

### **Abstract**

The flipping method and flipped classrooms are becoming more popular in classrooms of all ages across the country. Written in the style of an auto-ethnography, this study examines the effects of these modes of teaching on the students of an undergraduate organic chemistry course. The research explores the impacts on the learning culture of this classroom and discusses the potential implications of these effects on science classrooms at a secondary level. Examined from the perspective of a future secondary biology teacher, these results inform both the authors' future classrooms, but can also have an impact on others' classrooms as well.

### **Flipping Method & the Flipped Classroom Model in a Science Classroom**

One may ask, what is it like to be a learner in a flipped classroom, or in one where the flipping method is used? More specifically in the case of this thesis, what does it mean if a science class in K-12 education is flipped and the flipping method is implemented in it? I myself experienced what it is like to be a student in one of these classrooms at the collegiate level. I took the second half of the sophomore organic chemistry courses at Millersville University in the fall of 2016. The professor of this course decided to partially flip his class and to implement the flipping method in an attempt to defeat the stereotypes against organic chemistry. This is a summary of my experiences and how they have influenced my educational views.

The analysis part of this thesis is written as an auto-ethnography. An “auto-ethnography is an approach to research and writing that seeks to describe and systematically analyze (graphy) personal experience (*auto*) in order to understand cultural experience (*ethno*) (Ellis, Adams, & Bochner, 2010, p. 273).” It combines an ethnography, with an autobiography (Pace, 2012) and can be thought of as a sort of narrative inquiry (Chang, 2007). In this case, auto-ethnography is being utilized to analyze my own personal experiences as a participant observer in a flipped

classroom and to analyze how the flipping method affected the learning culture of my chemistry classroom. The different elements of the class that pertain to the flipping method, and what classified it as a flipped classroom, are broken down and looked at to see their effect on the success of the students in mastering the content. This auto-ethnography looks at not only how the content is taught, but what the end result of these teaching methods is and evaluates the method and the classroom as a whole.

A flipped classroom was developed by Bergman and Sams and is one where the teacher takes the lectures from the class and creates videos, or some other form of content, and assigns them for students to complete outside of the class time. This allows the teacher to create inquiry activities for students to perform during class. This way the students are able to build upon what they have learned and are able to receive more help from their teacher where they specifically need it (Bergmann & Sams, 2012). My organic chemistry course was only partially flipped. This means we still had the standard lecture time, but my professor created videos that he posted on the website EDpuzzle for the class to watch that covered basic or supplementary material. This allowed for different inquiry activities, such as think-ink-pair-share cards, to occur during the lectures, on top of the additional weekly lab.

While my class was only partially flipped, the flipping method was still implemented in the class. In order for the flipping method to be implemented in a class, the four pillars of flipped learning have to be evident. The four pillars are **F**lexible environment, **L**earning Culture, **I**ntentional content, and **P**rofessional Educator. These pillars are intended to guide an educator through the process of flipped learning in order to better apply it so that it is the most effective for the students (Hamdan, McKnight, McKnight, & Arfstrom, 2013). My professor utilized these pillars by not just choosing what content he was going to put in his videos, or by making himself

available for his students in case they needed additional support. He also modified not only the physical classroom, but the virtual one as well, in order to better fit the needs of our class. In lab, there were several stations where one could apply their knowledge and have multiple different manners of doing so. He also built in quizzes to his videos and supplied multiple different resources online to make sure that his students were learning the key parts of organic chemistry that they would need later on, and the little parts that created a more comprehensive understanding of the subject.

By structuring his class this way, the professor gave every the student the chance to succeed if they chose to. A flipped classroom places a great deal of responsibility on the students. If the students want to succeed, then they have to put the effort and work into their education. It makes them take an active role in their learning (Bergmann & Sams, 2012). It is due to having these experiences as a student that this class has shown me new ways to teach that I can then apply in my own future classroom. Experiencing a flipped classroom as a student allowed me to see what was beneficial and what was not, and how I can build upon this knowledge. I will not only have the experiences from a teacher's perspective, but from a student's as well. I now know how much work has to go into preparing a flipped course and a better idea of what is needed for it to excel. If I do choose to implement a flipped classroom, I will be able to use what I have learned to positively impact my future students' and their education.

The little aspects of my chemistry class showed me that the flipping method and flipped classrooms have the potential to be extremely beneficial for science classes in K-12 education. Even though the experiences discussed here are from a college level organic chemistry course, what is learned from them is still applicable to younger levels of education. Organic chemistry

is a difficult content to master, but the partially flipped setup of the course provided the tools that my classmates and I needed to succeed. This paper only highlighted the major aspects of our classroom that benefited us as students, but there were many more features that created an overall successful educational experience. These many aspects created a culture of learning where students had the opportunity to flourish in the class, and actually understand the material. They were not just rote memorizing everything to get a higher letter grade. They had the opportunity to develop a love of organic chemistry and actually want to learn it. By analyzing my experiences from this course, I was able to follow a flipped course through to its completion and see the benefits that are provided by this type of class structure and how they can impact the K-12 science classroom.

**References**

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