those who may not understand some more remedial skills (such as copying/pasting in MS Word for example) prior to the simulation will have had the chance to practice those skills prior to the lesson. With that preparation behind them, the hands-on lesson will focus more on the skills that students find most challenging.

In the classroom, students are active participants in their learning. They are given a starting (Word, Excel, PowerPoint, or Access) file, the instructor makes changes to the file as he/she advances through the lesson. Students follow along, making changes to the file as well. At the end of the class time, the student turns in the completed file and is given credit for the activity on a pass/fail basis. We have found this approach to be very effective and this is evident through their examination scores.

THE ONLINE COURSE

The traditional course was adapted for online instruction in the fall of 2009. Many of the same techniques that were found in the face-to-face instruction were deployed in the online course. There was one main difference - the hands-on instruction component found in the traditional classroom could not be easily replicated. The first semester of the course was a disaster with nearly a 20% fail rate. Over the years, assignments were tweaked, timelines were not as ambitious, and the fail rate dropped some to about 15%. The biggest issue was that students were going directly to assignments, not reading the book, or, if they were, they were not understanding the material so they could apply the concepts to the homework. Through course surveys and feedback, we learned that the simulation trainings were helpful for the more simple concepts but were not helpful with the more difficult ones because they didn't come with an explanation nor did they come with multiple examples – which some students need to fully understand a concept.

Online videos demonstrating the hands-on lesson were recorded by the instructor and then posted for the online students, but they were never required as there was no true way to track whether they were viewed by the student. Students could simply click on the video and the program would register as if the video had been “viewed”. Many students who didn’t struggle with the majority of the lessons would find themselves struggling with some of the Excel lessons. Some of the more diligent students utilized the posted videos but most resisted their use and simply took a failing grade on the assignments. After surveying the classes, the instructor learned that the students found that the videos were long. They would have preferred to locate the exact skill they didn’t understand and watch a short video about that skill only.

INTERACTIVE CONTENT DELIVERY TO ENGAGE THE STUDENTS

To more closely mimic the face-to-face interaction found in the classroom, and to ensure that online students understand the information presented, we added a new technique – question-embedded video (QVE). Research shows that “the question-embedded video-based environment promotes student learning, improves the amount of interaction of the student as well as time spent with the learning materials. Simply incorporating interactive video into e-learning environment may not always result in improving learning. However, QVE tool may lead to better learning outcomes and higher learner achievement” (Vural, 2013). Rather than have a video followed by a separate quiz, the question-embedded video makes the student pay attention to what is being taught. The student knows a quiz question may be presented at any time in the video timeline so he/she must pay attention to the material.

Using the quiz feature in TechSmith’s Camtasia software, we created interactive content that features short 5-15 minute videos that focus on a skill or two from the week’s lesson. Depending on the chapter, one to four videos may be posted. The video discusses the skill/concept, demonstrates it using the software program (Excel, Word, etc.), and then stops the video for a short quiz on the content that was just discussed. The student may reverse the video to replay the content if necessary.

The question-embedded video is required of the student and is graded. Moreover, the student must earn 100% on the video(s) to unlock the password for the homework. This ensures (unless the password is shared) that students complete the lesson followed by the homework assignments in that strict order. Similar to the flipped classroom, it is this strict sequence that forces students to learn and interact with the material before going to the homework assignments.

STUDENT PERFORMANCE COMPARISON

We have created videos for 90% of the course and have collected data about the new content’s effectiveness for over a year; initial feedback from the students has been extremely positive. Students find the content useful and more helpful than simply reading the chapter. Figure 1 shows the comparison of the scores from Excel exam 1 for the online courses with and without interactive content delivery. The first bar shows the average class scores for the previous methodology. The second bar shows the current face-to-face courses. It was our goal to close the gap between the first and second bars. Initial findings show that for the online class utilizing the new interactive content, for exam 1 there was a 7.5% increase in the average score when compared to that of the past online class where this content was not present. The current online courses are now within less than 2% of their face-to-face counterparts.

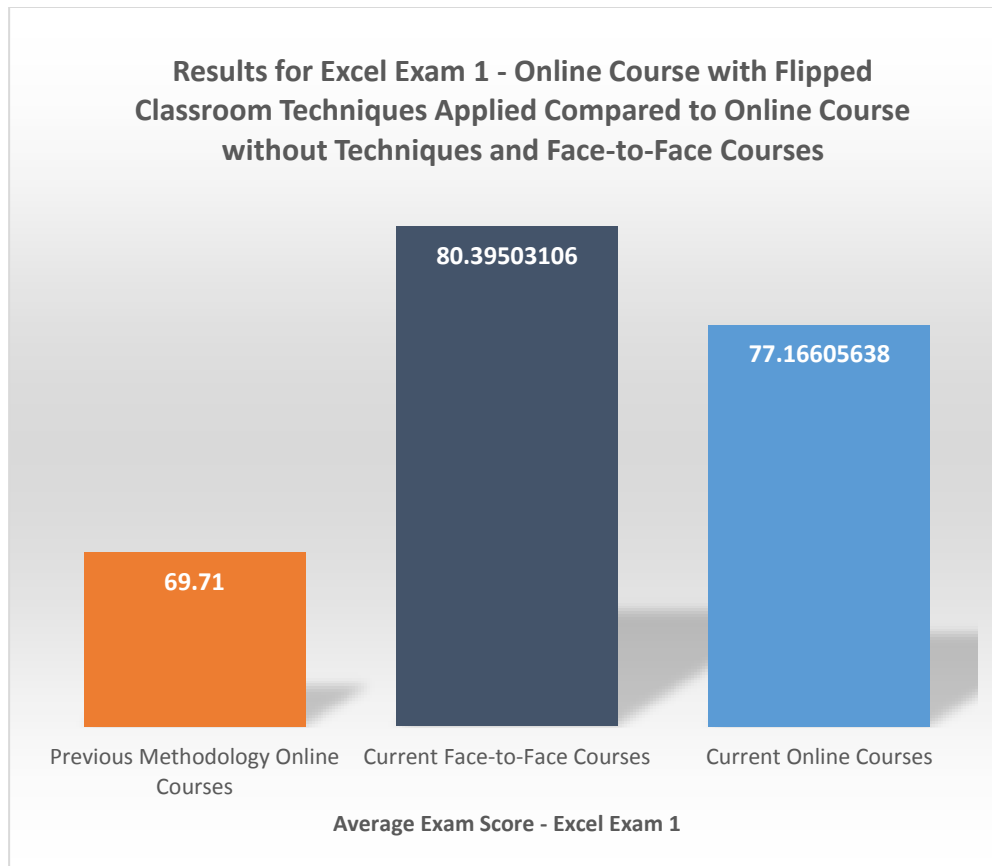


Figure 1. Comparison of Student Performance on Excel Exam 1

On exam 2, the online courses outperformed the face-to-face courses. Students performed well on the exam initially, but still some progress was achieved. For exam 2, there was a 5% increase in the average score when compared to that of the past online class where this content was not present. Figure 2 shows the comparison of the scores from Excel exam 2 for the online courses with and without question-embedded videos and strict sequencing.

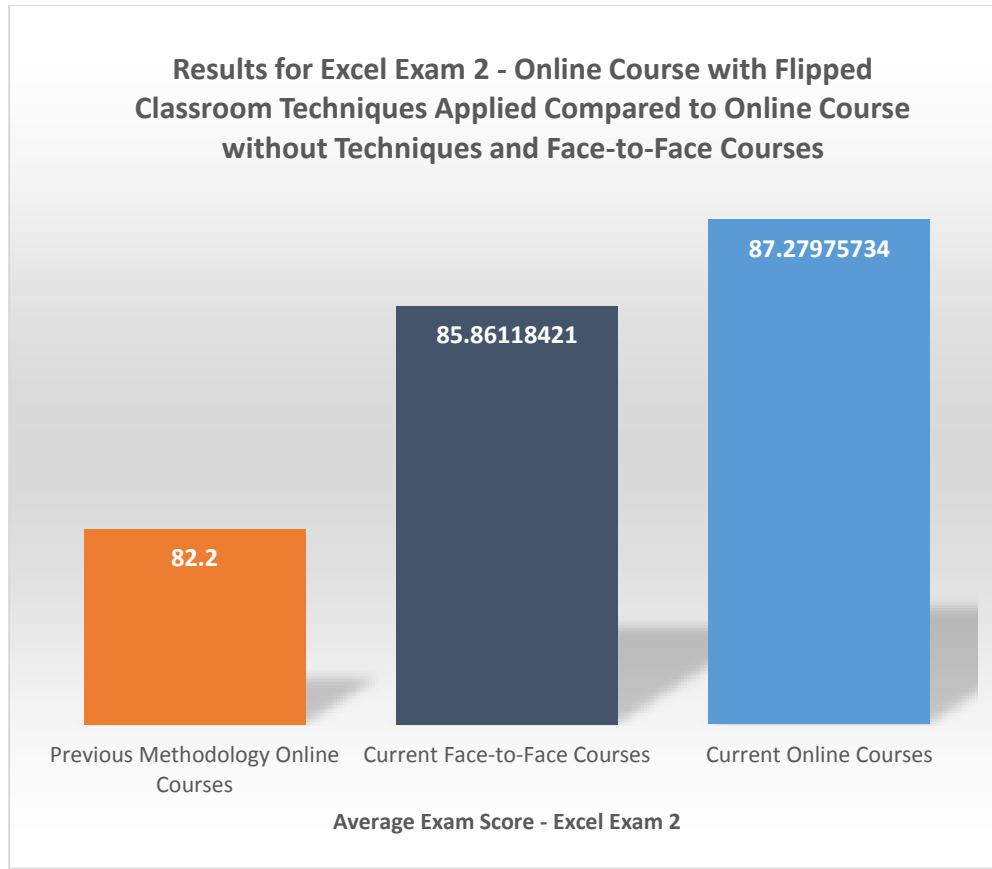


Figure 2. Comparison of Student Performance on Excel Exam 1

CONCLUSION

This paper has presented our ongoing experiment with the use of a flipped classroom technique, namely, question-embedded video and sequencing of materials, to improve student performance in an online class. We contend that applying a flipped classroom technique – utilizing online interactive video content – in the online course environment will indeed close the gap in student performance between the face-to-face setting and the online setting. Our initial results do support the idea that the additional content is working to close the gap between the online and face-to-face classes. This is an ongoing investigation and we will continue to gather more data and analyze the results.

REFERENCES

1. Bishop, J. L. & Verleger, M. A. (2013). The Flipped Classroom: A Survey of the Research. *120th American Society for Engineering Education Annual Conference & Exposition Atlanta*. Retrieved on 6 March 2015, from <http://www.studiesuccessho.nl/wp-content/uploads/2014/04/flipped-classroomartikel.pdf>
2. Carini, R., Kuh, G., & Klein, S. (2006). Student Engagement and Student Learning: Testing the Linkages. *Research in Higher Education*, 47(1), 1-32. Retrieved from <http://www.jstor.org/stable/40185882>
3. DiRienzo, C., & Lilly, G. (2014). Online Versus Face-to-Face: Does Delivery Method Matter for Undergraduate Business School Learning?. *Business Education & Accreditation*, v. 6 (1) p. 1-11, 2014. Available at SSRN: <http://ssrn.com/abstract=2330975>
4. Martin, F. G. (2012). Will massive open online courses change how we teach? *Communications of the ACM*, v.55 n.8, August 2012 [doi>10.1145/2240236.2240246]
5. Isken, M. W. (2014) Translating a Lab Based Spreadsheet Modeling Course to an Online Format: Experience from a Natural Experiment. *INFORMS Transactions on Education*, 14(3):120-128. <http://dx.doi.org/10.1287/ited.2013.0123>

6. Lage, Maureen J., Platt, Glenn J. and Treglia, Michael, (2000), Inverting the Classroom: A Gateway to Creating an Inclusive Learning Environment, *The Journal of Economic Education*, 31, issue 1, p. 30-43, <http://EconPapers.repec.org/RePEc:taf:jeduc:v:31:y:2000:i:1:p:30-43>
7. Wang, M., Jia, H., Sugumaran, V., Ran, W., & Liao, J. (2011). A Web-Based Learning System for Software Test Professionals. *IEEE Transactions on Education*, vol.54, no.2, pp.263,272, May 2011 [doi: 10.1109/TE.2010.2051546]
8. Stone, B. B. (2012). Flip Your Classroom to Increase Active Learning and Student Engagement. 28th Annual Conference on Distance Teaching and Learning. Web. 6 March 2015 Retrieved from http://www.uwex.edu/disted/conference/Resource_library/proceedings/56511_2012.pdf
9. Vural OF (2013). The impact of a question-embedded video-based learning tool on e-learning. *Educational Sciences: Theory and Practice* 13, 1315-1323. Retrieved from <http://files.eric.ed.gov/fulltext/EJ1017292.pdf>