EVALUATION OF A FLIPPED CLASSROOM IN AN UNDERGRADUATE BUSINESS COURSE

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ABSTRACT

This study examined the results of a flipped classroom trial conducted for Business 1112, an introductory business course at Mount Saint Vincent University in the fall semester of 2012. Dr. Findlay-Thompson taught three sections of Business 1112 and used the flipped classroom style for one of the three sections and the traditional lecture-style teaching methodology for the other two. Post-term interviews were conducted with the students in the flipped classroom to gather information on their views of the learning environment in a flipped classroom. As well, a comparison of the quantitative results of the grades between the three sections was used to compare the academic outcomes between the two teaching methodologies. Student views on the flipped classroom were mixed and the academic outcomes were identical between the three classrooms. These findings are discussed in terms of how the flipped classroom teaching methodology needs to be implemented properly and whether or not it is an effective way to engage students in the learning process.

JEL: A22, I21

KEYWORDS: Flipped Classroom, Effectiveness

INTRODUCTION

Educators are continually challenged to find new strategies for engaging students in the classroom so as to increase the effectiveness of the learning process. A flipped classroom inverts the normal learning process. It "moves the lectures outside the classrooms and uses learning activities to move practice with concepts inside the classroom" (Strayer, 2012, p. 171). The use of technology is a key component in allowing lectures to be pre-recorded and made available to students outside of the classroom setting. The philosophy behind the flipped classroom teaching methodology is that it allows instructors to teach both content and process. Eric Mazur a professor of physics at Harvard University suggested that "Learning is a two-step process. First, you must have some transfer of information; second you must make sense of that information by connecting it to your own experiences and organizing the information in your brain" (Demski, 2013, p. 34). The flipped classroom is designed to create a classroom experience that inspires lifelong learning and meets the objectives of Mazur's reference to a two-step process. Despite the recent accolades being extolled to the flipped classroom, there are also cautions about the need for both teachers and students to be properly trained in how to use and teach a flipped class. The remainder of this paper will review the relevant literature and how it integrates with the findings in this study. We will examine the data from actual results of a flipped classroom based on an experiment where the same professor taught an identical undergraduate business course to three sections using the flipped classroom methodology in one and traditional lecture-style teaching in the other two. The results will then be presented and the paper will close with some concluding comments.

LITERATURE REVIEW

In 2008, Jonathan Bergmann and Aaron Sams, two chemistry teachers at Woodland Park High School in Colorado's Pike Peak, were finding it difficult to find the time to reteach lessons for absent students. They used their own money and bought software that allowed them to record lessons and they posted them online. The results were unexpected – they found that even students who had not missed class were

watching the recordings because it helped them review and reinforce classroom lessons. This led to Bergmann and Sams rethinking how they used class time and the subsequent concept of a flipped classroom (Tucker, 2012).

A flipped classroom is most commonly described as a reversed teaching model where the teacher uses various forms of technology such as videos to record the normal classroom lectures and students are required to view these recorded lectures outside the regularly scheduled classroom time. This allows for the homework portion, or other interactive activities, to be completed within the classroom setting. The intent is to create a more collaborative learning environment where students are focused on working through problems with both the guidance of their teachers and the support of their peers. According to Tucker (2012) teachers that use the flipped classroom model universally agree that viewing the recorded videos outside class time are not enough to make the model successful. Rather, it is how teachers integrate these instructional videos into an overall approach that makes the difference.

Mark Frydenberg (2012) is a senior lecturer in computer information systems and involved with a company that produces software for the flipped classroom, CIS Sandbox. He cautions that although the flipped classroom premise is very simple and it is an effective way to engage students in learning it is not a "one size fits all" model. On the teaching side, he suggests that many instructors find it difficult to put their egos aside as they make the shift from being the "sage on the stage" to becoming the "guide on the side" and that many "students need an incentive to watch videos at home just like they need to be motivated to read their textbooks and do their homework" (Frydenberg (2012). He also suggests that not all students have access to the same technology such as smart phones or laptops, especially at home, and points out that there could be a digital divide against the flipped classroom methodology.

In schools where the flipped classroom has been used, the results appear to be positive. Carolyn Durley is a biology teacher at Okanagan Mission Secondary School in Kelowna, British Columbia, and adopted the flipped classroom in the 2011-2012 school year. She had noticed changes over the previous four years as to how students learned and recognized that she was losing her connection with them, something she had always relied upon in more than 20 years of teaching. She noted that students could get their biology from looking it up on YouTube or their phones and they "weren't buying into me spouting off – you know, the fountain of knowledge – anymore" (Pearson, 2012).

She was not overly technology-savvy but realized she had to change and the flipped classroom gave her the ability to connect in what she considers an extremely powerful way. She noted that the first time she used the flipped classroom there were struggles with her understanding of how to teach a flipped class and that the students were not ready to leap into a whole class of self-directed time. In her second semester, she structured the class differently, focusing in on the lessons learned from her first semester using the flipped classroom methodology. She has not yet measured academic progress by way of empirical data but feedback from students has been positive and she believes that her relationships with the students have strengthened. Durley stated that while empirical evidence is one way of measuring the effectiveness of the flipped classroom it can take many years of comparison to fully determine it from a quantitative approach. She concluded that there are many other benefits that although not measurable are positive signs that this particular pedagogical approach to teaching is effective.

Harvard university professor Eric Mazur was an early adopter of the flipped classroom model and states that "if you were to step into one of my classrooms, you'd think I was teaching a kindergarten class, not a physics class" (Demski, 2013). He insists that the pandemonium is a wonderful thing because students are actively engaging in the material rather than blindly sitting in a classroom and either ignoring or writing down the words said by the professor. According to Chris Millet, assistant director of Education Technology Services at Penn State University the simplicity of technology allows the flipped classroom

to be easily created. He states further "there are drop-dead simple technologies that keep the flow of idea generation and exchange moving inside the classroom to support active learning" (Demski, 2013, p. 33).

The academic literature is extremely limited on actual quantitative studies on the effectiveness of the flipped classroom. Three studies were found and are reported next. The first article was by Alvarez (2012) who reported on the students at Clintondale High School in Clinton Township, Michigan. In 2009, more than 50% of freshmen students failed English and school leaders had 736 discipline cases for 165 students. The school determined that a flipped classroom would offer students more time to prepare for class especially as many lived as far as 12 miles from the school and busing was not always reliable. A year after implementing the flipped classroom educators in the school saw the percentage of students failing fell from 52% to 19%; in math, a drop from 44% to 13%; in science, it declined from 41% to 19%; and in social studies, fewer than 10% of students failed, compared with nearly a third the previous year. The conclusions at Clintondale High School were that "the flip approach holds the golden key for students because educators can control and eliminate learning obstacles, and it allows teachers to give their best presentations and share resources" (Alvarez, 2012).

The second academic study was conducted by Jeremy Strayer (2012) on his own work with a flipped classroom. The research took place in two different introductory statistics classrooms taught by Strayer at an unidentified U.S. university. The typical student in his class was a middle-class white American from the MidWest. He structured one classroom to be a flipped and the other to be a traditional lecture-homework format. He did not compare the grade results between the two classes. Rather he used the College and University Classroom Environment Inventory (CUCEI) to assess the perceptions of the learning environment (both what they preferred and what they actually experienced). There were seven scale items, personalization, innovation, student cohesion, task orientation, cooperation, individualization, and equity. Students as a whole felt that their actual learning environment was not measuring up to their preferred environment. When comparing responses between students in the flipped class and students in the traditional class, students in the flipped class preferred an environment with greater Innovation and Cooperation but there was no evidence of a difference in preferences for the other scales.

The limitation of this study was that Strayer had control over final grades and he administered the test prior to the end of the semester. The third academic study was conducted by Ferreri and O'Connor (2013) on the redesign of a large self-care course previously delivered in a traditional lecture format to a small-group case-based course. The UNC Eshelman School of Pharmacy wanted to redesign a course to the flipped classroom style because application, analysis, and evaluation rather than knowledge of nonprescription products was the outcome required for the course. Instead of a content-delivery method which forced students to memorize information, they spent time gathering patient information and applying the information to patient self-care scenarios. To accommodate this shift in teaching style, classes were redesigned to a small-group discussion rather than a large lecture hall style course.

The results reported by Ferreri and O'Connor were that students in the smaller-class format reported a preference for working in teams and achieved significantly better academic grades with the new course format.There is always pedagogical debate by educators between content knowledge and skills acquisition. Although Jonathan Bergmann and Aaron Sams are often credited with formalizing the model and are successfully rolling out the flipped class model into the mainstream, the ideas behind flipping are not entirely new. The National Center for Academic Transformation (NCAT) has experimented with similar ideas over the past decade across a multitude of disciplines. Carol Twigg, NCATs president and CEO stated that redesigning courses offers an opportunity to reengage students and to improve their motivation but she dismisses pedagogical extremes by stating "If you don't have basic math skills, you can't do an interesting physics project" (Tucker, 2012).

There are other noted issues with the flipped classroom that limit some of the accolades it has received. Firstly, it has been argued that this type of teaching methodology could create a greater chasm between high-income and low-income students so it is only effective with a specific student population base. Secondly, not everyone has access to the internet especially in rural areas. Thirdly, schools generally have to have access to software that might be too costly and not a reality in educational budgets (Techsmith, 2013; Knewton, 2013). Fourthly, teachers have to be trained on how to use the software and how to properly structure a flipped classroom which is time consuming and requires a commitment on the part of the teacher. Finally, students must overcome their reliance on traditional classroom teaching and be willing to accept the responsibility for self-learning that comes with a flipped class.

METHODOLOGY

Three sections of Business 1112, Introduction to Business Administration, were taught by Dr. Sandi Findlay-Thompson, an Assistant Professor at Mount Saint Vincent University and one of the co-authors of this paper, in the fall 2012 semester. Section (01) was taught using the flipped classroom methodology and classes were held on Mondays and Wednesdays from 11:05 am – 12:20 pm. There were 30 students registered in this section and 28 were in the age category of 18-24 years. Section (02) was taught using a regular lecture-style methodology and classes were held on Mondays and Wednesdays from 3:05 – 4:20 pm. There were 42 students registered in this section and 37 were in the age category of 18-24 years. Section (05) was taught using a regular lecture-style methodology and classes were held on Tuesdays from 6:05 – 8:35 pm. There were 36 students registered in this section and 28 were in the age category of 18-24. Students were given the same course outline in each section including assignments, quizzes, and exams with identical weightings for each activity. After the semester was completed and final grades had been published, students were interviewed relating to their experience in the flipped classroom.

Case study interviews were deemed appropriate as Flyvbjerg (2006) and Zikmund (2003) agreed that case studies, specifically interviews with participants, are useful in gaining a better understanding of a phenomenon. Interviews also allow for the greatest depth and detail of information compared to other methods (Cooper & Schindler (1998). Further, Yin (1994) stated that case study interviews can provide insight into research problems, while Marshall and Rossman (1985) noted that interviewing was a better method of obtaining quality data. In this study, open-ended questions were used to inquire about the students' experience with a flipped classroom. Open-ended questions were used because they encourage respondents to answer freely (Zikmund, 2003), respond in their own words (Crano & Brewer, 2002), result in unanticipated answers (Zikmund, 2003), and often provide richer data compared to closed questions (Minichiello, Aroni, Timewell & Alexander, 1995).

While the general consensus among researchers was that there was no specific number of cases that should be used (Cooper & Schinder, 2001; Zikmund, 2003), some researchers have suggested upper and lower limits (Eisenhardt, 1989). Seven out of a potential 30 students were selected to be interviewed as the number fell between the range suggested by Eisenhardt (1989) and the results from this study will be considered and interpreted along with the students' final grades. The seven participants for the study were selected using a judgment sample. Cooper and Schindler (2001) and Tull and Hawkins (1997) both stated that judgment samples are appropriate for exploratory research. Furthermore, the researchers wanted to ensure participants had different academic backgrounds and the diversity in the classroom was represented in the sample. Flyvbjerg (2006) noted that this practice of judgment samples ensures a richer base of information for the researcher than random sampling.

The interviews ranged in length from 35-70 minutes and open-ended questions were recorded verbatim. The information from the interviews was then recorded using Excel spreadsheets to see patterns which emerged in the research. Organizing data into sections with a matrix-like structure is acknowledged as a practical method for facilitating pattern matching of qualitative data (Yin 1994).

RESULTS AND DISCUSSIONS

As noted above, the seven participants for the study were selected using a judgment sample. Table 1 shows the breakdown of type of student, number interviewed for each type of student, and the code used to represent the type of student. Students were asked a number of questions including whether or not they would enroll in another flipped class if given the opportunity, allowing the researchers to gain insight into their opinion of a flipped classroom compared to a traditional classroom. Student's overall opinion on the flipped classroom was mixed. Students A, C, F and G spoke positively to somewhat positively about the experience and the opportunity to complete work normally assigned for homework in class. Student A stated: *"I enjoyed the flipped classroom. I liked going to class knowing I would get things accomplished which impacted my grades. I also enjoyed the convenience of accessing recorded lectures when I wanted to watch them."* Students F and G both felt the flipped classroom allowed them to access assistance from their professor enabling them to do better on assignments. The sentiment is perhaps best expressed by Student F who stated "*…it is easier to talk to your professor in the class. In other classes, we (students) sit and listen. I do not like interrupting or asking questions. In our class, we could ask questions all the time. I did better because of this."*

Students B and D, while offering some positive comments on aspects of the flipped classroom, such as the interaction with their peers and their professor, preferred a more traditional learning environment. Student B stated, "*I liked being able to interact with others in the room. I didn't like watching the videos at home and felt the lectures should be in the classroom."* Student D echoed this concern saying, "*... it (flipped classroom) seemed like more work. We had to watch the videos and do the work in class. I know in other classes we are supposed to read chapters and prepare for class. But this is my choice. In a flipped classroom I had to watch the video and had to complete the assignments."* Student E, the one mature student, was strongly opposed to the notion of a flipped classroom with a strong preference for traditional learning. *"I didn't enjoy the class. I want to come to class and learn the material from the professor. This way if I don't understand something I can stop and ask her. In this class, I had to watch lectures and if I was confused I had to email questions or remember to ask in class."*

The majority of students did express interest in enrolling in another flipped class with Students A, F and G all stating they would do so if given the opportunity. All of these students said the flipped classroom allowed them to complete assignments in the classroom which helped them meet deadlines, access immediate help from their professor and in their opinion helped improve their grades. Student A noted *"…the classroom set up was good for me. I could complete my assignments in class and if I needed help I could easily ask one of my friends or the prof."* Students F and G expressed similar sentiment that being able to ask their peers for assistance improved the experience and resulted in better grades.

Students B, C and D would consider enrolling in another flipped class. These students spoke positively about the classroom environment, interaction with their peers and professor but were somewhat concerned that the flipped classroom resulted in more work with no impact on their grades. Student B said *"I don't think it impacted my grades one way or the other. It was interesting to try and I would probably try another. If I felt it really improved my grades, sure I would be more open to it (flipped classroom), but after this I am not sure if it matters to my marks."* Students C and D openly spoke about the extra work involved and their sentiment is likely best captured by Student D who stated *"... the class was more work. I liked the prof and my friends but I had to do more and my grades weren't very different. I would take another course like this but I don't have a strong preference."* Student E would not enroll in a flipped classroom again preferring a traditional classroom experience.

It is interesting that the mature student was the individual opposed to the flipped classroom. Given the significant increase and popularity of distance learning and the numbers of mature students who are taking educational programs in this manner, we would have expected the reverse to be true. It is not

possible to draw conjecture as to why this mature student did not have a positive experience or if he or she was simply an anomaly. Additional information would be required to draw any conclusions and it would necessitate a separate study comparing a controlled group of mature learners against a controlled group of younger learners to ascertain if there is resistance to the flipped classroom from this group set as a whole. The majority of comments from the student interviews concurred with the literature review findings. The results were a mixture of positive and negative responses to the flipped classroom style. It is not surprising that students found the workloads heavier because homework outside of the classroom is generally an option, whereas watching the videos outside of the classroom is mandatory because testing of material requires the students at some point to watch the lectures if they want to learn the material. For students in the flipped classroom in this study, they had a quiz at the start of the class immediately following the due date that the lecture had to be viewed.

Table 1: Students Interviewed

Type of Student	Number Interviewed	Coded
Traditional (direct from high school)	4	A,B,C,D
Mature	1	E
International (2 different countries)	2	F,G

This table shows the number of students interviewed and the type of each student. They have been coded as Students A through G for discussion purposes in this study.

Of interest, some of the students that were interviewed mentioned they believed they had earned better grades because of the flipped classroom. A comparison of the average grades between the flipped classroom (which was the course that the interviewed students came from) and two additional sections of the same course that were taught in a traditional lecture-style methodology are found in Table 2. In comparing the three sections of Business 1112 the average student scored in a "B" range (between 73-76) in all three sections. There were no grade differences when comparing the flipped classroom with the two other traditional-lecture style classes. This does not invalidate the students' belief that they did better in the flipped classroom but there is no evidence to support their claims other than their own perceptions of the learning experience. There was an expectation that grades would be higher in the flipped classroom for two reasons. The first was that quizzes were held the day following the due date for each video lecture. And as noted in Table 2 although the quiz scores were slightly higher for the flipped classroom section than for the other two sections where they did not watch the videos, the overall major exam grades were comparatively similar to the other two non-flipped sections.

Table 2: Grade Results between Flipped Classroom and Non-Flipped Classrooms

Section	Exam 1 - 15	Exam 2 - 15	Exam 3- 15	Quizzes- 5	Video -10	Debate - 10	Networking - 15	Case Study 15	Final Grade
Flipped Section (01)	10.62	10.62	10.51	3.94	9.10	7.05	12.36	10.87	75.09
Non-flipped Section (02)	10.40	10.53	10.61	3.25	8.97	8.08	10.97	10.94	73.80
Non-Flipped Section (05)	10.66	11.12	11.27	3.23	8.76	8.26	12.52	10.56	76.42

This table shows the grade results for Business 1112, breaking down the sections between flipped classroom which was sections (01) and the non–flipped classrooms which were sections (02) and (05) for an actual course held in the Fall of 2012.

It could lead to the conclusion that short-term memory was at play in the flipped-classroom quiz results. The second reason was that the in-class activities were designed to promote deeper learning of the course materials with the students doing more hands-on research and taking over more responsibility for the learning process. As noted by the interview responses, the majority of the students felt they had more opportunity in-class to ask questions of the professor or their fellow students and to work on projects but the grade results were not higher than those in the non-flipped classroom. A reason for this could be the inexperience of the professor teaching this flipped classroom. It was her first attempt at this style of

teaching and it would be interesting to do a follow-up project with her when she has finished more flipped-classrooms and becomes more competent in the teaching methodology.

CONCLUSIONS

The goals of this study were to compare the academic outcomes between two teaching methodologies, namely, a flipped classroom style versus traditional lecture-style as well as analyze student opinions regarding their views of a flipped classroom environment. Three sections of an identical class, Business 1112, Introduction to Business Administration were included in the study. Two of the classes were traditional lecture-style and the third was taught using the flipped classroom style. Students were given the same course outline in each section including assignments, quizzes, and exams with identical weightings for each activity. After the semester was completed and final grades had been published, grades were compared and students were interviewed and asked to relate their experiences in the flipped classroom. Identical questions were asked of all students but they were open-ended to allow students to freely comment on personal experiences.

The primary findings from this study were that there were no grade differences when comparing the flipped class with the two traditional-lecture style classes. There had been an expectation that grades would be higher in the flipped classroom based on the literature review findings. However, students did report that they felt they did better in the flipped classroom but there is no quantitative evidence in the grade results to support their claims other than their own perceptions of the learning experience. Students from the flipped class did report that they felt they had more opportunity in-class to ask questions of the professor or their fellow students and this could be responsible for the perceptions of a better learning environment in the flipped classroom.

This study was informative and confirmed that the flipped classroom to date has yielded both positive and negative outcomes, which concur with the literature review findings. Some lessons learned by the authors of this study who were involved with the experiment are that a number of processes seem to be necessary in order for the flipped classroom to be an effective teaching methodology. Firstly, student understanding of the purpose of the flipped classroom must be properly communicated and students given the opportunity to express concerns about their responsibilities to this new style of learning. Secondly, student buy-in must be gained so they will be committed to the learning process. Thirdly, the instructor must be willing to let go of traditional teaching practices and be fully trained in how to effectively implement a flipped classroom as it is not as simple as recording a video and letting students do homework in the class. If the conditions are properly set, the flipped classroom should have the potential to be an extremely effective learning style. It is the intention of the authors to conduct further flipped classroom experiments once the professor has been able to receive formalized training and establish formal procedures for communicating the process to students. A limitation in this study was the fact that the professor teaching all three sections had control of student responses. Although the survey was not administered or discussed with students until after the semester ended and final grades had been published, students might have concerns that if they took a class in the future with this same professor it could influence their success. Students were advised that names would not be released and the professor would have no way of knowing who had or had not participated and that all responses were confidential. The professor did not conduct the interviews or calculate the results, rather, these were done by the second author of this paper, Dr. Peter Mombourquette and only the cumulative results provided to Dr. Sandi Findlay-Thompson for review and analysis.

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BIOGRAPHY

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