

Flipping The Classroom: A Case of a Graduate Business Analytics Course

Rachida F. Parks
rachida.parks@qu.edu
Computer Information Systems
Quinnipiac University

Abstract

This is an example of flipping the classroom for an introductory graduate course in Business Analytics. This paper describes the creative steps undertaken to create flipped classroom and presents the outcomes for the flipped classroom for both the instructor and the students. This case explores the benefits, challenges, as well as suggestions with regards to this flipping approach. Findings show that flipping the classroom in this course helped students develop necessary skills often required in real-world situations. The case also provides reported suggestions by students for future improvements and concludes by discussing contributions to research, practice, and its associated future research opportunities.

Keywords: Flipping the Classroom, Flipped Learning, Business Analytics

1. INTRODUCTION

The main goal of education is to maximize learning for students. To do so, educators seek to identify ways to personalize and customize instruction for their students (Davies, R. S., Dean, D. L., & Ball, N. 2013). This type of customization may need an environment that is beyond the traditional classrooms, which has led educators to embrace the flipped or inverted classrooms. The philosophy behind flipping the classroom is that this approach allows educators the flexibility to better allocate the classroom time to further improve students' learning experiences. This includes spending more time working with students who need help, allowing discussions among students to work together to solve problems in the classroom, or focusing on critical thinking activities.

The flipped or inverted classroom has received considerable attention in higher education. This approach provides "a pedagogical approach in which direct instruction moves from the group learning space to the individual learning space, and the resulting group space is transformed into

a dynamic, interactive learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter" (FLN, 2014, p. 1). The flipped classroom allows the increase of students' engagement in the classroom by improving their active learning experiences (Thompson & Mombourquette, 2014).

Switching from a traditional classroom to a flipped classroom is not a trivial task for educators as there are no effective or accessible models to use (Davies et al 2013). Moreover, while the flipped classroom has been applied in many fields such as business, healthcare, marketing, finance and technology, it has received limited attention in the rising area of Business Analytics. Business Analytics has been chosen as a focus for this case due to the rising nature of this discipline and the required analytical skills. In fact, a survey of 3,000 executives conducted by MIT Sloan Management Review along with IBM Institute of Business Value (LaValle, Lesser, Shockley, Hopkins, & Kruschwitz, 2011) revealed that one of the main obstacles to widespread analytics adoption is the lack of critically and appropriately

using analytics to improve business. Therefore, a traditional classroom instruction cannot be of optimum benefit to students where engagement and critical thinking are the key to analytics skills. This paper examines the evidence for flipping the classroom in a graduate course in Business Analytics as well as the outcomes and perceptions associated with this approach to teaching and learning.

Unlike most studies which use a simplistic form of flipping the classroom (Hoffman, 2014) consisting of video lectures and/or reading outside of class followed by active collaborations inside the classroom, the current study embraces a more advanced form of flipping. This involves intense engagement of students in the classroom, the use of guest speakers, and students' leadership roles. The educator embraces the roles of coach, facilitator, subject expert, and standard setter & evaluator to support this advanced form of flipping.

The structure of this paper is as follows: The next section briefly reviews the most important concepts in flipping the classroom. We then outline our methodological approach for designing and implementing the flipping the classroom in a graduate course. Subsequently, we present our findings and synthesize them and conclude the paper with a discussion, limitations, and future work.

2. FLIPPING THE CLASSROOM

Several studies on flipping the classroom have been recently published (Rotellar and Cain 2016; O'Flaherty and Phillips 2015; Hamden, McKnight, McKnight & Arfstrom 2013) and have been applied to diverse fields such as engineering, economics, business, statistics, and healthcare, to name a few. The literature also identifies four main pillars of flipping the classroom: a flexible environment for learning, a learning culture based on learner-centered approach, intentional content to maximize classroom time, and professional educator which an essential ingredient that enables Flipped Learning to occur (FLN, 2014).

Four main measures have been identified concerning flipped classroom (Huber & Werner-2016). The first one is achievement, meaning that students are achieving deeper learning through the flipped approach. The second measure is perception as positive perception is influential in students' decisions such as pursuing a particular major (Love et al., 2013). Most studies also

reported increased engagement through the use of the flipped approach (McCallum, Schultz, Sellke & Spartz, 2015). Self-efficacy, the fourth measure mentioned in the literature, showed that students' reinforcement and timely feedback supports students' success in the flipped classroom (Yelamarthi and Drake 2015).

To provide educators with the skills and resources to implement the flipped learning model, Sams and Bergmann (2012) started the not-for-profit Flipped Learning Network (FLN) in early 2012. The goals of FLN are to facilitate dissemination of best practices among educators and provide an opportunity for learning and collaborating.

Concerning the themes covered in flipping the classroom in higher education, four themes seem to dominate the literature: reasons for flipping (Findlay-Thompson & Mombourquette, 2014), the flipping experience (Gaughan, 2014), outcomes of flipping (Love, Hodge, Grandgenett, and Swift, 2014) and lessons learned about flipping (Kim, Kim, Khera, and Getman, 2014).

3. METHODOLOGY

Context of the study

In Spring of 2016, I taught an introductory graduate course in Business Analytics for the third time. I chose to flip this classroom based on the industry demands for more engaged and critical thinking graduates. The flipped approach was based on several trials and errors.

Course and Content Development

A new graduate course was designed and developed to meet the requirements of a Business Analytics program in a Southern University in the United States. This course was described as an exploration of the integration of business application technologies and procedures, such as business intelligence and analytics, being leveraged by corporations. This introductory course included the following objectives:

1. To develop a basic knowledge of terminology, issues, and opportunities related to business intelligence
2. To explain technologies and components of business intelligence systems
3. To investigate selection/critical success criteria for adoption and application of Business Analytics
4. To describe the structure of data warehouse and the process of data extraction, transformation and loading
5. To apply Business Analytics through hands-

- on activities
6. To design reporting solutions utilizing information visualization techniques and digital dashboards
 7. To analyze management issues and opportunities related to the integration of Business Analytics into existing corporate infrastructures

Flipping the Classroom Format

The class structure and activities includes limited lectures and extensive class discussions, industry speakers, hands-on activities, and student presentations throughout the semester (Appendix A). A typical class is 2h and 40 minutes (See Figure 1). The first 10-15 minutes is a mini lecture by the educator initiating the class and introducing the topic, followed by an interaction session of about 60 minutes by an invited guest speaker who is an expert in the topic covered. A great effort goes into contacting and fitting into the speakers' schedule. Speakers consisted of industry experts from different fields (see appendix D) that provide either an interactive lecture or a demonstration of how Business Analytics is applied in their field/company. The third section of the class (60-75 minutes) is led by a class team and consists of a discussion and/or hands-on activities using Business Analytics tools such as Cognos, Tableau, SSRS or others. After the interactive discussion, the class proceeds to assessing the leadership team using a form provided in Appendix B. In this case, the educator wears several hats throughout the entire class using the roles of coach, facilitator, subject expert, and standard setter/evaluator. These roles are clearly identified by Kolb, A. Y., Kolb, D. A., Passarelli, A., & Sharma, G. (2014) using the educator role profile. The facilitator role allows the educator to connect with students and draw their intrinsic motivation. The subject expert role allows the educator to connect students' reflections to the subject being taught. In the standard-setter/evaluator role, the educator assists the students with the appropriate skills to meet requirements. Finally, in the coaching role, the educator collaborates with students using encouragements to further personal development and goals (Kolb et al., 2014).

In flipping the classroom, the students take ownership and responsibility of their learning through two roles (See figure 1): leadership role and participant role. In the leadership role, students form teams consisting of three or four members and have to lead a class session. Students are expected to serve as discussion leaders once or twice during the semester based

on the class size. Sign-up for discussion leader responsibilities occurs on the first day of class. Discussion leaders are responsible for preparing a set of discussion questions based on the topic assigned that week. The list of questions has to be approved by the instructor to make sure they contain the key points to be covered during the week. This approval process takes several iterations between the leadership team and the instructor to make sure 1) the leadership still has ownership of the topic and 2) the class has the appropriate set of questions that would have been covered by the instructor had it been a traditional lecture. These questions must be provided to the instructor several days before class. The instructor will then review and make suggestions, changes and/or additions where appropriate. The discussion leaders will then distribute, via email, the approved questions to all class members at least 5 days before class. After each class presentation, the performance of the discussion leaders is assessed as part of the contribution grade and is evaluated based on (1) the degree to which the questions highlight or tap all of the major themes in the readings, and (2) the utility of these questions to generate meaningful discussion during class. An evaluation form is provided in Appendix B.

When not serving the in leadership role, the students wear a participant hat and are expected to carefully prepare the assigned readings for each class period. "Prepare" was clearly explained as reading completely and critically the assignment readings, and being ready to discuss the issues raised in each application case in the assigned chapters for each week. The preparation is guided by questions provided by the discussion leaders (see below), but students are also encouraged to develop perspectives of their own on the readings that they can present during the class discussion. Students are encouraged to read additional readings as time and interest permit and to share these additional readings with their classmates.

Data Collection & Analysis

At the end of the course, team members were asked to provide informal feedback on their experience in this flipped course. Each discussion leadership and each team member was asked to provide feedback about their experience. Appendix C provides a detailed questionnaire broken down into three type of questions: 1) before the leadership presentation, 2) during and after the presentation, and finally 3) concluding remarks about this style of flipping the classroom.

A total of 29 students completed the questionnaire, for a response rate of 85%. The feedback was not part of their grade and was optional. The open-ended questions were analyzed using qualitative content analysis (Straus and Corbin 2008). Students testimonials were reported using abbreviations such as (S1) for student 1.

4. FINDINGS

The flipped Classroom Student Experience

Nearly every student admitted to feeling apprehension or some anxiety when this style of teaching was introduced at the beginning of the semester. Reasons for the apprehension ranged from to concerns about an unorthodox teaching technique to a simple dislike for public speaking in front of the classroom. However, as the class went on, students began to embrace this style of teaching, with many students preferring this style of teaching than the traditional one, where lecture from the instructor were dominant. One student summed up the sentiment by saying "By leading the discussion in class, we had a more interactive experience" (S5).

Benefits of the Flipped Classroom

Students responded enthusiastically to this style of teaching and quickly overcame their initial apprehension. In fact, most of the students reported enjoying this form of teaching as it led to interesting discussions and deeper learning as one student noted: "I think that a more flexible style of leading lectures gives students the opportunity of being creative and innovative" (S2).

By swapping the roles of instructor and student, students were forced to not only memorize but also understand and explain the topic assigned. One student commented: "I believe the main difference is that with an instructor provided lecture, there is a tendency to not truly process information as much as memorize. By developing the presentations ourselves, we had to take more ownership of the information." (S5). Students felt that they had a deeper understanding of the topics given and enjoyed the experience. Forcing students out of their comfort zone by making them teach to their peers also helped many students overcome public speaking fears as well. Some students remarked that they felt that this style of teaching helped them develop skills that would be required often in real-world situations. One student said: "We had a hard time knowing what was required for us on the presentation, but I think it was a good test for a real world type

situation again. We are not always going to have rules and guidelines to do things. We need to learn how to deal with these as they are thrown at us." (S4)

Students also felt more comfortable and more engaged when interacting with their peers. Having students teach took away some of the pressure that comes with answering a question incorrectly in class. One student noted that "To me, when I compare the traditional lectures by the instructor you feel like you don't want to make a mistake when your instructor asked the question and also most students are shy but for the leadership case, I feel that I can make mistakes because it doesn't feel scary seeing your classmates leading the discussion and answering to them." (S27)

Concerns of the Flipped Classroom

Students reported two main negative issues with regards to this learning style. Students often noted that they felt they learned less compared to traditional lectures on nights where they were not presenting a topic. One student noted: "While there is a benefit to the students who are leading the discussion, there is a possibility that there could be a disproportionate experience to the students that are learning from other students. While the presenting team may have had to learn a subject really well to present it. It may not necessarily be the case that they present it well or in a way that captures the audience." (S23). Students generally agreed that they learned much more on their own topics but did not benefit as much on other nights.

The second concern pertained to the performance of specific student groups. Student groups had various levels of preparation as well as presentation ability. This created an inconsistent learning experience that varied by student group. Students were concerned that they would not be getting adequate information on topics that were not presented thoroughly or effectively. Students complained that: "Not everyone will be presenting in an effective way where the class can understand what they are talking about." (S14)

Future Improvements of the Flipped Classroom

Overall, students enjoyed this style of teaching and felt that they learned effectively. However, some students offered suggestions that could help address some of the concerns that they had with this style. To address the fact that some presentations were weaker than others, students suggested that the instructor should either

introduce the topic or conclude the topic so that all essential points would be covered. This would address the student concerns about missing information on topics that were not presented effectively. A student suggested "It would be better if the instructor could give a brief introduction about the topic in the beginning of class, so that we can have two views on the topic; one from the group and the other from the expert (Instructor)" (S1). With another student suggesting: "I would recommend that the Instructor always follow the student team presentations with a recap of the most salient concepts and ideas that the instructor believes the class should have learned from the subject matter. In other words, the instructor should recap and reinforce the relevant things that each student should take away from each presentation." (S29).

Another suggestion expressed by the students was to incorporate some sort of points system for students' participation so that students are incentivized to actively participate and learn during presentations that are not their own. One student remarked: "I think if there were some grades involved for whoever answers most questions, it would be motivational for other students to participate, maybe this is how I would enhance it." (S27).

5. DISCUSSION

This case not only showed positive impact of the flipped classroom during the semesters the course was taught but also a lasting impact of students' attitudes and behaviors. This was especially when students have been reaching out after the semester was over through emails or social media reiterating appreciation of the style and its impact on their attitude and learning in their jobs.

From the perspective of an educator, this experience has been very humbling and demands a considerable time investment before and during the semester. Very humbling in the sense that doors are willingly open for constructive criticism, controlled chaos in the classroom, and improvement of instruction. The time investment for the flipped classroom, especially when the entire course is flipped not just one module or two, is extremely high. Usually this flipping method is self-taught, self-researched, and self-managed as such training is not offered in most universities. Kim, Kim, Khera, & Getman (2014) came up with nine design principles to support

flipped classroom that could be beneficial to those thinking of embracing the flipped approach.

With this case being focused on Business Analytics (BA), BA education should produce graduate students who possess skills beyond the technical and statistical requirements by transforming students from passive to active learners and by engaging students in higher level of self-initiatives, ownership and critical thinking.

This study is not without limitations. One of the major limitation of this study is that the educator's role in the flipped classroom was not fully explained to students at the beginning of the course. In fact, in the absence of lectures, a couple of students bluntly questioned the role of the educator half-way through the semester. In a flipped classroom, the role of an educator is more important and more demanding than in a traditional classroom. As shown in figure one, the educator has to wear numerous hats from coach, facilitator, subject expert, and standard setter/evaluator (Kolb et al., 2014). While the role of the educator in a flipped classroom is less visible, it is an essential ingredient to enable flipped learning to occur (FLN 2014). In this case, the perception that the class is self-led could have been alleviated by spending enough time early on educating the students on this teaching approach.

To alleviate these limitations and shortcoming, future improvements should focus on two major opportunities. The first opportunity resides in fully outlining and explaining the flipped classroom to students. By clearly stating not only the expectations but also the state of resistance and change they will go through, there might be more buy-in into the flipped classroom and less chaos. The second opportunity of improvement is to further develop a framework/model that is easily applicable by educators in the BA field.

6. CONCLUSION

Motivated by the significant demand in expertise in Business Analytics, a graduate course was developed not only to meet the curriculum requirements but also to build curiosity, student engagement, sense of debate, and analytical skills through the flipped classroom. The case showed positive impact of the flipped classroom. Not only was the educator able to cover more analytical skills in this field but also the students were able to quickly adapt and appreciate this style despite initial apprehensions. The roles of coach, facilitator, subject expert, and standard

setter/evaluator emerged as essential ingredients to the success of the flipped classroom approach.

In summary, flipping the classroom has major learning benefits as it fosters a creative, innovative, dynamic, and interactive learning environment. However, concerns rise with regards to quality, adequacy, and consistency of learning when students' teams are leading the presentations instead of the instructor. To such concerns, students made two major recommendations for improvements to include a confirmation of the accuracy of the content by the instructor as well as a grade incentive to actively engage the entire classroom in the discussions. Future studies should take into account the above students' recommendations but also thoroughly and clearly inform students of the expectations, roles and responsibilities of such learning environment. Future research should also further investigate and possibly measure the impact of this style of learning on different classes of Business Analytics.

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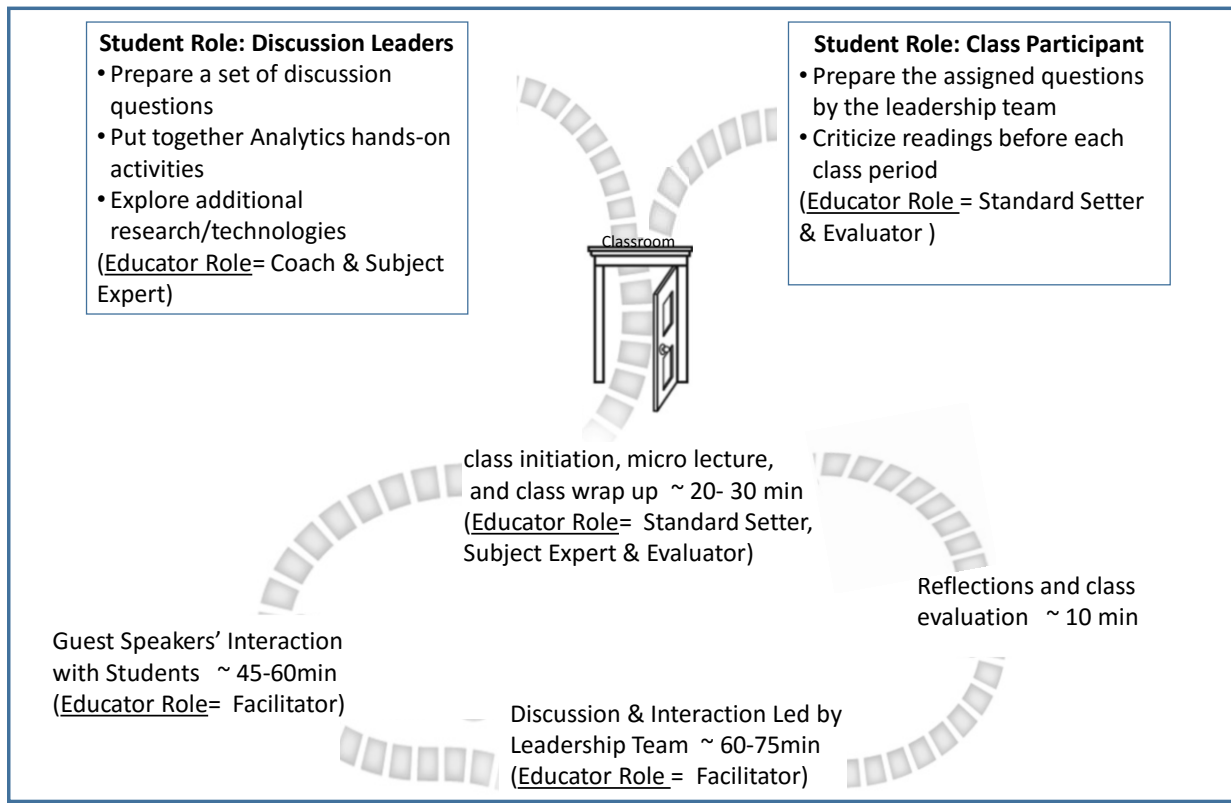


Figure 1 - The Flipped Classroom steps

Appendix A: Sample Course Schedule

Date	Topic	In-Class Activities	Readings /Assignments
Week 1	Module 1: Introduction to Business Intelligence/Analytics	<ul style="list-style-type: none"> •Article Discussion •IBM Cognos 	Read assigned article
Week 2	Business Intelligence Tools and vendors Guest Speaker (Banking & BI/BA)	Chapter 1 Discussion Types of BI tools Leading BI Vendors Team # 1 leading discussion	Read Chapter 1 Install Cognos
Week 3	Module 2: Relational Databases	Relational Databases Microsoft Team # 2 leading discussion	Assignment #1
Week 4		Analytics Hands-on activities	
Week 5	Module 2: Data Warehousing (ETL) Guest Speaker (Insurance & BI/BA)	Data cubes Discussion of application cases Team # 3 leading discussion	Read Chapter 2 Watch Videos
Week 6	Guest Speaker (Marketing & BI/BA)	Tableau Hands on activities	
Week 7	Module 3: Business Reporting, Visual analytics, and Business Performance Management Guest Speaker (Healthcare & BI)	Cognos Dashboard Discussion of application cases Team # 4 leading discussion	Read Chapter 3 Watch Videos Assignment #2
Week 8	Module 3: Data Visualization Guest Speaker (Insurance & BI)	Working with Google Maps and Google Earth Team # 5 leading discussion	Data visualization Readings
Week 9	Module 4: Data Mining Guest Speaker (Retail & BI)		Read Chapter 4
Week 10		EXAM 1	
Week 11		Spring Break	
Week 12	Module 5: Text and Web Analytics Guest Speaker (Energy & BI)	Discussion of application cases Team # 7 leading discussion	Read Chapter 5 Watch Videos
Week 13		Hands on activities	Assignment #3
Week 14	Module 6: Big Data and Analytics	Discussion of application cases Team # 8 leading discussion	Read Chapter 6 Watch Videos
Week 15		Exam 2	
Week 16		Term Project Presentations	Term Project

Appendix B: Discussion Leaders' Evaluation

Date:
 Team #:
 Your name:

What was your overall rating of today's team leading the discussion?
 Check the appropriate number. 1=low; 5=high

	1	2	3	4	5
Readings and questions were sent on time					
Extra readings were useful					
Team encouraged discussion and exchange of ideas					
Organization of the questions					
Delivery (visual aids, clarity, logical order, focus, control of the discussion) Add comments:					
What else would you like to rate: - - -					
How could you improve the delivery of this discussion?					
What are the main points do you recall about today's discussion?					

Appendix C: Feedback from Team members leading the discussion

Before the presentation

1. How did you originally perceive this style of leading the topic discussion instead of your professor lecturing?
2. How much help and support did you receive from your instructor to prepare for leading the discussion? Please provide as much details as possible
3. How much interaction did you have between your team members to prepare for the leadership discussion?
4. How much time (hours) and effort (searching and investigating) did you invest?
5. What was the topic of your leadership discussion?
6. How is your learning in this topic compared to a traditional method where the instructor provided a lecture?
7. Other important comments that I missed?

During and after the presentation

8. What creative aspect/activities did you implement during your leadership discussion?
9. How was the interaction among students during your leadership discussion?
10. Were students engaged in the discussion? How?
11. Were the students prepared and how does their learning compared if there was a traditional lecture by the instructor.
12. Other important comments that I missed?

Concluding remarks:

Your thoughts of this style of flipping the classroom

- Benefits
- Weaknesses
- Possible suggestions to enhance it

Appendix D: Sample Guest Speaker List

Guest Speaker	Title	Company	Industry
Guest Speaker 1	CEO	Name masked	Banking/Consulting
Guest Speaker 2	Manager Enterprise Business Intelligence	Name masked	Insurance
Guest Speaker 3	Global Privacy Executive	Name masked	Data Clearinghouse
Guest Speaker 4	Chief Medical Information Officer	Name masked	Healthcare
Guest Speaker 5	Vice President IT	Name masked	Insurance
Guest Speaker 6	Director of Business Intelligence	Name masked	Retail
Guest Speaker 7	Manager of Market Support and Analysis	Name masked	Energy