

EXAMINING THE ADOPTION AND IMPLEMENTATION OF THE FLIPPED  
CLASSROOM IN PRIVATE SCHOOLS: A MULTI-SITE CASE STUDY

By

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DISSERTATION APPROVAL PAGE

This is to certify that the thesis prepared by Dean Whitfield, entitled Examining the Adoption and Implementation of the Flipped Classroom in Private Schools: A Multi-Site Case Study, has been approved by the dissertation committee as satisfactorily completing the thesis requirement for the degree Doctor of Education (Ed.D.) in Instructional Technology, in the Department of Technology and Literacy.



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This work is dedicated to Dr. Alan George Smulian, better known to his grandchildren and son as “Pops.”

## **ABSTRACT**

### **Examining the Adoption and Implementation of the Flipped Classroom in Private Schools: A Multi-Site Case Study**

Dean Whitfield

This study explores the adoption and implementation of the flipped classroom in four private schools in the Mid-Atlantic. Its purpose was to understand why teachers choose the flipped classroom, and to describe in rich detail the pedagogical and technological approaches teachers utilized in their unique contextual classroom settings. It utilized a qualitative, multi-site case study methodology and Rogers' (2003) Innovation Diffusion Theory (IDT) as a theoretical lens. The cross-case analysis revealed five major themes including: competing definitions of the flipped classroom; a spectrum of practice utilizing technology; varied adoption pathways including re-invention, problem solving, and trial and error; variation in the participants' perceived relative advantages and affordances of flipped classroom; and sentiments of isolation among some participants. These findings begin to address a gap in the literature regarding adoption and implementation of the flipped classroom in K-12 private schools and point to several recommendations. First, continued research should help to refine a definition of practice that is grounded in pedagogical theory in K-12 contexts. Second, the impact of adoption pathways on the application of novel instructional practices like the flipped classroom needs to be explored further. Third, policy experts should consider their role in establishing Professional Learning Communities that foster adoption pathways for new pedagogies.

Fourth, teachers must consider discipline-specific practices within the context of the variable technology practices found with the flipped classroom. The ultimate impact of the flipped classroom on instruction and learning will reside in its adoption pathway, implementation, and capacity to foster student-centered learning environments.

Key Terms:

Flipped Classroom, Adoption, Innovation Diffusion Theory (IDT), K-12, Secondary Schools, Middle Schools, Elementary Schools, Multi-Site Case Study, Professional Learning Communities (PLC)

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## CHAPTER I

### INTRODUCTION AND THEORETICAL FRAMEWORK

Seated quietly in the back of a math classroom at a quarter past eight on an unusually warm March morning, Sean and I were interrupted abruptly during our meeting with a rush of air and energy that can only accompany a fifth grade boy. Dressed in khaki pants and a plaid short-sleeved shirt with white socks and deck shoes, he ran right past us toward a bank of four computers muttering, “forgot to watch the video.” Sean, the resident teacher, quickly turned and intervened verbally with: “Whoa, whoa, you’re not on that! Sit down.” The student pleaded, “but I forgot to watch the video!” As if in anticipation of this, Sean responded: “sit down, no, too late, sorry bud,” and the student slinked across the room to his seat as his peers began to flood in. The video itself, assigned for homework the previous night, was a set of instructions for playing a classroom game of ‘Battleship’ by using coordinate pairs on an X and Y axis.

While pairing-up students behind dividers, Sean appeared to be reconsidering his position on expecting every student to have watched the video. “Who doesn’t feel comfortable right now?” he asked, scanning the room for raised hands. Apparently satisfied by their silence, he let the boys loose to play coordinate-battleship, and the volume in the room rose as a steady stream of numbers were called and student ships were hit or missed. For the remainder of class, Sean assumed the role of coach, bouncing from pairs of students, intervening during conflicts, re-directing boisterous young boys, and keeping the minds of his students on coordinate pairs. Sean’s pace was as energetic as the voices of his students. As the boys continued to attend to coordinating battleships,

the conflict of students not watching the flipped video for homework disappeared. Sean blended into the background in a blur of movement, seeming to vanish into the noise of a busy elementary classroom.

### **Introduction**

Although devoid of an observable lecture, Sean's math classroom had many of the hallmarks of traditional instruction: textbooks, energetic students, industrial carpet, and a propensity of young boys to forget to do their homework. Yet, these fixtures belie the larger shifts in Sean's instruction during class time, and the impact that the flipped classroom has on the activities conducted by students and the teacher at home and in the classroom. The flipped classroom is often described as homework at school, school at home with a computer. Groups such as the *Flipped Learning Network* have emerged, underwritten by publishers such as Pearson Education and in cooperation with academic institutions such as George Mason University, in order to provide a clearinghouse of learning materials for the flipped instructional model. Hamdan, McKnight, Kathernine, and Arfstrom (2013) described flipped learning as

An alternative model of instruction... in which digital technologies are used to shift direct instruction outside of the group learning space to the individual learning space, usually via videos. Offloading direct instruction in this way allows teachers to reconsider how to maximize individual face-to-face time with students... Teachers can devote more time to coaching their students, helping them develop procedural fluency if needed, and inspiring and assisting them with challenging projects that give them greater control over their own learning (p. 3).

This inversion of the homework-lecture framework appears to have entered the mainstream media consciousness as well. Highlighted in *The Chronicle of Higher Education*, *The Economist*, *The New York Times*, and *Science*, the flipped classroom has become widely viewed by mainstream media, the public, parents, students, and educators alike as a novel approach to teach with technology (Berrett, 2012; Fitzpatrick, 2012 “Flipping classroom,” 2011; Mazur, 2009). Salman Khan, arguably the most notable figure in the emergence of the flipped classroom and founder of the Khan Academy, noted: “lectures done independently at a student’s pace; problem-solving in class... clearly wasn’t my idea. However, the popularity of the Khan Academy video library seems to have pushed it into mainstream thinking,” including the practice of teachers across the country (Kahn, 2012, p. 117).

As a novel instructional method, it is imperative to establish a clear description of flipped classroom adoption and practice among teachers. This dissertation study aims to address this need by closely examining the practice of five teachers in four private schools who use the flipped classroom as part of their regular practice of instruction. This chapter will address the background, statement of the problem, purpose of the study, significance of the study, research questions, research design, conceptual framework, limitations, assumptions, and definition of terms.

### **Emergence of the Flipped Classroom**

Although hardly new in its conception, the flipped classroom is a modern, technologically-supported take on the traditional lecture/homework paradigm. What activities are supposed to be in the classroom, versus what activities are best completed outside the classroom as homework, has been a subject of study and debate for a number

of decades, and has taken many forms (Kralovec, 2007). Historical models of instruction in humanities courses used the following form: send the reading home the night before class for students to digest, and then have students discuss the reading together in class with an expert or teacher (Kahn, 2012). The flipped classroom's earliest emergence mirrors this inversion of homework and classwork.

John Dewey (1916) wrote that the social importance of education was paramount in learning. He made the case for learning as a social construction that required a relevant dialog with peers and the instructor or expert. At that time, and in works published after his death, he continued to emphasize social interaction, rather than direct instruction, as a cornerstone to learning (Dewey, 1938). The flipped classroom notion of sending direct instruction out of the classroom in order to spend the class time emphasizing discussion, project based instruction, and group work, fits a Deweyian vision of learning that is promoted by flipped classroom proponents, which emphasizes the social nature of learning as a priority (Bergmann & Sams, 2012; Kahn, 2012).

One difference between earlier applications of direct instruction at home through texts, relative to the flipped classroom of today, resides in the affordances of modern technology. Rather than reading books for homework, a student is first exposed to new content via pre-recorded videos that usually include direct instruction from an instructor. Then, the class discussion reflects a humanities orientation, including student discussion, group work, and, in the cases of the sciences, problem completion. Indeed, technology has been central to the flipped classroom premise and the development of the flipped classroom. As early as the mid-1990's, a method of sending direct instruction home and allowing for collaboration or Peer Instruction (PI) in class involved the use of video tapes

(Mazur, 1997). With the establishment of web-based technologies to facilitate transmission of content, Mazur and colleagues (2001) at Harvard University refined their view of PI to include web-based assignments completed prior to support in-class discussion.

Concurrent with Mazur, Baker (2000) described a process for a classroom flip that used technology to move direct instruction outside of the classroom in order to prioritize class time for learning and instruction that de-emphasized the teacher while providing a cooperative, learner-focused environment. Baker (2000) set forth three key components of the outside of school activities, including lectures delivered online, quizzes, and threaded on-line discussions similar to those afforded today by Blackboard discussion forums. The in-class instruction shifted to include active learning blocks, structuring the class around clarifying questions, expanded student activity, application, and practice in collaborative groups (Baker, 2000).

Two chemistry teachers, Jonathan Bergmann and Aaron Sams (2007), introduced the most recent iteration of the flipped classroom with pre-recorded videos of their chemistry lessons. Using screen-capture software and PowerPoint, Bergmann and Sams recorded their lessons and posted them to YouTube (Fitzpatrick, 2012). This approach quickly developed into an instructional strategy that involved nightly videos for homework, along with guided and independent practice in school with their students (Bergmann & Sams, 2012). They defined the flipped class as an inversion of traditional teaching practices: “that which is traditionally done in class is now done at home and that which is traditionally done as homework is now completed in class” (Bergmann & Sams, 2012, p. 13). In Bergmann and Sams’ view, the flipped classroom enabled a greater

degree of student-teacher interaction in the classroom in order to work on solving problems (2012). They also credited the approach with affording them more class time to work on labs and alternative activities to the traditional classroom lecture (2012).

One critique of this approach is that it assumes that direct instruction is the predominant model of classroom instruction today. It assumes that lecturing to students is done via video transferred home as an activity that students complete independently. It also includes problem solving and practice as an activity done in class with the help of peers or the teacher. Bergmann and Sams (2012) align with these assumptions and assert that the use of flipped classroom, the technology-mediated delivery of content via videos at home, affords changes in classroom practice to a student-centered model.

### **Problem Statement**

To date, the flipped classroom has emerged in many subject areas and at many levels of instruction, ranging from elementary to post-secondary education (Bergmann & Sams, 2012; Flumerfelt & Green, 2013; Haake, 20013). Advocacy groups such as the Flipped Learning Network (2016) have asserted that there has been an increase in teachers using the approach, pointing to data from a three-year study, with a sample of 4326 participants. They also have cited positive gains from the approach, noting that 28% of administrators sampled in 2014 responded that the flipped learning model was having a “significant impact on transforming teaching and learning” in their resident schools (Flipped Learning Network, 2016, p. 2). Hodges and Weber (2015) reported the use of the flipped classroom in K-12 literature, and reported that 25% of teachers in a national survey claimed it to be an effective model of instruction.

However, as the flipped classroom begins to emerge in schools across the country,

there remains little research on the model in K-12 school settings. This includes a lack of description with regard to its implementation and practice in K-12 schools, especially K-12 private schools. The vast majority of the research that has been conducted to date on the model occurred at the post-secondary level (Bishop & Verleger, 2013). As the subsequent literature review will show, the research on flipped learning in K-12 settings is limited, and it lacks both quantitative study and rigorous qualitative research. While there are a rising number of proponents of the method in quasi-academic institutions such as the Flipped Learning Network, these sources promote the method by using white papers from publishers such as Pearson, which argue that “there is an established body of research that supports the key elements of the model, which are built on various instructional foundations to shift from a teacher-centered to a student-centered approach to instruction” (Hamdan, et al., 2013, p. 6). Such claims are dubious because the white papers present industry-sponsored content that is without jury process and therefore without a peer review.

In addition to a lack of rigorous examination of practice, there is an absence of understanding of the rationale for adoption of the model in the minds of educators in K-12 school settings. Adoption of flipped models of instruction appear to proliferate often with very little research as to their impact and effect in primary, middle, or secondary school educational environments. A major impetus for studying K-12 settings is to understand why stakeholders might choose to adopt the flipped classroom, and how they choose to implement its developing theoretical and pedagogical structure. This is especially important because while there are advantages of the method emerging in the research of the flipped classroom in post-secondary settings as an impetus for adoption,

these advantages may be negated or even present challenges in K-12 settings.

The basic supposition that lecture is the predominate mode of instruction in post-secondary courses and should be reduced (Ferreri & O'Connor, 2013; Knight & Wood, 2005) is one key example of the conflict of applying research on the flipped classroom in post-secondary settings to K-12 settings. This supposition was true for Bergmann and Sams (2012) in their high school chemistry classes. They asserted that the flipped classroom is a mechanism to reduce lecture, and they attributed success in their high school chemistry classrooms to this reduction in classroom lecture afforded by the flipped classroom. However, lecture may not be a predominant mode of instruction for many teachers in K-12 settings, who instead rely on alternative instructional frameworks for younger students or in other subjects such as English or Foreign Languages (Mehring, 2016). Teachers who do not see a need to transition away from lecture might find some aspects of the flipped classroom, such as creating video content, too burdensome to consider adoption. Additionally, as the flipped classroom relies on the participation of the student outside of the classroom environment, there may be impactful differences between the compliance of students, especially in varied school contexts.

Lastly, there is limited understanding of the specific learning theories that are applied to flipped classrooms. There is no agreement in the research regarding what constitutes the native and essential practices of teaching with the flipped classroom. Answers to these questions will begin to fill in some of the knowledge gaps and criticisms included in the current application of the instructional model. A better understanding of the model will be achieved through careful study of the adoption and practice of flipped classrooms in K-12, classroom settings. At no point has previous

research considered flipped classroom adoption at the K-12 level from a theoretical perspective. This study aims to close that gap and understand in part why teachers choose the flipped classroom and to describe in rich detail what pedagogy they are utilizing in its application in specific classroom settings in K-12 private schools.

### **Research Questions**

This dissertation research uses a qualitative, case study approach to examine the following specific research questions:

1. Why do private school K-12 teachers choose to adopt the flipped classroom?
  - 1a. What are their beliefs about teaching and learning that would inform their adoption of the flipped classroom?
  - 1b. What contextual/environmental factors inform their adoption of the flipped classroom?
2. How do private school K-12 teachers implement the flipped classroom?

### **Researcher Position Statement**

As the former Director of Technology for a private school in Maryland, I was an active member of a professional organization associated with a group of Mid-Atlantic private schools. In the Spring of 2012, I discovered the flipped classroom at the group's annual conference in which I witnessed a presentation by a math teacher on his personal experience screen-casting his lessons the night before class. He explained how he re-engineered his classroom lessons using a fifteen-dollar program called Screen Cast-O-Matic and a YouTube account. I saw this as an opportunity for my own school, as an institution that serves students with learning differences, to reduce homework difficulties and increase class time.

Four months after I pitched the concept to the school's Math Department Chair, a teacher had been assigned to the project and his course was re-written to be delivered as a flipped classroom. I assisted him during that first year by finding solutions to technical glitches, such as obtaining a space to host the videos and perfecting their creation. Upon completion of the first year using the flipped classroom, we surveyed the students and were able to show a reduction in missed homework assignments, an increase in positive perceptions of math on the part of students, and no change in test scores.

It was the lack of change in test scores, and the single student out of a class of eight who reported at the end of the year that he did not like being in a flipped classroom, that caused me to pause and reflect. We had failed to do our homework on the flipped classroom method. At the time, as is true today, the method was largely unstudied in high schools, so there was limited literature available. Importantly, the vast amount of information available was anecdotal and based on the accounts of practitioners. As I had encountered in my discovery of the method, applications were varied and often lacked teaching framework. Therefore, a question became readily available concerning the flipped classroom: is my experience typical, and what does it look like in other private schools in the Mid-Atlantic?

I entered this study believing the flipped classroom to be a means to shift instruction away from the teacher and towards students in classroom environment. I saw it as possibly providing architecture to increase teacher-to-student interactions, student-to-student interactions, and time spent on alternative activities in the classroom that did not include lecture. Initially, prior to this study, I assumed that there had to be a theoretical underpinning with regard to the flipped classroom. I also assumed that in

studying other teachers it would be readily apparent what aspects of the instruction constituted best practices. Neither of these two assumptions have proven to be true. Instead, it is clear that the flipped classroom is an emerging practice of instruction in K-12 settings, which does afford an opportunity to shift away from direct, lecture-based instruction, to more student-centered practices. It also appears to be true that it is a means of instruction that has a varied application in practice among teachers of different ages, subjects, and private school contexts.

### **Theoretical Framework – Rogers’ Diffusion of Innovations**

Rogers’ (2003) Innovation Diffusion Theory (IDT) was used as the theoretical framework for this study. Given the assumption that the flipped classroom is a new instructional model, it can be defined as an innovation according to Rogers (2003). Moreover, as teachers have self-identified as using the flipped classroom as their primary means of instruction, it is possible to study their application of the model as the adoption of an innovation in instruction. Rogers’ work, *The Diffusion of Innovation* (1962), provided the foundation for a body of research that addresses the decision process of individuals as they adopt or reject innovations within a population. Rogers’ Innovation Diffusion Theory (IDT) is often cited as the seminal work in the understanding of the adoption of new technologies (Straub, 2009). Proponents also applaud its range of application and seminal nature as strengths among adoption-diffusion theories to date (Straub, 2009). This section will explain why IDT was chosen as a lens for analysis, define IDT, and identify competing innovation adoption theories that were not used in the study.

It is important to define IDT for the purposes of this study, as it is used as a lens

for analysis. Rogers' IDT ascribes key characteristics of innovations to new ideas, practices, and objects as they pertain to their rate of adoption and diffusion. IDT is comprised of four key elements including: 1. an innovation, 2. communication channels, 3. time, and 4. a social system (Rogers, 2003). However, as this study is primarily concerned with the questions of why and how private school teachers adopt the instructional model, the theoretical framework for this study focused on the adoption decision process rather than diffusion as a whole. Rogers (2003) measures innovation adoption decisions by characteristics such as relative advantage, compatibility, complexity, triability, and observability. These factors will be discussed at length in Chapter V, as they are present in observations of teachers who have chosen to adopt the flipped classroom.

In regard to the innovation itself, a major component includes the perceived attributes of the innovation by individuals, as diffusion of an innovation relies on an individual's decision to adopt or reject the innovation. As Rogers explains, "the innovation decision process is essentially an information seeking and information process activity" that allows individuals to clarify the advantages and disadvantages of a given innovation (2003, p. 14). Therefore, in examining the adoption of the flipped classroom by each participant teacher, the relative advantage of the model becomes a useful conceptualization. Studies have shown that relative advantage was one component that accounted for the adoption of interactive whiteboards in their case study of English teachers (Jwaifell & Gasaymeh, 2013, p. 147). Included with relative advantage, Jwaifell and Gasaymeh (2013) also agree with Rogers' definition of IDT that the adoption of innovations is influenced by characteristics of innovations including compatibility,

simplicity, triability, and observability.

These characteristics are also influenced and impacted by the second key element of IDT theory: communication channels. Communication channels are the pathways by which messages are carried between individuals (Rogers, 2003). For the purposes of this study, individuals were recruited at the administrative level in both technical and academic roles, in conjunction with the classroom teachers, to capture the broadest view of the communication channels present within each case.

Time, the third element of IDT, is primarily a quality of rate as it applies to the innovation decision process. It is most applicable to questions regarding the population involved with the adoption (Rogers, 2003). Because all of the teachers in this study have self-determined to be adopters of the flipped classroom, and not non-adopters, questions regarding the rate of adoption have been dismissed. Moreover, time, as it emerges as a theme among participants, will be explored, but to the exclusion of an analysis of a rate of adoption, with which this study is not concerned. In line with this stipulation, an exploration of adopter categories comprising of innovators, early adopters, early majority, late majority, and laggards as they apply to the rate of adoption will not be explored. Rather, it is assumed that all the teacher participants in this study comprise innovators or early adopters of the flipped classroom, and any further distinction is not necessary.

The last key element of Rogers' IDT is a social system. This includes "individuals, informal groups, organizations, and/or subsystems" that are connected or related to achieving some common goal through problem solving (Rogers, 2003, p. 23). Teachers in this study reside within the social system of their school. They are connected

to their administrative team, students, parents, co-workers and peers. Included in this system is also the culture of the school and the culture of the classroom, which are created by teachers through their normative practices in teaching. This includes specific normative behaviors related to differences in subject disciplines. One important distinction among all of the teachers participating in this study is that they all comprise participants of optional innovation-decisions in that, as individuals, they have all voluntarily adopted the flipped classroom. In contrast, the teacher observed for the pilot study of this research was recruited for the flipped classroom and instructed to use it as part of his instructional practice.

Finally, while this study utilizes IDT, it is important to note that there are numerous permutations and additions to the literature with regard to adoption theory. Rogers' (2003) work itself originated out of a desire to consolidate and refine IDT as it emerged in the 1940's and 1950's. Major new contributions to the field include Concerns-Based Adoption Model (CBAM) (Hall, 1979), Technology Acceptance Model (TAM) (Straub, 2009), and United Theory of Acceptance and Use of Technology (UTAUT) (Straub, 2009). Each of these is an attempt to add to the capacity of IDT theory. CBAM specifically emerges from research on change theory and is based in educational settings on ideas derived by Hall (1979) and the work of Fuller (Straub, 2009). CBAM, while specifically developed to analyze individual adoption decisions and contrast them to the population in educational settings, does not offer an advantage over IDT because it is primarily concerned with top-down change initiatives and focuses on change agents in administrative roles (Straub, 2009). Neither of these conditions are necessarily present in the participants of this study, by design.

Two technology adoption theories that build on IDT and arise from information sciences are the Technology Acceptance Model (TAM) and United Theory of Acceptance and Use of Technology (UTAUT). Both of these focus on the specific technology being adopted, using the perceptions of the individual adopter as a measure of adoption, and emphasize the role of the individual in an adoption decision process typically outside of education (Straub, 2009). However, as a major component of this study included developing a description of de-facto practice of individual teachers in educational settings, in a context where the innovation was ill-defined, TAM and UTAUT offer a level of fidelity that is unnecessary and could obfuscate emerging themes and practices.

Therefore, while the Rogers' IDT is not the latest iteration of adoption-diffusion theory available (Straub, 2009), it still provides a sound and well-established lens to understand the emergence of the flipped classroom in classrooms. IDT is also used in conjunction with case study methodologies in the literature. Jwaifell and Gasaymeh (2013) used IDT as a means to examine the use of interactive whiteboards by female English teachers in Jordan in their qualitative case study of four classroom teachers. Hebert (2012) employed case study methodology, in conjunction with IDT, to examine the factors that affect electronic assessment system adoption with twelve participants in three distinct cases. Therefore, combining IDT with qualitative case study methodology for this research offers a tried and proven synergy enabling the examination of flipped classroom instructional model adoption in private Mid-Atlantic schools.

In summary, IDT has a long history of use as a means to understand technology adoption in education (Hebert, 2012; Jwaifell & Gasaymeh, 2013; Sahin, 2002). It

provides for a means to study and analyze new teaching practices in complex social systems without being overly prescriptive or cumbersome. IDT also provides a framework for understanding critical aspects of innovations including relative advantage, compatibility, complexity, triability, and observability. IDT outlines the aspects by which innovations are communicated and the factors that influence that communication at the individual level. Lastly, IDT works to explain the relationships between various stakeholders in social systems at individual and group levels but also institutional entities. The goal of this study is to use IDT as a lens for understanding the adoption of the flipped classroom in each of the five cases and identifying its practice among private school teachers in the Mid-Atlantic.

### **Definition of Terms**

**Affordance** – What an object or environment provides to an individual, as a technological innovation, including the possible actions that are perceived by the individual (Gibson, 2014; Norman, 2002).

**Adoption** – The process by which an individual assumes an idea, object, or practice, termed an innovation, over a prior state (Rogers, 2003).

**Classwork** – The activities students are engaged in while in the classroom setting that are not being led by the teacher directly.

**Differentiation** – The process by which a teacher modifies instruction to meet the varying needs of his or her students.

**Flipped Classroom** – A model of instruction that uses various forms of instructional technology to present direct instruction at home, prior to the classroom lesson, to allow for an increased number of interactive classroom activities.

Flipped Video – An instructional video, often created by the classroom teacher, distributed electronically for the student to view at home prior to classroom instruction.

Formative Assessment – Assessment that is used to alter instruction within a given instruction period.

Homework – The activities completed by the student that are assigned by the teacher to be completed outside of the classroom space.

Innovation – A practice, object, or idea that is perceived by an individual to be new (Rogers, 2003).

Innovation Diffusion Theory (IDT) – A theory that describes the process by which an innovation spreads across a population given particular social systems, communication channels, and particular aspects of the innovation itself (Rogers, 2003).

### **Limitations and Delimitations**

As a qualitative study, this research will not utilize a control group nor be broadly generalizable outside of each of the case sites. Rather, the research may be transferrable to like settings, due to its rich, thorough descriptions of individual teaching practices that draw on classroom observations, artifacts, and interviews of stakeholders (Marshall & Rossman, 2011). In addition, as the research focuses on the teaching practices of individual participant teachers and not students, it will not address the efficacy of flipped classroom on student performance.

The research is limited in each case to a single teacher and the practice within his or her individual school. The research began in December of 2014 and was completed by June of 2015 due to the close of the school year. Selection of participants was fostered by connections of peers through a professional network in the Mid-Atlantic via a

snowball sample (Mirriam, 2009). For entry into the study, participant teachers self-determined their use of the flipped classroom to a threshold of daily use at 75%. The participating teachers were also the means of contact with their administrators in all five cases and acted as gatekeepers for access to these stakeholders. The collection of a teacher, academic administrator, and technology administrator offers a strong cross section of perspectives in regard to each individual teacher's classroom practice. However, they cannot account for all the variation in opinion, perspective, or professional account with regard to the utilization of the flipped classroom in each school.

### **Chapter I Summary**

With the flipped classroom emerging as a practice among teachers in K-12 settings, it is important to examine its pathway to adoption in today's classrooms, given that adoption pathways impact the application of an innovation. In addition, the degree to which an individual assumes all the practices and aspects of an innovation are tied to the relative advantage, compatibility, complexity, triability, and observability of that given innovation (Rogers, 2003). It is also essential to examine the current practices of teachers in their use of the flipped classroom, in order to establish a foundation for future research that assesses the efficacy of the flipped classroom pedagogy as well as support its positive growth in K-12 private school settings. This study will help to define the method of instruction of the flipped classroom instructional model, its practice, as well as highlight cases of its use within Mid-Atlantic private schools. The results of this study may be used to inform teachers, administrators, and policy makers of the application of the flipped classroom as an emerging practice of technology in education.

The following chapters will address the current literature available on the flipped

classroom (Chapter II), the research design (Chapter III), findings including rich description of adoption and practice within each case (Chapter IV) and a cross-case analysis of emerging themes (Chapter V), and implications for future research and practice (Chapter VI).

## **CHAPTER II**

### **LITERATURE REVIEW**

#### **Introduction**

This chapter will review the literature on the flipped classroom in kindergarten through twelfth grade (K-12) education, highlighting academic studies describing this instructional model. It is divided into four major sections: search methodology, findings, gaps in the literature, and summary. Based on the findings of the review, this chapter argues that while the field of research on the flipped classroom is growing, it is still limited in the K-12 settings. It also shows that the studies reported in peer-reviewed literature in K-12 settings are primarily self-reported teacher descriptions of the method and very rarely describe the flipped classroom in conjunction with any learning theory or overarching practice. As such, where the flipped classroom is presented as an independent practice in these sources, it is loosely attributed to constructivist practices with varying applicable learning theories and definitions. This variation presents a challenge for future comparative studies of efficacy. Finally, a search of the literature was unable to find any sources that address the context for the adoption and implementation of the flipped classroom in private school settings. Accordingly, the impetus of the current study is to aid in better understanding the flipped classroom adoption, application and practice.

#### **Search Methodology**

The initial search used the term “flipped classroom\*” in Academic Search

Complete, Education Research Complete, ERIC, Library, Information Science & Technology Abstracts, Primary Search, Professional Development Collection, and Psychology and Behavioral Sciences Collection, and was limited to peer-reviewed articles from 2000-2015. This search returned 378 items from peer-reviewed academic journals only, an increase when compared to a previous search conducted in 2013 for the dissertation proposal, which returned 86 items under the same criteria.

Of the 378 articles returned, only articles that met the following inclusion criteria were selected for review including. The criteria included: peer review or juried, K-12 populations, and permutations of flipped learning, instruction, or classroom. The review excluded sources in post-secondary settings including: non juried periodicals, policy statements, post-secondary settings, industry settings, teacher preparation, and professional development settings. A process of refining the current search included adding in key terms such as secondary education, high school, junior high, middle school, as well as additional permutations of secondary education and flipped classroom, as found in the literature. Only 24 peer-reviewed sources were found to meet the inclusion and exclusion criteria of the flipped classroom in K-12 settings only.

The majority of research found addressed the flipped classroom in post-secondary settings. The last phase of the search was to use Google Scholar, again limiting items to only peer-reviewed content. This search was conducted in order to discover additional relevant material on the flipped classroom in K-12 settings, given the small number of peer-reviewed articles available. One book was discovered, entitled *Active Learning Through the Flipped classroom - A Collection of Selected Papers*, that provided five additional editor reviewed articles in K-12 settings on the flipped classroom (Keengwe,

Onchwari, & Oigara, 2014). Finally, the reference lists of the sources were also searched for additional potential sources to include in the literature review. A total of 33 sources of peer-reviewed content were found as a result of the searches. See Appendix B for an outlining schema of the iterative process of the search and returns in five major phases of search.

### **Findings**

This section is organized according to major findings of the review: working definitions of the model, flipped classroom practice (method only or model), and advantages and concerns. The literature is lacking in three major areas. First, it lacks an explanation of how the new model of instruction has emerged in individual teacher's classrooms, including a context for adoption. Second, it lacks an overarching definition of the practice of the flipped classroom with a relevant grounding in learning theory. Third, it lacks a description of the application of the flipped classroom that is not self-reported. These areas must be addressed in order to allow future studies of the flipped classroom to address questions of efficacy and impact. These gaps in the literature will be addressed in detail in the following sections.

#### **Working Definitions of the Model**

Defining the flipped classroom of instruction is difficult due to its recent emergence, as well as its nature as a grass-roots movement of teachers adopting a model of instruction that in practice is paired with a multitude of learning theories (Bergmann & Sams, 2014). However, there are some commonalities that can be determined from the literature in regards to a working definition for study of the flipped classroom. In their early work on flipping, Lage, Platt, and Treglia, (2000) and Baker (2000) provided

definitions of flipping that still resonate closely with current descriptions of the model as a reorganization of the class lecture and homework paradigm. Lage et al. (2000) asserted that “inverting the classroom means that events that have traditionally taken place *inside* the classroom now take place *outside* the classroom and vice versa” (p. 32). Baker (2000) stated, “a key online component for the ‘flipped’ class is the movement of lecture material out of the classroom through online delivery... the professor is now free to use class time for other activities” (pp. 12-13). More recently, Bergmann and Sams (2012) emphasized that “basically the concept of a flipped class is this: that which is traditionally done in class is now done at home, and that which is traditionally done as homework is now completed in class” (p. 13).

However, beyond this basic definition, there is some disagreement as to what activities take place in the before-class and in-class phases of the flipped classroom, and the role of technology in its facilitation. Tucker (2012) for example, comments:

While there is no one model, the core idea is to flip the common instructional approach: With teacher-created videos and interactive lessons, instruction that used to occur in class is now accessed at home, in advance of class. Class becomes the place to work through problems, advance concepts, and engage in collaborative learning (2012, p. 82).

This definition, while applicable to most descriptions of the flipped classroom in the literature, also narrowly defines the content delivered at home to be teacher-created and digital in nature. Conversely, the work of Lage and colleagues (2000) asserted that the activities that would normally have occurred inside the classroom now occur prior to class in order to engage in classroom activities that could be interpreted previously as

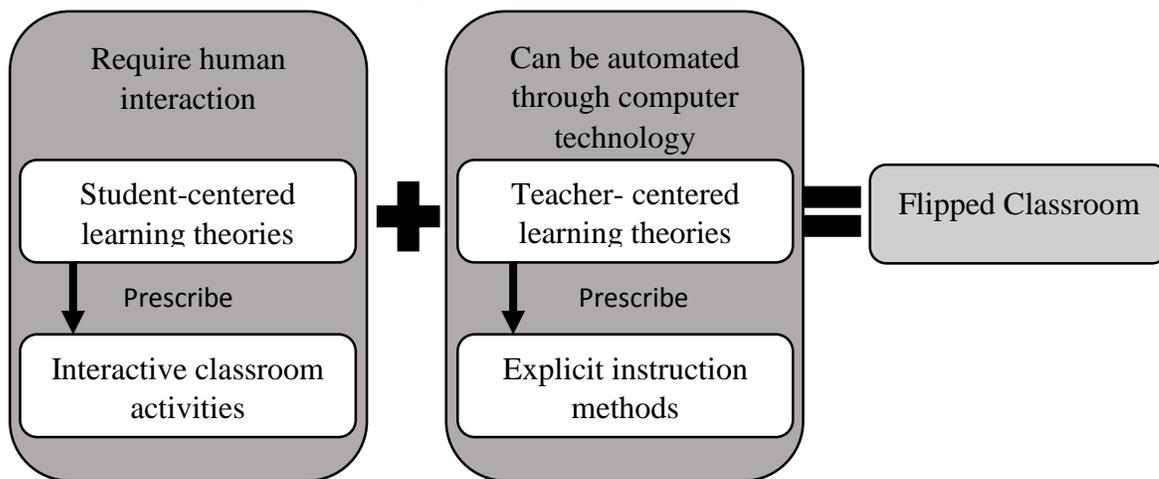
exclusively homework. More recently, Herreid and Schiller (2015) similarly claim that in the flipped classroom “teachers give the students homework that covers the essential material habitually presented in lecture, then when class time rolls around, the teacher has time for practical exercises such as case studies, games, contests, problem solving etc.” (2015, p. 75). This definition could include more traditional tools such as textbooks. Therefore, according to this definition, students reading textbooks the night prior to class, in place of lecture, could then be said to be participating in a flipped classroom.

In an attempt to clarify the activities of the flipped classroom, Bishop and Verleger (2013) defined the flipped classroom as consisting of a two-part technique. Their definition includes group learning activities in the classroom that are interactive, and individual instruction outside of the classroom that is computer-based and given prior to class (Bishop & Verleger, 2013). As shown in *Figure 1*, following page, it utilized the context of learning to define the flip, peer/teacher interaction verses direct instruction, but also included the behaviors, pedagogy, and facilitation with technology.

Figure 1

*Flipped Classroom Definition*

Adapted from *The flipped classroom: a survey of the research: 120th ASEE Annual Conference & Exposition* (Bishop & Verleger, 2013)



This definition mirrors Bergmann and Sams' (2014) current definition: that class time be used for group and individual work, and direct instruction takes place outside of the classroom using a learning object. They also add that direct instruction is to be accomplished through some technologically-mediated format (2014). However, while Bergmann and Sams (2014) focus on technology, a learning object could include non-digital elements such as a traditional textbook or reading assignment, which may neither be new or particularly innovative.

Although there is an absence of a canonical model of the flipped classroom, particularly in terms of the role of technology and the activities that comprise flipped instruction, a working definition is required to allow for study and comparison among cases observed (Moore, Gillett, & Steele, 2014). The working definition utilized for this research is as follows: the flipped classroom is a model of instruction that uses various forms of instructional technology to present direct instruction at home prior to the

classroom lesson, and to allow for an increased number of interactive classroom activities, including peer interaction and individualized teacher-to-student interaction.

### **Flipped Classroom Practice: Method or Model?**

One of the most striking aspects of the flipped classroom literature is a lack of agreement in regards to its practice and a lack of consensus in terms of the learning theory being applied to guide its application. Overall, the literature on the flipped classroom falls into one of two categories.

First, it is described as a method of instruction only (Ash, 2012; Bergmann & Sams, 2014). The method, in this case, is limited to the mechanisms and means of inversion in a lecture-homework paradigm with the use of a technological intervention such as streaming video. This can include multiple means of conducting this inversion (Ash, 2012). It is likely that teaching philosophy, subjects taught, tenure, and school context, all play a role in the application of a flipped classroom by individual teachers. Moore, Gillett, and Steele (2014) suggested that there is no single defining model of the flipped classroom. They critiqued the research as being limited to descriptions of implementation that include various applications of videos, in-class activities, differentiations, and assessment (Moore, Gillett, & Steele, 2014). This also aligned with Tucker's (2012) even broader assertion that there is not one single model for the flipped classroom, but rather an emphasis on inverting the previous instructional practices of lecture and homework.

Second, the flipped classroom was described as a model of instruction falling on a variable spectrum of constructivist practice. A model in this instance was used to depict

the practices of the flipped classroom as well as its assumptions, frameworks, and principles it includes. At one end of this spectrum, the model incorporated a number of generic student-centered or constructivist principles with the flipped classroom (Bishop & Verleger, 2013; Schultz, Duffield, Rasmussen, & Wageman, 2014). At the other end, the flipped classroom presented a specific learning theory, usually under the constructivist umbrella, to explain the practices of the flipped classroom. These are useful distinctions because they aid in an understanding of why teachers may choose to adopt the flipped classroom as well as a potential explanation as to how the model is implemented by the individual teachers in this study.

**Method of instruction only.** The most notable figures in the adoption of the flipped classroom, Bergmann and Sams (2012) implied that the flipped classroom can be conducted as a standalone practice of a teaching as method without a guiding learning theory. However, critics such as Ash (2012) noted that a change in method of instruction, with no change in philosophy, could result in no improvement in the classroom. Specifically, Ash (2012) criticized the flipped classroom for being a tool for shifting lectures, but not reconsidering its value as instructional practice. The summary described the flipped classroom as a “better version of a bad thing” (Ash, 2012, p. 6). Bergmann and Sams (2014) have also shifted their view of the model and criticized its implementation by teachers, noting that it has been constricted to delivering instruction efficiently and not necessarily a mechanism for ensuring a student-centered classroom. This is an assertion that the flipped classroom is a method of instruction only, a mere delivery scheme that needs no attributable learning theory. Horn (2013) also noted that a change in outcome for students is unlikely with a simple inversion of lecture and

homework. If the flipped classroom in practice is a direct swap of lecture and homework without a change in instruction, then common sense would suggest that no change should be expected with its implementation with regard to student learning.

Kahn (2012) agreed with this assessment. In his book *The One World School House: Education Reimagined* (2012), he noted that the flipped classroom is still a lecture-based system with a time-shift that still has students moving together on a daily basis. He asserted that the flipped classroom is merely an optimization of Prussian models of education and that it is likely not going to represent any compelling change in education (Kahn, 2012). These claims were in line with the criticisms of Ash (2012) and Bergmann and Sams (2014). Bergman and Sams (2014) specifically reflected: “The original flipped classroom concept changed how teachers delivered content, but it was a strategy that was narrowly focused on delivering content efficiently” (p. xi). However, even with these criticisms in the literature, a thread embracing the possibility of changing the primary mode of instruction in the classroom, by an inversion of the lecture-homework paradigm, has emerged.

**A varied model on a constructivist spectrum.** *Ill-defined theories.* Much of the literature applauds the flipped classroom as a new model of instruction without identifying specific mechanisms or theory behind it; rather, authors present a litany of pedagogical approaches framed as ways that the flipped classroom approach can impact instruction. For example, there are described advantages of utilizing a flipped approach including: 1) increased one-on-one teacher interactions, 2) a student-centered classroom, 3) ownership of student learning, 4) improving issues with absences, 5) Differentiation (in two areas - home and class), and 6) improved classroom management (Schultz,

Duffield, Rasmussen, & Wageman, 2014). The authors attributed increases in student performance to increasing the number of one-on-one interactions between the teacher and student and creating a student-centered learning environment (Schultz et al, 2014). However, they did not tie those factors to broader constructivist theories in education presented by Dewey (1938), Piaget (1973), or Vygotsky (1978) (Schultz et al, 2014).

Helgeson (2015) also described the flipped classroom as a varied model of instruction with multiple attributable learning theories. For example, he asserted that there are numerous means to implement the flipped classroom, and that the approach is dependent on the situation (Helgeson, 2015). He suggested that use of the model may result in increases in one-on-one student-teacher interactions, differentiation, and student choice (Helgeson, 2015). He added that the flipped classroom is a means for teachers to examine how they utilize their time (Helgeson, 2015). Fulton (2012) described the success of the flipped classroom in the adoption of a school wide flipped math curriculum. Originally employed to combat rising textbook costs, she described how the flipped classroom has allowed for better use of class time from lecture to engage students in open-ended, cross-curricular projects (Fulton, 2012). The rise in test scores and performance indicators was attributed to the flipped classroom instructional design and not any one particular learning theory (Fulton, 2012). Careful study and analysis is required with regard to the application of flipped classroom in specific contexts to better understand how teachers are relating the practice of the model to blended frameworks of multiple theories.

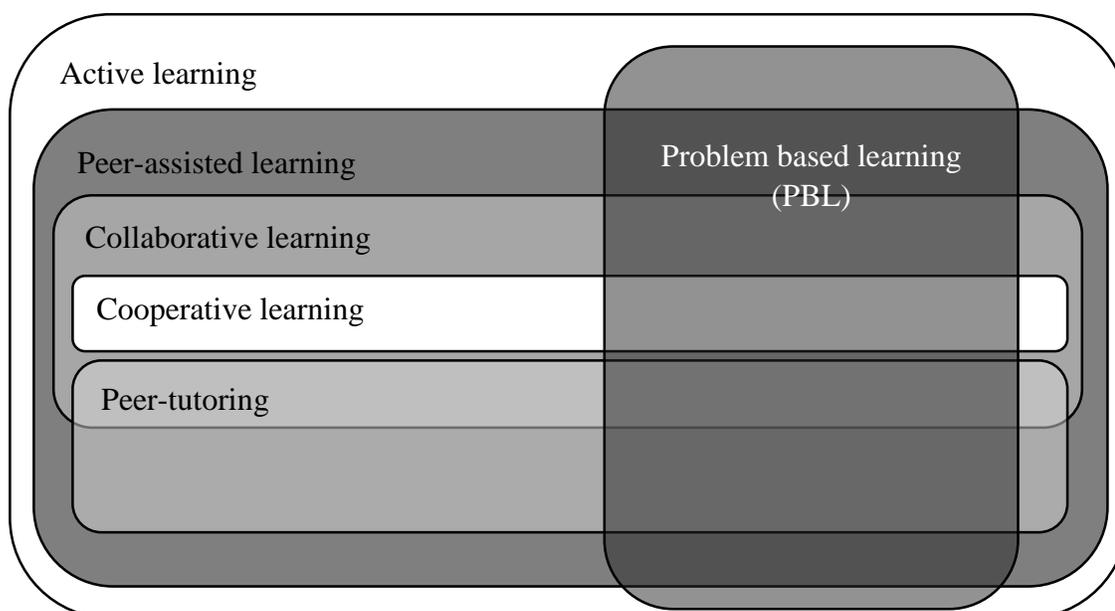
*Defined theories.* As previously noted, the literature addresses the flipped classroom primarily in one of two ways: first, as a method of instruction only and second,

as a model of instruction falling on a spectrum of constructivist learning theories from ill-defined to defined. Having addressed the ill-defined presentations of the flipped classroom, below is a collection of specific theoretical frameworks that, for some authors, informed their implementation of the model of the flipped classroom. Taken as a whole, these theories suggest a shift towards prioritizing constructivist views of education in student-centered learning theories enabled by a flipped classroom. Bishop and Verleger (2013) made an effort to establish a hierarchy of these theoretical frameworks as they are applied to the flipped classroom in primarily post-secondary settings (Figure 2). They asserted that the flipped classroom cannot exist without a framework from a student-centered learning theory (Bishop & Verleger, 2013)

Figure 2

*Associated student-centered learning theories and methods*

Adapted from *The flipped classroom: a survey of the research: 120th ASEE Annual Conference & Exposition* (Bishop & Verleger, 2013)



While it is not apparent that an overarching hierarchy exists in the K-12 literature, similar theoretical frameworks do emerge. These include pedagogy situated around learning styles, peer-assisted instruction, collaborative and cooperative learning, problem-based learning, and active learning. K-12 literature expands this list to include many more attributable learning theories to the flipped classroom. One possible explanation for this variety lies in the idea that during the process of adoption, K-12 educators may discover a model of instruction first, adapt it to their own teaching practice, and following implementation, attribute it to underlying theoretical frameworks. The following are specific theoretical frameworks used in conjunction with the flipped classroom in K-12 settings from the literature.

*Blended Learning.* A limited set of the K-12 literature compared the flipped classroom to blended learning in a description of its practice (Horn, 2013; Kong, 2014; Metzger, 2014). Blended learning was broadly conceived of as a pedagogy comprising classroom-based and online components of instruction working in conjunction with one-another (Metzger, 2014). Kong (2014) attributed the flipped classroom to form of blended learning design, moving less active learning tasks - like lecture - outside of the classroom. He also attributed the flipped classroom to blended learning as a mechanism only. He does this by describing the development of his own unique pedagogical intervention (Kong, 2014). Horn (2013) agreed that the flipped classroom is a form of blended learning, adding that its use has also not yet been measured empirically.

*Student-Centered Learning.* Broadly, across the literature, there is an emphasis on student-centered theoretical frameworks with regard to the flipped classroom. As

Roehl, Reddy, and Shannon (2013) noted, “if the goal of teaching is to engender understanding... educators must shift from a teaching-centered paradigm toward a learner-centered paradigm” (p. 45). They claim that active learning allows students to achieve higher-order thinking and offers a better approach to engaging students with variable learning styles (Roehl, Reddy, & Shannon, 2013). This has been corroborated by other studies (Freeman & Schiller, 2015). Researchers praised the flipped classroom as a model for expanding class time, allowing them to use case studies in high school biology courses as a class activity (Herreid C. F., Schiller, Heereid, & Wright, 2014).

*Problem-based learning and collaborative problem-based learning.* Kotlik (2014) agreed with the previous sentiments, suggesting that project based activities, or Problem Based Learning (PBL), would be more pervasive in the classroom if not for the time lost to direct instruction. In his review, he credited the model with providing the time in the classroom to accomplish student-centered learning (Kotlik, 2014). While pragmatic in his depiction of the use of PBL as an in-class activity enabled by the flipped classroom, Kotlik’s (2014) study illustrated the predominant theme in the literature that the flipped classroom is a model of instruction attached to an underlying theoretical framework in practice.

In a quasi-experimental mixed methods study of 91 students in two 11<sup>th</sup> grade engineering classes using Collaborative Problem Based Learning (CPBL) and the flipped learning model, Chao, Chen, and Chuang (2015) described positive outcomes for students in regard to their attitude towards learning and achievement. The authors determined that the flipped learning approach enabled teachers to expand on their time frame and incorporate an increased number of student-centered in-class activities (Chao, Chen, &

Chuang, 2015). They also conclude that flipped learning enabled students to conduct CPBL activities in class as a learner-centered approach to teaching, in contrast to previous traditional instruction (Chao et. al., 2015). Flipped learning was framed to structure in-class activity, and at-home activity, affording the space and time needed to use an established CPBL pedagogy. In this case, as with the vast majority of the literature, it is an intentional utilization of a student-centered theoretical framework in conjunction with the flipped classroom that is salient. Chao et al. (2015) also take a firm stance on the application of the flipped classroom, noting that it must be implemented within an existing effective pedagogical model.

*Experiential learning theory (ELT)*. DeSantis et al. (2015) in their study of two geometry classrooms utilizing Experiential Learning Theory (ELT) as a theoretical framework for analyzing the flipped classroom, noted that in ELT “meaningful learning can only occur when educators allow learners to make choices about how they learn” (p. 43). They cited mixed results with the implantation of the flipped classroom and noted that implementation is reliant on the specific contexts of teacher use and individual learning needs (DeSantis et. al, 2015). Unlike other studies, this study highlighted the role the teacher plays in using the flipped classroom to establish a constructivist framework for learning in their classroom (DeSantis et. al., 2015).

Gillan and Smith (2014) described the flipped classroom as a paradigm shift that offered an opportunity to use class time for hands-on and experiential learning, which they deem to be a foundation of science pedagogy. Their application of the flipped classroom included a single unit on ocean acidification with students building coral reef models with colored chalk in beta fish bowls. Gillan and Smith (2014) argued that by

front-loading the class session with direct instruction at home through flipped videos, the instructors were able to provide increased class time for laboratory exercises and discussion. Through quantitative and qualitative measures, students were better served seeing the science rather than being “fed information” through lecture (Gillan & Smith, 2014, p. 32).

*Engagement theory (ET)*. Moran and Young (2014) in their study of 49 high school AP English students determined the flipped classroom to have mixed results. They noted that “there seems to be subsets and variations of the flipped method” and the “way the flipped method is implemented varies from teacher to teacher...” (p. 182). Engagement Theory (ET) was used, via a mixed-methods study, in order to analyze three aspects of the flipped classroom including behavior engagement, emotional engagement, and cognitive engagement. However, they found the outcome of the instruction to be polarizing among students (Moran & Young, 2014). For example, some students found the model to be foreign and alienating relative to their prior experiences, while others enjoyed the increased independence and activity in class (Moran & Young, 2014).

The literature also suggested that the transition, in ET, to a more constructivist framework, could be challenging for teachers, as students are encouraged to be active learners and require different classroom management strategies (Larcara, 2014). These included the addition of learning new formative assessment strategies, managing group work, and additionally fostering an active learning culture in the classroom (Larcara, 2014). These shifts in the roles and responsibilities of the teacher in the flipped classroom need to be studied and further explored in the context of creating a constructivist-learning environment.

*Differentiation.* Multiple studies have shown that the flipped classroom affords an increase in differentiation because it enabled teachers to mentor each individual student in each class meeting (Bergmann & Sams, 2014; Lacara, 2014). Other studies stated that the flipped classroom could enable the teacher to change the learning environment including its content, the process, and ultimately the product (Siegle, 2013). Similarly, multiple researchers described the flipped classroom as a model of instruction that affords an increase in differentiation (Helgeson, 2015; Moore, Gillett, & Steele, 2014; Schultz et al., 2014). Specifically, Helgeson (2015) suggested that teachers should consider using the flipped classroom to create a classroom environment in which students are grouped by ability and placed in stations the teacher can monitor independently. This grouping by ability level would allow students to move according to their individual needs and at their own pace (Helgeson, 2015). Expanding on differentiation, Yildiz, Petela, and Mahoney (2014) applied Universal Design for Learning (UDL) and the implementation of the flipped classroom in their action research project involving elementary students studying nutrition. They asserted that the flipped classroom activities and approaches promoted 21<sup>st</sup> century skills among their elementary students by aligning with modules of instruction designed around a UDL framework (Yildiz, Petela, & Mahoney, 2014). They also suggested that success of their participatory action research project in nutrition was due to connecting project-based learning with UDL and the flipped classroom (Yildiz, Petela, & Mahoney, 2014).

**Summary – method or model?** The above sections discussed the flipped classroom's implementation in the literature in the context of two major paradigms. First, the flipped classroom was examined as a method of instruction only. Second, it

was reviewed as a variable model of instruction falling on a spectrum that at one end incorporates a number of general student-centered or constructivist views and at the other presents a specific (constructivist) learning theory. On the whole, the literature suggests that rather than a limited instructional method only, the flipped classroom is a model of instruction with a unique practice embedded in constructivist ideologies. The literature also suggests a continuing shift towards prioritizing constructivist views of education in student-centered learning practices that are enabled by a flipped classroom of instruction.

It is important to note that the variation found in the literature suggests that the flipped classroom is still yet to be defined clearly in practice and in theory. This present study aims to address this gap in the literature by carefully describing the practice of individual teachers and the beliefs teachers hold with regard to teaching and learning.

### **Proposed Advantages and Concerns Regarding the Flipped Classroom**

Given that much of the literature focused on teacher self-report of experiences flipping the classroom, there has been much written about the benefits and concerns regarding the flipped classroom (Herreid & Schiller, 2015; Schultz, et al., 2014).

Advantages of the model play a substantial role in the decision making process of individuals and institutions, and also have an impact on the rate of adoption of a given innovation (Rogers, 2003). Regardless of the objective aspects of the advantage of the innovation, the rate of adoption relies heavily on the perceived advantages (Rogers, 2003). The perception of value, rather than objective value, resides in many aspects of the decision to adopt the flipped classroom, such as the selection of outside videos.

Using pre-authored content objectively saves time and requires less skill. However, some teachers may consider those benefits less valuable when compared to the benefits of self-

authored videos with regard to their content alignment with previous instruction. Those teachers may choose to spend the time and effort to create videos, despite the availability of pre-authored content. The relative advantage lies in what aspects of the innovation the user finds individually advantageous in their unique context. Therefore, in trying to understand why individual teachers may adopt the flipped classroom, addressing the perceived advantages and concerns in the literature is essential.

Herreid and Schiller (2015) provided the most extensive list of advantages in the literature, and many of their assertions are supported by their peers who propose similar advantages. Below are some of the most frequently cited advantages given for flipping the classroom:

- Increased student control over learning (Flumerfelt & Green, 2013; Horn, 2013; Schultz, et al., 2014; Herreid & Schiller, 2015)
- Individualized or differentiated instruction (Flumerfelt & Green, 2013; Larcara, 2014; Schultz, Duffield, Rasmussen, & Wageman, 2014; Bergmann, Overmyer, & Wilie, 2013)
- Increased class time for higher order activities (Herreid & Schiller, 2015; Horn, 2013; Tucker, 2012)
- Increased time with individualized teacher support (Horn, 2013; Schultz, et al., 2014; Bergmann, Overmyer, & Wilie, 2013; Herreid & Schiller, 2015)
- Ownership of learning on the part of students (Schultz, et al., 2014; Bergmann, Overmyer, & Wilie, 2013; Herreid & Schiller, 2015)
- Reducing the impact of student absences (Schultz, et al., 2014; Bergmann, Overmyer, & Wilie, 2013; Herreid & Schiller, 2015)

- Improved classroom management. (Schultz, et al., 2014; Herreid & Schiller, 2015)

The above advantages generally emerge as a consequence of a reduction of direct instruction in the classroom. It is suggested in the literature that by expanding time in the classroom, a teacher is able to engage in more one-on-one interactions and have students work at different paces on common activities leading to these benefits (Schultz, et al., 2014).

However, not all of the advantages listed above are as clear. For example, a number of researchers suggested that by requiring students to watch a video at home, they are naturally more responsible for their learning (Schultz, et al., 2014; Bergmann, Overmyer, & Wilie, 2013; Herreid & Schiller, 2015). It is important to understand if the flipped classroom raises the consequences for students not participating in the model of instruction. For example, would a student who regularly has conflicts with their time at home due to sports or extracurricular activities be left at a disadvantage relative their peers? Similar questions are raised regarding all of the above proposed advantages and careful study and analysis is required to determine if teachers, in practice, experience these to be true across multiple settings.

In the literature, the importance and impact on the classroom of more nuanced advantages are less understood. One study described an advantage of the model as social justice via equal support at school (Ash, 2012). This suggests that by having students work with the content expert at school, and not their parents (who may come from various levels of socioeconomic background and education), flipped instruction may enable a more equitable learning experience (Ash, 2012). Other nuanced benefits proposed include increased processing time for students (Flumerfelt & Green, 2013),

engagement with parents (Bergmann & Sams, 2012), and standardization of content delivery (Flumerfelt & Green, 2013). Variation in processing time for students is conceived of as falling across a spectrum, which the flipped classroom aids in addressing by extending time in the classroom for student questions and support (Flumerfelt & Green, 2013). Engagement with parents occurs through the advent of teacher videos, and the subsequent classroom content, being accessible at home through the flipped videos (Bergman & Sams, 2012). Standardization is presented as a natural consequence of pre-recorded videos being used in sequence in place of live lectures (Flumerfelt & Green, 2012). In summary, these advantages of social justice, increases in processing time for students, and increased engagement with parents lead to an emerging model of instruction which needs to be better understood in its application. This is in part due to the numerous advantages attributed to flipped classroom without a broader understanding of use in practice in varied settings.

Multiple barriers to adoption of the flipped classroom were also found in the literature. For example, while student responsibility is noted as an advantage to the flipped classroom, some reported a greater consequence of students failing to participate in the flipped classroom at home (Herreid & Schiller, 2015; Horn, 2013; Siegle, 2013). This could include not only a lack of participation, but also an issue of home Internet or computer access providing a barrier for students (Schultz, Duffield, Rasmussen, & Wageman, 2014; Horn, 2013; Siegle, 2013). Some cited classroom management with the flipped classroom to be challenging, as it requires a shift in the behaviors of the teacher to include methods of instruction not necessarily compatible or familiar (Fulton, 2012). The adoption of any new teaching method would likely cause this disruption, but Fulton

(2012) cited the extensive work on the part of teachers and a paradigm shift from teacher-centered to learner-centered as a major obstacle.

Lastly, Siegle (2013) raised the concern of a lack of scalability, with the idea that it would not be feasible to have students watch hours of video after school each day as a source of their direct instruction if their entire school to require the flipped classroom. However, the literature reported there are schools that utilized the flipped classroom school-wide with success (Fulton, 2012; Rosenberg, 2013). The frequency and application of nightly videos is an understudied but important aspect of study within the flipped classroom. For example, if a student were to encounter six flipped courses a day in which even a short 10 minutes of video was required, and provided those students are pausing, rewinding, and re-watching as described in the literature, then their total viewing time could be as much as three times the hour of video. This would constitute a very large increase in screen time mandated by schools utilizing the flipped classroom school-wide. Therefore, understanding the frequency of video use for homework, as well as how videos are integrated into the broader framework of teacher adoption with flipped classroom, is of critical importance. It will help establish a baseline for flipped video use both in frequency and in duration.

As Rogers (2003) noted, perception of relative advantage plays a large role in the likelihood that an individual will adopt an innovation. It also has an impact on the rate of adoption. Therefore, the perceived advantages and disadvantages of the flipped classroom may play a role in adoption by individual teachers. Furthermore, the advantages and disadvantages of the model described in the K-12 literature need to be understood in varied contexts. For example, some advantages such as social justice may

have significant bearing in specific schools with specific population characteristics, and not in others. Examining perceptions of advantages and disadvantages, in the specific context of each case, will help expand on the existing literature available by establishing which advantages or disadvantages may constitute an impetus for adoption of the flipped classroom.

### **Gaps in the Literature**

#### **Poor Definition**

As Bishop and Verleger (2013) noted in their literature review of post-secondary and secondary applications of the flipped classroom, “despite the buzz around the flipped classroom as an exciting new topic in educational research, there is a lack of consensus on what exactly the flipped classroom is...” (p. 4). In some of the most abstract definitions, the flipped classroom is defined as “direct instruction delivered to the individual outside of class, and more strategic use of in-class time for group work and individualized attention” (Bergmann & Sams, 2014, p. xi). In one of the most nuanced definitions, the flipped classroom is defined “as an educational technique that consists of two parts: interactive group learning activities inside the classroom, and direct computer-based individual instruction outside the classroom” (Bishop & Verleger, 2013, p. 4). Each of these definitions describes a piece of a spectrum of descriptions found in the literature, but both are problematic for K-12 settings for the following reasons.

In the first instance of the definition, it is impossible to differentiate the flipped classroom from more traditional applications of classroom methods, including reading from a textbook assigned the night before a discussion. The flipped classroom becomes a repeat of the same instructional practices of the 20<sup>th</sup> century, polished to now include

screen casting (Ash, 2012). Moreover, with the literature primarily comprising descriptions of teacher practice that are self-described, it is impossible to distinguish if the classroom practices of teachers are in fact a shift towards constructivist methodology fostered by the flipped classroom method.

Bishop and Verleger (2013) further confused this question of whether the flipped classroom is capable of being a mechanism to shift to more constructivist framework. They suggested that the flipped classroom was not a means to transition from behaviorist to constructivist teaching practices in their own analysis of the literature but rather a means of a union (2013). Bishop and Vergleger (2013) asserted that the method “represents a unique combination of learning theories once thought to be incompatible-- active, problem-based learning activities founded upon a constructivist ideology and instructional lectures derived from the direct instruction methods founded upon behaviorist principles” (p. 1). By staking the flipped classroom to a hybrid of constructivist and behaviorist practices, Bishop and Verleger (20013) may have accurately described finite actions of the method, but do not account for the overall practice by individual teachers. Teachers may in actuality, as Bergman and Sams (2013) argued, utilize lecture through videos at home to maintain a behaviorist classroom that is still teacher-centered. This includes maintaining classrooms around predicable, pre-assembled, tasks that do not represent the kind of student-engagement and inquiry Bishop and Verleger espouse (2013). Bishop and Verleger’s assertion of hybridization further clouds the notion that the flipped classroom may be acting as a change agent, shifting away from behaviorist teaching philosophies.

Early proponents of the model, Bergmann and Sams (2014) have recently shifted

their definition from flipped mastery to flipped learning, highlighting a major criticism and thus major gap in the literature:

The original flipped classroom concept changed how teachers delivered content, but it was a strategy that was narrowly focused on delivering content efficiently. A flipped classroom didn't ensure a student-centered classroom. Learning in a flipped classroom was still very much teacher-centric. Even the flipped mastery model was still quite teacher-centric, albeit student-paced (p. xi).

From the K-12 literature available, it is unclear if Bergmann and Sams' claims reflect the predominant application of the flipped classroom in individual classrooms. A number of authors in the literature hold the same sentiment as Hodges and Weber (2015) who asserted that the flipped classroom is responsible for affording inquiry-based learning that is based in discovery and more than pedagogical strategy. This contrast to Bergmann and Sam's criticism necessitates investigation and aligns with the stated aims of this study to better understand the practices of individual teachers with regard to the flipped classroom. With the criticism by Ash (2012) above, and uncertainty of the extent to which the flipped classroom represents either behaviorist or constructivist teaching practices, the literature benefits from a careful analysis of flipped classroom practice that is not self-reported.

### **Adoption**

The adoption of the flipped classroom has primarily been portrayed as a recent surge of teachers experimenting in their own classrooms (DeSantis et al., 2015; Bergmann & Sams, 2015). However, aside from the assertion that the flipped classroom

is a grassroots movement by teachers (Bergmann & Sams, 2015), the literature does not examine why or how teachers adopt the flipped classroom for use in their own classrooms. It is important to understand adoption, since the pathway to adoption will ultimately impact the practice of individual teachers. Adoption is also a means to understanding the aspects of an innovation from the perspective of its relevant characteristics as outlined by Rogers (2003).

Therefore, this study aims to characterize the rationale for adoption by individual teachers in their particular settings, specifically regard to its *relative advantage*, *compatibility*, *complexity*, *trialability*, and *observability* as outlined by Rogers' Diffusion of Innovations Theory (2003). As the flipped classroom has been described as a *grassroots* movement, this study will aim to better understand, through a lens of adoption, how the method of instruction is being communicated and in what social systems—neither of which are clearly evident in the current literature.

### **Rich Description of Practice**

The notion of the flipped classroom's implementation as paramount to its success and impact is not new (Tucker, 2012). DeSantis et al. (2015) described the limitation of using pre-recorded videos, not featuring the teacher in the study, as possibly contributing to their finding of no distinguishable difference in the performance of students in their experimental-control trial of two 10<sup>th</sup> grade geometry classes. Students, however, expressed a marked dissatisfaction with their experience of the flipped classroom. At the same time, in a study of 91 female high school engineering students in Taiwan, Chao, Chen, and Chuang (2015) were able to discern a statistically significant, positive difference in attitude and performance towards the flipped classroom. The value in

describing practice and identifying key components of flipped classroom cannot be overstated. It underlines the need to examine constructs of the flipped classroom, including the frequency of video use, typical format of the videos, transitions to classroom activity, predominant behaviors of teachers in the classroom, and mechanisms of assessment.

Specifically, there is a need to clearly describe the activities in the classroom that work in tandem with the instructional videos that go home. DeSantis et al. (2015) suggested that

If flipped lesson planning proves to be more effective than traditional forms of instruction, the simple replacement of lecture with streaming video is unlikely to be the mechanism responsible for its success. Instead, the efficacy of flipped lesson planning, like most pedagogies, is highly dependent on the skill of the teachers that employ it, and their abilities to marshal their resources to devise lessons that meet the learning needs of their students (p. 52)

However, as previously noted, a broad spectrum of learning theories are used to describe the flipped classroom practice of teachers in the literature. While the theories together suggest that in-class activities take a student-centered or constructivist view of learning, the wide variety of theories applied make it difficult to determine what aspects of the flipped classroom are essential for replication.

Therefore, studying these aspects of the flipped classroom in context, and within the social systems of each case, will enable a better understanding of the flipped classroom as a practice of instruction. It will also help to better address the gap between

the stated practice of the flipped classroom in the literature and the de facto practice among individual teachers.

### **Chapter II Summary**

As the flipped classroom has grown in notoriety and promise, it now includes applications in K-12 settings that include school-wide settings (Fulton, 2012; Rosenberg, 2013). However, the literature on the flipped classroom in K-12 education remains limited, as it primarily consists of editorial commentary or individual teachers describing their own experience and practice. Various definitions of the model, ranging from descriptions of moving direct instruction to nuanced applications involving specific tools and classroom activities, are present in the literature. The resulting ambiguity in the literature requires an operational definition of the model for the purpose of this study: the flipped classroom is a model of instruction that uses various forms of instructional technology to present direct instruction at home, prior to the classroom lesson, to allow for an increased number of interactive classroom activities including peer interaction and individualized teacher to student interaction.

The literature is mixed in its description of the flipped classroom from the perspective of theory. It is described in one of two operating conditions. First, it is described as a method of instruction only. Alternatively, it is described as a variable model instruction falling on a spectrum that at one end incorporates a number of student-centered or constructivist principles, and at the other identifies a specific learning theory, often under a constructivist umbrella. This suggests that the literature is incomplete in its description of practice by teachers of the flipped classroom. It also suggests an incomplete understanding of the foundations in pedagogy that inform its adoption.

The concept of inverse instruction (Lage, Platt, & Treglia, 2000), or synonymous classroom flip (Baker, 2000), emerged a decade prior to its mainstream use that includes the moniker flipped classroom (Bergmann & Sams, 2008). Mazur and those who studied flipped, inverted, or inverse classrooms of the 1990's and early 21st century, developed a theory around changing the lecture paradigm that might have been hindered by the lack of technology afforded at the time. With the advent of video hosting sites such as YouTube (2005), and screen casting software such as Camtasia (2002), being so readily available by the middle of the 2000's, the recent emergence of the flipped classroom may in fact be more of a consequence of the tools finally meeting the need.

This theme of technology facilitating the adoption of new teaching methods runs as an undertone through the K-12 literature, which makes understanding the pathways and incremental implementations of the flipped classroom vital to examine as its methods are adopted in various school settings. Technology can have an impact on the adoption and implementation of the flipped classroom (Fulton, 2012). In specific settings and contexts, technology appears to play a significant role in the adoption of new teaching practices such as the flipped classroom. Fulton (2012) observed that unblocking YouTube removed a barrier to using the flipped classroom. This includes studying not just the practice of teachers but also their relationships with school administrators and technology leaders in each school.

Finally, with continuing conflicts in the emerging research on efficacy with the regard to the method of instruction, it is apparent that an intermediate step has been skipped in the literature (Chao, Chen, & Chuang, 2015; Desantis, Van Curen, Putsch, & Metzger, 2015). There is a wide variation in descriptions of implementation in the

literature in K-12 settings, ranging from subtle implementations of the flipped classroom that includes the use of premade videos for homework to significant inversions of instruction such as exclusively teacher created content and changes in class activity. Tucker (2012) stated “teachers almost universally agree that it's not the instructional videos on their own, but how they are integrated into an overall approach, that makes the difference” (p. 82). Therefore, a rich examination of the flipped classroom with careful description of teacher practice, in context, must first take place to address not only the adoption of the method but also to better describe its essential elements. These include items such as the frequency of video use, typical format of the videos, transitions to classroom activity, predominant behaviors of teachers in the classroom, mechanisms of assessment, to name a few. This study aims to better understand these components and thus address the gap in the literature.

## **CHAPTER III**

### **METHODOLOGY**

#### **Introduction**

This study seeks to understand why and how five private school teachers adopted and implemented the flipped classroom in K-12 settings in the Mid-Atlantic. As Chapter I described, the flipped classroom is emerging among K-12 teachers as a novel means of instruction. As noted in Chapter II, the literature suggests that the flipped classroom lacks a clear definition and a clear attribution to learning theory. The literature also lacks a description of practice that is not self-reported in K-12 settings. This significantly inhibits future study of efficacy and best practices with regard to the flipped classroom. To address these gaps in the literature, this study pursues answers to the following research questions:

1. Why do private school K-12 teachers choose to adopt the flipped classroom?
  - 1a. What are their beliefs about teaching and learning that would inform their adoption of the flipped classroom?
  - 1b. What contextual/environmental factors inform their adoption of the flipped classroom?
2. How do private school K-12 teachers implement the flipped classroom?

It is essential that the method of study be in strong alignment with these questions. The following chapter will outline the method of study used in conducting the case study of the five teachers in their classrooms and the analysis of data collected. It includes the

rationale, the theoretical framework, selection of participants, settings, data collection, data analysis, validation, limitations, and a statement of the researcher's position. Examples of instruments developed and utilized in the course of study can be found in the Appendices.

### **Rationale for Case Study Research Design**

In this study, a qualitative, multi-site, multiple-case study approach to data collection and analysis is utilized to study the adoption of the flipped classroom of instruction. Case study design is most appropriate and advantageous, according to Yin (2014), when answers are sought as to why and how questions regarding contemporary events without the researcher's ability to impose direct control. For studying forms of instruction such as the flipped classroom that occur in unique settings, case study design is also appropriate as it enables multiple sources of data, and multiple sources of evidence, to be analyzed for convergence or divergence (Yin, 2014). This is established in Chapter IV and Chapter V where cases are described within their boundaries and then contrasted against one another in the development of emerging themes for analysis.

Case study research is a growing method of inquiry in the social sciences among survey research, experimental design, and random assignment (Yin, 2014). It can be found in fields including Anthropology, Ethnography, Political Science, Psychology, Sociology, etc. and disciplines including Accounting, Business, Education, Evaluation, Marketing, Nursing, Public Health, Social Work, and other areas (Yin, 2014). It has emerged as a standalone practice of investigation including investigation and explanation expanding beyond surveys or histories (Yin, 2014). For this research, case study methodology is seen to comprise a method of analysis, and a unit of measure, contrary to

the assertions of Walcott (2009). It is in alignment with the constructs of case study methodology of Creswell (2007), Merriam (2009), Stake (1995), and Yin (2014). As such, case study methodology comprises not only a mechanism for doing qualitative research, but also constitutes its own research approach akin to phenomenology, grounded theory, or ethnography.

This research design was chosen for the following reasons. First, as noted in the literature review, the use of the flipped classroom is relatively new in K-12 classroom settings. As a contemporary practice the flipped classroom is best investigated by a case study, as it is a method that offers the exploratory power to understand the practice in context (Yin, 2014). Additionally, it is a study method that emphasizes understanding and meaning that is preferable (Merriam, 2009). Qualitative research at its heart holds an ontological perspective that reality is subjective and defined by participants (Creswell, 2007). Currently, the literature suggests a lack of a coherent definition and application of the model among teachers and scholars regarding the implementation of the instruction. This required that an inductive methodology be used to better adapt to the realities of the participants' experiences, as well as during analysis, to help "develop an increasingly detailed knowledge of the topic being studied" (Creswell, 2007, p. 19). This can include multiple perspectives and include an interpretation that lead to emerging themes enabled by case study methodology. Ultimately, this also fits with Social Constructivist paradigms, seeking to garner understanding through an inductive, reflexive, iterative process fostered by case study methodology (Creswell, 2007; Yin, 2014).

Using a multiple-case study method was appropriate to study the adoption of flipped classrooms given that teachers in classrooms represented clear bounded systems

with unique characteristics. In this study, the case boundaries include the individual teachers and extend through their actions to include their instruction, course materials, interactions with students, and their interactions with supporting administrators and parents. Case studies can be used to capture as rich a picture of teachers' experiences as possible in order to understand the why and how of individual teachers' adoption of the flipped classroom (Merriam, 2009), including the de-facto practice of teachers with regard to the flipped classroom.

The use of multiple cases and multiple sites helped to capture any emergent group characteristics and experiences among a variety of contexts that can build a greater understanding of the flipped classroom instructional model. A multi-case study design supported a narrative approach to the analysis while helping to define the factors that influenced the method of study. According to Merriam (2009), the value in multisite case studies lies in the fact that, "the more cases included in a study, and the greater the variation across the cases, the more compelling an interpretation is likely to be" (p. 49). In this study, as wide a range of teaching disciplines and grades taught were selected from the available participants from the snowball sample of participating schools.

By singling out the practices of individual teachers in their classrooms, their instruction and the method of the flipped classroom they employ, a bounded system can be established and studied. This is evident in the definition given by Yin (2014), which states: "a case study is an empirical inquiry that investigates a contemporary phenomenon (the 'case') in depth and within its real-life context, especially when the boundaries between phenomenon and context may not clearly evident" (p. 16). It is important to understand why teachers in private schools are choosing to adopt flipped classrooms of

instruction, as well as their beliefs about teaching and learning that inform their adoption of the instructional model, and what contextual or environmental factors inform their adoption of the instructional model. Lastly, it is essential to understand and describe how the teachers implement the instructional model. Hence, a qualitative case study of various instances in which teachers are adopting instructional model, with its associated methodology, was conducted to help inform the context as well as the phenomenon of study.

Rogers' (2003) Innovation Diffusion Theory (IDT) was used as an analytic framework for this research. All teacher participants in the study have, by their own declaration, adopted the flipped classroom as a primary means of instruction in the classroom. The threshold of complete adoption by participants was established, a-priori, to include participant's declaration that they use the model at least 75% of the time in their instruction. Therefore, the goal of this research was not to consider or identify where a participant may be on an adoption hierarchy. Rather, its focus was the rationale for adoption, the context of the adoption, and the practice of the participant teacher with this novel model of instruction. Below, the theoretical framework is presented before providing details related to the specific methods that will be used for this study.

### **Settings**

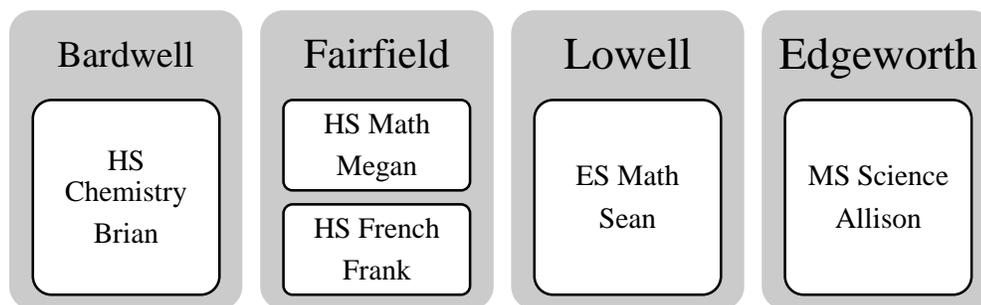
This study focused on the practices of five teachers, in four member schools, in a Mid-Atlantic independent private school network. At the time of the study, the network consisted of approximately 120 independent private schools serving approximately 47,000 students. The Mid-Atlantic school network hosts approximately 7,200 schoolteachers and administrators and serves a student population that is self-determined

to comprise a diverse student body of one third minority students.

As independent schools, there are very few common threads between the member schools besides their governance requirements, their accreditation, and their status as private non-profit institutions. As a community, they offer a declaration of choice describing “a range of educational options: coeducation or single sex; religious affiliation or nonsectarian; preschool, elementary, or secondary; day or boarding; and each has a distinct educational philosophy and mission” (Professional network website, 2014, para. 2). This presents advantages and disadvantages for a multisite case study design. For example, one of the advantages is that it affords greater variation between cases; conversely, it makes common comparisons about typical technology access almost impossible. Yet, as the focus is on the individual teacher and their interactions with the instructional model and environment, careful documentation and analysis is utilized to describe these variations between schools. The following sections present the case setting descriptions of the four school sites in the study as shown below in *Figure 3*.

Figure 3

*Multi-site Case Study distribution*



**Bardwell**

Located on in the suburbs of a large city in the Mid-Atlantic, Bardwell is an imposing, sprawling campus. It is split down the middle, dividing the high school from

middle and lower school campuses by a county road that was once likely a sedate, quiet track but now requires a large footbridge to transverse the two halves of the campus. Bardwell sits on approximately forty green acres in a suburban subdivision. Founded in the middle of the 19th century, it is an independent, nonsectarian college preparatory school serving approximately 600 boys in grades K-12. The current campus, built in the 1960's, hosts an upper school, middle school, and lower school, as well as numerous athletic facilities including multiple athletic fields, multiple gymnasiums, and tennis courts.

Demographically, Bardwell describes itself as serving boys of diverse backgrounds, which includes 24% of the individuals identifying as students of color. The school has a stated average class size of 14 and a student-faculty ratio of 7:1. It employs 89 full-time faculty, one part-time faculty member, and four administrative/teaching faculty of which over 65% hold advanced degrees. The school's tuition ranges from approximately \$20,000 to \$27,000 per year with \$3.5 million in financial aid (Bardwell website, 2015). In contrast, the zoned public school district for Bardwell has a district wide student-teacher ratio of approximately 12.5:1. It hosts a population of students of over 100,000 with nearly 50% of its students eligible for free/reduced price meals. Approximately 53% of the public school district students identify as Asian, African American, Hispanic, or Latino.

### **Fairfield**

Fairfield is a coeducational private school in the Mid-Atlantic United States on the edge of a major metropolitan city serving approximately 850 students in grades pre-K through 12<sup>th</sup>. Founded in the late 18th century, it resides on a substantial 30-acre plot

with over a dozen buildings of various ages including a dining hall, lower school, middle school, upper school, alumni center, administrative offices, a gymnasium, and other buildings. It also has multiple athletic fields, some grass and some artificial turf, as well as a lap pool and tennis courts.

Demographically, the school's website notes a "diverse student body" including 25% ratio of "students of color" and 75% of students "who self-identify with a religion" (Fairfield website, 2015). Fairfield's stated tuition rate for the year is between approximately \$18,800 and \$26,000. The school also reports that students received over \$3 million in a single school year for financial aid, operating currently with an annual budget of approximately \$20 million. Fairfield also employs 97 full-time and 17 part-time teachers resulting in a student-faculty ratio of 7:1. In contrast the zoned public school system for Fairfield houses approximately 85 thousand students, of which approximately 83% are described as African-American. It also averages a district wide student to teacher ratio of approximately 16:1. Lastly, the zoned public school system also serves a population of students in which 84% are classified as low income based on eligibility for "Free or Reduced-Price Meals." (Fairfield website, 2015)

### **Lowell**

Lowell resides on a 75-acre campus for approximately 680 boys in grades 3-12. According to the school's website, Lowell was founded in the late 1920's and the school today has resided in its current location for the past 80 years. The Lower School building was built just prior to WWII and constitutes an architecture that is mirrored throughout the campus of red brick and stone. In addition to a Lower School building, the campus houses separate buildings for the Middle and Upper School's with their own libraries and

media centers. There is a dining hall and 700-seat performing arts center, as well a large sports complex including a stadium with a turf field, six traditional ball fields, three indoor basketball courts, a strength training center, outdoor swimming pool, tennis courts, wrestling room, and one off-site hockey rink.

Demographically, the school states that 35% of its boys are “students of color” and that “one in four boys receives tuition assistance” with an award of approximately \$20,000 each (Lowell website, 2015). The stated tuition rate for the year is between approximately \$35,500 and \$37,000 a year including meal service for lunch. The school reports that students received over \$4 million annually in financial aid. Lowell also discloses on its website that it hires more than 125 full and part-time faculty resulting in an average class size of 15 students. Lowell does not report its graduation rate or what colleges its boys attend after matriculation.

In contrast, the zoned public school system for Lowell houses approximately 154,000 students in just over two hundred school buildings. The district reports that approximately 35% of its students are on free and reduced meal service (FARMS) and approximately 15% of its students qualify for ESOL support. It also reports its racial and ethnic composition to include approximately 31% White, 28 % Hispanic, 21% African American, 14% Asian students. The district also reports an average student-instructor ratio of approximately eleven to one with a graduation rate just under 90% and just under 80% of students meeting the state’s university entrance requirements.

### **Edgeworth**

Edgeworth is an urban private school housed in two buildings with a skywalk connecting the older six-story brick building connected to a larger, new six-story building

with a massive subterranean parking lot. Located two blocks from a subway stop, Starbucks, law school, and major university; Edgeworth has a cosmopolitan feel both inside and out. Edgeworth was founded in the late sixties as a co-ed college preparatory school for grades 6-12 with a mission of providing a “progressive education” (Edgeworth website, 2015). Sharing resources with local institutions for athletics and performances, the school comprises only two multi-story buildings. The school’s modest size includes an enrollment of approximately 300 students and 46 faculty members.

Demographically, the school claims to have a student body comprised of “32% students of color” and 33% of its students receiving financial aid. The school’s tuition is between \$34,000 and \$37,000 depending on the grade of the student. It also claims to graduate students with an average composite SAT score of approximately 1,780. For comparison, the local zoned public school includes a population of approximately 46,000 students in approximately 110 buildings as of 2014. This also includes approximately 76% of its students on “Free or Reduced” priced meals, 68% of its students as “Black,” 16% “Hispanic,” and 4% “Other Ethnicity” (District website, 2015). The district averages a composite SAT score of approximately 1,200, as of 2014, and a graduation rate of just less than 60% as of 2013 (District website, 2015).

### **Selection of Participants**

The study participants included five teachers at four sites in three disciplines and three grade levels. Four technology professionals, and four administrators, at the four private schools in the Mid-Atlantic, were also included as associated with bounded cases of study. This section describes the sampling procedures for recruiting the study participants.

## **Teacher Sampling**

As an active member of a group of technology professionals in a Mid-Atlantic private school network, I utilized my position to conduct a snowball sample to gather participants. This allowed the use of connections in the network to leverage further contacts to technology professionals and to identify teachers who are currently utilizing the flipped classroom. A recruitment letter (Appendix C) was sent via email to 281 technology professionals in 102 of 122 member schools of a Mid-Atlantic consortium of independent private schools. The email addresses of the technology professionals in the remaining 20 were not readily available, and so calls were made to the schools asking for a contact to take the survey. A follow-up recruitment email was sent to all schools without response from a representative technology leader (Appendix D).

From the recruitment of technology leaders, 63 responses were received from technology leaders at 39 different schools. These technology leaders provided the names of teachers at their schools who were currently flipping their classrooms. These teachers each received a teacher recruitment email in continuation of the snowball sample (Appendix E). A follow-up email was sent to those teachers who did not respond in the first-round recruiting email (Appendix F). 25 surveys could be attributed to individual schools (14 different institutions) as they were submitted with emails using the school's public IP address. Ultimately, 26 of the teacher surveys were completed.

The final step for selection of participants for the study via the snowball sample required identifying participants among the 26 teachers who responded to the survey who met the following selection criteria: had taught for at least one year prior to the study; was not in the pilot phase of using flipped classroom; and self-reported use of the model

at least 80% of the time. Using these criteria, four teachers were selected who represented the maximum variation in the subjects taught and location (Merriam, 2009) in order to illustrate key differences between their implementation of the flipped classroom. The teachers included: an elementary math teacher, high school math teacher, high school chemistry teacher, and middle school science teacher. The teachers came from four schools in two different major metropolitan cities in the mid-Atlantic. Each participant was called to confirm their willingness to participate in the study as well to confirm their tenure, utilization of the flipped classroom, and access for study. Two 'backup' teachers were also contacted in the event that any of the four selected teachers could or would become unavailable.

Early in the study, a participant teacher identified a peer in her building who also flipped his classroom instruction. Given that his participation would provide an instance of multiple teachers flipping within a school site, thus providing another element of variation in the sample as suggested by Merriam (2009), this teacher was contacted and agreed to participate. Originally, this participant had been rejected because he responded to the survey as only flipping about 75% of the time. This was considered close enough to the 80% threshold of adoption desired and included the benefits gained in variation of subject matter and peer comparison in the same institution.

### **Technology Professional and Administrator Sampling**

Coordinating contact with administrators and technology leaders within cases was conducted through the teachers in each setting. This was necessary because the teachers in all cases constituted the point of contact for each school site. Additionally, the teachers were able to best identify those individuals who would identify as either a

technology administrator or academic administrator for their cases. In only once case, Bardwell, did I have previous contact with the technology administrator through our mutual participation in a professional network. Ultimately, one academic administrator and one technology administrator were included from each site.

### **Data Collection**

The following is a summary of data collection process and procedures, following a multi-site, multi-case qualitative study design. Data collected included interviews of teachers, technology professionals, and administrators; observations of flipped classroom instruction; and secondary source data, including artifacts from class observation and items provided by teachers outside of class (for example, videos provided to students for at-home work). All data collection was conducted in the spring semester of 2015. This section begins with a brief description of a pilot study designed and conducted to refine research instruments, gain experience with classroom observation, and build confidence with equipment used for observation. The pilot study was conducted during the Winter trimester from December 2, 2014 through January 27, 2015.

### **Pilot Study**

The rationale for conducting a pilot study was to refine procedures for the study, refine instruments, and to establish a routine of observation and reflection on the part of the researcher. The pilot study was conducted within my school with work colleagues, which offered both advantages and disadvantages as a pilot setting. All the participants, the teacher, his department chair, the head of school, and the school principal were easily accessible for interviews. Their responses also helped to shape the interview questions

by signaling the need to ask additional, focused questions about teaching backgrounds and adoption pathways.

The teacher was observed 10 times for a complete period, which also helped to establish five classroom observations as a reasonable point of saturation for observation for the broader study. This was due in part to the obvious repetition in teacher behavior and classroom routine after the first five observed classes that occurred without significant deviation. Pilot observations were also a means to establish an effective field note schema and reflective journaling pattern. Technical equipment was also vetted such as determining the lapel microphone holding charge for approximately three classroom observations and the data recorder for two.

### **Research Procedure**

The following, *Table 1*, depicts the study cycle and participant focus. Each phase of data collection is detailed following the table. All the participants, and Heads of School at each site, signed study consent forms prior to any observation on campus. The study began with a research proposal given in the fall of 2014 and subsequent IRB approval (Appendix A).

Table 1

*Study Timeline*

| Date/Phase  | Data Source  | Purpose  | Outcome  |
|---|--|--|--|
| Winter 2014 - Survey of technology network for suitable cases of the flipped classroom          | An email (see Appendix C) was sent to 281 professionals in 102 of 122 schools                                  | To gather participants at suitable sites for study   | 63 administrators ultimately responded to the survey and 26 teachers completed the survey. 5 teachers were selected to participate on selection criteria noted above.  |
| Winter 2014 – Pilot Study of flipped classrooms   | ‘semi-structured’ formal interviews, 10 classroom observations, artifacts from class observations              | To pilot and refine instruments for interviews and observations as well as to refine observation technique and gain experience with equipment. | 3 administrators and 1 teacher participated in a pilot study of the use of a flipped classroom for Algebra 1 students in the researcher’s school. Semi-structured interview questions were expanded and refined as well as well as classroom observation procedures. |
| Early Spring 2015 – Interviews begin for all participant teachers                               | ‘semi-structured’ formal interviews.   | To gather data about their teaching philosophy, definition of flipped, etc.  | 5 first round interviews were conducted using the questions derived from Jwaifell and Gasaymeh (2013) (Appendix G).  |
| Spring 2015 – Observations of selected teachers   | 7 classroom observations of each participating teacher utilizing the flipped classroom of instruction          | To gather primary data of the application of the flipped classroom   | 5 teachers, in 4 sites, were observed 7 times during the course of 13 weeks of instruction.  |
| Spring 2015 – Interview of associated members of the cases including technology coordinators or | ‘semi structured’ formal interviews of at least 30 minutes with stakeholders associated with the participating | To gather primary data of the context in which the flipped classroom is implemented  | By design a technology and Academic administrator were interviewed at each case site using the same 10 questions given to teachers with small wording  |

|  |   |   |   |
|--|---|---|---|
| administrators   | teacher   |   | changes to match the participant's role.  |
| Spring/Summer 2015 – Collection of artifacts from participating teachers | Collection of flipped classroom lessons, lesson plans, and associated teaching materials                                    | To gather secondary data to support the primary data (observations) of the application of the flipped classroom | 70 total artifacts were collected from the 5 teachers including, flipped video lessons, assignments sheets, classroom handouts, project materials, etc. |
| Spring/Summer 2015 – 2 <sup>nd</sup> interview of participating teachers | semi-structured interview of at least 30 minutes using quotations from interviews and observations associated with the case | To use an inductive process to support the observations and member checking                                     | 5 teachers, in 4 sites, participated in a 2 <sup>nd</sup> round interview using a semi-structured format with 7 questions (Appendix H).                 |

The following sections describe specific applications relative to observations, interviews, and secondary source data.

### **Observations**

Described by Marshall and Rossman (2011) as “being central to qualitative research,” direct classroom observation was a major component of the data collected (p. 138). Seven separate classes were recorded for each teacher in the study, with an average observation period of 58 minutes, with a total of approximately 33 hours of observation. Bogdan and Biklen (2007) define an observational case study as the observation of participants comprising the major data source with support from formal and informal interviews as well as primary source documents. Observations of teacher instruction were scheduled at the teacher's discretion based on their availability. In order to reach a saturation of observation, each teacher was initially scheduled to be observed at least five times, with a goal of observing an entire period of instruction in each instance.

Observations began in February and were carried out in each site to the end of the school year in June. Although the goal was to observe teachers at least every other week, in order to maintain regular contact with the teachers and sites, schedule conflicts, school events, as well as a number of snowfalls caused a random observation schedule for each teacher. A gap in observation occurred due to a conflict with annual conference for the professional network for the member schools and the need to prioritize administrator interviews over classroom observation for a complete data set. However, because design relied on the availability of teachers and not on any specific schedule of observation this is unlikely an impactful incidence.

Data saturation was achieved as teachers' behaviors became predictable. Their classroom routines could also be seen on multiple occasions as repetition following distinct patterns. Ultimately, every teacher was observed beyond the initial five observations for an additional two observations in order to further ensure data saturation.

Data collected during the observations included audio recordings of the teacher and field notes of behavior and activity of the participants, as well as any artifacts distributed by the teachers. During the observation, a Microsoft Surface tablet was utilized to improve the speed with which field notes could be taken and for its ability to fit in a compact space in the classrooms. Field notes were broken down into five-minute intervals of recording and reflection utilizing five-minute sweeps of teacher activity and behavior, student activity, and content displayed for instruction, to ensure a continuous mindset of observation as a priority. Each class session was also recorded using a lapel microphone and transceiver to better capture the dialog of the teacher and limit accidental data collection of students in the classroom. The vast majority of student comments or

noises found after data collection were unintelligible with this technique and none of that content was transcribed for further study. The frequency plots of observations can be found in Appendix I.

### **Interviews**

The study was comprised of an initial interview with the teacher, a minimum of seven classroom observations, interviews with a technology administrator and an academic administrator were conducted concurrently with the observation period, and a final or exit interview with the teacher. This series of interviews at each site occurred concurrently with other sites. Interviews averaged 34 minutes in length and utilized an open-ended structure facilitated by a series of questions derived from the interview instrument of Jwaifell and Gasaymeh (2013). The questions themselves were tested during a pilot phase of the study and revised upon reflection to the final 10 listed in Appendix G. These were utilized with all the participants including teachers and administrators. Teachers also received a second-round interview using a tailored set of open-ended questions. An example of these questions, utilized with a participant, Brian, in his second interview is listed in Appendix H. Teachers were given the first interview and then either the technology administrator or academic administrator was interviewed. Teachers at each site were also then given the final exit interview, after observations were complete, to ensure an opportunity for reflection on their experience of being observed. A plot of the frequency of these interviews can be found in Appendix I.

Interviews were utilized in order to capture the experience of the participant teachers. Semi-structured and unstructured methodology was used as a means for participants to add their own unique perspective with regard to the flipped classroom

(Marshall & Rossman, 2011, p. 144). Data collection revolved around individual interview responses using two separate question phases. First, prior to the observations, interviews used a semi-structured approach that included both 10 structured interview questions as well as opportunities for additional questions or clarification (Merriam, 2009). These questions included inquiry into the teacher's philosophies as well as how they personally defined the flipped classroom (Appendix G). They were aligned with IDT and were adapted from the interview instrument of Jwaifell and Gasaymeh (2013 p. 142).

Second, throughout the observational phase, a more informal or unstructured interview format was used including the use of open-ended questions (Merriam, 2009) in order to gather more information about themes emerging from teachers' uses of the flipped classroom. These were recorded in classroom observation notes, transcribed, and examined for themes, with interpretation to follow. In addition to the teachers, semi-structured interviews of associated members of the teacher's leadership team at each site were conducted in order to establish, if possible, the adoption criteria and model selection of the flipped classroom at each case setting. These included questions regarding teaching philosophy, application of the flipped instructional model, and the mechanism for adoption in the school setting (Appendix G). In each case, an interview with a technology administrator and an academic administrator was sought. Their participation was one of convenience relying on access, a willingness to participate, and the support and consent of the classroom teacher. An initial set of pilot interviews were transcribed by hand to ensure consistency and a transcription service was used to transcribe all the

remaining interview recordings. Each recording was then reviewed with the transcript copy in hand to correct any transcription errors.

### **Secondary Source Data**

Artifacts of assignments, assignment schedules, flipped lesson videos, lesson plans, and classroom exercises were collected throughout the study. Teachers were asked after, and sometimes during, observations, for handouts or homework assignments given to students. Paper documents were collected, scanned, and archived for study. Flipped videos and digital artifacts were collected and, in the case of the videos, typically involved the teacher sharing a URL. As noted by Yin (2014), physical artifacts make up an important part of the evidence in case study research and design. Further, as a case study, it was imperative that the research be extensive and draw on multiple sources, including those mentioned above as direct observation and interviews, and also including artifacts (Creswell, 2007). Also, the flipped classroom instructional model, by its very nature is an instructional strategy that typically utilizes pre-recorded videos, offered a unique opportunity to gather rich and descriptive artifacts for study and reflection with participants. In all, 70 items were collected from the participating teachers.

### **Data Analysis**

Five cases were examined for this research using a two-phased analysis: a within case analysis, resulting in rich detailed descriptions organized into themes related to the research questions; and a cross-case thematic analysis, to examine the practices of teachers within each unique setting as they contrast across the cases (Creswell, 2007, p. 75). The method of analysis during each of the two phases was inductive and utilized open coding, drawing on the observations, transcripts of interviews, notes from

interviews, and artifacts collected to develop themes (Marshall & Rossman, 2011; Merriam, 2009).

Specifically, a constant comparative method, as outlined by Merriam (2009, p. 175), was used during the process of analysis. This was done using the same underlying tenants of the constant comparative method proposed by Glaser and Strauss (1965) in their articulation of grounded theory. However, the constant comparative method was used in this research for data analysis that intended to be inductive without any intention of building underlying theory, as would be the case in a grounded theory study. This approach to analysis is widely used in qualitative research (Merriam, 2009, p. 175).

Furthermore, the constant comparative method has been used in conjunction with case study methodology, and Rogers' IDT, in understanding innovations in education with regard to technology. Hebert (2012), in examining the adoption of electronic assessment systems, noted that these assessment systems aid in focusing a "robust and accurate analysis of the data..." while allowing for a lens of understanding through IDT (p. 41). Hebert (2012) concluded using IDT as a lens, in conjunction with data analysis technics including the constant comparative method (Glaser & Strauss, 1967), that "regardless of what innovation is in question, be it technological or not, its impact will be exposed through the individuals who utilize it" (p. 43).

The constant comparative method required that each "particular incident" encountered during the process of the research be compared with another "incident" in a constant cycle of comparison until emerging patterns could be drawn (Merriam, 2009). Incidents for the purposes of this study were sourced from notes from observations, transcripts of interviews, notes from interviews, artifacts collected, and the codes

generated during the process of analysis. During the analysis, open codes were generated during the first pass of interview transcripts and field notes. For example, teacher – bending, teacher – stooping, teacher – kneeling with student were generated in instances when the teacher was observed conducting those behaviors.

The codes were refined and condensed during a second pass of all the transcripts and field notes and condensed. During the second pass, Rogers' (2003) IDT was used to analyze and understand themes emerging from the codes. For example, in the second round of coding teacher behavior codes such as teacher – kneeling or teacher - bending were condensed to teacher – proximity and teacher – posture as they were not substantive through the adoption lens. Additionally, codes that mimicked Rogers language were identified such as the code teacher – adaptation which were determined to be similar in application by teachers with Rogers concepts such as re-invention (2003). In the third round of coding, themes were identified for the purposes of a cross case analysis as described in Chapter V, generated from the condensed codes. A copy of the complete code table, with frequencies and number of source references, can be found in Appendix J.

### **Validation**

In order to ensure descriptions of participant perspectives that accurately reflected and represented their experiences, the following methods of validation were employed during the study. First, triangulation was utilized through the collection of multiple sources of data including artifacts, observations, and interviews with multiple participants involved in a given case (Creswell, 2007; Marshall & Rossman, 2011). Interviews with both technology administrators and academic administrators offered both pedagogical

perspectives and technical perspectives from participants at each site that would not have been evident in self-reported or directly observed behaviors from the teachers themselves. Artifacts, such as the flipped videos, also offered the ability to contrast to the teachers' practices in the classroom and their self-reported behaviors. Direct classroom observation, in addition to the interviews of the teachers, allowed for even greater triangulation of data than would be possible had on-site observation not take place.

Member checking was also utilized in the second interviews utilizing descriptions of practice and quotations that were reflections of the participants' peer perspectives regarding the flipped classroom instructional model (Marshall & Rossman, 2011; Merriam, 2009). This included using participant statements from the administrators from the academic and technology perspectives being read back to participating teachers in the 2<sup>nd</sup> interviews. It also included case description summaries from each case in Chapter IV. These were also sent to each participant teacher for his or her review as a means of member checking. All participants indicated that the case description summaries accurately reflected their classroom practice and their experiences.

### **Design Limitations**

Qualitative research is a balance of ideals to the practicality of access, time, bias, and factors of study outside of the laboratory. With this understanding, there are aspects of the research design that were limiting. First, the use of a snowball sample to gather participants was advantageous as it enabled contacts within the researcher's professional network to ask as multiplier/amplifier to recruit teacher participants who were unknown to the researcher at the time of the study.

Gathering the data for this study required active participation of the teacher participants and therefore negated the use of random selection for participants. The largest cross section of disciplines and ages taught by teachers was sought, as well as other restricting criteria mentioned in participant selection above, the teachers represent an intentional subset of teachers recruited from the snowball sample. Observation also had to occur at the convenience of the teachers due to the intrusion on class time by the frequency of observation. This also included specific observation dates at the convenience of the participating teacher and limiting observation to a single semester.

Lastly, due to the nature of the flipped classroom adoption, the majority of the flipped videos were shared via URL, and in some cases, have expired during the course of study. Cognizant of this conflict, when possible, MP4 files were solicited from teachers for study of the flipped classroom videos. In most cases, however, because the teachers utilized YouTube as their primary means of storage for videos, they were often not inclined nor able to provide recorded data files. One participating teacher, Brian, even noted this problem with his videos in his transition from his previous school noting: “they were all put on YouTube originally... I have a YouTube site from my old school that's still active. I have no, way of actually getting into it anymore” (2015). Yet, at least one flipped video from each participating teacher was available for study in perpetuity and in most cases all the videos assigned were reviewed shortly after the observed lesson.

### **Chapter III Summary**

As noted in the literature review, the flipped classroom is emerging in K-12 classroom settings as a relatively new pedagogy. This dissertation consists of a qualitative multi-site case study methodology in conjunction with the inductive, open

coding, and constant comparative method of analysis, and IDT as a grounding theoretical framework, to examine the adoption of the flipped classroom instructional model in private Mid-Atlantic schools. Specifically, this study aimed to understand: 1. Why are teachers in K-12 classrooms choosing to adopt a “flipped classroom” model of instruction? a. What are their beliefs about teaching and learning that would inform their adoption of the instructional model? b. What contextual/environmental factors inform their adoption of the instructional model? and ultimately, 2. How do they implement the instructional model?

Participants included five private school teachers in the mid-Atlantic. Data collected included: two phases of interviews, classroom observations, and secondary source data including flipped videos and classroom handouts. A two-phased analysis was conducted, first consisting of “within case analysis” including rich detailed descriptions and themes and then a “cross-case analysis” using a thematic analysis of the practices of teachers within each unique case (Creswell, 2007, p. 75). A constant comparative method, as outlined by Merriam (2009), was used throughout the process of analysis. This included using Rogers’ (2003) IDT as a lens for understanding and developing themes

Lastly, data collected using a multi-case qualitative study design included: a uniform research procedure for all five cases including two phases of interviews, classroom observations, and secondary source data including flipped videos and classroom handouts. All the interviews were transcribed. The method of analysis during each of the two phases was inductive and utilized open coding to develop themes provided by observations of participants and their responses to interview questions

(Marshall & Rossman, 2011; Merriam, 2009). A constant comparative method, as outlined by Merriam (2009), was used throughout the process of analysis. This included using Rogers' (2003) IDT as a lens for understanding and developing themes. In summary, this research consists of a qualitative multi-site case study methodology in conjunction with the inductive, open coding, and constant comparative method of analysis, and IDT as a grounding theoretical framework, to examine the adoption of the flipped classroom instructional model in private Mid-Atlantic schools.

## CHAPTER IV

### INTER-CASE DESCRIPTIONS

The following is a case-by-case description of each teacher's pedagogy including the school context, classroom, adoption, and practice with the flipped classroom model. Each case was examined for its adoption context with regard to the flipped classroom model including to its *relative advantage, compatibility, complexity, triability, and observability*, as outlined by Rogers' Diffusion of Innovations Theory (2003). Second, each case was examined through a lens of adoption, how the model of instruction was being communicated, and in what context. Lastly, the practice of instruction was examined in each case, including the videos that are sent home as well as the classroom practices in each setting. This examination included the frequency of video use, typical format of the videos, transitions to classroom activity, predominant behaviors of teachers in the classroom, mechanisms of assessment, as well as other techniques. The ultimate aim of this chapter is to better define the de facto practice of the flipped classroom, in context, for these five educators: Brian, Megan, Frank, Sean, and Allison.

#### **Brian**

##### **An Introduction**

As I walked into Bardwell's upper school building on a cold winter day at a quarter to eight I was helped by a young boy dressed beyond his years in khaki pants, boat shoes, a collared checkered shirt and tie. Salt crunched under my shoes as I walked into a busy main hallway and over to a smiling secretary who, after my second visit,

already knew me by name. Brian came to greet me with a strong handshake as I put my pen down from writing my own name-tag. He was dressed in black slacks, a shirt with cufflinks, a tie, and a blazer. The atmosphere of the entire building was noticeably formal and tidy and stands in contrast to the noises of hurried students conversing in decidedly informal conversation.

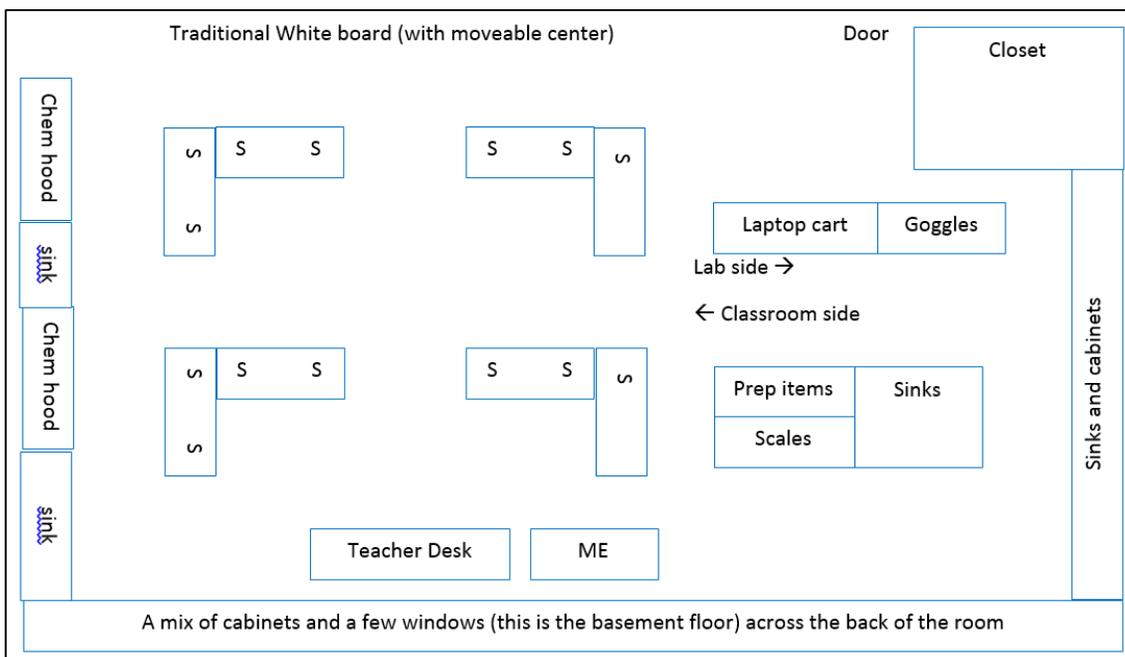
Brian's office was a combination of workstations, a round worktable of a brown polished wood that matches a line of book shelves, and his desk which was covered from end to end in loose papers. In the center of the desk, a lone laptop was the only orientation to the desk's general purpose as a work station. Brian was a veteran teacher having served fifteen years at his prior school as a chemistry teacher. When we met during his second year at Bardwell, he had arrived to pilot a new model of administration in a split Dean/Teacher role. As a teacher, his halftime job included two sections of lower level chemistry and one section of physics (Brian, Interview 1 at Bardwell, 2015). Brian embodied an eloquent, reflective educator, who brought with him a sense of calm to Bardwell's halls.

**Brian's classroom.** On my first observation day of Brian, I traveled from his office in the lobby of the first floor, down the hallway, down a flight of stairs, and directly into a chemistry classroom and lab. Brian carried an orange soda can in his left hand and a re-usable Frozen themed grocery bag in his right. It was filled to the brim with marshmallows, graham crackers, and *Hershey's* chocolate bars. In my portage I carried my computer, recorder, field notes, files for artifacts, and my workbag. We looked like a set of pack mules trekking down the hallways. The room itself appeared to be only a few years old with very new furniture and fixtures. It was dual configured as a

chemistry lab and classroom, clearly divided into two zones as shown below in *Figure 4*. From the ceiling hung retractable power cords spaced evenly throughout the classroom side. The room was also washed in the bright white fluorescent lights ubiquitous in American classrooms. Like a roaming traveler, Brian set himself up at the front of the classroom, unpacking his supplies and setting up his mobile classroom. Interestingly, he taught his other Physics section in the classroom across the hall in the same fashion of a traveling teacher.

Figure 4

*Brian's classroom*



The classroom was also noticeably sterile, and only included items that can be found in a catalog. There was no student work displayed and only posters of owls saying ‘Be Wise Protect Your Eyes’ and an otter saying ‘Do as you Otter, take safety seriously wear your goggles’ added any flair or softness to the room. There was a large periodic table on the right-hand side of the board. The desks were classic science tables, large

enough for two students, with black chemically resistive tops and light-colored wood. The chairs and all accenting colors were a maroon color and the floor was made of 9-by-9 white linoleum tiles. The walls were also cinderblock white. The resident teacher, an AP Chemistry teacher, was regularly present and silently seated at his desk during all of Brian's classes.

### **Adoption Context**

**Brian's view of teaching.** Brian described himself as a teacher who prefers to work with kids "who struggle" (Interview 1, 2015). He reflected on his own educational philosophy noting that he believes:

Everybody can succeed in the classroom given the right tools and the right support. I believe real strongly in providing a lot of individual support to students. And helping to find the ways to best engage them and also to best provide as many different resources for support as possible to help them be successful in the classroom (Interview 1, 2015).

Similarly, Brian described being in his previous school with a very supportive IT department with a Technology Integration Specialist who was constantly asking, "What are your complaints? What are your concerns? What are the things you're struggling with?" (Interview 1, 2015). In response, he worked closely with a colleague in his department who was experimenting with videos in his classroom practice.

**Brian's Adoption.** In describing his adoption of the flipped classroom, Brian noted that he was lucky enough to travel to Boston and witness a presentation by Bergman and Sams on the flipped classroom model, which sparked his experimentation. He described a frustration with the traditional model of instruction. He noted that he

“would spend a significant portion of time explaining the concept, how to do the problems, show five or six examples of a problem in class” (Brian, Interview 1, 2015). Students would then go home without asking questions, get frustrated at home, and return without making any progress. Additionally, he lamented, “I was frustrated by how long it took to get through material... I couldn't help them when they needed help” (Brian, Interview 1, 2015).

Clearly at odds with traditional, teacher-centered instruction, Brian returned from the conference in Boston with a mechanism for changing his teaching. He reflectively noted on his traditional teaching practice:

The part that they were understanding easily I was doing with them, but the part they were struggling with, I was not where I could be of assistance. And that was my big frustration, that's why the model spoke to me so much is, I can move the time they need my help the most to where I'm available to give that help (Brian, Interview 1, 2015).

Hence his traditional flipped classroom adoption was born out of a need to reduce lecture and increase opportunities for student-teacher interactions in the classroom. In his transition to Bardwell, he described a need to continue to adapt and change his teaching. In relation to the flipped classroom he had pushed some lecture back into this classroom, explaining that: “I find that the students here need more times through the explanation and have had more trouble embracing the video portion of it” (Brian, Interview 1, 2015).

Brian's frustration with his previous model of instruction did not appear to end with the introduction of the flipped classroom. As he explained in his last interview he planned to pilot a model of instruction with the flipped classroom which he called “tiered

instruction” (Brian, Interview 2, 2015). In it he described a hierarchy of content he will present to students, using the flipped model, to enable a greater differentiation afforded to students in Bardwell. As he explained: “What I'm going to do, is allow students to choose which of the three groups they want to work towards. And, then grade them on a scale based on that...” (Brian, Interview 2, 2015). In each group Brian planned to ‘tier’ the objectives in degrees of difficulty so that “ideally the group that's struggling more, now would have that same two weeks to cover a slightly smaller amount of material” (Interview 2, 2015).

As Brian explained, he envisioned tiered instruction to enable an asynchronous classroom in which three distinct groups of students could in fact be moving at different paces in windows of time during the school year. Brian attributed this flexibility to the flipped classroom, explaining:

The flipped model allows me to do a lot more of that where I can say here's this type of problem, that's covered in this video. This group needs to watch that video, this group doesn't. This group can work on this, this group can watch that video... And then in class, sort of meet with the different groups individually to see where it's going to be. (Interview 2, 2015)

This highlighted Brian’s willingness to experiment with his teaching practice but also his faith in the flipped classroom as a model of instruction that afforded him the ability to experiment with his teaching in Bardwell.

**Experimentation and flipped classroom videos at Bardwell.** Brian demonstrated a tremendous amount of trial and error in his description of finally adopting

a hosting site called *eduCanon* as his ultimate platform delivery which he chose to use in addition to Bardwell's own Learning Management System (LMS). He noted that "now this year, one of my other frustrations was trying to encourage the students as much as possible to actually watch those videos". (Brian, Interview 1, 2015). He added that in discovering *eduCanon*:

I looked at it quickly and said 'oh, this is great because I know Camtasia, I can build questions into the videos' and stuff like that. But, then you've got to be able to upload the whole HTML files, and all of that stuff which I didn't have, hadn't gone through the process of learning where that would fit and where that would host and all that. So, as you can [see] it was the simple solution because it doesn't cost anything and it, it allows me to put questions in the middle of the video. (Brian, Interview 1, 2015)

The use of formative assessments embedded in the video is a strategy that Brian developed over time. Previously, he would have utilized *Google Forms*, linked directly below the videos embedded in his school's Moodle page, with a couple of "check questions to see if they'd understood the video" (Brian, Interview 1, 2015). However, as Brian noted, he knew he "had a lot of students who were just going and filling in the questions" and thus needed a mechanism for embedding questions into the videos that did not allow students to anticipate or skip them (Interview 1, 2015). As Brian asserted "they have no idea where the questions are gonna appear in the video, so it checks, it's a little bit better, more countable way of checking their understanding throughout the course of the video and checking to see that they've actually watched it" (Interview 1, 2015).

Brian still encountered challenges with his students even with all of his iterative

experimentation with the hosting and delivery of the flipped classroom. For example, even with the questions now randomly embed in the videos, Brian lamented:

I'm hearing that there are some who just, minimize it in the background and wait for a question to pop up, and then go answer the question. So, I mean, you're not gonna be able to get around them avoiding it, but at least, they're having to let the video play in the background more than they were in the past..." (Interview 1, 2015)

That deception on the part of some students also played into a broader conflict for Brian with the introduction of the flipped classroom to Bardwell. When asked if the flipped classroom raised the stakes by shifting more direct instruction out of the classroom, Technology Director Alicia responded with "Absolutely, I think... there has to be sort of that culture development that this is the way this classroom is going to work. Don't fall behind" (Interview, 2015). Chris, the Dean of Academics, noted in his assessment of the flipped classroom that "the biggest challenge for me as an administrator with it is that, our school has not had this as part of their, the academic program" (Interview, 2015). He added in his assessment of this conflict that students have:

... always been in a, in a traditional classroom setting. They get to the tenth grade year, they walk into the science classroom, it, and, and it's totally different... And so the challenge is you, you know, students struggle for a variety of reasons. And when parents see that there's something new and the student's struggling, they make a one-to-one link in their mind. They're struggling because of the flip classroom model not

because he's not putting the effort, or not because the subject material is just conceptually difficult for a 15-year-old" (Chris, Interview, 2015)

Together, he and Brian chose to re-examine their communication of the flipped classroom model with parents and drafted "a long letter" which was designed to explain, in Brian words, "why I'm using the model, how it works, what exactly I'm trying to accomplish with it" (Chris, Interview, 2015). Both agreed with Alicia that establishing this culture and creating clear expectations was an essential aspect of the adoption of the model.

Interestingly, Chris raised a positive outcome, also mirrored by Alicia, in the value of introducing different models of instruction as preparation for college regardless of the change. Chris explained, "I think it's really helpful for our students to have [the] experience, even if it's just one class and hopefully that will grow" (Interview, 2015). He added, with "doing work online as they go to college... if we didn't give them any taste of that, I think I'd feel a lot more concerned that we're not preparing them well for the next educational four years" (Chris, Interview, 2015). Brian mirrored this perspective as he asserted that: "I'm asking [them] to do school in a different way to, to learn in a slightly different way. And, I think that's a good thing to prepare them for, life in general and college" (Interview 1, 2015). Together, with the perspective of Alicia, Bardwell presented itself as a school with a culture of experimentation and willingness to embrace teacher driven initiatives.

**Bardwell's adoption of the flipped classroom.** Bardwell's math department had a problem that needed a solution. For years, teachers had been giving paper packets to

their students as summer work to combat summer learning loss. As the technology director Alicia explained:

More or less when we adopted use of the Khan Academy tutorial system for our summer math program... Probably a couple hundred math problems each summer when we moved from that to Khan Academy playlist. Which was providing them the opportunity to watch a review video on a particular mathematical method, or process, and then to perform a set of problems to reacquaint themselves with that method... The head of the math department and I sort of discovered that around the same time and thought it would be a nice time to jettison our paper workbook for the more flipped approach. Now that's not truly the flipped classroom because in the summer we're not here, but essentially we're shifting the kinds of instructional activities that one would normally associate with being in the classroom. It was shifting them to that independent, sort of, homework zone. (Interview, 2015)

They had since shifted their summer work configuration for math again but their continuous search for better approaches highlighted a culture of experimentation found throughout the school.

Brian was brought to Bardwell to establish an administrative model of grade level Deans who would work part time in that capacity and part time as classroom teachers in those grades. As Brian used the flipped classroom model prior to his arrival at Bardwell, it was coincidence that brought this specific instance of the flipped classroom to chemistry and physics classes. However, as Chris noted in his interview, the flipped

classroom evolved as a bottom-up development within the school (Interview, 2015). Thus, in conjunction with the tools available in the school including the Learning Management System, the prior experience of students using the model during the summer, and a broader culture of teacher autonomy appeared to have aided Brian's implementation of the flipped classroom in Bardwell.

The alignment of constructivist views of learning and teaching among Chris, the "Co-Head of the Upper School mainly dealing with the academic program," Alicia, the Technology Director, and Brian also appeared to be facilitated by the communication channels described by Rogers within Bardwell. The culture, outwardly appeared to be very nurturing to teacher-led initiatives as Alicia affirmed that the flipped classroom arrived at Bardwell through "teacher direction, picking and choosing what they needed to solve problems" (Interview, 2015) and Chris agreed that it was a "bottom up adoption" through "individuals feeling like they want to explore this part of, you know, current educational developments, and just putting them into practice" (Interview, 2015). In summary, the congruence between the beliefs about teaching and learning between the administration and teacher, the administration embracing the experimentation on the part of teachers, and the endorsement of teacher led initiatives had all facilitated Brian's ability to implement the flipped classroom within Bardwell.

### **Practice**

Brian presented as a confident educator. As the first participant to be observed in the study, his open, calm demeanor was a constant throughout observation. Appendix K highlights the primary class activities, Brian's primary behaviors, and the flipped video frequency during seven observations of Brian's teaching. These aspects of his instruction

will be expanded upon below to further describe his classroom teaching practice and his use of flipped classroom videos.

**Brian's flipped classroom.** After five years of experimentation with the flipped classroom model, Brian described his adoption of the flipped classroom one that has evolved in to multiple pieces (Brian, Interview 1, 2015). He explained that he now introduces content to the students via a video and then recaps his instruction in class and then moves on to problem solving and labs as a reinforcement mechanism (Brian, Interview 1, 2015). Brian's description of a transition to a modified flipped classroom, highlighted by mediated utilization of video for the replacement of lecture, was confirmed in observation of his classroom. On my first observation of his instruction I witnessed an inquiry activity utilizing marshmallows, graham crackers, and chocolate to illustrate limiting reagents. It was not preceded by a flipped video and employed primarily direct instruction and choral question such as "how many marshmallows will we have left? How many graham crackers will we have left?" (Brian, Observation 1, 2015). These questions were posed after students were given the following problem on the board to complete in pairs at their desks: "[the] limiting reagent in the recipe?" The following reagents were also written on the board: "45 Mm and 72 Hs and 48 Gc." The lesson was punctuated by outbursts, noise, and enthusiasm for the consumption of 'S'mores' throughout. Brian acknowledged on our walk to class that this could have been done with a video but that he preferred to do it this way because the kids loved it and it was a good way to build inquiry into the lesson.

In my third observation of Brian, I again witnessed a preference for not using a flipped video in favor of his previous method. Brian explained that he formerly used

videos as homework the night before in order to give lab directions but that “this group does better when he presents it in class” (Brian, Observation 3, 2015). He did use a video to introduce the laboratory on my seventh observation. Brian used flipped videos less frequently preceding his lessons than I was expecting as participants affirmed that they flipped the majority of the time. In his response to survey question five: do your flipped classrooms utilize any specific learning models? Brian indicated that he uses “flipped videos for lecture introduction and then increased class time for practice problems, group work and labs.” One would then expect that utilization would not necessarily fall into a daily utilization of flipped video, as is often portrayed in the literature. Rather, I witnessed in his seven observations that one observation included the flipped video preceding the lesson only as homework, two included the flipped video as homework only, and one included both a preceding video and homework video.

Hence, a less frequent utilization of videos aligned with Brian’s assertion in our first interview:

“So I now see it more as, a three or four piece model where the video is the introduction to the material then I will recap that material in class. And then do problem solving and labs to re-enforce that material... I guess originally when I started, I saw it as a two part thing. I flipped lecture home, problem solving in class, now I sort of see it as one piece of four things that I’m trying to do. So I’ve brought some more of the lecture time back into the classroom, but I continue to use the videos to introduce all the material and it has, still has the advantage of allowing me to, when I talk about it in class, go through it much more quickly”

Brian's modification of the pacing of the 'traditional' flipped classroom is a re-invention defined by Rogers (2003) to include the amount in which an innovation is altered by the participant during implementation of an adoption. Re-invention, or perhaps more commonly perceived as adaptation, was found in the implementation of every instance of the flipped classroom by teachers studied and will be explored in Chapter V as it pertains to a cross-case analysis.

In observing Brian, the obvious aspects to his teaching were a student-centered view of learning, a high number of one-on-one student teacher interactions, and constant movement in the classroom as in Appendix K. The first was evident from our interview when he described his rationale for adoption of the flipped classroom model by explaining that, before the flipped model, he "spent a lot of time at the front of the classroom, talking and not being able to spend as much time listening and interacting with students, and that bothered me" (Brian, Interview 1, 2015). He added that, "rather the students work to help each other and work through the process on their own with my guidance rather than me just telling them how to do it" (Brian, Interview 1, 2015). His transition to the flipped classroom, with a focus on individual students mediated by numerous one-on-one student teacher interactions, was evident in every observation.

Constant movement on the part of the teacher was also a hallmark of Brian's classroom practice. It was observed regularly in all but the third observation of a classroom laboratory exercise in which he was primarily located monitoring chemical reagents. Otherwise, movement was a constant as evident in my second observation and noted in my field journal that night:

1. He moved around during the entire class period visiting with every student at least once.
2. He would crouch or bend when addressing each student at their desk (similar in demeanor and nature).
3. He never took a seat throughout the entire class period.
4. He would give some students significantly more attention or others based on their requests and also his own selection (moving to off task students) (Case study field journal, 2015)

Brian's constant pacing through the classroom, at times appearing to look like laps around the classroom, worked in conjunction with his numerous one-on-one teacher-student interactions. The two, in combination, appeared to facilitate and adhere to his stated philosophy of promoting a student-centered classroom (Brian, Interview 1, 2015).

Classroom management was also an aspect of Brian's classroom that appeared to be heavily influenced by his behavior and his use of the flipped classroom. Students appeared to have a greater tendency to engage in off-task behaviors when Brian was not moving in the classroom and engaging with students. This was especially poignant during periods of direct instruction in contrast to his movement around the classroom while students were working on problems. However, the periods in which Brian was moving around the room, while students were working on problems, were not without their own instances of off-task behavior on the part of student. For example, in observing Brian move around the classroom it was evident that off-task behavior "concentrated to areas away from the location of the teacher and essentially trail his movement around the classroom" (Observation 4, 2015). Brian appeared to be conscious of this symptom and

could be observed on multiple occasions moving back to students who were off-task. This was problematic due to his intense engagement with students on an individual basis. Off-task behaviors could become quite loud, or off-color, before he would notice or intervene. While it was apparent that the classroom activities that were less teacher-centered did have less off-task behavior; the echo of off-task students in Brian's movement around the classroom during one-on-one interactions was still an apparent disadvantage to the model of instruction for Brian.

Lastly, Brian's classroom practice was highlighted by a variety of classroom practices including classroom inquiry activities, virtual laboratory exercises, traditional laboratory exercises, traditional direct instruction or lecture, class problem solving exercises, paired or group problem solving exercises, and assessments such as quizzes. While these were randomly observed at the convenience of the teacher, they highlighted the variety of classroom practice that Brian attributed to a flipped model of instruction. Such variation, in conjunction with his varied frequency of flipped video use and his own reflections of the model, indicated that Brian's view of the flipped classroom was not a limited one for one inversion of lecture and homework but as a practice of instruction that was more nuanced.

**Brian's flipped classroom videos.** As noted above, Brian's videos were not a nightly aspect of his instruction. Rather, he tried to transition "lecture time to video at home and move as much of the problem solving time in my course...to the classroom and then free up as much time as possible for additional labs and additional practice" (Brian, Interview 1, 2015). This included a frequency that matched his current setting and students. In his own words, Brian asserted that:

Students here need more times through the explanation and have had more trouble embracing the video portion of it. So I now see it more as a three or four-piece model where the video is the introduction to the material, then I will recap that material in class. And then do problem solving and labs to re-enforce that material (Interview 1, 2015)

A review of content was evident in Brian's teaching practice in the classroom and was witnessed in practice, as a review of lecture from the video, on two occasions. In both instances, direct instruction was used primarily with choral questions to review what was presented on a video assigned for homework. In the first case the direct instruction lasted approximately 20 minutes before students transitioned to an in class activity utilizing web-assign and in the second case it was only 10 minutes of review which transitioned to a virtual gas law lab.

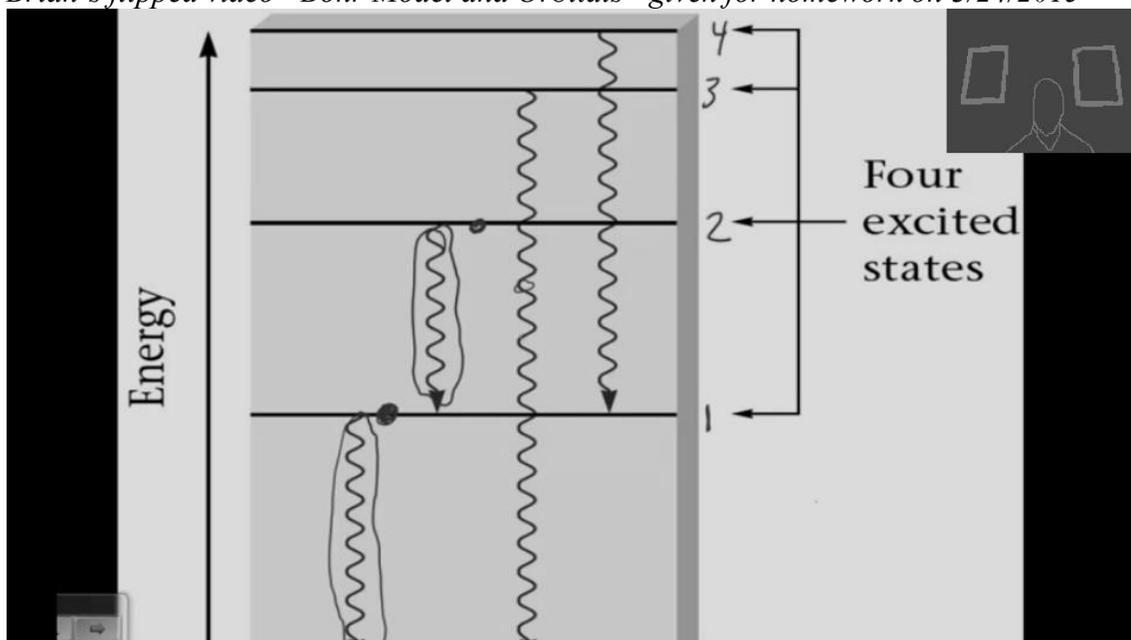
Brian utilized eduCanon as his platform for delivering his videos. The website [www.eduCanon.com](http://www.eduCanon.com) is a platform for creating and/or delivering videos for instruction. It allowed for formative assessment to be placed inside the videos themselves as checkpoints, which was a technique Brian utilized. His videos, however, were hosted via *YouTube* and had been created using *Camtasia*, a video editing software. Most videos on his YouTube channel for chemistry were at least 2-3 years old and ranged in a length from approximately five-to-ten minutes with a few as long as 15 minutes. Brian noted that this length was intentional, stating that: "I generally try to have a five to twelve-minute video... I think my longest one is 15 minutes long and that's, that's long. I want to keep them under ten, if I can" (Interview 1, 2015). His videos, as depicted below in *Figure 5*, utilized a 'talking head' in the corner, sometimes above and sometimes below,

as well as pre-typed slides with images. Brian, in the videos provided, narrated with a ‘talking head’ over the slides and wrote directly on the images in his screen cast as he works. They were not polished final products and appeared, from the backgrounds around his head, to have been made in his dining room, office, or classroom.

Background noises can be heard in some instances including bells ringing, dogs barking, etc.

Figure 5

*Brian's flipped video "Bohr Model and Orbitals" given for homework on 3/24/2015*



Brian explained that the lack of polish in his videos was attributed to the fact that it provided a more authentic experience for students and enabled them to connect with his material. He explained:

I think there's something good to... the mistakes and the... not professional look of the videos. They, you know, there's, there's errors in them. There's bells ringing in them. There's, you know, things that just

happened in them. And a dog barking, my dog barking in them. And I think that's just fine. I think that the students actually connect to that a lot (Brian, Interview 1, 2015)

This is in conjunction with his sentiments of practicality noting that the “first year of doing this model was an insane amount of work” (Brian, Interview 1, 2015). Brian described a desire to go back and refine the videos after using them for four years but noted that the time commitment is prohibitive. Yet, his commitment to self-produced videos was evident as he added: “I strongly believe that the students need to hear from me, to hear my explanation... I just think it, it works much better if it's, it's your presentation” (Brian, Interview 1, 2015). Thus, his videos on his YouTube channel show a history of production over time in a growing library of content in various states of production, age, and polish. They mirror Brian’s constant commitment to experimentation and development of his teaching practice as he added “hopefully, [in] the next couple of years I will go back through all of them and, and refine them” (Interview 1, 2015).

Brian’s use of video included a frequency, from his own observation, of approximately every other day for homework. As he described:

I probably have between five and eight videos in a unit. And if a unit takes 15 days, you know, eight of the night's homework will be videos. And the other seven nights will be finishing up problems we've started in class, or something of that sort... (Brian, Interview 1, 2015)

He added that as a rule he did “try to have about a ten-minute video to introduce a topic, before we go over it in class the next day” (Brian, Interview 1, 2015). This frequency

was close to what was observed but events such as school breaks, weather, and major assessments reduced the observed frequency of the utilization of flipped videos. For example, after Spring Break, Brian chose not to assign a video over the break and rather to introduce the new content more traditionally in the first class meeting. Also, a more traditional introduction to a laboratory exercises was observed on my third visit where Brian chose to not use a flipped video because, in his assessment, the class did better with a more traditional introduction (Observation 3, 2015). The frequency of video use will be further addressed in the cross case analysis in Chapter V.

### **Brian's Case Summary**

Brian represented a reflective veteran educator who had adopted the flipped classroom over the course of the past few years in an iterative process of experimentation and refinement. First, he used basic screen casts posted to YouTube as means to free up more class time to help kids “who struggle” (Brian, Interview 1, 2015). Then he viewed the flipped classroom as a “three or four-piece model” which could foster a greater engagement with students in the classroom (Brian, Interview 2, 2015). As noted above, he was in strong alignment with both of the school’s academic and technology administrators’ views of technology in regard to the flipped classroom as being a positive mechanism for fostering a more ‘student-centered’ classroom.

Brian’s use of the flipped classroom, while with its complications of implementation as a ‘new’ model of instruction within Bardwell, continued to be supported by the school’s administrative team. It was also in alignment with the broader culture of the school embracing experimentation in the classroom with regards to method and practice of teachers. While Brian’s flipped videos were not used or presented with

the regularity presented in the literature in a direct swap for lecture and homework, they complemented his classroom activities that were varied and included a high number of one-on-one student teacher interactions as well as constant teacher movement. The overall picture of Brian's classroom practice was one that focused on reducing direct instruction in the classroom and associated off-task behaviors by students. It also included increasing the time afforded in class for students to work in pairs or groups on class exercises or problem sets enabled by the flipped classroom.

Lastly, Brian appeared to conceptualize the flipped classroom model as a vehicle for further differentiating his classroom practice in a model he described as "tiered instruction" (Brian, Interview 2, 2015). He described his ultimate goal in continuing the flipped classroom to include producing videos in multiple tiers with three distinct tracks for students to select affording an asynchronous model of instruction in which students can move at different paces within allotted windows of time. Again, his focus on mechanisms for expanding student support, as facilitated by the flipped classroom, was a common thread in his descriptions of practice and in observing his teaching in the classroom.

## **Megan**

### **An Introduction**

I arrived 15 minutes early for my first meeting with Megan. After having parked in an open lot in the middle of the campus grounds of Fairfield; I walked up a series of stone steps adjoining terraced gardens towards a larger Tudor-style building. It was a cloudy, cold morning, with rain likely on the forecast. On the right, a large construction project was being undertaken to renovate the school's major performance space. Large

iron beams protruded from stone walls and they were cut and covered in plastic to keep out the weather. My first visit to Fairfield had been canceled due to snow. The ongoing weather, with its impact on school closures, proved to be a challenge for these schools during the late winter and early spring.

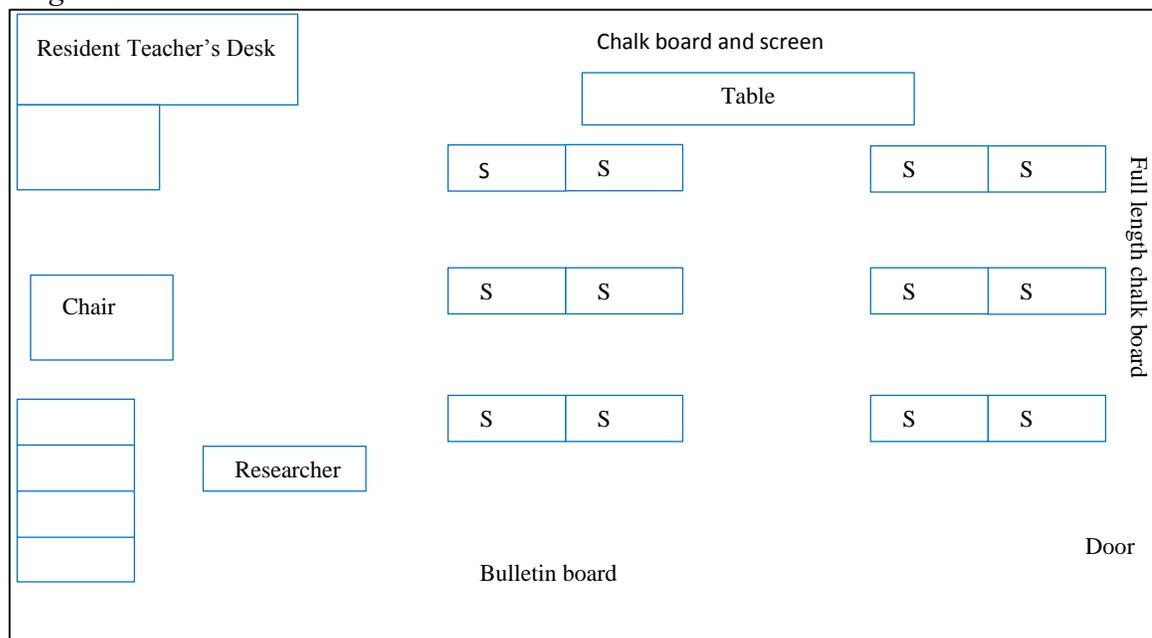
I was greeted at the door by a flustered, young administrative assistant who did not appear to know the guest admission process. Another staff member, apparently training the new hire, called Megan, left a message and asked me to take a seat. After a short wait Megan arrived very formally dressed in a pencil skirt and blouse extended her arm to shake hands. She smiled and asked if I had any trouble finding the school. We walked, together across a courtyard, into the large adjacent building that was under construction. After entering a pass code into a key pad, we traveled up to her office on the second floor, tucked away along the senior hallway. It was fairly cluttered with a desk, two chairs, and a circular table full of stacks of papers in various states of order. Megan's office appeared to match the campus feeling embodying old and new with a renovated exterior stone wall on two sides and a glass filled wall and doorway on the others. It was a well-used space, inviting, and ultimately steeped in history. Our first meeting lasted approximately an hour and in reflection in my journal that night I noted that Megan was "friendly and warm throughout the interview and appeared to have genuine interest in reflection on teaching practice and application of the flipped classroom" (Whitfield, 2015).

Megan appeared to be a veteran teacher in her second career. She was in her thirteenth year with Fairfield, and served as their senior class Dean in a similar halftime administration role that Brian served in at Bardwell. Megan taught three courses a day: a

ninth and tenth grade Geometry course, an Algebra and Trigonometry course for tenth graders, and Calculus for seniors. For the purposes of this study, only her flipped ninth and tenth grade Geometry course was studied because her flipped calculus course would have ended early due to AP exams, and her other course, Trigonometry, was not yet flipped. Megan explained that this was because she did not have time to it being “a new prep for this year...” and because she has “a very busy senior class” (Megan, Observation 1, 2015). Megan maintained a pragmatism in regard to the flipped classroom model throughout her interviews and in her observations presented a reflective, compassionate teacher who clearly valued her students’ varied perspectives in the classroom.

**Megan’s classroom.** My first introduction to Megan’s classroom was after a brief walk from her office to an adjacent building. Similar to her office, the classroom was housed in the frame of what appeared to be an older structure but with more recent interior finish and furnishings. It was on a lower level, without any exterior windows but the upward facing tracks of light fixtures filled the ceiling tiles with a bright glow, obfuscating the subterranean nature of the classroom. The room itself was only slightly adorned with personal items, including a row of wolf posters along one side and a few woodcut shapes of cones and cylinders on a desk in the corner. The only remaining personal item was an aged recliner. Chairs and desks were aligned in pairs facing the screen and chalkboard as shown in *Figure 6*. Besides a few math equations on a traditional chalk board there was no other indication as to the subject taught in the room. The floor, covered in drab industrial carpet, and walls, equally mild painted in a flat cream-color, also contributed a bland flavor in the room.

Figure 6

*Megan's classroom*

As with Brian's classroom, Megan's classroom was a shared environment. The resident teacher, who must have loved wolves, entered in our first observation period after about 20 minutes and resided at his desk marking papers during Megan's instruction. His desk, noted throughout the observations, was typically covered with work and not inviting as a shared space. Megan exclusively used a large table at the front of the room as her administrative center, utilizing a wireless connection from her tablet laptop to a ceiling mounted projector to present content. As with any traveling teacher who visits another classroom to provide instruction, it had the feeling of a mid-day commute to work. This was highlighted with the obvious delays caused by interruptions while traveling to class and by inquires of students and teachers addressed to Megan in the halls. Her traveling-teacher status was also obvious at the end of class as shown by the necessity to completely and quickly clean up.

## **Adoption Context**

**Megan's view of teaching.** Megan described her role in the classroom as a coach in reflecting that students in math must start with concepts and “discover some of the concepts as well as have some of the concepts clarified...” (Megan, Interview 1, 2015). She also held, in reflecting on her teaching philosophy, that students “need to spend most of their time practicing and working through problems” (Megan, Observation 1, 2015). Her focus on problem solving and practice as priorities in math instruction was also supported by observations of her classroom practice. Megan, in seven observations, limited her direct instruction to less than half of the class time. In the majority of the observations, her use of direct instruction made up less than a third of class time being replaced with students working on problems in pairs or individually.

Megan also attributed the flipped classroom to being highly compatible with her view of instruction. She explained, referring to the flipped classroom:

... the model is the introduction of the material through the video and then working through problem sets and, and implementation of the concepts in the video during class time. It very much fits with mine because I see myself as more of a coach... (Megan, Interview 1, 2015)

She added that, with the flipped classroom, her “time in the classroom is more loose” and reflected that her “classroom’s always been casual but it allowed it to be very interactive the entire time” (Megan, Interview 1, 2015). Megan also placed a lot of value on the perspective of her students in regard to her instruction. She asserted that the flipped classroom had a positive impact on her classroom environment explaining that “it allows it to be a very comfortable place for kids” (Megan, Interview 1, 2015).

Megan also described the comfort of her students being a priority in her subject area. She explained “for me the idea of mathematics, kids being comfortable with mathematics is really important to me” (Megan, Interview 1, 2015). In describing the value of the flipped classroom model in the classroom she added:

... not feeling like I don't, you know, I don't do math or my family's not good at math, whatever it is, it's that ability to, everybody can see in the classroom, like, oh, I can do these things. And even though it starts to get harder, I'm still able to do it, and I have somebody there helping me do it, and I can get individual attention for those kids that need that individual attention to go over a concept (Megan, Interview 1, 2015).

Megan's focus on individual students through one-on-one interactions, as described above, was evident in all seven of her observed lessons. Taken as a whole, Megan appeared to be a teacher who, through observation and in her own reflection, placed a priority on the views and perceptions of her students.

**Megan's adoption.** Megan described her adoption of the flipped classroom as originating from the experience she had at a math conferences, a number of years prior to her experimentation with the model. As she noted:

Some teachers there talked about a process of giving kids problems to work the night before that would relate to the class they were going to have the next day as opposed to, to reinforcing what they learned in class, that night. And so that first idea of kind of flipping what you're doing, to prepare the night before. (Megan, Interview 1, 2015)

Megan, in a unique reflection relative to any of the participants of this study, described her first encounter with the flipped classroom model as mechanism for social justice. She noted that in attending the conference she encountered a teacher working on her PhD who:

Was showing that the idea of having kids work on a concept at night that's introductory and then reinforcing it in the classroom allowed students, particularly students that that didn't have home support, to achieve better in the classroom. (Megan, Interview 1, 2015)

Megan explained her own rationale for adoption explaining that, in regards to the flipped classroom, “it seemed like this would be really a way... that I could understand what the kids understood better” (Interview 1, 2015).

Megan also addressed her own perception of value in regards to the flipped classroom and social justice explaining how it leveraged her time in class to support students equally. In her own words, she added:

I could help them, I could also help those kids that didn't have parental help, support at home. We had so many kids spending a lot of money on tutoring. And I felt like, they're spending a lot of money to come to school here [LAUGH] they shouldn't be spending a lot of money on tutoring on top of that, and I felt like this would also reduce that. So, it was that whole piece of not only better instruction, but also kind of leveling the playing field for kids that couldn't afford couldn't afford or didn't have parental support at home, we're the reasons why I, I started it. (Megan, Interview 1, 2015)

Megan's emphasis on social justice and advocacy as a primary impetus for adoption also aligned with *Diffusion of Innovations Theory* in that it suggested that Megan viewed the flipped classroom as offering a relative advantage and compatibility with her beliefs with regard to teaching (Rogers, 2003).

In addition to social justice Megan also described a major relative advantage of the flipped classroom as being a time shifting and time saving tool. As she described in her first view of a presentation of the flipped classroom in math, "if you're able to present the material ahead, you can spend your time in the classroom working the problems, to me, it seemed revolutionary" (Megan, Interview 1, 2015). Also, frustrated with her previous mode of instruction she explained "I spent most of my time in the classroom... reviewing homework and hardly getting to the material I wanted them to then work on that next day" (Megan, Interview 1, 2015). Megan elaborated that she was able to increase the amount of support she was able to give students in the classroom and cover more course content by moving direct instruction to the home prior to class. Lastly, in her rationale for adopting the flipped classroom, she explained that she felt that it enabled her to "understand what the kids understood better" in a mechanism where she "could help them..." (Megan, Observation 1, 2015)

**Facilitation of adoption through a one-to-one iPad program.** The academic administrator, Courtney, described Megan as one of the "pioneering spirits" in the school as she described her role in the adoption of the flipped classroom within Fairfield (Interview, 2015). This in contrast to what Courtney, the academic administrator, described as "skepticism" in regards to the flipped classroom within Megan's math department (Interview, 2015). Yet, even with

this skepticism, the technology administrator, Jennifer, attributed the adoption of the flipped classroom to a pilot program Megan participated in using iPads in a one-to-one model. As she explained, Megan started using iPads “in the second year of her doing the flipped classroom and that really facilitated the types of things she was trying to do with the kids when they had that device, so that is really where it started” (Jennifer, Interview, 2015). Jennifer also explained that one of the major barriers to adoption of the flipped classroom “was the technology access” at home and that “we rectified that with Megan in particular by having her students have devices that they took home...” (Jennifer, Interview, 2015).

Reducing the complexity of the adoption of the flipped classroom by providing common tools for students is in strong alignment with the assertions of Rogers that complexity has a negative impact on adoption. Megan explained, in making her decision to apply for the iPad pilot, that it “was very important to me for kids to be able to have access to the information, and be able to have that access either both here at school and at home” (Megan, Interview 1, 2015). She added in referring to the flipped classroom “conceptually, I always thought it was a really, really good idea... but I wasn't, I wasn't sure how I was gonna implement it” (Megan, Interview 1, 2015). Megan also explained that the ability to watch videos in class, and marry the flipped classroom with a pilot iPad program, caused her to apply for the program in the first place.

**Fairfield’s adoption of the flipped classroom.** Though the origin of the adoption of the flipped classroom within Fairfield’s halls is unclear; Megan did appear to have had an impact on its introduction. Courtney, the academic administrator,

remembered the flipped classroom starting from a conference in California five years prior (Courtney, 2015). Megan attributed the origin to a conference for math teachers held seven years ago in which “some teachers there talked about a process of giving kids problems to work the night before that would relate to the class they were going to have the next day as opposed to, to reinforcing what they learned in class, that night” (Megan, Interview 1, 2015). Jennifer, the technology administrator, took a more recent stance noting that the flipped classroom did not enter Fairfield in earnest until a “summer program” in which Megan returned and said “I appreciate that not everybody is on board with this, but I'm doing it, so I'm doing it whether you do it or not” (Interview, 2015). Jennifer also suggested that this adoption of the flipped classroom ran counter to the culture of the school explaining in relation to Megan that “she had been toying with this, but in our school we make decisions, for the most part, by group conversation” (Interview, 2015). She added that “there is not a lot of, sort of, people out on their own” (Jennifer, Interview, 2015).

Frank, the second teacher I studied at Fairfield, also remembered a summer program as the start of the flipped classroom in Fairfield as he reflected “I brought them with me like little seeds [laugh] but those folks were doing it here at that school... they had a summer workshop” (Frank, Interview 1, 2015). Megan, too, described discovering the flipped classroom at a much earlier date than this summer workshop, noting that after a previous encounter with the model she went to a conference found the practice to be “revolutionary” (Megan, Interview 1, 2015). Regardless of the individual teachers’ descriptions of their discovery of the flipped classroom, or the conflicting narratives offered by the administrators of Fairfield, all four parties appear to agree that it was a

‘summer workshop’ the year prior to an iPad pilot program which solidified the practice of the flipped classroom among teachers.

Both the administrators and Megan addressed the role the iPad program played in facilitating the adoption of the flipped classroom program for Fairfield. Courtney, when asked directly if the iPad program played a role in adoption responded, “Yes, because I think that and any, any one-to-one program would” (Courtney, 2015). Jennifer, likewise, noted in reference to the iPads that “she got them in the second year of her doing the flipped classroom and that really facilitated the types of things she was trying to do with the kids when they had that device, so that is really where it started” (Jennifer, 2015). Lastly, Megan, explained that she “started that year because I had that opportunity to marry that flip classroom... with the kids who were getting iPads” (Megan, Interview 1, 2015). When pressed if the technology afforded the opportunity, Megan affirmed her belief that the iPad pilot did in fact facilitate the adoption. In summary, the willingness of Megan to independently experiment with the flipped classroom, even in the face of skeptics, coupled with the addition of a one-to-one iPad pilot, provided the environment for the flipped classroom to be adopted at Fairfield.

### **Practice**

Megan exuded the confidence of a veteran educator. Throughout this study she commanded a presence in the hallways of Fairfield. Appendix K highlights the primary class activities, Megan’s primary behaviors, and the flipped video frequency during seven observations of her teaching. These aspects of Megan’s instruction will be expanded upon below to further describe her classroom teaching practice and her use of flipped classroom videos.

**Megan's classroom practice.** Megan was in her third year of implementing a flipped classroom for her Geometry class. The most noticeable aspect of her classroom instruction was the time dedicated to students working on problem sets. Whether on paper, as noted on the first day of observation, or in an iPad app on the fourth day; Megan devoted the majority of her class time to students working independently, in pairs, or in groups of three. This aligned closely with her view of her role as an instructor, stating “I believe that my job is more of, is [a] coach...” and she added that she believed that students “need to spend most of their time practicing and working through problem” (Megan, Interview 1, 2015). In the first observation of students in Megan's class, she allotted 40 minutes of a 70-minute period to work on a packet in pairs. The entire time she moved from pair to pair, answering questions when asked and appeared to mediate behavior and keep students on task. This activity began with no introduction of content or instructions from her besides for students to begin. The remaining time was direct instruction on angle bisectors using predominantly choral questions. Megan's final comments to the class as the bell rang were “the homework is to finish those three problems watch the video... I will be checking those video notes” (Megan, Observation 1, 2015)

Megan's lack of an introduction or review at the beginning of class on our first observation was unusual, as she included one in all of her following observations besides the day she gave a quiz. As she described her own practice describing the events after a flipped video for homework:

when we come to class the next day, we will work on problems associated with that video. I typically will also go over the basic concepts again that

were in the video just way more, way shorter than what I would do under any normal lecture. So I, I spend a very quick beginning of the class on those concepts, going over the concepts that were in the video and then we begin working on problem sets in class, or a project, or something that relates to that.... they won't have a video to watch every night, they will typically have a video on most concepts (Megan, Interview 1, 2015).

Megan explained that this adaption to her classroom practice of using introductions was equivalent to the type of warm-up she would have done in a traditional model of instruction (Megan, Interview 1, 2015). She also noted that at times it was just a necessity because of scheduling, noting:

it's just reinforcing what the important points are so that when we get started on the work in class that sometimes, especially because with the blocks that we have. Some days it may have been if they watched the video Friday at the end of class and we don't have class again until Tuesday. It's been a while since they've seen that information so it triggers their memory as well (Megan, Interview 1, 2015).

Pragmatic or not, the use of short periods of direct instruction was a significant adaptation of the flipped classroom model not described in the literature.

One of the most apparent aspects of Megan's classroom was her constant movement between students in one-on-one interactions with individuals or pairs of students. In each instance, she appeared to be working with students and coaching them. The technology administrator for Fairfield, Jennifer, held the same view of the flipped classroom, aligning with Megan when she noted:

the classroom activities, class time is used for problem solving, group discussion, group problem solving, individual support from the teacher. So that they, in turn, their role in the day-to-day classroom in a flipped environment, is more of a mentor and coach of the kids (Interview, 2015)

Megan's view of this practice of moving around the classroom constantly to answer questions and to address off-task behaviors was also confirmed in her comments after the observation of her second class. When asked if she felt like she's "herding cats at times" she responded "yes, it often feels that way and you end up being a lot more of a coach than a teacher" (Case study field journal, 2015). When pushed to reflect on this difficult transition for some teachers Megan answered yes, asserting: "that's why she thinks she's one of the few who likes to use the model in her instruction because she likes the fluid nature of the instruction" (Case study field journal, 2015). She also added "that for teachers who like a lot of control it's hard to use the flipped classroom" reflecting her position on the transition of the teacher to a mentoring or coaching role (Case study field journal, 2015)

Complicating an understanding of the connection or link between the flipped classroom videos and classroom activity was Megan's use of one-on-one and pair interactions throughout her class time without necessarily having a preceding flipped video. Only two of Megan's observations included a preceding flipped video while the majority of her classes still revolved around a majority of class time spent on working problems independently or in pairs as noted in Appendix K. As noted in the literature review, the flipped classroom is often cited as an inversion of classroom practices for

those done at home, namely direct instruction for problem solving, however this did not appear to be an equal exchange in Megan's practice. She gave an abundance of class time to problem solving, on a nearly daily basis, while intermittently taking direct instruction and sending it home in her flipped videos with in-class reviews of content from the sample of observation.

**Megan's videos.** Megan utilized Screencast-o-matic for her recordings of the eight videos she made available for the study and utilized pre-written Microsoft OneNote pages with imported graphics and problems. Megan hosted her screencasts on YouTube under her own channel, and she supplied links to her students on weekly assignment sheets, linked directly to the videos she wanted students to watch prior to class. Her YouTube channel was created on August 31<sup>st</sup>, 2012 and all of the videos supplied in this study were created in the spring of 2013. All the videos were of Megan's creation by design as she explained, "I choose to do my own videos because I want the kids to hear my language that I use in the classroom and to be consistent with that" (Megan, 2015).

The videos ranged in time from 2 minutes and 46 seconds to 15 minutes and 1 second. Megan noted that this time limit was also intentional in reflecting on why she prefers to use her screen-casting platform:

I typically use Screencast-O-Matic, which limits me to 15 minutes. But I limit it to 15 minutes anyway, because the kids in the conference that I went to, the kids said anything beyond 15 minutes, they weren't gonna watch. And it got crazy so, I, 15 minutes is good for me (Megan, 2015).

Five of the eight videos were described as reviews and focused entirely on solving problems. The first three reviewed began with a definition of the concept, described the

process for solving a problem type, and continued with multiple examples. The videos themselves are all created by Megan and included her handwriting over the OneNote pages as shown in below in *Figure 7*.

Figure 7

*Megan's flipped video "Proportional Segments between Parallel Lines" given for homework on 3/31/2015 for observed class on 4/1/2015*

Unfiled Notes

Tuesday, April 09, 2013  
12:16 PM

### Proportional Segments Between Parallel Lines

Separate each figure below into two triangles. Then find  $x$  and numerical values for the given ratios.

a.  $\overline{EC} \parallel \overline{AB}$   
 $x = ?$   
 $\frac{DE}{AE} = ?$ ,  $\frac{DC}{BC} = ?$

b.  $\overline{KH} \parallel \overline{FG}$   
 $x = ?$   
 $\frac{JK}{KF} = ?$ ,  $\frac{JH}{HG} = ?$

c.  $\overline{QN} \parallel \overline{LM}$

Handwritten notes and diagrams include:

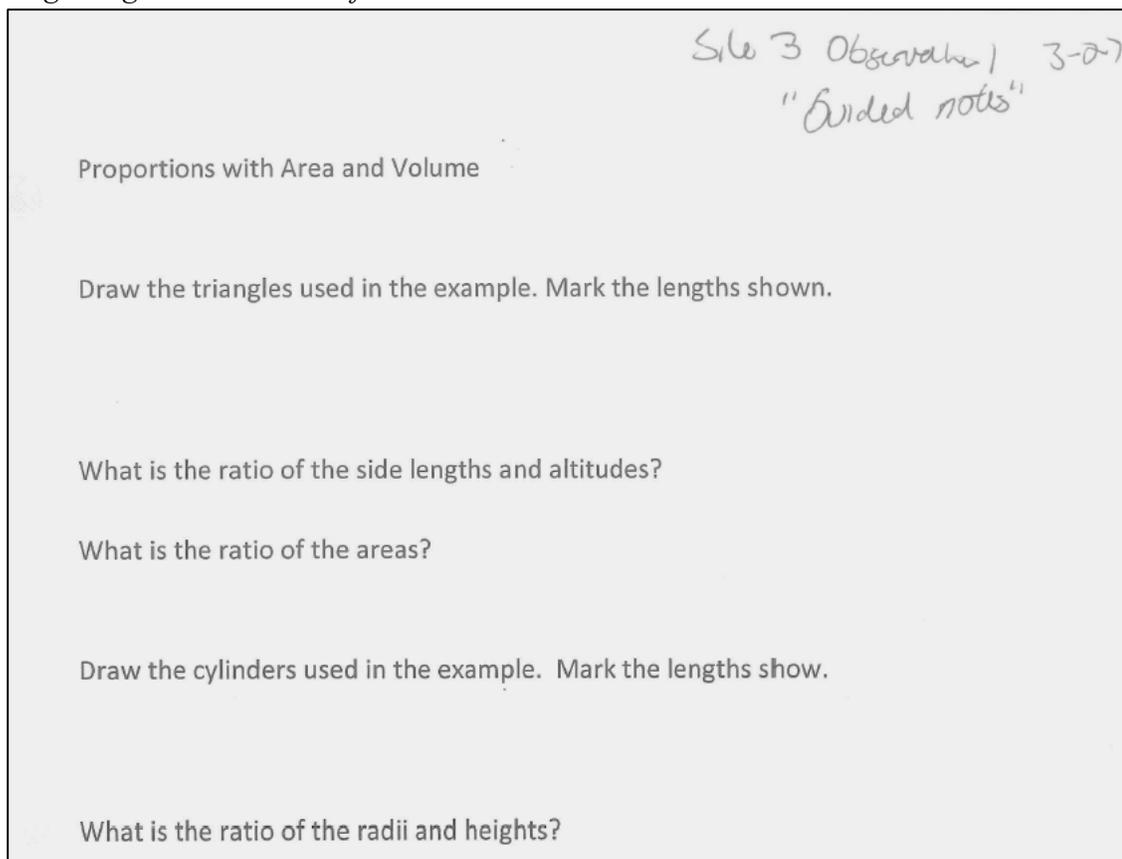
- Diagram for (a): A triangle  $\triangle ABC$  with a line segment  $EC$  parallel to  $AB$ . The segment  $DE$  is 8,  $EC$  is 12, and  $EB$  is  $x$ . A smaller triangle  $\triangle DEC$  is shown with sides 8 and 12.
- Diagram for (b): A triangle  $\triangle JFG$  with a line segment  $KH$  parallel to  $FG$ . The segment  $JK$  is 24,  $KF$  is 8, and  $KG$  is  $x$ . A smaller triangle  $\triangle JKH$  is shown.
- Diagram for (c): A triangle  $\triangle M$  with a line segment  $QN$  parallel to  $LM$ . The segment  $QN$  is 16 and  $NM$  is 12.
- Handwritten equations:  $\frac{8}{24} = \frac{12}{12x}$ ,  $8(12x) = 288$ ,  $124x = 36$ , and  $x = 24$ .

Megan also described “typically” using a “guided note sheet” for her students when watching the flipped videos (Megan, Interview 1, 2015). The self-generated worksheet, as shown below in *Figure 8* from her first observation, included a series of questions relating to the video in chronological order. Megan described these guided notes as facilitating the process of watching the videos at home for students. As she explained, “it’s good for differentiation... students have the opportunity to watch and watch the videos at their own pace, to re-watch the videos with the guided notes that help them” (Megan, Interview 1, 2015). Courtney also appeared to be in agreement with

Megan's use of the guided notes as scaffolding tool for the videos, explaining "I know that she provides some sort of guided note taking sheet which seems like an important element" (Interview, 2015). The frequency of utilization of guided notes included one guided note sheet for the eight videos assigned, five of which were for review.

Figure 8

*Megan's guided note sheet from 3/27/2015*



In describing her videos, Megan asserted that a major hurdle to adopting the flipped classroom was the creation of the videos, due to the time commitment and investment in a static format. She noted:

It does take time. Once you've done it, if you do it right the first time, I mean, there's a learning curve...you don't time stamp your videos, you

make sure that you are really explain- like I did this for my first year I taught calculus I did this with some of my videos, and the way that I taught it is different from the way that I teach it now, so I would have to go back in and redo those videos for certain sections because I don't like the way that I taught it the first time. I found a way more effective way and I might be able to, to teach it, or to describe what I was doing so if you are really confident in the way, in the information you're given and you do it without a time stamp, you're good, cuz then once you've done it, it's not a lot of redo (Megan, Interview 2, 2015).

Yet, conscious of this time commitment, Megan still appeared to prefer creating her own content. Jenifer also commented on Megan's preference to create her videos over a time constraint, and explained, "it took a lot of time you know, creating those lessons, doing those videos took a lot of time, it's double the time... but I think she saw that, the benefit of that outweighs the cost over time" (Interview, 2015).

Lastly, Megan also attributed the videos she has created with improving her direct instruction explaining "my lectures are way more organized when I do this because I can write, take the time to write it very neatly, whereas when I'm in the classroom, I'm writing very fast (Interview 1, 2015). She added "it allows me to be, for my lectures to be actually, the portion of it with just lecture and the video, it allows that to be very succinct and very, very organized" (Megan, Interview 1, 2015). In contrast, Megan explained that being organized in her videos allowed her classroom to be relaxed. In her words, "my time in the classroom is, is more loose, my classroom's always been casual but it allows it to be very interactive the entire time (Megan,

Interview 1, 2015). The formality of the videos appeared to be an intentional contrast to Megan's classroom environment derived from the flipped classroom model.

### **Megan's Case Summary**

Megan was a second career, veteran teacher at Fairfield of 13 years who had adopted the flipped classroom for the past three years. She used the flipped classroom as a means to emphasize her role as a *coach* and utilize the majority of her class time for "practicing and working through problems" (Megan, Interview 1, 2015). Over the course of her adoption in the past three years, Megan had increased the amount of in-class review, or lecture, she conducted with her classes because she "had to reinforce it more and be more structured" (Interview 2, 2015). As noted above, her view, were in strong alignment with both of the school's academic and technology administrators' views of technology in regard to the flipped classroom as having a positive impact in affording students to spend time problem solving in class with support.

Megan's use of the flipped classroom included a use of videos for homework with a relatively high frequency. This included using a video preceding, or following, a class meeting for every observed lesson. Her classroom activity was highlighted by a high number of one-on-one student teacher interactions and almost constant teacher movement for the majority of class time. While short periods of direct instruction were present in five of the seven class observations, they were typically short in duration and exclusively included reviews of content and not new course content. Generally, Megan's classroom practice was one that focused on problem solving in pairs or individually by reducing direct instruction in the classroom. It also included an approach to classroom instruction

that included a mentoring aspect, which aimed to reduce off-task behaviors of students while promoting their successive progress on class assignments.

Lastly, Megan viewed the flipped classroom model as enabling variable support in the classroom as it pertains to differentiated instruction and social justice. As she explained “I really believe that this model will level the playing field for kids that do not have the same advantages that other kids do” (Megan, Interview 2, 2015). Her emphasis on the flipped classroom model as a mechanism for focusing on student support was evident from observing her structure of class time, her use of guiding questions with her flipped videos, and the reflections of the administrators at Fairfield. Lastly, Megan attributed the flipped classroom model as being focused on students, explaining “I think it helps my role in the classroom as coach so the kids see me as their, as their advocate...” (Interview 1, 2015). This perspective further highlighted the value she placed on the model in altering her instruction to be increasingly student-centered.

## **Frank**

### **An introduction**

I arrived early to Fairfield on my second visit. This time it was to observe Frank for the first time. Overcast and unseasonably warm, the campus had a humid damp feel with a low grey ceiling of clouds. After walking up the long, terraced flight of stone steps, I entered the main upper school building and took a seat in office on the left. At this point, the administrative assistant already knew me by name and, after her flustered first meeting, appeared to have settled in at Fairfield. After a twenty-minute wait Frank appeared at the door, dressed in grey wool slacks and a formal black long sleeve shirt with black shoes and belt. This was our second meeting and he again offered a firm

handshake and smile as he welcomed me back to Fairfield. Frank was the second participating teacher in this study from Fairfield and the two, including Megan, represented a unique comparison and contrast.

Frank was in his eleventh year teaching. He, as the previous two participants in this study, also split his position as a teacher. Working in his second year at Fairfield teaching two French II courses, he also worked as the Technology Coordinator for the upper school. His office was nestled in the corner of the main entrance and corridor of the upper school building with tall glass panes which gave ample view into the office. Throughout our time together, Frank was regularly interrupted for impromptu questions from faculty on subjects ranging from basic functions on iPads, the school's Learning Management System (LMS) to video production. His demeanor was formal. Frank also had a sharp, European sense of humor that emerged in his classes and his interactions with both the students and myself. From our first interview it was evident he was a bright, ambitious, and reflective educator who enjoyed his vocation.

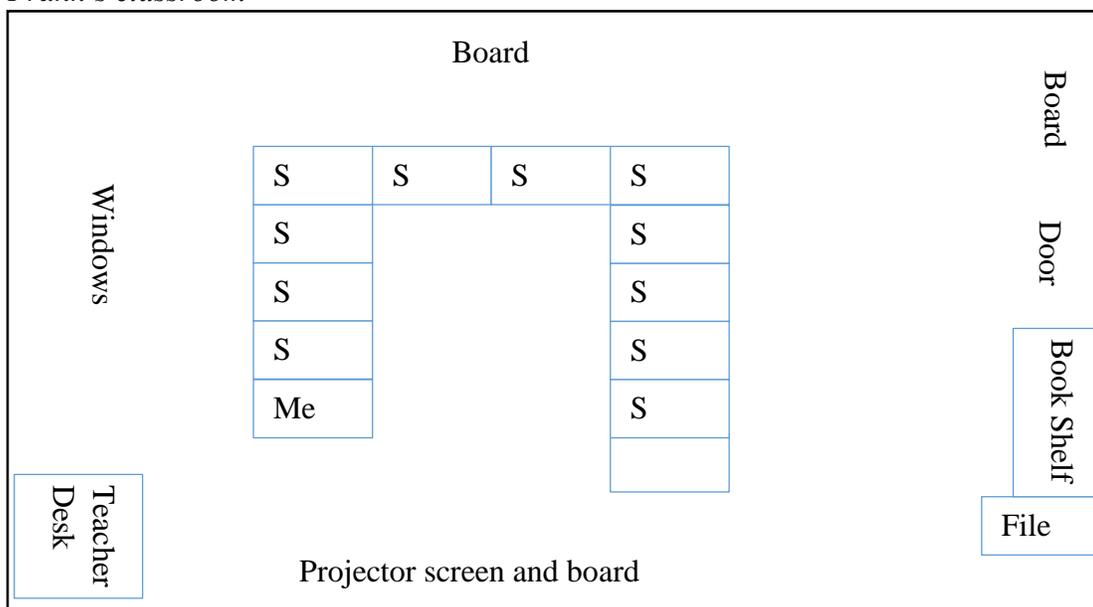
**Frank's classroom.** Frank's classroom was down a flight of narrow stairs in the main upper school building in the basement level of the building. Because the entire structure sits on a steep incline, Frank was lucky to share a room on this subterranean floor that included a bank of windows. The room itself was virtually devoid of any adornment. The walls, doors, and even doorframes had been painted in the same drab grey color as the bookshelves. As I noted in my journal the night of my first observation "it reminded me of an old college lecture room for a liberal arts class" (Case study field journal, 2015). Besides a few foreign language phrases printed on white paper, backed

with cardboard on the walls, it was virtually impossible to tell what subject was taught in this monochromatic hollow.

The classroom included a ‘U’ shaped pattern of desks aligned with the front of the room and it had three white boards and a pull down projector screen on one side as shown in below in *Figure 9*. The lone bookshelf, in its matching paint scheme, was bare. The teacher’s desk was completely absent of any artifacts of any kind except for a VGA input plug strung along from the wall. The only visible technology in the room was a center mounted ceiling projector.

Figure 9

*Frank’s classroom*



### Adoption Context

**Frank’s view of teaching.** Frank viewed his instruction and teaching from perspective of language acquisition. As he explained first foremost, “my big shtick is basically, you know, is it's a language, so I think it's very important to put the emphasis on communicative skills” (Frank, Interview 1, 2015). As he described in this emphasis

on communication, he tried to emphasize the relationship between what is familiar to the student and what is foreign to a student. As he explained: “I use from the teenager's interest and bridge out to what they quote on would be if they were living in France if that makes sense” (Frank, Interview 1, 2015). Frank was clearly focused on a student perspective on learning.

As Frank explained his second priority in the classroom was differentiated instruction. In an explanation of his adoption of the flipped classroom, he recalled: “I was having the idea for different students to, to be able to use material... the ability for students to be able to watch us at their leisure. You know, pause, take notes, and so forth” (Frank, Interview 1, 2015). He also added *Universal Design* to his list of priorities in the classroom when teaching a foreign language. From Frank's perspective this included the utilization of multiple materials including, songs, recordings, and visuals to balance out texts (Frank, Interview 1, 2015). While it is unclear exactly how Frank might define Universal Design relative to more formal definitions, it highlighted his interest in presenting students with multiple modalities in the classroom and continuing to provide students with choices in their learning.

Lastly, Frank clearly believed in fostering independence on the part of students as a major priority in instruction. In his closing reflection, when asked to describe his beliefs about learning, he noted:

Frank: That's the other thing. I think and the last thing I think it's, it's, you know what I mean, someone's cliché again, but, like being a bad learner. Most people choose to move from task to task and not everybody's doing the same thing at the same time.

Dean: And when you say an independent learner, you're trying to foster a classroom that.

Frank: Exactly.

Dean: Okay, you want to foster a classroom that provides a way for students to be an independent learner.

Frank: Exactly. I haven't found a way yet, but maybe one day I'll find the Holy Grail (Interview 1, 2015).

Alluding to an adoption of the flipped classroom, Frank's priorities for instruction included emphasizing communication moving from the familiar to foreign, differentiating instruction for students using multiple modalities, and fostering independence among learners. As he described his priorities, Frank spoke as though they were a continuing endeavor, a goal set to reach for in the classroom.

**Frank's adoption.** Frank described himself bringing the flipped classroom to Fairfield in his transition to the school from San Francisco two years prior. As he recalled "I bought them with me like little seeds. [LAUGH]. But those folks were doing it here at that school. Like they had the summer workshop. Before I came back from classroom and they were exchanging ideas" (Frank, Interview 1, 2015). Frank's first exposure to a flip in instruction came from watching a teacher at his previous school on the West Coast at least five years prior. She was using a document camera to record her lessons using manipulatives and then would replay her recording in class to work and narrate over it (Frank, Interview 1, 2015). She would also use her videos during times of independent learning and to facilitate changing the pace of the course with "some students were watching the video on computers while others were doing different

activities” (Frank, Interview 1, 2015). However, her approach, as Frank recalled, was not entirely reflective of the flipped classroom as he understands it today because she did not send those videos home with students.

Frank credited her with highlighting a change in the structure of the course as not only his first glimpse into the model of instruction but also something that appealed to his interest in restructuring his courses. He was simultaneously enrolled in a certificate course in mobile learning because his former school was transitioning to a one-to-one iPad program in their middle school. Frank credited this course at the University of San Diego, and a certificate course in online learning, for getting him engaged in blended learning models (Interview 1, 2015). Blended learning became the catalyst for Frank to begin to experiment with the flipped classroom.

In addition, Frank also credited technology facilitating his adoption mirroring Brian and Megan in their respective settings. As Frank recalled, noting his inspiring teacher and coursework:

Those two things at the same time got me interested in how about I get started, especially, I think the last piece is the technology make it so much easier now. You know, when she was doing it as a teacher, she had a doc cam. She was recording it. We were a mac school, so she was [using] iMovie, whereas now we like explain everything for me and I thought we, or as the person claimed, I can literally make a lesson in 15 minutes. Exploiting YouTube, all in one app, in one device. So I think that technology is well, is there to make it much easier these days than it might have been, I don't know, like not even 6 years ago.

Frank currently used Screen Flow for Macs, and Explained Everything on his iPad, to create his videos. He has utilized these tools for the past two years. Asking Frank to reflect on any barriers to the flipped classroom from technology he laughed and replied: “You’re asking the wrong person,” alluding to his position as technology coordinator (Interview 2, 2015). When pushed further he explained: “I think the tools have become much more, simpler, user friendly” and added “10 years ago I would have learned how to, would have had taken me much more expensive equipment, I’d need to have a camera, I would have to record it then maybe I’ll sell tapes to everyone or CD’s” (Frank, Interview 2, 2015). In his view today “with some of the apps, it’s become very user friendly” requiring “literally pressing one button, record, and then you just- drawing and then you just click on save and all these kids have access to it... no it’s like the bar is pretty low” (Frank, Interview 2, 2015).

**Frank’s rationale for adoption.** Frank attributed his adoption to the flipped classroom stemming from five major interests. First, he viewed it as a means of increasing differentiation by giving students the ability “to re-watch, watch again, pause, take notes like a grammar lesson for example” (Frank, Interview 1, 2015). Second, he used it to add a level of independence on the part of the learner. Third, he used it to expand into multiple modalities, including in his words “having that different type of stimulus, you know, depending on the students” (Frank, Interview 1, 2015). Fourth, it allowed him to lessen the impact from absences. As Frank explained:

I mean it sounds silly, but we had to deal with early dismissal, missing school, snow days. And that does, that doesn't put down... disadvantageous, you know, if they are sick, if they are missing school. If

they are away for x, y, and z, at least they, they don't, they don't lag too much with the other kids. We just keep tagging them along the, along the, with the courses (Frank, Interview 1, 2015).

While neither administrator at Fairfield proposed this as an advantage of the flipped classroom, Megan did. She asserted, “you can learn anywhere, but it's that with in an age where kids miss for various reasons,” adding in reference to the flip classroom, “whether its sports, whether it's college visits, whether it's whatever, it's that they don't miss as much with this approach” (Megan, Interview 2, 2015).

Frank identified a major advantage, affording adoption of the flipped classroom, to be its efficiency resulting in an increase in time. As he clarified:

I think that's last piece. I think, you know, what I can explain in the five-minute video will take me like 25 to half an hour in class time.

Absolutely. And it's much more efficient that way. And we all know the teachers are always starving for time (Frank, Interview 1, 2015).

Frank was also not alone among participants in this study to cite time as a major benefiting factor contributing to adoption of the flipped classroom. Taken together with increased differentiation, increased independence, multiple modalities, and a reduction in absences, Frank clearly viewed the flipped classroom as providing a relative advantage to traditional instruction, thus resulting in his adoption of the model.

Finally, in trying to understand why Frank chose to adopt the flipped classroom model of instruction, it was important to note that Frank did not believe it to be the best mechanism for teaching. Rather, he perceived it to be an incremental step towards an

ultimate goal of student driven, location independent, asynchronous, learning he calls gamification. As he explained:

“the Holy Grail of it will be the gamification of it. That's what the kids hungering and lust for doing. Like the dueling, the ability to go from one level to another. To get excited about having two hearts left, to complete that unit... So, to actually have a much more flexible model than the other one, we don't necessarily be needing to do the same unit all at the same time. Some kids will want to take off and actually go fast and learn a lot. I have the ability to that. But, kids who wanna to take their time can do it as well. So, you can expand that model where have like online modules of some sort. And actually challenge the notion of hey, you have to be in school, on site, to do my course (Frank, Interview 2, 2015).

A blend of ideas including distance learning, blended learning, and gamification, Frank's notion of the next step was salient because it highlighted his continuing interest in pushing the boundaries of his instructional paradigm. It illustrated a dissatisfaction with previous pedagogy and perceived relative advantage of the flipped classroom model moving towards Frank's goals for teaching. He acknowledged the difficulties of asynchronous instruction, stating: “I think that is like pie in the sky... the challenge is like, wait a minute, you completed two years of French in six months? What do we do with you as a sophomore, where do we place you” (Frank, Interview 2, 2015)? Yet, his desire to shift instruction was steadfast as he explained his interest in going beyond the flipped classroom in the future to a more asynchronous model of instruction noting “that's one thing I would actually want to explore, having a lot of the work already in nice

modules online where the kids can go at their own pace...” (Frank, Interview 2, 2015).

Frank’s desire to continue to experiment with the flipped classroom was illustrated by his rationale for adoption and his affinity for novel approaches of instruction within his school setting.

**‘Tip of the iceberg’ - Fairfield’s adoption of the flipped classroom.** Frank’s recollection of the adoption of the flipped classroom by Fairfield included the same summer workshop as recounted by Megan and Courtney. He also attributed, as noted by Megan, Courtney, and Jennifer, that adoption of the flipped classroom was facilitated by the school’s one-to-one iPad program. Uniquely though, Frank described the school’s introduction to flipped classroom as limited. “They were starting with that piece with like the visible part of the iceberg, like screen casting. I think that's the first piece they were doing. I think that's what Megan was doing” (Frank, Interview 1, 2015).

Frank’s depiction of the school’s early adoption as limited to the ‘tip of the iceberg’ was explained in detail from his perspective of defining the flipped classroom:

There is what I call the Iceberg part of it. You know, I think for the same classroom if I can take the bad metaphor of an iceberg, the visible part is the screen casting so the ability for the teacher to screen cast a lesson that will naturally in the past what I've done in class. And actually screen cast that lesson and have students watch it for homework, and you know take notes, tie it in with an assessment piece. Cuz that is how some your kids can be like, oh yeah, I watched your video I didn't understand a word of it. So, and I think that's what I call the iceberg like the visible part of it, but the big part, the big part that is under the water, the hardest one is okay

when we've done that, what we do with the rest, you know, what happened in class? (Interview 1, 2015)

Frank's perspective on the flipped classroom was uniquely centered on what occurs in the classroom and not what was being sent home via video. This was unique from literature. It also suggested that he views the adoption of the flipped classroom within Fairfield to be limited in nature. Rogers' explained this prevalence for a visual aspect of an innovation to impact adoption. He cited the clustering of solar panel water heaters in California as an example of the value of observability noting that they often appear in groups of three or four in communities (Rogers, 2003, p. 16).

From Frank's perspective, he found the creation of screen-casts to be relatively easy compared to a shift in his instruction in the classroom. He lamented, "that's the piece I'm still struggling with, still figuring out is, what happens under that water, what happens once we've done that first piece of screen casting..." (Frank, Interview 1, 2015).

However, the ability of the flipped classroom to be used in a limited basis, starting with only a reduction in lecture, provided it with a level of triability that Rogers' suggested will improve adoption for Fairfield teachers. For example, Rogers' explained "new ideas that can be tried on the installment plan will generally be adopted more quickly than innovations that are not divisible" (2003, p. 16). For Fairfield teachers this implied that the ability of the flipped classroom to be taught in steps, first as a screen cast of one lecture, graduating to many, and finally large shifts in classroom practice, made it an innovation that is likely to diffuse and be adopted broadly.

## Practice

Frank was a confident, formal educator in his classroom, adept at managing transitions and utilizing routines to guide student expectations. I was witness to only one major off-task behavior by a group of three students during the period of observation and his response was calm and impactful. Appendix K shows the major primary activities of the class, primary behavior of the teacher, and flipped video frequency for Frank.

**Frank's classroom practice.** Our first observation was canceled due to snow, which was in contrast to the general warmth outside on the campus and inside the old buildings as we walked to the basement level during our first meeting. After a quick set-up, and after introductions to the students had taken place, Frank quickly began giving the opening task for students writing on the board: "quell etait le dernier film que tu as vu?" and "cetail un bon film? Pourquoi?" (Observation 1, 2015). This discussion with partners of movie favorites quickly transitioned into a one-on-one check with each student, going around the horseshoe, as Frank assessed their conversations. This daily warm-up, with a quick teacher check, was present in six of seven of my observations of Frank's teaching practice as shown in Appendix K. He primarily used the time that students were engaged in conversations to take attendance, write the homework on the board, and also to set up for a class activity writing directions on the board. The vast majority of Frank's class time was also devoted to independent work or work in pairs, in which Frank moved constantly throughout the room engaging in one-on-one interactions with students. Because of the horseshoe configuration, he could often be found completing laps around the room as noted in observations of his practice. For example, in my second observation, he completed six trips around the perimeter of the classroom

during one period of classwork (Observation 2 , 2015). Frank also exhibited this pacing-like behavior in observations three, six, and seven, completing multiple trips around the room working with students.

Frank described his emphasis in reducing direct instruction and using class time for students to work as being the biggest advantage of the flipped classroom model. As he explained, “We can actually do something interesting in class, instead of me just standing and talking, right?” (Frank, Interview 1, 2015). In analyzing his use of class time he added:

I teach a foreign language, but, if we spend 80 time, 80% of the time me talking, I know how to talk, how to speak French. I've known since I was two years old. Those guys don't. And so if the class time of like 70 minutes or 50 minutes is spent with me talking for half an hour of it, we're not really encouraging speaking skills at all here. So I mean that's a big plus, you know, instead of me standing and talking away, at least they have the stage, you know. I like that, that, so it's students taking the stage (Frank, Interview 1, 2015).

These activities had included students describing their favorite movies and guessing their titles based on descriptions. They had also included writing scripts and filming movies of their own unique superheroes, reviewing their peers' movies and writing critiques. Finally, students have worked together writing recipe reviews and making videos to pitch their favorites with very little direct instruction in the classroom.

Frank also used formative assessment on numerous occasions in his classroom. As previously noted, he typically began each class with warm-up dialog between pairs of

students followed by a review of the previous night's homework. He also included Google Forms as a means of formative assessment in class. On my second observation, I observed Frank using two Google Forms as a check of vocabulary and grammar on terms around going to the movies. In *Figure 10* below, a snapshot of his assigned classwork illustrates the beginning of the form. As he explained during class as students paired off independently, "sometimes they work by themselves" and "sometimes I make them work in groups" but "for this that can do what they want" (Observation 2 , 2015). Students worked on their workbook exercises and then independently switched to the classwork assignments without any direction from Frank. Following the two Google Forms activities, students completed a shared Google doc of vocabulary terms that were projected on the front of the board. Not only did students arrive at this point in the lesson independently in their small groups, their contribution was not dictated by the teacher. In my field journal that night I noted that students: "worked in pairs or independently on three classwork assignments for the entire 70 minutes... a positive of the flipped model that these students are used to working on tasks for so long with few to no transitions" (Whitfield, 2015). Students completed this constant work while compiling five distinct pieces of formative feedback for their teacher, their warm-up, the two Google Forms, their work in the workbook, and finally the Google Doc they compiled together.

Figure 10

*Frank's first classwork assignment from second observation 4/7/2015*



**J'aimerais trop avoir une camera !**

Avec le livre page 64, répondez aux questions suivantes

\* Required

**Nom, prénom \***

**Mail \***

**Classe : \***

**J'entends = ? \***

**de types = ? \***  
(dans le contexte)

It is clear from our interviews and through observations of Frank's instruction that he placed a priority on students working in class rather than lecturing. In reflecting on what types of activities must now occur in the classroom, Frank explained that the screen casting itself in the flipped classroom was just the beginning. In his words he explained:

I think that's what I call the iceberg like the visible part of it, but the big part, the big part that is under the water, the hardest one is okay [UNKNOWN] with that, what we do with the rest, you know, what happened in class? And if [UNKNOWN] still struggling, still figuring out this, what happens under that water, what happens once we've done that

first piece of screen casting assessing students and flipping that model when during construction is kind of like lecture style has been relegated to homework, what happened in the classroom? What kind of activities we do with students, what kind of things we're gonna. Produce with them, that is gonna allow them to do those three things. Independent learner a difference<sup>1</sup> instruction and the last one, but I was saying like, you know, having a variety of materials for those different type of learners as well (Frank, Interview 1, 2015).

As Frank explained, his goal in the classroom was to produce an environment that encouraged independence on the part of students, allowed for differentiation of instruction, and offered a variety of instructional materials for different types of learners. As he addressed earlier in regards to the elusive goal of fostering completely independent learners “I haven't found a way yet, but maybe one day I'll find the Holy Grail (Frank, Interview 1, 2015).

The last notable aspect of Frank's classroom, with respect to the flipped classroom model, was his willingness to experiment and adapt the model based on his needs. For example, in observation 6 he used a short equality written in French, “Synonyme = hypothese = suggestion,” to begin a short period of direct instruction to cover material from the night before (Observation 6, 2015). In his embedded assessment with the flipped video he had asked students to answer if “they had any questions from the video” from these answers he decided to cover this small section of content he felt the

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<sup>1</sup> Frank regularly interchanges the words difference and differentiated when speaking about differentiated instruction.

students had not grasped fully (Observation 6, 2015). He then quickly added, noting in class that “I forgot to add this, I had a senior moment, it happens to all of us,” a brief period of instruction of nouns for sports terms (Observation 6, 2015). Frank introduced direct instruction after the warm-up, and proceeding direct instruction, in what amounted to a brief correction in lesson without apparent hesitation. His ease with the flipped model was palpable from the first observation of his teaching and appeared to be a consequence of its relevant flexibility within Frank’s teaching. When combined with his focus on formative assessment, a significant proportion of individual student support, and peer interaction, Frank’s classroom appeared to favor a student-centered environment as noted from our interviews.

**Frank’s videos.** Flipped videos were used extensively in Frank’s practice including being assigned in five out of seven observations - as noted in Appendix K - and preceding three of the observed classes. They were unique in that each one observed and collected as an artifact was embedded in a Google Form that Frank then linked in the school’s Moodle page. The Forms provided, as noted above, a formative assessment for students watching the videos which Frank was observed referencing during direct instruction on our sixth observation. As shown below in *Figure 11*, videos were embedded in a form that asks for their name, email, and class, followed by the embedded screen cast and then various questions.

Figure 11

*Frank's flipped video "Quantities" given for homework on 4/21/2015 during observation 4*



Frank began his practice with screen casting in his previous school using Explain Everything and Screen Flow, which are both Mac products. He created his videos using Explain Everything on an iPad while most of his peers used Screen Cast-o-matic. He noted in his first interview was “just our way” (Frank, Interview 1, 2015). All of Frank’s videos were annotated using pen tools in Explain Everything, with the occasional image or graphic and limited amounts of text. His videos were also short, none of which were longer than seven minutes, and none included a talking head.

Frank's use of flipped videos was not a daily occurrence. He included four units in his second semester and in those units he only had 14 videos covering the content. As he explained that it was due to:

the content I usually flip, it's through the morphology of the language, there's a mechanic grammar, very much like a math teacher might flip, you know like, hey, how to solve that equation? And what are the rules of the language? So, that's usually what I, what I flip because, that's the, I mean that's the most basic you know (Frank, Interview 1, 2015)

Yet, as Frank recalled he had also been taking the direct instruction of his grammar lessons out of the classroom for long enough now that "explaining grammar rules in class, I barely do it anymore. I really, I don't think I've, I've done it like once this year and it was a disaster. [LAUGH] Where people checked out". Yet, as Frank acknowledged his videos were designed to be short and stripped down "like something might take me 25 minutes to explain" and shrink it down to something a fifth the size (Interview 2, 2015). For students, he explained that the videos enabled him to be efficient, provided more embedded materials such as graphics, images, and videos, all in a format that could be paused, rewound, and viewed multiple times. Frank attributed this to providing a level of "differentiated instruction" that he explained included "the ability for students to be able to pause the lecture, take notes, being able to ask question for me online..." (Interview 2, 2015). He also explained that his format for the videos, embedded in Google Forms, offered a chance for "shy" students to "type the question and submit it..." adding "I don't share people's name and the kids don't know who has the question and why we went back to it" (Frank, Interview 2, 2015). The flipped videos,

while not a daily addition to Frank's teaching, by his own account were a mechanism to prioritize classroom activities and ultimately change his pedagogy in the classroom. In addition to the gains of efficiency, multiple modalities, and differentiation, Frank also concluded that the flipped videos have changed his behavior in the classroom. As he explained, "I think now I'm able to go around the classroom and have more like a one-to-one interaction with them" (Frank, Interview 2, 2015). His frequent movement in the classroom, and numerous one-on-one interactions with students, were evident in every classroom observation and constituted a distinct aspect of Frank's behavior while teaching.

Frank also appeared to be continuing to experiment with the flipped classroom, in a similar way to both Brian and Megan. In observing his classroom on our final day together, he stopped his students in the middle of class and said, "I've gotten a very good request to put all the videos on Moodle for the exam" (Observation 7, 2015). His previous videos were compiled in Moodle by unit, color coded, and labeled in accordance with the students' workbook. This also included placing the videos in order by unit for the entire year. In addition, he added a series of quizzes on Google Forms, which he would email the correct responses to the students after their completion that correlated to these videos. This continued experimentation with the application of the flipped classroom model for review was a continuing trend among participants which will be addressed in Chapter V as it related to Roger's description of innovation adoption via re-invention (2003). Lastly, as the request came from a student to have the videos posted together as a review, Frank was exhibiting an inclination to focus on students' requests

and needs for their own learning which also correlated with his own description of creating a student-centered classroom.

### **Frank's Case Summary**

Frank was an ambitious veteran educator of 11 years who has adopted the flipped classroom model of instruction for the past three years. A split administrator and educator, Frank was a classroom teacher of two sections of French two as well as the Upper School Technology Coordinator for Fairfield. Frank's priorities for instruction with flipped classroom model included emphasizing communication, moving from the familiar to foreign, differentiating instruction for students using multiple modalities, and fostering independence among learners. As he described them, Frank took on the perspective of education being a continuous endeavor, a goal set to reach for. Mirroring his ambitions, Frank's experimentation in his classroom, afforded by the flipped classroom model, was a continuous facet of his teaching.

Frank's classroom practice was frenetic yet singularly focused on students as the vast majority of Frank's class time was devoted to independent work or work in pairs. He moved constantly throughout the room engaging in one-on-one interactions with students. Frank described his emphasis on using class time for students to work, by reducing directing instruction, as being one of its biggest advantages of the flipped classroom model. He asserted that "we can actually do something interesting in class, instead of me just standing and talking..." (Frank, Interview 1, 2015). In every observation of Frank's teaching, there was an abundance of formative assessment including practices such as warm-up activities with pairs of students being questioned directly. He also included classwork assignments with embedded questions in Google

Forms and his flipped videos themselves were embedded in a Google Form with reflective questions. From his perspective these formative assessments provided a mechanism to differentiate instruction by providing support to students who otherwise may have been dissuaded from asking questions in class. Frank's use of the flipped classroom model to focus on the individual student as a priority was in strong alignment with the sentiments of both the academic and technology administrators at Fairfield.

Finally, Frank foresaw the flipped classroom model as an incremental step towards an asynchronous classroom that encompasses a blended learning environment comprising of distance education and gamification. Broadly, he embodied an educator whose willingness to experiment with these instructional methods had led him to embrace the flipped classroom model, with its flipped classroom videos, as a means to foster a student-centered classroom. Frank contended, with his sharp European sense of humor, that the barrier to adoption of the flipped classroom had become straightforward from a mechanical standpoint over the past 10 years causing the bar to be pretty low (Frank, Interview 2, 2015). Yet, as he eloquently stated, the flipped classroom videos are “the tip of the iceberg” and the difficult piece is figuring out “what happens under that water, what happens once we've done that first piece of screen casting...” (Frank, Interview 1, 2015). Frank hinted at the next steps in his practice including continued expansion and emphasis on differentiation, individualized instruction, multiple modalities, and the development of independence on the part of students. He expressed a desire to continue to foster a classroom environment that afforded students greater choice in learning, including time, place, and action with the flipped classroom.

## Sean

### An Introduction

Sean's school was about an hour and half's drive from my home. The school entrance was sparse and obscured a sprawling green campus with multiple buildings quietly tucked into a suburban neighborhood. Turning off the road and down the driveway, I was greeted by a security guard who had absolutely no idea who I was or why I was visiting Lowell School. Finding my way from the gate-house, I drove past immaculately kept ball fields with tidy hedgerows. The track and football field were ringed with a brick half-wall with a tall bronze mascot guarding the entrance. The campus was situated around a long ring road and I inadvertently found my way to the Upper School building where a secretary was nice enough to point out the Lower School building across campus. Turning the corner and heading back to the main gate Sean, flagged me down. He was walking with a group of students along the road to the dining hall. He was dressed in brown slacks, a large winter coat, hat and gloves. Sean directed me to park behind the Lower School building and we walked together over to dining hall. In a brief 30 minutes, we talked about my study, reviewed the consent forms, and just generally talked about flipped teaching and education, and Sean was revealed to be easy going and exceedingly reflective in his teaching practice.

Sean was a second career teacher having started in business and finance and then switched to education. As he elaborated, "some real interesting turn of events landed me at a school, teaching, with no prior experience" (Sean, Interview 1, 2015). After 14 years with Lowell, having now earned a Master's degree in education, he taught four sections of fifth grade math and one reading class during the week in an eight-day rotation. He

was also active in extracurricular activities for Lowell, coaching football in the fall and baseball in the spring, and directing the Lower School play in the winter. The father of two girls, Sean struck me from our first encounter as “eloquent and very self-reflective in his approach to his teaching” with a noticeably structured classroom environment with clearly established routines for his students (Case study field journal, 2015). Sean’s demeanor and dress matched his background in finance. He has formal attention to learning in the classroom that was both courteous and diligent.

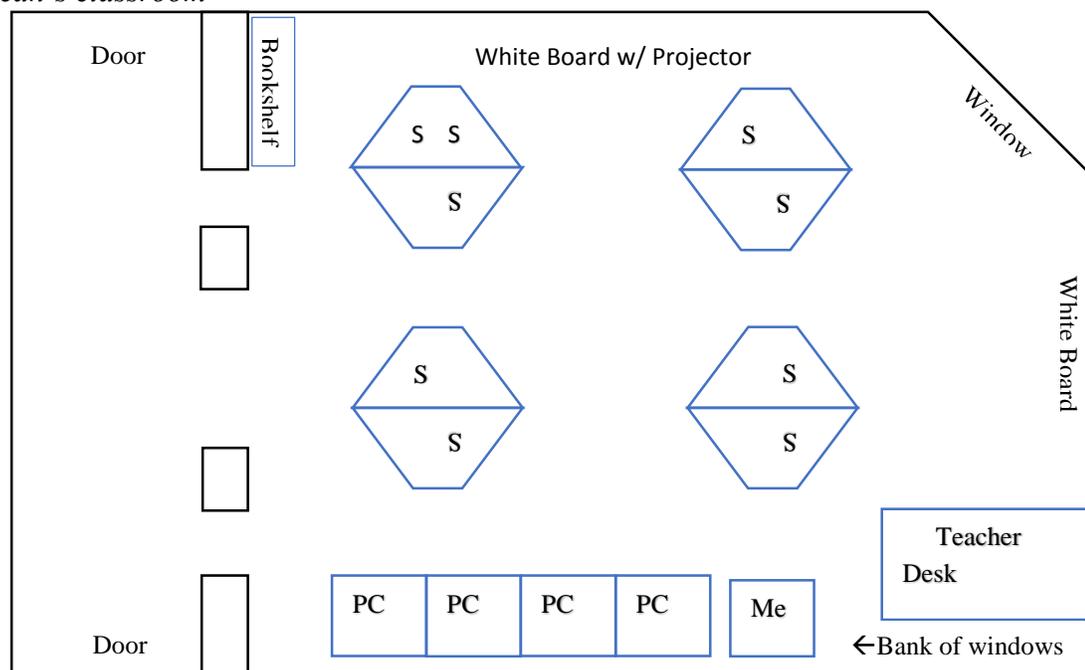
**Sean’s classroom.** Sean’s classroom was in the basement of the Lower School Building. A two-story structure of red brick and stone with black single pane windows, the Lower School had a single hallway down the middle of the upper level and with a winding narrow staircase leading down at the far end. Having emerged on the lower level, Sean’s classroom was tucked around a corridor behind a pillar. There were a series of lockers, just in front of a large media center, with an adjoining teacher’s lounge and workroom. His room was modest in size, with a row of open cabinets for students inside the door to the right. On the left, there were a series of pillars separating the instructional space from this common, area that led to an exterior door. The right side (far side) of the room opposite the door was filled with windows as the building was built into a steep hill.

Sean’s classroom was warm and full of character. It was adorned with novelties like lacrosse sticks, a football, and numerous posters, the most striking of which depicted ‘9 and  $\frac{3}{4}$ ’ posted on a brick background on of the pillars in the room. The carpet was monochromatic beige and the walls were a neutral white. The age of the building was given away by a slightly musty odor likely originating from the recent rain and the

subterranean nature of Sean’s classroom. The classroom was configured with four work tables constructed from eight trapezoid tables as shown below in *Figure 12*. The furniture, aside from the large wooden teacher’s desk, was compact in size and designed for elementary age students. Overall, Sean’s classroom was in stark contrast to the other participants in this study in that it was his primary and only instructional space. This led not only to an abundance of artifacts in the room but also high level of personalization of the classroom that was unique to Sean.

Figure 12

*Sean’s classroom*



### Adoption Context

**Sean’s view of teaching.** Sean defined his philosophy with regard to teaching to be in constructivist in nature (Interview 1, 2015). He described this philosophy to include a perspective of students “where they need to construct meaning, they need to discover instead of being just told” (Sean, Interview 1, 2015). This was not something that Sean

originally ascribed to himself when he began teaching 14 years ago. He explained that when he first started teaching, he was “too quick to give the answer... so I didn’t push the student, to go a little bit further or beyond their comfort zone” (Sean, Interview 1, 2015). Now in his teaching, he strives to “not give them the answer” and “let them struggle a little bit” (Sean, Interview 1, 2015). This shift in teaching practice for Sean also included a shift in his view of lecture and the priorities of class time.

According to Sean, he has shifted in his view of the priority for class time and now sees it as one of problem solving and work on the part of students, not lecture. In his words:

get students working. Don't talk to them anymore... Get them problem solving, so that's another part of my philosophy. I want students to get to work. I don't wanna talk to them. I used to want talk, I thought I was you know, I am pretty entertaining up here you know, but it's not about me, it's about them. And that took me a little while, to get off of my pedestal and start to let them learn (Sean, Interview 1, 2015).

He described the shift as a natural one, explaining that “many teachers when they first start, I think, from what I’ve heard, they think they’re on a stage” (Sean, Interview 1, 2015). Today, Sean appeared to place a significant focus on the in-class activities of his students, including ample amounts of problem solving and support. Sean rejected lecture as the primary activity in class, as he asserted his “philosophy is let them do the work instead of lecturing” because his new “philosophy is that lecturing doesn’t work anymore with this generation” (Interview 1, 2015). This rejection of lecture in the classroom was

because of a change in the attention of Sean's students, he explains, and constitutes the impetus for experimenting with the flipped classroom model.

**Sean's adoption.** Sean attributed his introduction to the flipped classroom model to reading articles and then the original text by Jonathan Bergmann and Arron Sam's *Flip Your Classroom: Reach Every Student Every Class Every Day* (2012). Then a student introduced Khan Academy to Sean in the winter of 2012-2013 school year:

so I'm saying to myself, wow, there's all this movement towards this direction. And then, halfway through that year, that's when I just decided okay, I know about it, I can do it. I just did (Interview 1, 2015).

Starting with a stack of books and an iPhone placed on top, Sean recorded his videos into MP4 files, which he placed on the school's Moodle page. As he noted, the relative advantages he perceived from flipped classroom model prompted his movement, in the middle of the school year, as an independent experiment. The independence of Sean's experimentation with the flipped classroom was vociferously stated by Robert, the Head of the Lower school and academic administrator, reporting that "Sean has taken on that role himself" in "an individual classroom" and that the method is "not utilized anywhere in the lowest school other than his room" (Robert, Interview, 2015).

Sean's rationale for his independent adoption of the flipped classroom model stemmed primarily from two areas of conflict in his previous instructional method. First, he struggled with his students ability to stay focused during direct instruction. As he exclaimed:

"My students can no longer focus, as a group, for even five minutes is a stretch, very difficult. And I, I think that I'm pretty skilled at keeping

things lively. I, I'm just telling you, if you're trying to teach something on a board, with fifteen or sixteen boys in a class. It's very difficult, and there's just too many of them can't hold it together (Sean, Interview 1, 2015).

Second, beyond his perception of a shift in attention span of his students, he also believed his students are afforded more time and help in the flipped classroom model. For example, Sean noted that it “opens up so much more time” and that he “needed more time during the class, to help...” (Interview 1, 2015). Moreover, in his assessment of his previous teaching method, he was frustrated that he did not have enough time to answer students’ questions and provide feedback for the work that had previously be assigned for homework (Sean, Interview 1, 2015). This dissatisfaction with the previous model of instruction in addressing students’ abilities to focus, and the perceived lack of time contributed, necessitated a change in his instruction. Sean’s description of his conflict and desire to experiment with a new method of instruction to address these conflicts aligned with Rogers’ conceptualization of relative advantage that Sean’s attributed to the flipped classroom model.

**Lowell’s adoption of the flipped classroom.** Descriptions from both the technology administrator, Mathew and the academic administrator, Robert, indicate that Sean was the originator of the flipped classroom adoption within Lowell’s lower school. Mathew attributed this to a broader culture in the school, explaining that “all instruction and the way in which things are, are, it’s very teacher driven at this, at Lowell” (Interview, 2015). Mathew also asserted that Sean was the only teacher at Lowell who

currently used the flipped classroom model. This was also mirrored in the comments by Robert who was quick to define Sean's use of the model as "an experimental classroom in nature" noting that "we're looking at the results at the end of the year" (Robert, Interview, 2015). The independence of Sean's practice with the flipped classroom was congruent between the administrators, however, the duration and nature of Sean's teaching practice with the flipped classroom was not.

According to Sean, he's been using flipped model of instruction for over two years and now he "consider[s] it a 100% flipped classroom" (Interview 2, 2015). The school's quarterly magazine describes Sean's "test run" with the flipped classroom beginning in the winter of 2012-13 as a "road-test" (Lowell Magazine, 2013). This supported Roberts's assertion of the flipped classroom being an experiment at Lowell. The duration of Sean's utilization of greater than two years, and the apparent expansion of the flipped classroom, and its notoriety in the school conflicts with Robert's account. The technology page of the school's website, and its Lower School page, described the use of flipped classroom as:

Teachers post video of their lessons to the portal so that students can re-watch them, or to conduct "flipped" classrooms when they themselves are absent. With the flipped-classroom concept, students watch video of the lesson at home and then complete assignments at school with the teacher there to interact with and help them. (School website, Academic (School Website, Technology page, 2014-2015)

The discrepancy between the assertions of the academic administrator and Sean's account of a routine practice, also coincided with an apparent discomfort discussing the flipped

classroom. In stark contrast to the other administrators interviewed for this study, Robert could not describe a flipped lesson or define it.

Mathew, new to the lower school this year in his position as the technology administrator, explained the lack of awareness on the part Robert by asserting in regards to the flipped classroom that:

It's just not widely used or it's not been widely promoted to be used. So, it really hasn't been, we have a new headmaster who's fantastic and, and he says right up front, I'm not tech savvy, but I'm tech willing. As far as the, the head of the school. And you know, I think that there, there, there hasn't been really a technology component to lower school, for what I understand, 10 years. So I'm kind of coming into a situation where technology and the way, and especially the flipped classroom model, hasn't been widely talked about or used (Interview, 2015).

Sean lamented this same lack of awareness during after our fourth observation as he walked me down to Robert's office. In noting that this was Robert's first year as Lower School head, he added that he had never been observed by any administrator while using the flipped classroom, even though his video was presented through YouTube to parents two years prior. In warning that the Robert "might not know much about what he's doing," Sean ended his comments in the hallway with a clear frustration with not being observed adding that it "wasn't a good thing" (Case study field journal, 2015).

The isolation in which Sean practiced the flipped classroom model in Lowell was not distinctive relative to the other participants observed. The lack of knowledge, however, on the part of the academic administrator was unique and contrasted with the

clear prominence of the model in the media disclosed outside of the school as a whole.

Mathew's comments also mirrored this disconnect:

The school did a great communication thing they put on Facebook and an article the communications department did on Sean and that was fantastic. And it gave him some recognition for it, but I don't think that uh, it's celebrated enough among the faculty for them to step forward and also want to do it (Interview, 2015).

Mathew personally took on this incongruence as part of his addition to the staff of Lowell as the Lower School technology coordinator, explaining that he purchased a Swivel to help facilitated teachers in creating flipped videos. Different from a screen cast, in which the teacher records their movements on a device, the Swivel enables auto tracking of a presenter, allowing the camera to pan with the movements of teacher while working at the board for example. Mathew described this purchase as a “field of dreams” approach, coupled with additional professional development, as means to “help some of our teachers to do the same” (Interview, 2015). Mathew appeared to want to foster an expansion of teacher created videos for instruction and expand the practice of the flipped classroom beyond Sean's classroom. Broadly, there appeared to be tension between the desire to expand the use of the flipped classroom and factors emanating from the administrative team and school culture.

### **Practice**

Sean was a confident, charismatic teacher who was never without a tie, pressed trousers, and starched shirt. He conducted his classroom from the perspective of a businessman and ran his classroom with a formal, compassionate tone. Appendix K

highlights the primary class activities, Sean's primary behaviors, and frequency in which he used flipped videos. These aspects of his instruction will be expanded upon below to further describe his classroom teaching practice and his use of flipped classroom videos.

**Sean's flipped classroom.** Sean utilized routines extensively in his classroom. The very first activity I witnessed in his class was a homework review conducted by students. Standing at the front of the room, two boys, one with the teacher's copy of the text were slowly moving around the room asking for the answers to the night's homework. As a student answered correctly, one boy tossed a football to the student and he returned it. All the while Sean was slowly walking around the room checking the homework on each student's desk. This began quickly when Sean saying "today we're doing answer the questions and throw the ball, keep doing it right and we'll keep doing it" (Sean, Observation 1, 2015). As the students toss and answer independently, Sean quietly took one of the student's homework pages and placed it on the document camera. He did this as the boys finished with their homework and then projected the students' work. Carefully, he corrected one of his answers with the class. With that he transitioned quickly to present two example problems using choral questions. Then, as easily as he's slipped between the prior three tasks, he said to the class "today you have about 30 minutes to complete this problem set... I want you to be able to finish about 50% of this work" (Sean, Observation 1, 2015). In less than a minute, students had each taken a book and worksheet, as shown below in *Figure 13*. They are seated, working in pairs or groups of four clustered at tables.

Figure 13

*Sean's classwork sheets collected 3/3/2015 Observation 1*

| Problem Set _____ Date _____ Name _____ Class _____ |   |   |
|---|---|---|
| Show all necessary work, be neat, and do not rush.  |   |   |
| 1   | 2 | 3 |
| 4   | 5 | 6 |
| 7   | 8 | 9 |

Sean then quickly took seat at his desk and queued up light jazz on the computer from a playlist. As he's was sitting entering his attendance, a few students had raised their hands. Sean noticed, looking up, and said, "I'll be walking around in a second guys" (Observation 1, 2015). Once Sean was up, he was constantly moving from group to group, individual to individual, often kneeling next to the student he's working with. For over thirty minutes, Sean went from one pair, one group, or one student to another, stopping to bend, question, or prompt. Often he used phrases like "focus" as he passes a student, or had longer constructive exchanges such as "you're going too fast... and you're not taking the time to acknowledge your mistakes" (Observation 1, 2015). Sean explained that this is by design, his constant movement, with students working on problems for the majority of class is the added value of the flipped classroom because:

the biggest advantage absolutely is time in the classroom. Absolutely the biggest advantage. Totally changes the dynamic of how much the boys are able to problem solve. That's what you want I think in math, is time on task. Maybe with any, with any subject. You know, it's time doing something, practice is, is what makes you better. Oh that's the biggest advantage and that's why it's not a fad. It's a very important tool.

Five out of the seven observations of Sean included a predominant amount of class time being devoted to individual or small group engagement, one-on-one with the teacher.

Another example of Sean's use of classroom routine to foster engagement is a classwork check system of highlighting. Noted on the first, second, and third observations, Sean places printed copies of the answer keys to the classwork around the room. Students are expected to travel to those sheets after each problem they complete and highlight their correct answers. Sean explained during our second observation that this was "his own method of ensuring engagement" (Observation 2, 2015). When addressing a student at the end of the class who he discovered had done a number of the same problems incorrectly, Sean admonished him for not doing the highlighting, explaining "check as you're going along so this doesn't happen at the end" (Observation 2, 2015). The expectation is that students correct their work. The highlighting saves the original process for Sean to review. Ultimately, the highlighting acts as a formative assessment for Sean that gave him feedback on students' progress during classwork and helped support on task behavior on the part of students.

In addition to the classwork highlighting checks as a unique practice with the flipped classroom, Sean also reviewed his tests with each of his students during class.

During our third observation together on a Monday, Sean assigned a flipped video the previous week and was able to use the same framework of highlighter checks and answers keys stationed around the room to engage the students for the majority of class. Distinctly different than the two previous observations was the fact that Sean remained at his desk during the entire thirty-minute period the tests were reviewed. He also reviewed the test individually going from strongest scores to the weakest scores. Sean worked for noticeably longer periods of time with students who struggled on the test. This variation in the amount of time given to students in one-on-one interactions aligned with Sean's comments from our first interview in which he explained that with the flipped classroom "you still have more time than you ever did before, to help that student with a different learning profile" (Interview 1, 2015). Taking the time to individually address students on their tests was fostered by Sean's ability to use the flipped classroom model to have students work independently and with each other.

Another example of Sean's unique and varied practice with the flipped classroom came in the fourth observation, in which he had the students play a game of Battleship using coordinate pairs. His patterns and behaviors remained virtually unchanged from previous observations, including a short review of the flipped video's content on coordinate pairs then pairing the students up with paper copies of game boards as shown below in *Figure 14*. As play began, Sean's behavior also remained the same as his "movement in the room is continuous and fluid as he moves table to table" interacting with pairs and individuals throughout the class period (Observation 4, 2015). Yet another example of Sean's variation of classroom practice with the flipped classroom was observed during our sixth meeting in which he opted to engage the students in a

classroom group exercise after the preceding videos. Using a series of challenge problems, he used choral questions to prompt the students as they worked in pairs and at tables to solve each in turn. He explained afterwards that he: “likes to break up the flow” of the flipped model, “typically on Friday’s and have the boys do something like this” (Observation 6, 2015). Sean explained that this adaptation with the flipped classroom has come over time:

I consider it a 100% flipped classroom. Because they're still watching a video. But now what I do, I cover the material, but I don't have them do the whole problem set. I do some challenge problems. Or something else. But I still don't think that that makes it less than, because I did something different. That just makes it interesting (Interview 2, 2015).

This also included in Sean’s practice an entire class period devoted to a guided inquiry project using manipulatives during our fifth observation. Sean clearly valued routine and structure in his class with regard to the flipped classroom as much as he included and values varied classroom activities.



a head shake no. He quickly steps to the board and writes out 72 with two lines down and asks, “do you remember this” and instructs “come up here and do it” (Observation 2, 2015). Then, when distracted by another student having an outburst, a second student from the boys table independently walked up to the board and wrote down 9 and 8 under the two lines drawn down by the first boy. The first boy then wrote the next set down of 4 and 4 as the second writes below the 9 a set of 3. Sean, in reflection of this moment in class explains “sometimes, I’ve tried [COUGH] and it’s a very difficult, probably the hardest thing to set up, I think, in a classroom, is where students help each other...” (Interview 2, 2015). However, in an affirmation of the value of the flipped classroom, he defended the efforts of encouraging peer interactions in conjunction with his efforts explaining:

At home, they'd be alone. They may not be getting the help. Or their parents may, someone may help them and do it wrong, or not understand it, or do it a different way, and then they get. So, by keeping all the work in, most of the work in here, they get the collaborative, or the group, they get the dynamic of working with each other, but they also get me here, rather than doing that work alone (Sean, Interview 2, 2015).

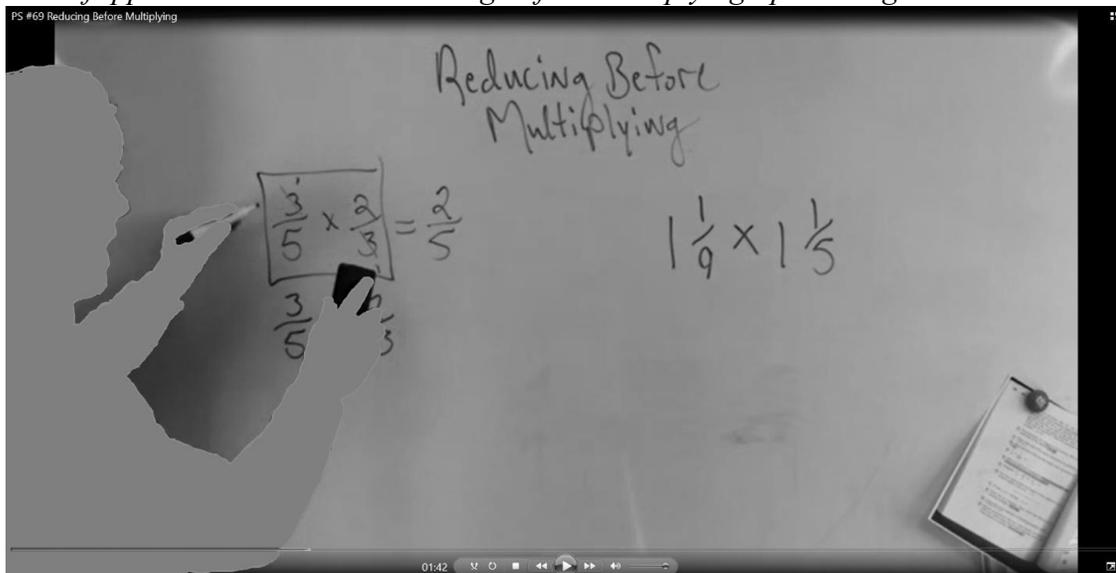
Sean accomplished this cooperation in a classroom environment that was warm with humor and empathy. Often he ended his classes with a joke like “What is a shark’s favorite game... swallow the leader” or “gentlemen, I need to torture you for one minute, why are pirates called pirates... they simply arrr” (Observation 1, 2015; Observation 7, 2015). Overall, Sean’s classroom practice with the flipped classroom was that of a

seasoned educator who has mastered the art of having students work cooperatively in class while still maintaining high expectations for his students.

**Sean’s flipped classroom videos.** Sean provided six of the seven videos associated with his observed instruction. All had the same format including Sean positioned on the left side of the screen positioned at his classroom whiteboard. As he is left-handed, Sean is open to the camera as he shifted from the edge to the middle of the board explaining concepts such as ‘order of operations,’ ‘battle ship,’ and ‘writing fractions as decimals.’ The videos range in length from shortest of three minutes and thirty-four seconds to the longest of six minutes and twenty-nine seconds as shown below in *Figure 15*.

Figure 15

*Sean’s flipped video “PS #69 Reducing Before Multiplying” preceding class on 3/3/2015*



Sean only used a projected image in one of his videos, covering the instructions for playing ‘battleship’ using coordinate pairs, otherwise in all of his videos he pre-wrote

some content and then solves problems using an expo marker and eraser. All of his videos are recorded using an iPhone and as Sean explains:

The nuts and bolts are, I set up my lesson on the board, there may be some things that I write down. The title, I'll write down a few examples, so I don't have to be, I, it, I don't need to be writing everything as I'm talking. Some of it's already preset. I set up my iPhone, so I use an iPhone. Press play, walk in front, teach (Interview 1, 2015)

The videos themselves were not polished; rather, they had an authentic feel to them as if Sean was teaching in front of his students. They included mistakes, such as in his video of 'PEMDAS' or 'order of operations' in which he wrote the product of a step on the wrong side of the problem, he quickly noticed, erased the sum and said "thank you for catching that mistake, you at home who was paying attention" (Artifact 'PEMDAS' from Sean at Lowell, 2015). In the same video, Sean included humor, as he did in his classroom, adding, "anything divided by itself is one, a trillion-which is my paycheck-divided by a trillion is one" (Artifact 'PEMDAS' from Sean at Lowell, 2015). Lastly, in congruency with their unpolished nature some appeared to be recorded in front of students. His video on 'exponents and writing decimals as fractions' he says "guys you gotta keep is down while I record this" indicating that he either recorded this concurrently during class time or while monitoring students in other capacities (Artifact 'exponents and writing decimals as fractions' from Sean at Lowell, 2015). The overall impression is that Sean was making his videos at convenient times and with the tools he was comfortable with.

Time was also a major consideration for Sean when he produced these videos to post on the school's portal, Moodle. As he explained:

I try to keep it around seven, eight minutes, at most. As a matter of fact, when I go, when I get around ten, I hear it from students. Man, that was long. And, and that's, honestly, I just heard that the other day. That was 10 minutes last night, Mr. Sean. Wow! Why was it so long?

Sean is not alone in his requirement of short flipped videos as it was mirrored by all five teachers in this study. However, like Frank, he creates the shortest videos observed, at around four minutes for four of the six collected. Sean also, in his videos, very narrowly described a mechanical exercise, solving a problem for example, and typically spent very little time in his videos on broader conceptualities of the problems being covered.

The last notable aspect of Sean's flipped videos was his stern reliance on students watching the videos and very strict words with students who did not. This included his responses to students prior to class. For example, when a student ran to the computer early on our fourth observation and pleads "I forgot to watch the video," Sean responds firmly "too late bud" (Observation 4, 2015). Or later, in that same period, after arranging boys into pairs he states to the group, "I had a video up, if you didn't watch it you're going to have a problem" (Observation 4, 2015). Sean also made his expectations regarding watching the video clear when working with students during the classwork. Moving to a table at the front of his room on the sixth observation, he asked two boys, "How are you guys doing," and getting varied responses that are in conflict he responds, "obviously we didn't watch the video" (Observation 6, 2015). His insistence on the

students conforming to the expectation of watching the flipped videos was a constant throughout his teaching practice.

### **Sean's Case Summary**

Sean was a second-career educator, arriving in the halls of Lowell 14 years ago after working in business and finance. With a Master's degree in education, he presented himself as a confident, adept, compassionate teacher who was reflective of his practice and eager to experiment. Sean independently adopted the flipped classroom model over two years ago at Lowell because he felt that traditional lecturing had stopped being effective with his students (Interview 1, 2015). Sean also described a desire to leverage his classroom time to afford a greater amount of time on task, working to solving problems with support of the teacher, and less time lecturing.

Sean was the only teacher in Lowell's Lower School that was using the flipped classroom model extensively. Both the school's technology and academic administrators confirmed Sean's position as a leader experimenting with the model in a school. The academic administrator pointed to a more experimental aspect to Sean's classroom as the reason for the limited adoption at Lowell. Conversely, the school's technology administrator applied a more teacher-centered and bottom-up culture as an explanation for the lack of a broader adoption of the flipped classroom and he implied greater personal interest in the model expanding beyond Sean's classroom.

In the classroom, Sean utilized a wide array of classroom activities incorporating the flipped classroom, including individual and paired classwork, paired game or lab based work, inquiry activities, and most uniquely individualized assessment review. In all of these activities, besides the one occurrence of giving a test, Sean was frenetic in his

movement around the classroom working with students individually, in pairs, or in small groups, throughout the majority of class time. Typically beginning with a homework check, then short review of the preceding flipped video, Sean fell into a routine of moving between individual student-teacher interactions for the remainder of class. His use of highlighters and answer keys around the room for a formative assessment of students on classwork is a unique addition to his classwork practice with the flipped classroom. Sean's individual post-test review with each boy, utilizing the same classwork structure, was also a unique practice embedded with his use of the flipped classroom.

Lastly, Sean's used the most straightforward mechanism of creating flipped videos of any teacher observed. His MP4 recordings of himself teaching at a whiteboard, were directly placed on the school's LMS to be viewed by students for homework. His videos were short, concise, step-wise constructions of example problems and ranged in length between approximately 3 and a half and 6 and half minutes. They were short by design and were not polished constructions including background noise and camera noise. They also included humor and aligned very closely with the same visual cues Sean used in the classroom being virtual copies of his mannerism and writing conventions that he used in the classroom. Taken as a whole, with his classroom practice and comments about his belief in teaching, Sean appeared to be an educator who liked to experiment with his practice and placed an emphasis on the perspectives of his students. Sean appeared to be using the flipped classroom model in an effort expand the amount of time on task he could provide his students in a constructive supportive environment that encouraged questions and cooperation.

## Allison

### An Introduction

I arrived to Edgeworth about 40 minutes early, having given myself too much time for urban traffic. There was a cold, light intermittent rain outside as I walked off the street into the main six story building and pushed the intercom. After being let in, I walked up to a tall half-wall with a receptionist buried behind it. She looked up and smiled asking me to sign in. I took my self-penned nametag and asked if I can sit down somewhere to wait for Allison. I was directed to a round lobby filled with a ping-pong table, small futons, two vending machines, and a circle of college flags along the ceiling. After a thirty-minute wait, I headed back to the main entrance and was told to head back to the ping-pong room and travel up the elevator to the fourth floor. Lost and wandering, I was directed to a classroom on the far left that looked like a science room, but had a male teacher standing with a room full of kids. I took my seat next to the door and waited. A short woman in sandals, green cargo pants, and a black shirt with dark black cropped hair walked off the elevator, smiled, and reached out her hand. With a questioning tone, she asked, "Dean?"

We set up in the classroom supply room while the previous teacher continued his lesson in the adjoining room. The supply room appeared to have a dual purpose of teacher work-stations and storage. Glass windows offered a clear view into the room which did not appear to be bothering Allison as she pushed an exercise ball out of the way and took a seat on a more traditional office chair. Our conversation, feeling a bit rushed due to a concern for an incoming weather front, lasted about 45 minutes. My

overall impression was that Allison was an energetic and thoughtful individual with a passion for teaching.

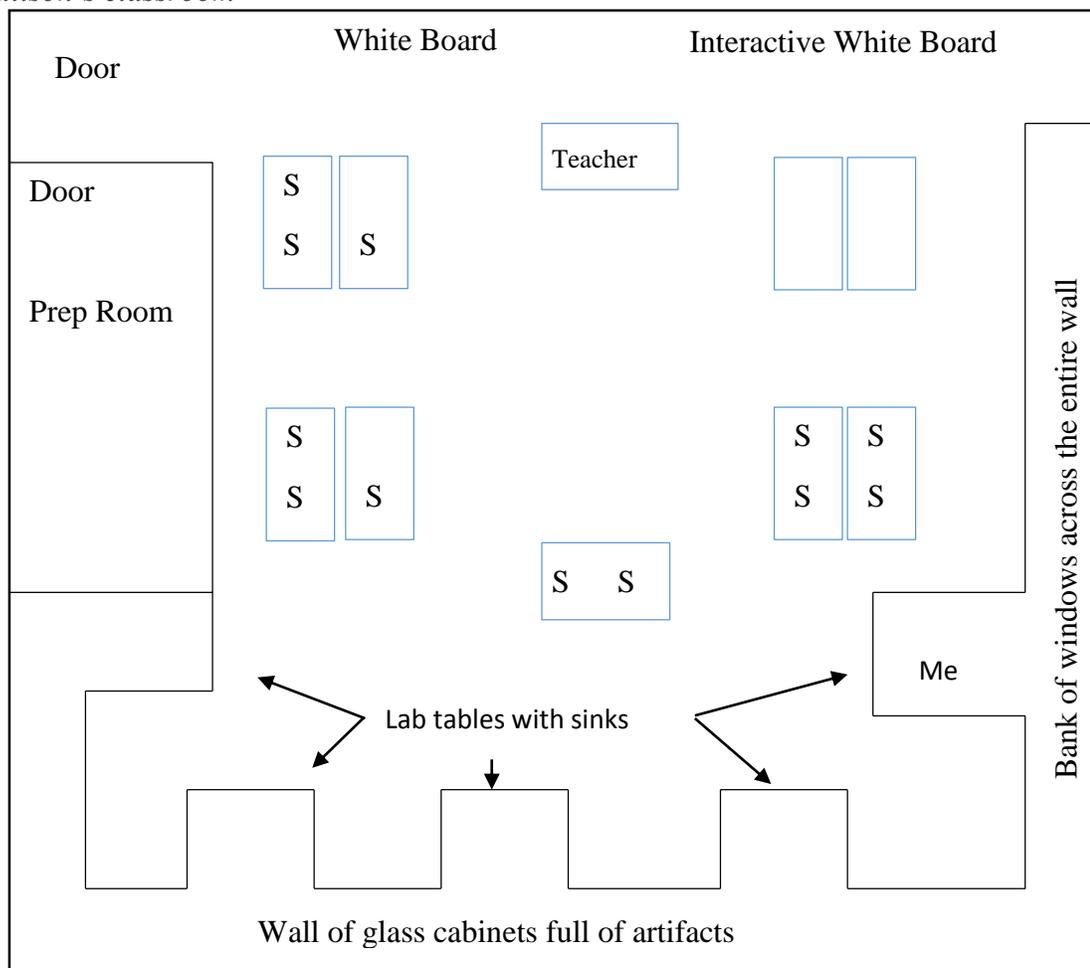
Allison was a veteran at Edgeworth having taught for the school since 2001. She held a Bachelor's degree in Biology and a Master's in School Administration. She taught three classes in a 90-minute block rotation: two sections of Life Sciences to seventh graders and an eighth grade "Language Workshop, which is a class for our kids who struggled a little bit and needed some extra TLC and support and better studentship, and writing, and all of those good things" (Allison, Interview 1, 2015). Allison was also the eighth grade dean for her school. Using the flipped classroom model for her second year with her Life Science students only, Allison began the method as part of a school sponsored program of six teachers who took a six-week summer course on flipped classrooms. Now she used the model in conjunction with a school based iPad program that has grown to include the seventh grade and will include the eighth grade the year following. Allison presented herself as a teacher who was very willing to experiment in both her classroom and teaching practices.

**Allison's classroom.** Allison did not have her own classroom. She shared a science room on the fourth floor with at least two other faculty members at Edgeworth, keeping a small desk in the adjoining prep room. The room, as shown below in *Figure 16*, was divided into two major sections: a classroom in the front with a lab configuration in the back. Configured for 20 students, no more than 12 students were ever observed in this classroom with Allison. The tables were configured for two students and had solid imitation wood tops. The lab area was configured with square tables for four students with solid black tops and stools. The floor was a drab white linoleum tile. The back wall

was full of class cabinets full of science supplies, models, and random assortments of look-to-be craft supplies. The left wall was a bank of large class windows with white blinds and the opposite wall had a large glassed in office and prep room in which the majority of the windows were covered by an oversized periodic table.

Figure 16

*Allison's classroom*



The room had a cluttered, chaotic feel due in large part to the lab tables covered in boxes and materials from a Rube Goldberg contest in which the students had previously competed. The teacher's table was a high fixed structure and had a stool behind it. It appeared to serve the purpose of supply table, lectern, and teacher workspace. During

Allison's observation, she was often interrupted by visiting students, teachers, and administrators, giving a sense that the school had culture of a sort of open-door policy for visiting classrooms and an informality, which was also observed as most of the teachers were very casually in dress wearing denim jeans and polos. The classroom had a large Promethean interactive whiteboard, projector, and iPad cart with individually assigned student fourth generation iPads.

### **Adoption Context**

**Allison's view of teaching.** Allison was a teacher who preferred large blocks of time for her instruction. She lamented the loss of time as she explained:

I used to have four 90-minute periods with my kids. But now we have a different schedule that rotates through just like my other schedule did. But everyone has the same periods. So you have a long period in the morning and, then, you have a double but only one. And then you have the shorter periods in the afternoon. And so for me, I was getting through less material because, it was broken up more than the 90 minute chunks..."

(Allison, Interview 1, 2015)

The need for more time, and longer blocks of time, proved to be a major motivation for Allison's adoption of the flipped classroom. She noted in our first interview "I was really interested in trying to figure out how I could craft things a little bit differently, because I felt like I was losing. The practice, you know, that I really wanted the kids to have" (Allison, Interview 1, 2015). Time, in turn, besides being a major motivator for change in Allison's classroom, was also a concurrent aspect of her teaching philosophy.

Allison described her beliefs about teaching science to include an aspect of facilitated practice. As she explained she believed that her students must “really not only understand what I'm trying to convey to them but they can actually use and apply that knowledge when they practice” (Allison, Interview 1, 2015). This included an emphasis on time in the construction and application of knowledge which Allison concisely stated as “the more time for practice, the better... And the more varied the practice, the better (Interview 1, 2015). In her mind, this also included a volume of on-task activity in regards to the subject and also that variety of tasks. She explained this variety “could be through activities, labs, projects” (Allison, Interview 1, 2015). With this perspective, Allison solidified her view that class time was best spent with students engaged in activities that emphasized student practice.

Allison also viewed this priority for classroom practice in a nuanced fashion. She attributed the time needed in class for getting students “thinking, synthesizing, building, creating, all of those good things” which she described “helps them solidify those terms, ideas, concepts for them” (Allison, Interview 1, 2015). Allison’s attitude towards the flipped classroom was one of leveraging time to afford these benefits in classroom. As she explained in the past:

If I wanted to do those kind of big practice or long projects. Then I wasn't getting through the material, I necessarily wanted to get through. Just because of the, the way the schedule was. So I was interested in trying to figure out another way (Allison, Interview 1, 2015).

In summary, Allison described her primary aim of having students practicing and engaging in activities in class to allow for application and construction on the part of

students. She also aimed to keep these at the forefront in her classroom environment with regard to student learning by leveraging her allotted time.

**Allison's adoption.** Allison's first encounter with the flipped classroom model came three years prior from a former student turned student-teacher. Allison explained that the student-teacher was placed at the school through a fellowship for two years, and when working under Allison was using a unique set of videos to present content. As Allison recalled, she was impressed with the teacher's method but found it overwhelming, explaining:

The way she did it I was like this is so great but I could never do this.

Like it's so, hard. Because she had multiple screen setup on her computer, and you had to hit pause, and then record, and then, there was no real way to edit, so if you made an error you would have to go all the way back

(Interview 1, 2015)

The technical hurdles, Allison explained, made her forgo using the model herself. However, they set a basis for her willingness to participate in a future program offered by the school.

In the following year Allison was offered the opportunity to take a six-week course online with different members of her school through a virtual school program for teachers. She attributed this experience, coupled with an all-day professional workshop offered by the same organization, with solidifying her decision to adopt the model. In reflection she noted "for me and learning all the different types of flipped classroom, the kind of model that I took to heart was of that blended learning" and explained "so I use it as a way to introduce the kids to concepts outside of class so then when we're in class we

can spend more time reinforcing those ideas” (Allison, Interview 1, 2015). She also viewed the flipped classroom reducing barriers for her students, adding:

I think in terms of note taking for kids I think in a lot of different ways your everyday things in the classroom, it can be made easier for kids and. You can kind of cut down on, on time spent there, also. So just, in a way to recoup time, but also to make things a little bit more engaging and a, and easier for them in terms of the dysgraphia, and the other issues that. Creep up, kind of more common now for kids (Allison, Interview 1, 2015).

Again, her adoption of the flipped classroom aligned with a desire to re-structure her class time and offer different opportunities to her students in the classroom. In her own words, she reflected: “I was really interested in trying to figure out how I could craft things a little bit differently, because I felt like I was losing the practice, you know, that I really wanted the kids to have” (Allison, Interview 1, 2015). Allison’s view of the flipped classroom as a positive addition to her classroom practice, possible because of her experience with the method and a reduction in the technical barriers, was what ultimately led her to decide to implement the flipped classroom a year after first seeing it in practice.

**Edgeworth’s adoption of the flipped classroom.** Edgeworth was distinctly different from the previous three schools, in that the adoption of the flipped classroom was described as being facilitated from the top down. As Daniel, the Technology Director for the school recalled:

Within the last five years, the board put together a committee to look into what they called at that time, distance learning. And so, there was a

distance learning task force and originally it came out of conversations about how to, you know, look for external sources of revenue. They made the mistake of putting educators on the committee and, of course, we didn't see it as a source of revenue, but as a way of thinking about teaching and learning differently. Which isn't going to save you money necessarily, or make you money... so we came out of that deciding that distant learning really is not very good for Edgeworth, not very an appropriate fit for Edgeworth (Interview, 2015).

From this process, Daniel described that the school “learned the terminology” and “learned what flipped classrooms are” and this sparked an interested in exploring these areas outside of the area of distance education (Interview, 2015). As he explained, this also served as the mechanism for funding the enrollment of teachers in an “online learning initiative” which he described as “slightly misnamed” and the same program Allison took part in (Daniel, Interview, 2015).

Allison described a similar origin to the arrival of the flipped classroom to Edgeworth but she alluded to the influence of a parent, working on her Ph.D, as being paramount. She explained:

She worked with us and our technology person, director, Daniel (pseudonym), worked with us. So we kind of took the class and then we split into, um, about two worked with Mary, was the parent, and then three of us worked with Daniel to help, kind of, craft and plan what we wanted to do for the faculty meeting (Allison, Interview 1, 2015)

Allison also remembered being asked by her head of school to participate in this professional group tasked with teaching other teachers about the flipped classroom during the 2012-2013 school year. From these presentations, Brandon, the science department chair, described a “sort of a, technology push... trying to get teachers to use technology more” at Edgeworth (Interview, 2015). This was supported by Daniel, who explained that at Edgeworth “we give teachers lots of autonomy” and in referencing the flipped classroom added, “I think that what has happened though is that more and more folks certainly from the online learning initiative we got a lot of good energy around it...” (Interview, 2015). His comments were in line with Brandon and Allison’s, revealing a school culture that allowed for independence among teachers but, from an administrative perspective, tried to use professional development on specific topics to impact teacher’s practices from the top down.

Brandon, like Allison, attributed the origin of the flipped classroom at Edgeworth to a single board member. He, like Daniel, described a two-part history of first exploring on-line learning and then experiencing an offshoot of professional development in the areas of blended learning and the flipped classroom. From Brandon’s perspective:

It was, it was more or less a school-wide program. Teachers who were interested in this were invited to a series of meetings. In which the technology was introduced and we had the opportunity to ask questions. My, my understanding is that at this particular time. A member of our board of trustees was exploring the possibility of creating some sort of online component...” (Interview, 2015)

From Brandon's perspective, the result of this school wide push was positive in that it enabled teachers to learn how to better use technology in the classroom. He also viewed Allison as "one of the leaders in our school..." and asserted that "she, has latched onto technological methods, kinda independently of what the school has been, been making available simply because she's very good at going out and finding things" (Interview, 2015). From Allison's perspective, she described the workshops she attended on the flipped classroom as being very positive and containing a planning component that she considered very hands on. Reflecting Brandon's comments, Allison, at the time, was engaged in another training program for faculty focusing on iPad's in the classroom. While both Brandon and Daniel described Allison as an early adopter with technology at Edgeworth, her experience in her school was unique to the other participants studied in that her school sponsored professional development on the flipped classroom prior to her adoption. She was able to participate in a program with peer teachers that explicitly covered content on the flipped classroom through the use of school funds, which was in stark contrast to the other three school sites studied.

### **Practice**

Allison was an experienced, tenured educator at Edgeworth who had been working for the school since 2001. During her observations she maintained an affable and thoughtful demeanor in her classroom and hallways of Edgeworth. She also appeared as a leader among the faculty on numerous occasions, addressing the questions of other staff members on programing and schedules for students. *Table 8* depicts the primary class activities, Allison's primary behaviors, and the flipped video frequency during seven observations of her teaching (Appendix K). As noted in the previous cases,

these will be expanded upon below to further describe her classroom teaching practice and her use of flipped classroom videos.

**Allison's flipped classroom.** Allison was a casual teacher in nature and practice. For example, on or first observation together she arrived in blue jeans, sandals, and a black shirt and scarf. It was common from the first day to hear students call out "Allison" when asking a question rather than raising a hand (Observation 1, 2015). Also, in line with her calm but commanding presence, she only removed one student during observation for behavior, and only for a few minutes. Rather, Allison used subtle and casual management techniques including, from our first observation, asking a disruptive student to "please get a drink" and stating to the class "I know this is uncomfortable but we are going to forge ahead as best we can" (Observation 1, 2015). Her casual approach also included her use of class time. In all but one observation, when students were taking a test, Allison spent at least five minutes of the beginning of class in direct instruction reviewing the class assignments or schedule. On more than one occasion Allison chose to write out the directions or definitions for students rather than use a pre-printed or projected image of those items leading to an image of teaching that was less planned or structured.

In her second year utilizing the flipped classroom, Allison also appeared to be less deliberate about her practice. In responding to the flipped classroom survey of teachers she stated that she used the model "80-85 % of the time (majority of the time)" (Whitfield, Survey of teachers, 2014). From the available sample of her instruction, the flipped videos provided were only witnessed prior to instruction on three occasions out of the seven observation periods. She also was never observed giving a flipped video for

homework. The discrepancy between Allison's stated use and the observed use of the flipped classroom, as measured by flipped video utilization, was unique relative to other participants in this study. The lower observed frequency of flipped videos could be attributed to observations near major breaks in instruction, such as Spring Break, or the end of the school year, as Allison stated in her first interview that she used videos "whenever I'm introducing something new" (Interview 1, 2015)

Allison also utilized a number of pre-made videos as part of her homework for students and classwork, which was unique to her practice of the flipped classroom. This also appeared to be in alignment with her casual teaching style. For example, on our second observation she gave a pre-made video to students to watch. It was a minute and a half long YouTube clip on biotic and abiotic factors. This was due to a late night school activity that precluded her making a video of her own and she decided to use a clip from YouTube instead (Allison, Observation 2, 2015). During our fourth observation, Allison explained that she does prefer to use her own videos with students but was limited "by time constraints" (Observation 4, 2015). The intermittent use of pre-made ones also aligned strongly with her own preferences stating that one of her "hang-ups" included not liking to be recorded, as she explained "I'm never in front of the camera... for me, it's always stuff I've screen-casted" (Allison, Interview 1, 2015). While other participants had objected to using outside content for the flipped videos, Allison appeared comfortable and willing to incorporate them into her classroom practice on a limited basis.

Allison was also unique in her use of flipped videos during class instead of just outside of it. On the fourth observation of her class, Allison used the majority of class to

have students watch three sequential flipped videos in pairs. The first two included videos she produced with the requirements of taking notes and completing associated assessments on the school's Student Information System (SIS). The third required students to watch a pre-made video she had provided with a link to on YouTube and take notes. Allison's explanation for having her students watch the flipped videos in class was two-fold. First, her daughter had a concert she wished to attend later in the day and having the students conduct an independent activity was convenient for a substitute. Subsequently, in order to keep her classes together needed to have all her sections complete the same activity. Next, Allison wanted her students to get "back in the groove" after having had a number of days away from flipped videos (Observation 4, 2015). As she explained during class, she wanted to help review expectations with regard to note taking and completion of associated assessment activities.

The last notable aspect of Allison's flipped classroom practice was the continued use of direct instruction and choral questions as a primary aspect of her instruction. Allison included a significant portion of time for student work in only three out of the seven observations of her classroom. This was in contrast to the other participants, whose practice included the majority of class time use of independent student work on the majority of observed days. Allison appeared to be aware of her contrasts to others who use the flipped classroom as she noted in our second interview when reflecting about the flipped classroom:

I'm, I think the only middle school teacher who regularly uses a flipped classroom. So I don't have a lot of colleagues to share delivery and like instruction, because the, I think the high school teachers use it a little bit

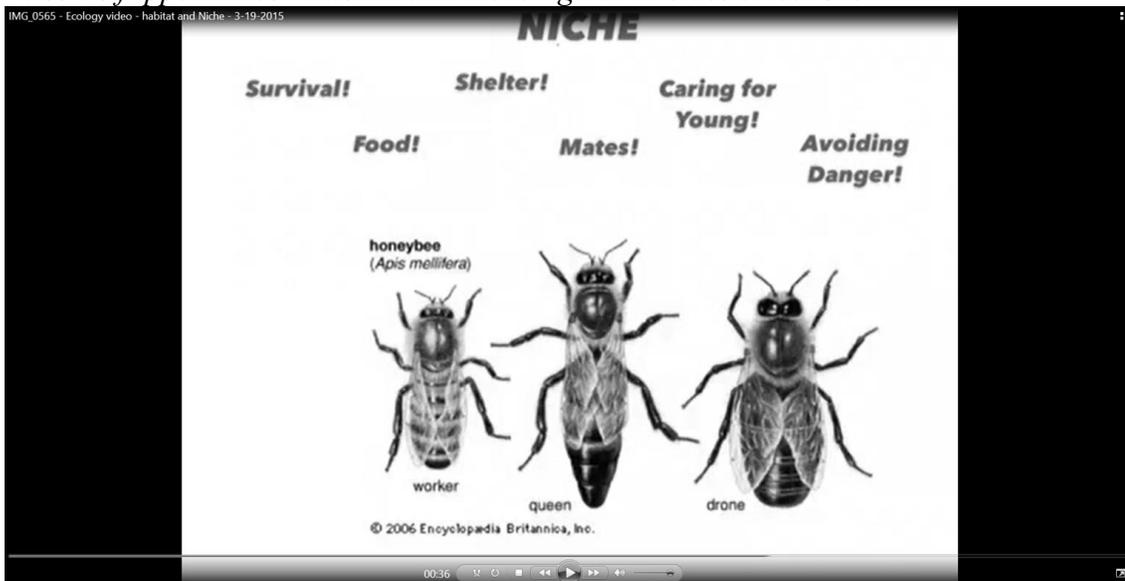
differently than I would. So it's. Yeah, I don't know, kind of, how I'm doing... I don't have a sense of, kind of what other middle school science teachers are doing, in general, you know? (Interview 2, 2015)

She also explained that because her training included peers who were not science teachers it was difficult to assess her adoption. Overall, the impression from Allison's class time was of a compassionate, casual educator who was in the second year experimenting with a method she's adopted to leverage class time but has not yet refined in practice.

**Allison's flipped classroom videos.** Allison provided two of her own videos for review, one pre-made video from YouTube, and two student-created flipped videos. The pre-made video was a short minute and a half on abiotic and biotic factors and was assigned for homework preceding the second observation. The two student-created videos were samples that Allison provided of the videos students produced for the sixth observation, in which they were required to review a peer's video and take notes. The first was short, at only one minute 40 seconds, and was about rivers. The students had overdubbed a series of still frames. The second was of two students sitting in the classroom and completely narrated from a script that covers desert biomes. It was significantly longer at five minutes 47 seconds. Allison's videos were both clips from her in-class assignment. The first, on species relationships, depicted three slides with Allison over dubbing describing predation. The second, shown below in *Figure 17*, defined the niche of a honeybee again used slides with Allison narrating.

Figure 17

*Allison's flipped video "habitat and niche" given in class 3/19/2015*



Allison described her use of flipped videos as “whenever I’m introducing something new” (Interview 1, 2015). She divided her year into units by topics and from a review of her SIS page she attached videos to each topic. As she explained when pointing to a topic section “here’s class notes, here’s handouts, here’s videos... and so this lesson I made a note-taking guide for this video” (Allison, Interview 1, 2015). She added, pointing to a second flipped video and referring to note taking, “this video they were taking, you know, it’s on their own” (Allison, Interview 1, 2015). As the year progressed, Allison left the course units open, with their topics, so that students could return and review the content. Allison added, referring to the videos themselves, “I try to keep it in that, like, five to seven-minute window, because their attention starts to wane, I think my longest one might be nine” (Interview 1, 2015). Overall, there appeared to be a half-dozen videos for each topic, which belied the frequency of observed flipped video use.

The most striking aspect of Allison's flipped video use and her application of the flipped classroom model was her willingness to experiment with student's use of flipped videos. For example, she explained in the first interview, referencing her direct instruction:

“With the iPads the kids ask can I record this... they like they like to do that a lot. And for some things it's too long. It's, like, not, it, I'm like, that would be a forever long video. So I'm like, I don't know that that's the best way to tackle that. So sometimes we break it down into snippets or I'm like you, if you wanna record, you might wanna do this, you know, this part” (Allison, Interview 2, 2015).

The second example of this experimentation was witnessed on the sixth observation. Allison had students create their own flipped videos for their peers as a homework assignment. As Allison described, “I've gotten such good feedback and responses from the kids... you know, they really seem to like it and gravitate towards it, and use it” and as a consequence she added, “we have a whole list of resources about all these different biomes that we can then keep going back to...” (Interview 2, 2015). She also described that students were taught, in making the videos, “what's the good, what's the bad, what's the ugly, and kind of hash that out... and how can they improve on their own” (Allison, Interview 2, 2015). By taking the time to create her own videos, but also have her students create their own, Allison was engaging in a metacognitive exercise not seen in any of the other classroom observed. Generally, while Allison appeared to use flipped videos in the most sparingly amongst the teachers observed, she was also using them in uniquely by presenting them in class and for encouraging student production.

### **Allison's Case Summary**

Allison was a seasoned educator, arriving to Edgeworth in 2001. Teaching two sections of seventh grade life science, she also taught language workshop for eighth graders as well playing the role of administrator as the eighth grade Dean. With a Master's in school administration she was confident, affable, reflective educator who, while informal at times, was clearly eager to experiment with her practice and challenge herself. Allison adopted the flipped classroom two years ago out of personal interest and school sponsored exploration into blended learning. Allison attributed her desire to flip her classroom as stemming from a need to leverage her class time to increase opportunities for labs, projects, and class activities. She also attributed her continuation with the model as a response to positive feedback from students and a realization of time saved.

Unique relative to the other participants of this study, Allison's school had had significant interests from the administrative team to expand on the use of digital tools in the classroom specifically in regard to the flipped classroom model. However, Allison still perceived herself to be an isolated practitioner of the flipped classroom model in the middle school and lamented the lack of a cohort in which she could expand her practice. Both the technology and academic administrators described a culture at Edgeworth that promoted teacher independence and a model of encouraging the use of the flipped classroom through school sponsored professional development. Also, both were in agreement that the adoption, except for a few 'leaders' such as Allison, was limited in scope.

In practice, Allison was not observed using flipped videos adjoining class instruction to the degree indicated by posts on her SIS or based on her own descriptions. However, her use of the videos in class were the most unique owing to her incorporation of them into class time itself and her assignment of flipped video creation to students as peer exercises. In class, Allison took up the same postures as the other participants in this study with a high number of one-to-one interactions and constant movement when engaged with students working on independent, paired, or group activities.

Lastly, Allison embodied a teacher who was willing to experiment with her practice and eager to continuously improve. She rationalized this as one of her limitations of the flipped classroom explaining why she did not get to re-use her flipped videos, “I always change my curriculum... I’m always tweaking so I don’t get those kind of gains” (Allison, Interview 1, 2015). This, in conjunction with a desire to leverage her time with the flipped classroom, were illustrations that Allison was not only willing to alter her instruction year over year, but rather was eager to do so.

## **CHAPTER V**

### **CROSS CASE ANALYSIS**

#### **Introduction**

In the preceding chapter, each participant's experience with the flipped classroom was described within their unique case settings including the context of their adoption. The purpose of this chapter is to identify and examine five emerging themes arising across the five cases. The first theme describes the two competing definitions of the flipped classroom arising from the participants: one, an inversion of lecture and homework, the other which emphasized student engagement, collaboration, and a rejection of classroom lecture. The contrast in definitions is a significant finding because it influences the degree to which the flipped classroom serves as an enabling mechanism for constructivist pedagogy. The second major theme looks at the spectrum of practice utilizing technology that emerged from observing the teachers' classrooms and use of flipped videos. Each teacher's flipped classroom practice was examined through the process of production, the final flipped video product, hosting, and then the implementation of that video into the classroom. The third theme addresses the adoption of the flipped classroom, which for each participant included degrees of re-invention, problem solving, and trial and error. These characteristics are significant because, for these teachers, they appear to be associated with the adoption process of the flipped classroom at the outset.

The fourth major theme arising from this cross case analysis includes a distinct variation in the relative advantages and affordances participants could ascribe to the

flipped classroom. This variation was also demonstrated in the second theme: a spectrum of technology and practice across all five teachers. Variation in perception and practice on the part of participants is significant in that it indicates that the flipped classroom is not being implemented as a uniform pedagogy. Rather, it indicates a degree of contextual variation that is likely to impact the ultimate efficacy and influence of the flipped classroom. Future studies will need to consider and address this variation in the technologies used and the practices of classroom teachers in their implementation of the flipped classroom.

Lastly, a subset of practicing teachers conveyed sentiments of isolation. The fifth theme contrasts the participants who described their practice as taking place within a Professional Learning Community (PLC). The contrast in experience between these participants relative to the support they received in their unique schools is significant because it indicates that the context of an adoption impacts the adopter, their experience, and ultimately their resulting practice of instruction. Each of these five themes will now be examined extensively with respect to the five participating teachers.

### **Data Analysis and Emergent Themes**

As noted in Chapter III, cases were examined using a two-phased analysis: first within each case, resulting in rich detailed descriptions organized into themes related to the research questions; and subsequently a cross-case thematic analysis to examine the practices of teachers within each unique setting as they contrast across the cases (Creswell, 2007). The method of analysis during each phase was inductive and utilized open coding, drawing on the field notes of observations, transcripts of interviews, notes from interviews, and artifacts collected, to develop themes (Marshall & Rossman, 2011;

Merriam, 2009). Specifically, a constant comparative method was used, as outlined by Merriam (2009), which relied on condensing codes into categories and then examining those for emergent themes. This was done using with the same underlying tenets of the constant comparative method proposed by Glaser and Strauss (1965) in their articulation of grounded theory. The goal was not to create theory but to better understand the adoption of the flipped classroom in the unique contexts of each setting with rich description of practice. The constant comparative method, offered a circular and inductive process, of examining emergent codes, alignment in a theoretical framework, condensing those codes to categories, re-examination of those categories to the theoretical framework again, and then the development of themes from the categorical hierarchy. All of this work was done while constantly returning to the original data sets to ensure a constant immersion and connection to the cases being studied.

As an illustration of this application in practice, I originally coded for the term experimentation in the first round of open coding from classroom observation transcripts. Brian, for example, described changing his flipped classroom to a tiered model and this was coded as experimentation. Then, after returning to the data and comparing it to the theoretical framework of Rogers' (2003) and examining the frequency and setting of the code experimentation, I determined that adaptation was a more representative condensed code than experimentation (Appendix J). This was because of how frequently, for example in Brian's case, he described an ongoing change of practice as a major impetus for his adoption overall. Going back to the data again, it was clear from its frequency that adaptation, in conjunction with other codes such as frustration with traditional teaching, was a relevant and emergent component of theme three (specifically, re-

invention). The term re-invention was derived from the theoretical perspective of IDT and aids in an understanding of the data in context of the broader literature (Rogers, 2003).

Purposefully, each data set was reviewed in three distinct passes for coding, constantly referring back to the theoretical framework, the researcher's own reflections, and the data to provide adherence to the constant comparative method (Merriam, 2009). This process was repeated to develop each of the following themes as they represent emergent findings across the five cases.

## **Findings**

### **Theme 1: What is Flip? Two Emerging, Competing Definitions**

The literature on flipped classrooms, as noted in Chapter II, provided some guidance as to its definition. These included descriptions of the flipped classroom from a simple inversion of the lecture-homework paradigm to a broader conceptual framework including “teacher-created videos and interactive lessons...” delivered at home prior to class and a focus on class time for students “to work through problems, advance concepts, and engage in collaborative learning” (Tucker, 2012, p. 82). It was necessary, for the purposes of conducting this research study, to set the following working definition: the flipped classroom is a model of instruction that uses various forms of instructional technology to present direct instruction at home, prior to the classroom lesson, to allow for an increased number of interactive classroom activities, including peer interaction and individualized teacher to student interaction.

While this definition serves the function of allowing for an investigation of teacher practices in the classroom, it was not universal among participants in this study.

Rather, two distinct definitions of the flipped classroom emerged from the five cases.

The first was a more traditional definition of the flipped classroom as a direct inversion of the lecture-homework paradigm, facilitated by technologies to provide direct instruction at home in the form of video tutorials and classroom time spent on individual problem solving with teacher support. The second still emphasized direct instruction at home facilitated by technology but was based in an assertion that class time is better spent having students participate in collaborative exercises working in student-centered classroom.

The divide, as will be described at length below, appears to fall along disciplinary lines, but the literature also suggests it may be a consequence of the initial development of the flipped classroom as a change in content delivery and not pedagogy (Bergmann and Sams, 2014). One example of this includes the notion that a math course, previously delivered as direct instruction in the classroom in a teacher-centered mode, would still be teacher-centered with students individually working on problems in class with assistance from the teacher only. Ash (2012) critiqued this approach, noting that the flipped classroom could be conceived of as time-shifting tool and not a means of transforming instruction. Bergmann and Sams themselves cautioned that the flipped classroom may provide a teacher-centric model that does not ensure a student-centered classroom (2014). The result is a spectrum of teacher behaviors that, at one end, demonstrate a direct inversion of lecture and homework while maintaining a teacher-centric model of instruction, and at the other end de-emphasizes lecture for collaborative student-centered activities in the classroom. These practices are described in detail below.

**Teacher-centric inversion of lecture and homework.** The teachers whose definition of the flipped classroom included the more limited scope of the first definition include the math teachers, Megan and Sean. Sean defined his practice as sending the students home to complete a flipped video of approximately seven minutes and then having the students complete two or three practice problems at home, with the video (Sean, Interview 1, 2015). Typically, he explained, this included working on those practice problems after the video for immediate re-enforcement of the content (Sean, Interview 1, 2015). Sean was observed on multiple occasions using the first few minutes of class time to do a check of this work; the remainder of class time was spent on classwork problems that the students then checked for accuracy. His definition and practice are consistent with the most limited descriptions of the flipped classroom as an inversion of the lecture-homework paradigm in which students completed items in class that would have been completed for homework in traditional instructional methods.

Megan described a similar process in her teaching with the flipped classroom, where she provided a short video the night before with a guided note sheet. She described using the very beginning of class to review the concepts from the night before (Megan, Interview 1, 2015). She was observed on multiple occasions moving quickly to have the students get to work on a classroom problem set, project, or paired exercise. Her classroom behavior was very similar to Sean's, as seen in her constant movement between students working on problems throughout her lessons. During observations, she and Sean frequently used this model of completing classroom problems in class with students.

Two common factors are present in Sean and Megan's practice. First, they both teach a discipline – math – marked by the need to have students complete problem sets regularly, even daily. Megan and Sean expressed a strong desire to be able to help their students complete problems and support their learning. Megan even advocated this position from the perspective of social justice, noting that by having the teacher present while doing problems, she was offering unified level of support to all students. This is in contrast to models in which students complete homework problems and have access to variable amounts of support based on socio economic status and other factors including parental support.

The second common factor includes the nature of the math texts they used in support of their teaching. The math content area is unique in that texts are broken into relatively small sections. Sean addresses this directly, explaining that he used a *Saxton* textbook that is built around bite-size sections of content (Sean, Interview 1, 2015). The frequency of the content delivery cycle and demands of problem solving exercises appear to be in strong alignment with this narrower use of the flipped classroom. It is important to note that in her description of her classroom practice, Megan said that she used the flipped classroom time for other activities besides problem solving, but this was not observed.

Some administrators aligned strongly with this view of the flipped classroom as a tool for focusing on problem solving in class with one-on-one teacher guidance.

Brandon, the academic coordinator for Edgeworth, defines the flipped classroom as students using technology to acquire fundamental information prior to the formal lesson in class, then using class time to practice skills that they

acquired through the technological presentation. The goal being... classroom time is used more, for effective interaction with the teacher. Practicing skills that were required under the teacher's guidance, with feedback input, and, and mentorship that that's actually a much better use of class time (Interview, 2015).

His definition is limited to using the flipped classroom for problem solving in one-on-one interactions as a focus of the pedagogy.

**Between teacher-centric and student-centric views.** Brian, the science teacher, is distinct in his vision of the flipped classroom in bridging the gap between the two representations of the flipped classroom: those who define it as an inversion of practices of homework and lecture to those who see a broader interpretation. As he explains eloquently:

My use of the flipped classroom has changed since I came here. I originally started with more of the traditional flipped model which was to move as much of my lecture time to video at home and move as much of the problem solving time in my course and, to the classroom and then free up as much time as possible for additional labs and additional practice with the material (Brian, Interview I, 2015).

In Brian's model of the flipped classroom, he reduced the frequency of videos and extended the time spent in class on re-enforcing concepts, introduced in the video, through some combination of lecture, lab, problem solving and/or activity. It is important to note that the periods of observation, which primarily included problem solving, were in strong alignment with Megan and Sean's practice in terms of the frequency of student

interaction, one-on-one interaction with students, and the structure of a preceding video and problems for classwork.

The notable difference between Brian's practice and that of Megan and Sean was the presence of both virtual and real laboratory exercises independently conducted by students with intermittent guidance. These were in contrast to the types of activities present in Megan and Sean's math courses. Sean did have observable alternative activities beyond problem solving in class such as a test review by student (Sean, Observation 3, 2015), an in-class game (Sean, Observation 4, 2015), and an inquiry activity on parallel lines (Sean, Observation 5, 2015). However, in the test review and his game lesson, his interactions were almost exclusively one-on-one with his students. The inquiry activity was, for moments, student-directed but quickly returned to teacher-directed choral questions to scaffold the students' progress.

Brian appeared more willing to allow his students to independently progress through the exercises, as evidenced by his fewer interruptions for classroom management during those laboratory exercises (Brian, Observations 1, 3, 7, 2015). He also appeared to facilitate peer interaction by grouping students to complete joint tasks that required peer input (Brian, Observations 1,3,7, 2015). On the dates in which his primary lesson activity involved problem solving, however, his behavior, and resulting classroom environment, was similar to Megan and Sean. This supports the assertion that discipline specific differences in content areas may play a role in the ultimate practice of the method.

**Student engagement, collaboration, and a rejection of classroom lecture.** The remaining teachers, Frank and Allison, offered an alternative definition to the flipped

classroom that prescribed an emphasis on student engagement through collaboration and interaction and a de-emphasis of lecture. While Brian, Megan, and Sean at various times advocated a point of view that emphasized student support, it was more typically directed from the teacher and not from peers.

For example, Frank's classroom practice was full of peer interaction between students. He clearly demonstrated a desire to reduce lecture in the classroom in favor of student engagement and collaboration with his role shifting to a coach or mentor. He offered his definition of the flipped classroom with a unique metaphor of an iceberg, describing the flipped videos as the visible part, but questioning what occurs below the surface. He suggested that the reduction of lecture to video is the flipped classroom reduced to its simplest form. He asserted that the classroom component comprises not only the activities previously considered homework but rather a host of new opportunities for student-centered learning and engagement. He envisions a classroom that does more than relegate lecture to the home environment but also redesigns the time spent in-class to include increased peer interaction and student-centered activities (Frank, Interview 2, 2015). Allison similarly asserted that the flipped classroom was best at creating an environment in which social learning could take place and in which students could be learning from their peers (Allison, Interview 2, 2015). For both Allison and Frank, the priority for class, or grouped instruction, was to include peer interaction and collaboration.

Courtney, the academic administrator at Megan's school, struggled to define the flipped classroom but ultimately pointed out the distinction between traditional views of flipped classrooms versus broader definitions. Her comments are reflective of the views

of the majority of administrators and the teachers Frank and Allison: the flipped classroom is an opportunity to expand the class space beyond solving homework problems and lecture. In her vision, flipped instruction combined a check of comprehension at the beginning of class with the remainder of class being dedicated to student activities requiring what she called application, in other words, students being engaged in a task (Courtney, Interview, 2015). Although she believed that the continuation of problem solving from home to school could be a useful task for students in-class, she added that she thought class time could be used for real world problems and laboratory exercises in addition to problem solving, so long as they all included peer interaction (Courtney, Interview, 2015).

Daniel, the technology director for Edgeworth, offers the most succinct description of this broader definition of the flipped classroom, explaining that “it’s an opportunity to use class in, I think, a more productive way... if it’s something they could be doing on their own, then the question would be, why are they doing it in class...” (Daniel, Interview, 2015). He explains that moving direct instruction outside of the classroom through video allows for the social learning that should be a priority in the classroom. (Daniel, Interview, 2015). Allison, the classroom teacher at his site, supports this idea, as do the majority of the technology administrators. As a group, the technology administrators appear to take this broader lens of defining the flipped classroom as a lecture reduction tool whose primary purpose is to foster student engagement and interaction in the classroom.

As previously described, some of the participants described the teacher’s responsibility to foster student engagement in the classroom as a role change for the

teacher. Jenifer, the technology administrator for Fairfield, explained that class time should be used for group problem solving, discussion, and support from teacher (Jenifer, Interview, 2015). She added that the flipped classroom envisions the role of the teacher changing to one of a mentor or coach for kids as they work in the classroom environment. Frank, when asked about the changing role of a teacher in the flipped classroom, agreed but added, “maybe we need to just update the definition of teacher in the first place right?” (Frank, Interview 2, 2015).

**Summary: What is flip? Two competing, emerging definitions.** In observing the practice of five participant teachers, two definitions of the flipped classroom emerged. First, Megan and Sean who practiced the method in the more traditional means as an inversion of practices: video lectures at home, with homework (problem sets) done in the classroom. Their inversion seems to align strongly with discipline-specific elements of math instruction. It includes primarily one-on-one teacher to student interactions in which the majority of classroom activity is mediated by the teacher.

Second, Frank and Allison offer a much broader interpretation of the flipped classroom, asserting it as a means for student collaboration and interaction over independent activity. They presented a preference for using class time for student engagement through collaborative exercises and a rejection of classroom lecture. By not including periods of time for problem solving, their classroom activity contrasted with Megan and Sean.

Ultimately, between these two perspectives was Brian, who also appeared to reject lecture but included a more traditional perspective with regard to the application of the flipped classroom. His classroom, during periods of activity including problem

solving, was very similar to Megan and Sean's, involving primarily teacher mediated one-on-one interactions answering questions of individual students. However, during periods of laboratory exercises his classroom resembled a decentralized, student-centric classroom in which groups of students would progress together engaged in collaborative tasks.

## **Theme 2: Spectrum of Technology Use and Classroom Practice**

The largest contrast between the teachers observed in this study resides in their spectrum of practice utilizing technology within the flipped classroom. For the purpose of analysis, each teacher's flipped classroom practice was examined through process of production, the final flipped video product, hosting, and then the implementation of that video into the classroom.

The teachers' spectrum of practice with technology is significant for two major reasons. First, it suggests a difference in how the teachers perceived the affordances of the flipped classroom (described below). Second, it suggests a variance in the application of the flipped classroom in practice among teachers that is not accounted for in the literature. Below are the contrasts in technology use between teachers, and their ultimate application to the classroom that highlight this variation.

Brian, Megan, Frank, and Allison currently, and previously, hosted their videos on YouTube as free repository for video content. Sean placed his videos directly on the school's LMS after their creation. Frank embedded his videos from YouTube into Google Forms, with assessment questions. Brian, who previously hosted on YouTube, has moved his videos, embedding them in a hosting service called Edmodo, which allows for assessment questions to be placed within the flipped videos as concept checks.

Notably, Allison was the only teacher to have adopted the use of externally authored videos in addition to her own flipped videos. The variety of technology adoption and progression among participants is as complex as it is illustrative of the organic nature of an individual's acquisition of novel teaching practices with technology.

*Table 2* documents the variety in technology practices among the teachers as they produced their flipped videos. It also shows how each teacher had to accommodate unique aspects of flipped teaching with videos including production, hosting, delivery, and ultimate integration into practice. The first notable aspect of *Table 2*, along with a contrast in technologies used and implementation, are the similarities between participants and their flipped videos. First, with the exception of Allison, all the participants described a need to create their own videos. Therefore, all five teachers created screen-casts for their use in their own personal classroom instruction. Second, four of the five teachers when creating their videos used annotations with voiceover. The only teacher to directly record himself not using a screen casting tool was Sean. Third, YouTube was an initial framework for hosting videos for all the teachers except Sean. As noted in Chapter II, Fulton (2012) asserts that unblocking YouTube removed a barrier to using the flipped classroom for many teachers. As Sean's school still blocked YouTube to their lower campus, his placement of videos on the school's LMS is in alignment with Fulton's observations.

The alignment between teachers is expected in these areas with the advent of video hosting sites such as YouTube (2005) and screen casting software such as Camtasia (2002) being so readily available. However, with all these similarities, there are still important and nuanced contrasts between teachers regarding their implementation of the

flipped classroom. In the following sections each of these aspects will be scrutinized for their influence on teaching practice and flipped classroom adoption.

Table 2

*Contrast in flipped classroom videos between teachers*

| Teacher | Production                    | Product                                    | Hosting          | Implementation                       |                                     |                 |                      |
|---------|-------------------------------|--|------------------|--------------------------------------|-------------------------------------|-----------------|----------------------|
|         |                               |  |                  | Delivery                             | Assessment?                         | Outside Videos? | Frequency            |
| Brian   | Camtasia & Power Point        | Talking Head with annotations              | YouTube & Edmodo | LMS linked to Edmodo                 | In videos as questions              | No              | Weekly               |
| Megan   | Screen Cast-O-matic & OneNote | Voiceover with annotations                 | YouTube          | LMS & YouTube & Google Drive         | Guided notes template               | No              | Almost daily         |
| Frank   | Explain Everything on an iPad | Voiceover with annotations                 | YouTube          | LMS & Google Form & embedded YouTube | Google Form questions               | No              | Almost daily         |
| Sean    | iPhone                        | Teacher at the board recorded in real time | LMS              | LMS with videos downloaded as MP4    | Numbered problems in a paper format | No              | Daily                |
| Allison | Explain Everything on an iPad | Voiceover with annotations                 | YouTube          | LMS & YouTube                        | None                                | Yes             | Once or twice a week |

**Production.** All of the participant teachers, with the exception Sean, created screen casts in which they annotated pre-made slides. In creating the screen casts, there exists a distinct contrast between those who used an all-in-one tool, and those who used multiple tools. Megan and Brian for example, used Microsoft based products, OneNote and PowerPoint respectively, to create content slides which they then screen cast with two different tools. Megan used a cheaper and less robust tool called Screen Cast-o-Matic which offers a free web-based recording tool, or a professional recording tool for \$15 a year. Brian on the other hand used a more expensive screen-casting tool, Camtasia,

which retails for approximately \$300 and offers a number of additional features. In contrast, Frank, Sean, and Allison used an iPad app called Explain Everything to create their content slides and record their videos.

**Product.** The differences in the affordances provided by the different technology tools are mirrored in the products produced by the teachers. For example, Brian was able to add a talking head to his videos with the extra features afforded by Camtasia that is not possible with the Explain Everything or the free version of Screen Cast-O-matic. Sean, by recording at the whiteboard, also created a type of talking head video, but in real time, producing a type of distinct classroom lecture style recording (Guo, Kim, & Rubin, 2014).

All of the participants described the length of the video as an intentional aspect of their videos and emphasize a short video as essential. Brian explained his longest video was 15 minutes (Interview 2, 2015). Megan added that she also believed that this brevity in instructional video was an advantage over traditional instruction as a time saver outside of school (Megan, Interview 1, 2015). Her assessment of the value of the shorter time frame was also supported by her view that students would not watch a longer video. Sean, echoed this sentiment explaining “You start getting over 10 minutes and you got a problem with the attention span thing... so I try to keep them around seven minutes...” (Sean, Interview 1, 2015). Frank and Alison echoed these statements, noting that longer videos would be problematic from the perspective of student attention. Both cited videos of even shorter spans of time closer to five minutes. As a whole, the brevity of the videos appears to be a necessity of practice with some variation depending on the content and discipline. The shorter instructional videos are also supported in the literature as

resulting in higher levels of engagement in broader blended learning contexts such as MOOC's (Guo et al., 2014).

In one notable contrast between participant teachers, Megan and Brian both used PC products in producing their flipped videos that did not conform to their student devices, while Frank and Allison used iPad products and their students had like access. Sean produced a flipped video in an MP4 format in a class setting in which his students did not have a one-to-one platform. Brian's use of a PC product for production was similar in nature to Sean's, in that his students did not have a one-to-one platform in class. Megan used Microsoft OneNote as her background to her slides and once again presented her material in a format that did not conform to her students' device deployments as iPads.

The difference in formats of products between teachers and students ultimately did not appear to be a burden for students in these classrooms. However, it does align with the spectrum of technologies used. It also, in light of the work of Guo et al. (2014), represents a possible area of conflict and incongruence between the flipped classroom and its application in the classroom with varying technologies. In implementing the flipped classroom teachers could be unknowingly using tools to produce products that are antagonistic to their goals in the classroom. To an extreme end, teachers could also be producing videos products that negatively impact the overall application of the flipped classroom.

**Hosting.** YouTube was a common thread among all participants and was used as a hosting tool for all but Sean's videos. The literature suggests that the arrival of YouTube was one of the critical developments in allowing for broad adoption of the

flipped classroom (Bergmann & Sams, *Remixing chemistry class*, 2008; Fulton, *Upside down and inside out: flip your classroom to improve student learning*, 2012). The explanation for Sean's use of his school's LMS over YouTube resides in his process of experimenting with the flipped classroom. As he began the flipped classroom in the middle of the school year, using his iPhone to record his videos as an MP4, he used the pre-existing LMS in his school. YouTube did not provide a relative advantage, or affordance, to his current school set-up. His technology administrator also noted that the school LMS is not as user friendly as it could be (Mathew, Interview, 2015). However, Sean never mentioned this as a barrier, or precluding factor, for his classroom adoption. Other participating teachers were much more positive in their descriptions of the barriers reduced by the advent of YouTube. Frank for example noted:

I can literally make a lesson in 15 minutes... exploiting YouTube, all in one app, in one device. So I think that technology, as well, is there to make it much easier these days than it might have been, I don't know like not even 6 years ago (Frank, Interview 1, 2015).

His praise was echoed less directly by administrators in the majority of sites who appeared to agree that hosting with YouTube was positive. None of the participants raised concerns regarding the nature of YouTube as an unfiltered space (Jones & Cuthrell, 2011) or suggested that they used YouTube for Schools as an alternative (Strom, 2012)

The potential of losing access to videos stored on external sites was one limitation of the flipped classroom described by Brian, Frank, and Allison. As Brian explained, he had a legacy YouTube account from his previous school to which he no longer had

access (Brian, Interview 1, 2015). Frank also admitted to losing access to his flipped videos when moving from a school based YouTube account. These issues of storage, while not presenting as barriers to adoption for these teachers, also included some personal nuances as well. Allison, for example, described a hesitation to creating too many flipped videos because she believed her content changed too frequently year to year. Sean also echoed these sentiments when referring to a change in math texts. While none of these teachers have been doing the flipped classroom for long enough to expect a revision due to changes in curriculum, it does appear to be a conflict with the model and a reality of implementation.

**Implementation.** Differences in implementation of videos in the flipped classroom were found across all five participant teachers. These specifically resided in the areas of video delivery, formative assessment, outside video use, and the frequency of use with regard to the videos.

*Delivery.* As a group, all the teachers used their school's LMS to funnel videos through YouTube to students with the exception of Sean. As noted above, Sean used MP4 hosted directly through his school's LMS. Megan and Frank both directed their students to their videos on YouTube through either a Google Doc or Google Form respectively. Frank, when questioned about this three-step system for getting kids from the LMS, to a Google form, to his video on YouTube explained that he knew it was a number of steps but it afforded a streamlined process for his students (Frank, Interview 1, 2015). Allison and Brian both used YouTube links in their practice. Allison posted them directly her school's LMS. Brian hosted his videos using EduCannon.

*Assessment.* Brian described his shift in practice to EduCannon as one of necessity due in part for his desire to solidify his formative assessment strategies with students (Interview 1, 2015). His practice to add an embedded set of questions in the video was driven by the fact that he had students who were not completing the questions associated with his previous videos (Brian, Interview 1, 2015). Other teachers also appeared to value this kind of embedded formative assessment. Megan stated that she liked how her peer, Frank, placed his videos in a Google form, and planned to do something similar. Brian, however, was the only participant who appeared to have changed his practice based on a need to increase formative assessment with the flipped videos. Other teachers, Sean and Megan for example, appear to rely on the completion of associated problem sets to determine adherence to the flipped videos by students. Sean and Megan were also observed directly checking homework as part of their daily classroom practice. Allison was the only teacher who appeared to have no overt formative assessment strategy.

*Outside Videos.* All of the participants, except Allison, rejected the use of outside videos. Megan, Sean, and Brian all expressed the view that using their own videos was a priority. Brian explained this clearly in his discussion of his videos noting “I think it, it should still be you as the teacher... I think that works best and students connect with that the best” (Brian, Interview 1, 2015). He also adds, “I think there's something to having the person you connect with as a teacher being the one doing the explaining...” (Brian, Interview 1, 2015). The rationale for the rejection of outside content, or inclusion of it, was ultimately unclear through the lens of this study. It is, however, a major difference

in adoption of the model and could constitute significant time savings to individuals who adopt outside content for their flipped videos.

*Frequency.* The participants used videos in the flipped classroom with varying frequency. Allison, on one end of the spectrum, explained that she may have as much as two weeks between videos because of her school's seven-day cycle (Allison, Interview 1, 2015). Sean, on the other end of the spectrum, used flipped videos preceding class on almost every observation, with the exception of holidays and assessments. Frank and Megan fell into an intermediate group that was almost daily and Brian described a frequency that was weekly. As he notes:

I try to have about a 10 minute video to introduce a topic, before we go over it in class the next day. So I probably have between five and eight videos in a unit. And if a unit takes 15 days, you know, eight of the night's homework will be videos. And the other seven nights will be finishing up problems we've started in class, or something of that sort, but, so typically like what's happening today (Brian, Interview 1, 2015).

In observation, his frequency was less than every other day but constituted a regular part of his classroom practice. There appears to be an alignment between disciplines such as math, having a greater frequency of flipped videos.

**Summary of theme 2: Spectrum of technology and classroom practice.** The single largest difference between participant teachers observed in this study resided in the spectrum of practice with the flipped classroom. It signifies a difference in the affordances perceived by the participants with regard the flipped classroom as outlined above. It also supports the variance found in practice among teachers that is not

accounted for in the literature. Specifically, teachers also presented significant variation in how they accomplished unique aspects of flipped teaching including the production, hosting, delivery of flipped videos as well as the ultimate implementation of those videos in practice. Variations of implementation included differences in delivery formats, formative assessment strategies, the use of outside content, and the frequency of video delivery.

### **Theme 3: Re-invention, Problem Solving, and Triability**

Re-invention, problem solving, and triability emerge in each case as the prevailing adoption rationale for implementing the flipped classroom. Each teacher described a need to solve an instructional or pedagogical problem, provided some degree of his or her own re-invention with regard to the flipped classroom, and found adoption feasible because of triability. As a major aim of this study was to understand the impetus for adoption of the flipped classroom in these five cases, these three components of adoption theory will be addressed together.

Rogers asserted that the sustainability of any new innovation is positively impacted by the degree to which it can be re-invented (2003). He characterized re-invention as occurring at the implementation stage of many adoptions for many adopters (Rogers, 2003). For example, Rogers described the Plains Indians as re-inventing their use of horses, when introduced to them, by using a travois, or triangle-frame cart for dogs (Rogers, 2003). Their early adoption of horses included not riding them but using them as pack animals similar to their prior experience. All five teachers demonstrated a propensity to alter their instructional practice when adopting the flipped classroom, largely in order to solve problems they identified with their instruction. Rogers asserted

that the degree to which an innovation can be re-invented factors into its ultimate diffusion, but for the purposes of this study, re-invention appears to also impact that nature of the practice significantly. As they implemented the flipped classroom, all five teachers did so as a direct result of needing to solve problems within the traditional classroom. The relative triability of the flipped classroom also appears to have positively impacted these five teachers' decisions to experiment with it.

**Re-invention.** All 5 teachers exhibited some degree of re-invention as described by Rogers, changing their implementation of the flipped classroom based on their needs. Rogers defined re-invention as any changes an individual makes to an innovation during the process of adoption (2003). Characterizing re-invention is critical because, as Rogers explained, it generally impacts adoptions in three major ways. First, it occurs at the stage of implementation of an innovation. Second, the ability of an innovation to be re-invented leads to faster rates of adoption; “innovations that are more flexible and that can be more easily re-invented can be fit to a wider range of adopters' conditions” (Rogers, 2003 p. 183). Third, the greater the degree of re-invention there is, the greater the sustainability of the innovation. Additionally, the sustaining use of the innovation over time is the primary measure of impact of adoption in the first place (Rogers, 2003). The degree to which the teachers have adapted the model in large part appears to be a direct result of their experience with the model, but also appears to be influenced by their own unique beliefs about teaching and learning.

Megan, the high school math teacher, exhibited the least variation in her practice with regard to the model, utilizing it in a manner that was fairly consistent throughout the period of observation. However, as she explained in her first interview, she had adapted

her use of the flipped classroom to include more direct instruction at the beginning of class, a change that would be classified by Rogers as re-invention (2003). As she explained, she was not able to transition the same instructional sequence with the flipped classroom she adopted in her higher level calculus classes, with no in-class review following the videos, to her Geometry classes (Megan, Interview 2, 2015). Her re-invention of her initial implementation of the flipped classroom made it possible to implement the flipped classroom in her Geometry class. The ability of the flipped classroom to afford this re-invention appears to be a fundamental component to its adoption in these five teachers' classrooms, even when the apparent re-invention is comparatively small - in Megan's case, a sequence change.

Sean was the most consistent in his application of the flipped classroom method as measured by the frequency in which he would assign a flipped video and then conduct his subsequent class. However, he also introduced into his pedagogy unique re-inventions to his classroom practice when implementing the flipped classroom. First, he incorporated a classroom practice of having students check their classwork assignments enabling students to independently gauge their progress in class. Second, he created a mechanism to conduct an in-class test review with each student during class time while the majority of students completed their classwork assignments independently (Sean, Observation 5, 2015). This re-invention of the flipped classroom allowed for a one-on-one review with each student in the classroom on their previous assessment performance within the continuous flow of classwork for remaining students. Lastly, he was observed having students play a game of coordinate battleship in class, after having watched a video of the rules of the game the night before, in the same flipped model he had used

previously for direct instruction. His addition of these practices into his own description of a more traditional definition of the flipped classroom aligns with a teacher who is re-inventing the flipped classroom to meet his needs (Rogers, 2003).

Other participants also altered their use of the flipped classroom, but did so more directly in their application of the videos themselves. As Frank explained: “I think the model is evolving as well as more teachers are using it, as I'm using it personally. Where I think people's grasp of it is not just watching a lecture at home, doing work in class...” (Frank, Interview 2, 2015). He asserted that a major shift in his application of the flipped classroom arose from a need to differentiate instruction. This was a major component of his view of teaching, and explained his reason for adding Google Forms to his practice. As noted in his case description, he now embeds his flipped videos from YouTube into Google Forms. This unique re-invention affords, as he explains:

The ability for students to be able to pause the lecture, take notes, being able to ask question for me online. Like if the kid is shy, he may not want to say the question in front of the other one. And the ability for them just to type the question and submit it, and I don't share people's name and the kids don't know who has the question and why we went back to it. So, I think that an opportunity for different instruction in many ways with that model, that in the past maybe the kids would absolutely not understand what you're talking about (Frank, Interview 2, 2015).

His addition of formative assessment was observed in the classroom on multiple occasions as he used the answers provided by the Google Form to conduct a class review. Frank's use of this formative assessment is an apparent result of his desire to increase his

interaction with students. It highlights the association of adaptation of the model with the teacher's beliefs and experiences.

Allison's re-invention of the flipped classroom included having students create flipped videos using the same tools she used. These in turn became the basis for assigning a flipped video as homework (Allison, Observation 6, 2015). Allison described this strategy - make a video in class and watch two at home - as a way to have students think about instruction and learning (Allison, Interview 2, 2015). Framed this way, Allison is using students to create a digital library of content. She also perceived it as a way to address concepts around learning and the learning process with her students.

Lastly, Brian has the most elaborate evolution of re-invention of the flipped classroom described by any of the participants. As he described in our first encounter, his evolution in practice stems from his teaching philosophy that is centered on supporting students and fostering engagement (Brian, Interview 1, 2015). As he transitioned from the use of the flipped classroom in a previous school, he noted that in his new school he found that students' needs included a greater review of content. This resulted in a shift in viewing the flipped classroom as a direct lecture-homework inversion to a more elaborate model (Brian, Interview 1, 2015). He describes the in-class portion to involve more labs, review, and problem solving that were all aspects of his classroom instruction that were directly observed.

The major change Brian has planned for his future implementation of the flipped classroom is to tier the instruction based on students' selection of chemistry topics and interests. This model of tiered instruction will still use the flipped classroom, but he will create three tracks of videos associated with tiered objectives. As he described it:

I'm going to... allow students to choose which of the three groups they want to work towards. And, then grade them on a scale based on that. So, if you do all three sets of objectives, or if you do the tier three objectives, which would be everything, you can still earn up to 100% in the course. If you just do the tier two objective, you earn like 92 in the course. You do the tier one objective, you can earn up to an 85. Each getting the same amount of work through the process (Brian, Interview 2, 2015)

He believes this will enable him to leverage the flipped classroom to provide additional support to students while providing areas of growth for students who wish to move further with the curriculum. His ultimate vision is to differentiate the classroom experience for each student to better meet his or her individual needs. He believes he can achieve this level of fidelity by continuing to re-invent the flipped classroom.

**Problem-solving.** Another significant component of the adoption rationale for each participating teacher was the degree to which the flipped classroom alleviated or addressed some difficulty with traditional classroom instruction. In the simplest terms, the flipped classroom offered a solution, in each case, to an existing problem in the educators' classroom practice that had become burdensome enough to necessitate a change in instruction. This change was made in spite of the difficulties associated with making the flipped classroom videos, which was described by the majority of the participants as cumbersome. In terms of rationale for the adoption of the flipped classroom, three specific problems arose as themes: the need for more time, the desire for a reduction in lecture, and desire for an increased focus on student engagement. While these themes appear to be a common

characteristic of the adoption process for the teachers in their individual contexts, each individual emphasized one over the others based on their school context and personal beliefs.

Brian describes all three components in his rejection of the traditional classroom; he felt that his prior method of lecture still included too much direct instruction and talking and not enough student engagement (Brian, Interview 1, 2015). He also asserted a desire to establish a student-centered model to give him the time to support students (Brian, Interview 1, 2015). He described his struggle with spending the majority of his class time explaining concepts, reviewing problems, having students complete a few problems in class, getting few questions, and only to find the following day that students could not complete the homework without support or review. Megan and Sean mirrored these sentiments describing a frustration with the traditional paradigm for teaching problem-solving skills as not affording enough time for practice with support.

Sean felt that providing more time was the single greatest value of the flipped classroom and reason alone to reject his previous teaching practice. Describing his students and his change to the flipped model, he noted:

It's very difficult, and there's just too many of them can't hold it together...  
I knew I needed more time during the class, to help people. And what I used to do is people used to do all this homework at home. Homework.  
[LAUGH] So, you know there might be you, you know, 20 problems they have to do. Who are they asking for help? And are, were they asking me question when they came back in? And, was there enough time to address

those questions? And the answer was, was no, there wasn't enough time.

This opens up so much more time (Sean, Interview 1, 2015)

Sean's practices in the classroom also aligned with his focus on time as a priority.

For example, he used a flipped video to introduce game procedures at home to expand class time for play (Sean, Observation 4, 2015).

Allison, in her assertion of the flipped classroom's capacity to solve a problem, described it as aligning with her needs to be focused on student support by reducing direct instruction in her classroom. Her desire to reduce lecture and increase student interaction is representative of the solution she foresaw of the flipped classroom. This also aligns with her overall definition of the flipped classroom, as outlined in Theme 1, where she described the flipped classroom as a means to a decentralized, student-centric classroom in which groups of students are engaged in collaborative tasks. In observation, this was not a clear outcome as the majority of classroom interactions were teacher-centered and involving one-on-one interactions with students.

Administrators, like Jenifer at Fairfield, also agreed with idea of teacher adoption of the flipped classroom as a means of problem solving. She emphasized, in agreement with Sean, that time is a major advantage of the flipped model, explaining that her school focuses on student learning and not on using class time for content delivery (Jenifer, Interview, 2015). Her assertion affirms the broader finding that discomfort with current teaching practices helps foster the adoption of the flipped classroom and is grounded in the notion that it provides affordances for students and teachers. These will be addressed at length below, in theme four, but it is important to recognize that these are embedded in

a choice for adoption by the teacher based on the flipped classroom as a solution to instructional problems.

**Triability.** Triability is another component of Rogers' Innovation Diffusion Theory that has a strong association with adoption (Rogers, 2003). Triability is loosely defined as the degree to which an innovation can be undertaken, or tested, relative to a previous condition (Rogers, 2003). For example, a digital whiteboard could be conceived of as less readily triable as an education technology relative to a web-based app. The whiteboard must be locally installed and connected to a projector and computer. In contrast, a web-based app can be shared between teachers in separate locations, does not require dedicated hardware, and in short, is readily accessible to be tested. The flipped classroom appears to fulfill the requirements of being triable as an innovation, especially in the cases of Sean, Brian, and Allison.

Sean adopted the flipped classroom in the middle of the school year. A complete mid-year transition to a new teaching model is a dramatic shift in practice, but as Sean explained, it was necessary because his students could no longer focus on his traditional lectures (Interview 1, 2015). Sean's ability to adopt an entirely new teaching practice mid-year is a testament to the relative ease and accessibility that he found with the flipped classroom. Brian highlighted the flipped classroom's triability by shifting his practice with the model from a relatively limited implementation in the first instance to a more complicated one recently. His shift from YouTube clips only, to an embedded assessment scheme, to his future plans for multiple, tiered videos, is an indication of how malleable, or testable, he perceived the model to be (Brian, Interview 2, 2015). The ultimate re-invention with Brian's use of flipped classroom is a result of how flexible and

accessible he perceived it to be. Allison's view of the flipped classroom videos as being readily triable is highlighted by her using the flipped classroom with students and engaging students in their own creation of flipped videos (Observation 6, 2015). Her use of the flipped videos is unique in that she used the videos as formative and summative assessment and not only a content delivery scheme. It denotes how accessible she perceived the videos to be, and ultimately, the high degree of triability she attributed to the flipped classroom. These three teachers highlight the triability of the flipped classroom as a measure of the degree to which the flipped classroom is accessible and testable.

One contrast to this emergent finding of triability resides in Frank's perception of the flipped classroom as a whole. Frank spoke to the accessibility, or ease of using the videos, as one of the limitations of the flipped classroom (Interview 1, 2015). He believed that the videos are just the tip of the iceberg in a larger practice of flipped instruction, and that he found much of the practice of the flipped classroom is hidden from adopters (Frank, Interview 1, 2015). These hidden aspects include the classroom practice of individual teachers, including formative assessment, student support, time management, and classroom management. These also include the aspects of the model that contrasted between participants in this study and were highly dependent on the contexts in which the model was applied. His assertion contrasted with Sean, Brian, and Allison in regards to Rogers' triability (2003) and suggested that, while components of the flipped classroom may be readily examined and adopted, the overall practice of instruction may be in fact less accessible and less understood.

**Summary theme 3: Re-invention, problem solving, and triability.** All five participating teachers demonstrated a propensity to alter their instructional practice in adopting the flipped classroom, largely in order to solve an instructional problem. As Rogers stated, re-invention impacts the sustainability of any new innovation, its impact on the flipped classroom is important to understand (Rogers, 2003, p. 182,). Moreover, in examining the practices of teachers, re-invention appears to impact their ultimate practice with the model. All five participating teachers have adapted their practice with the flipped classroom in manners that align with Rogers' descriptions of re-invention.

A rejection of the current state of classroom instruction for each teacher appears to also play a significant role in their adoption of the flipped classroom. Their transition to the model is marked by a desire to solve specific classroom problems, including concerns regarding shortness in class time, a need to reduce lecture, and a need to foster increased student engagement drive their adoption. Individually, these priorities fall across a spectrum for Brian, Megan, Frank, Sean, and Allison. Together they constitute a rejection of their previous instructional practice in favor of the flipped classroom.

Lastly, triability, as defined by Rogers (2003), appears to be a positive net experience of the flipped classroom and the associated flipped videos. Teachers were readily able to put into practice the flipped classroom because as an innovation it offered, in their view, a simplistic alternative to traditional instruction through the flipped videos. Alternatively, classroom practices of the flipped classroom appear to be less observable, and therefore less obvious as affordances for experimentation with the model as a whole. The effect was best described by Frank as his "tip of the iceberg" problem, noting that the most observable aspect of the flipped classroom is the flipped video component

(Interview 1, 2015). However, he cautioned that the most essential aspect of the flipped classroom, the classroom delivery, is the component that requires continued problem solving and re-invention.

#### **Theme 4: Relative Advantages and Affordances**

Relative advantage is the perception of benefit from a given innovation in relation to an alternative or the status quo (Rogers, 2003). The value placed on the advantages of the innovation is derived from the individual experiences of adopters and the environments and contexts in which the adoption takes place. As Rogers explained, “It does not matter so much whether an innovation has a great deal of *objective* advantage... what does matter is whether an individual perceives the innovation as advantageous” (2003, p. 15). Relative advantage is a notable aspect of any innovation diffusion process because it impacts that rate of diffusion in a population, as well as impacts each individual adopter (Rogers, 2003). Because relative advantage is a perceived component of an adoption, each individual naturally attributes his or her own advantages to an innovation and therefore undertakes that adoption uniquely. This was evident through observation as all five teachers offered varied adoption pathways and described different relative advantages.

Part of perceiving a relative advantage of an innovation is being aware of the affordances of that innovation in the first place. Affordance in the most direct sense is what an object or environment provides to an individual (Gibson, 2014). As a technology, or in this case an innovation, the affordances are the possible actions that are perceived by the individual with regard to the innovation (Norman, 2002). For example, the handle on a tea cup could be perceived as having any number of affordances based on

the experience of a user. The looped handle can be used for holding single cup but also a means to carry multiple cups. The handle could also be used to store the cup on a hook if the user perceives it to be a suitable application of the handle.

Because the flipped classroom is an innovation itself, it requires that individual teachers make adoption decisions based on their own perceptions of the affordances of the model. In order for an aspect of the flipped classroom to be considered a relative advantage, it must first be perceived by the individual as an affordance. For example, if a teacher were deciding to adopt pencils with erasers over pencils without erasers, the teacher must first see the eraser as having the capacity to complete an action - to erase - before they can determine if erasing is in fact a relative advantage in the classroom. For the flipped classroom this can include a number of subtle components and nuances that must first be realized as having an action in the classroom prior to their consideration as offering relative advantage. The following paragraphs describe the prevailing relative advantages, and as such, the affordances described by teachers in this study.

**Relative advantages and affordances of the flipped classroom.** A number of findings emerged with regard to the perceived relative advantage of the flipped classroom on examining participant responses to the following interview question: *What are some advantages and disadvantages of using the flipped classroom for instruction for you as teacher, and for your students learning?* Broadly, it was determined that:

- A greater number of unique advantages over unique disadvantages of the flipped classroom could be described by all participants.
- A greater number of unique advantages of the flipped classroom could be described by teachers than by their site administrators.

- Four out of the five teachers could describe more unique disadvantages of the flipped classroom than their site administrators.
- Student control over content in the use of flipped classroom videos was described by every participant as an advantage of the model.
- Student control over content in the use of the flipped classroom videos, differentiation, and increased class time were described by every participant teacher as advantages of the flipped classroom.
- In a site specific finding, Megan and Frank displayed strong alignment in regard to their perceptions of advantages to the flipped classroom that were not reflected by their site administrators.

A subset of these findings is especially salient to adoption and the perception of relative advantage of the flipped classroom.

*Unique advantages over unique disadvantages.* The first observation is not unexpected as it aligns closely with Rogers' assertion that innovations with greater relative advantage are more likely to be adopted (2003). As all the participants in this study are assumed to have adopted the flipped classroom, the finding that their calculation of the model is a positive one is not unexpected. However, the fact that some teachers could identify a greater number of unique advantages for the method, three times as many for Frank and Megan, suggests that some teachers are more aware of the affordances of the model than others. Moreover, their ability to identify more unique disadvantages suggests that they have a greater fluency with the application of the flipped classroom in practice than the administrator in their schools.

*Student Control.* A second major observation of the above findings includes the discovery that every participant in the study cited student control over the videos. For example, Chris explained that, from his perspective as the academic administrator at Bardwell, the control afforded to students through the ability to pause, rewind, and re-watch flipped videos has been helpful for different learners (Chris, Interview, 2015). Other administrators such as Robert, who had the least experience with the model, also praised this type of student control as the number one benefit of the flipped videos (Interview, 2015).

Teachers expanded on this notion of student of control as well. Megan, at Fairfield, extended this control to not only the process of watching the videos but the location as well. As she explained, the flipped classroom offers students the ability to choose when to engage in learning with the videos due to the numerous interruptions in their school day (Megan, Interview 2, 2015). She gives the following student example to illustrate her point:

I have one young man and you probably know who I'm talking about, who was out for an extended period of time because of mental health issues. He was out, and he still could complete a lot of the work because he could find, get that kind that and he was actually pretty strong math student, so he was able to do that. Same thing, my seniors who are out all the time for college visits in the fall, but didn't really miss the overall concepts

(Megan, Interview 2, 2015)

Megan asserted that the flipped classroom offers the affordance of student control in learning beyond the just the time of instruction, and direct manipulation of the videos, to

also include the place instruction takes place. Her perspective is an illustration of the contrast in perception of affordances of the flipped classroom between participants resulting in a difference in the perception of relative advantage as described by Rogers (2003).

*Three common relative advantages.* While this study does not intend to produce an exhaustive list of relative benefits to using the flipped classroom, there are three relative advantages that were common among all five teachers. These included the increase in student control over content in the use of the flipped classroom videos, differentiation, and increased class time. A total list of participant described benefits can be found in Appendix L. The frequency with which these relative advantages are cited suggest that the three may play a role in influencing the broader adoption of the flipped classroom. Each participating teacher, while not asked to rank these items, tended to focus one of the three. For example, Sean and Brian emphasized an expansion of time as a major advantage, while Frank and Allison focused on differentiation. Megan appeared to focus on student control as a major relative advantage. This supports the individual perspectives of teachers as being an essential component of the adoption of the flipped classroom. It also suggests how nuanced their decision-making processes are in support and defense of the model.

*Alignment in perceptions of advantages.* Megan and Frank also show strong alignment in their descriptions of unique advantages of the flipped classroom. Of their described advantages, they independently noted 13 overlapping advantages of the flipped classroom. These included beliefs that the flipped classroom helped to develop independence on the part of the learner, created a resource for students outside of the

classroom, changed the role of the teacher preferably to a *coach* or *mentor*, and supported students who suffered from absenteeism, among other advantages. The sheer volume of the number of relative advantages they can each describe, coupled with the use of a common language in most cases, is suggestive of support or acceptance of the model of instruction in their school site. The lack of a corresponding alignment with their administrative team's descriptions of relative advantages in number and type, however, suggests that this acceptance might be limited to the core of teachers who practice the method. Megan and Frank both acknowledged that their direct supervisors had little experience with the model. They also both attended a weekly professional development program that Megan accounted for as a time she encountered the flipped classroom as a formal professional development experience. This may account for the common language used by each and the volume of affordances they can describe.

Ultimately, the variation in total advantages described by all participating teachers and administrators appears to align with the spectrum of practice witnessed and described in Chapter IV and described above. The variation also aligns with Rogers' assertion that the relative advantage of an innovation is perceived by individuals. This distinction is important because this variation may be negatively impacting the practices of teachers in the flipped classroom because they may not be aware of all of the affordances of the model. It also may be negatively impacting their interactions with administrators, as there does not appear to be agreement regarding the relative advantages, and at a more basic level, the affordances of the flipped model.

**Summary of theme 4: Relative advantages and affordances.** As defined above, relative advantage is the perception of benefit from a given innovation in relation

to an alternative or the status quo (Rogers, 2003). Importantly, advantages of any innovation are defined by the individual and are impacted by the environment and contexts in which the adoption takes place. All five teacher participants defined the relative advantages of the flipped classroom differently but agreed on three, namely: student control over content in the use of the flipped classroom videos, differentiation, and increased class time. In contrast, there was less alignment between administrators and their perceptions of relative advantages and teachers. Megan and Frank had the greatest number of described relative advantages of the model and aligned strongly in their perceptions of relative advantage for the flipped classroom.

#### **Theme 5: Isolation in Adoption and Contrast to Professional Learning Communities**

The adoption of an innovation such as the flipped classroom requires that the innovation itself be communicated to the adopter. In examining the experiences of the teachers and how they discovered the flipped classroom, particularly in response to the interview question *Where did you first hear about the flipped classroom?*, two major pathways emerge. Teachers either discovered the flipped classroom method independently from their school, or as part of some formal relationship within the school as shown below in *Table 3*.

A major difference between these teachers in their adoption resides in how their communication channels can be described. Brian, for example, relied heavily on the interpersonal relationships he had with his IT specialist and peer teacher in his prior school, in his adoption of the flipped classroom. Rogers asserted that interpersonal communication can have a stronger influence on adoption relative to other channels such as mass media (2003). However, while participants' experiences with communicating

the innovation aligned closely with Rogers', they all represent individuals who have adopted the flipped classroom in one setting and now are in new settings. This resulted in a break in communication channels for Allison and Brian, who are among the teachers who express sentiments of isolation with regard to their flipped classroom use. Described below is the specific finding of isolation among a subset of the teachers studied.

Table 3

*3a. Where did you first hear about the flipped classroom?*

| <b>Communication channels within the school</b>                          | <b>Communication channels outside of the school</b>             |
|--|---|
| Brian – IT Specialist and peer within is previous school.                | Frank – certificate in blended learning from outside university |
| Allison – professional development workshop with faculty from Edgeworth. | Megan – local conference  |
| Sean – articles and a student presenting Kahn Academy                    |   |

**Isolation.** From the above *Table 3*, it could be assumed that the teachers whose discovery of the flipped classroom inside a school would benefit from the support of the school with regard to their use of the flipped classroom as part of an overarching communication channel described by Rogers. However, contrary to this notion, Brian, Sean, and Allison all described some degree of isolation with their use of the flipped classroom. This is in contrast to Megan and Frank who taught in the same school and appeared to include a professional network that was knowledgeable of the model and conversed about it regularly. The following is an examination of this contrast and the alignment of Rogers' communication channels with the Professional Learning Community (PLC) at one of the schools.

*Brian moving to Bardwell.* As Brian explained, he brought his model of the flipped classroom with him two years ago to Bardwell in a move from his previous school. In doing so he has adjusted his delivery of the model to include more review and extending the periods between his flipped video. In his analysis he ascribed some of his difficulties with implementing the flipped classroom in his current school with individual students not attending to his course. (Brian, Interview 1, 2015). In working with his academic administrator, Chris, they have instituted some changes including a formal letter to the parents at the start of the year.

In Chris's assessment, Brian's conflict arose from his frequent use of the flipped classroom and from the parents' misunderstanding of its value and purpose (Chris, Interview, 2015). His assessment of this conflict included the parents' notion that Brian uses the model independently at Bardwell, without any major adoption from his peers. Chris explained that part of this was a misunderstanding, noting "the only time that there's criticism of it is, because people aren't understanding it new and, and he's bearing the brunt of it because he's the first one doing it" (Chris, Interview, 2015). The risks associated with being the first to attempt a new model of instruction in isolation align strongly with Rogers' (2003) characteristics of an early adopter.

As a mid-level administrator and as a grade Dean, Brian enjoys an elevated social status in his school among his peers. He is also a veteran teacher who appears to have positive attitudes towards science and change that are all associated by Rogers with early adopters (2003). Therefore, it is likely that in spite of his isolation, he is maintaining his adoption. Additionally, while Rogers would assert Brian's isolation as a negative impact

on his adoption because of a lack of communication channels, Brian appears to still be able to experiment with his practice of the flipped classroom.

*Allison at Edgeworth.* Edgeworth began a formal process of exploring alternative models of instruction through an on-line learning taskforce two years prior to Allison's experience with the flipped classroom. This was eventually abandoned for a more local initiative (Daniel, Interview, 2015). Described initially as a *blended learning* program it was designed as a school wide professional development opportunity (Brandon, Interview, 2015). Allison described her participation in that process taking place the year prior to her adoption of the flipped classroom and being a major catalyst for her adoption.

However, as the year the study was concluded, the professional development focus, as a school wide initiative, had already moved to iPads and their integration into the classroom. Allison describes her experience with the flipped classroom as “nervous” following this professional development:

I'm, I think the only middle school teacher who regularly uses a flipped classroom. So I don't have a lot of colleagues to share delivery and like instruction... I don't know, kind of, how I'm doing... So I don't have a sense of, kind of what other middle school science teachers are doing, in general, you know? (Allison, Interview 2, 2015)

In contrast to Brian, Allison appears much more conflicted with her application of the flipped classroom without describing any classroom conflicts. They both, however, align as teachers whose instruction with the model has developed in isolation after a period of collaboration and work with the support of a professional community.

*Sean.* Contrasting to an even greater degree, Sean began using the flipped classroom mid-year, upon return from winter break. This sudden shift in his instruction was without any support from peers and is indicative of the apparent autonomy in which he works within Lowell school. Sean echoed these sentiments of working in isolation when he walked me to interview his academic administrator. He explained that he had not been formally observed in years and that my observation had exceeded anything conducted by the school. Sean's comments were confirmed in interviewing the academic administrator, Robert, as he would frequently defer to Sean on definitions of the flipped classroom. Sean's own personal perspective appears to impact his independence with the model of instruction. When asked if he had any formal training in the flipped classroom he flatly replied "No" and added "I don't see, for me, reading this book [pointing to Bergmann and Sams (2012)], I know how to use my iPhone, point it at the board, I know how to teach the content and then I put it on, [Laugh] I put it on the board... I don't know what you need to teach?" (Sean, Interview 1, 2015). With these assertions, and the lack of input from his administrative team, Sean represents the furthest extreme observed of a teacher practicing the flipped classroom in isolation.

**Professional learning communities.** Megan and Frank offer a distinct contrast in their experience with the flipped classroom as peers in the same school setting. While their initial adoptions of the model originated out of independent inquiry, as noted previously, they both now work in a school that has an ongoing platform of professional development that includes the flipped classroom. Megan explained that Fairfield utilizes a professional development program that includes plus-days, in which students arrive to school at 10 am on a Wednesday to allow teachers common planning and instructional

time (Interview 1, 2015). Megan recalls Frank teaching her how to embed YouTube videos in Google forms as a means of attaching formative assessment to his flipped videos (Interview 1, 2015). Her recollection of his practice embedding the flipped videos in Google Forms was accurate and confirmed by observation. Megan's ability to share in a peer's work is unique in comparison to Sean, Allison, or Brian and highlights the communication fostered at Fairfield.

The support for the teachers at Fairfield was also present at the administrator level. Courtney, the academic administrator at Fairfield, conceded some skepticism among her peers with regard to the flipped classroom but quickly rejected it as a lack of understanding (Courtney, Interview, 2015). Courtney also explained that criticism has been directed at Megan but defended her adding:

When Megan was evaluated this this winter, the department chair did not view the videos that went with the flipped classroom. And so came to her classroom the next day, not having prepared. And so couldn't quite understand what was going on, and actually pointed the finger at things that she did not do when actually she had done them in the video. So I just, I think that there is some sort of out of hand disregard for the method.

But the proof is in, in the pudding, right? (Courtney, Interview, 2015)

Megan, when approached about this criticism, was quick to dismiss it as a fault of her supervisor who did not understand the model of instruction. In contrast to Brian's experience, this illustrates how the support and communication with peers and administrators can embolden an individual teacher like Megan.

A higher degree of communication between Frank and Megan was also evident in both the number of discrete advantages they could attribute to the flipped classroom -15 and 18 respectively - and the 13 that they agreed upon. These included an agreement that the flipped classroom is a more efficient means of instruction, that it adds time to the classroom for higher order activities with students, changes the role of the teacher to a coach, offers more student support, encourages independent learners, supports students who are absent, and more.

There were barriers to Megan and Frank's communication including being situated in different buildings on campus, being in different departments, and being members of a school with over 100 faculty members. This did not appear to inhibit the administrative awareness, as Jenifer, the technology administrator at Fairfield, was also aware of Megan's use of the flipped classroom, mentioning her specifically over a dozen times. She also continued using her as an exemplar for the practice of the flipped classroom when defining it during her interview (Jennifer, Interview, 2015). The greater degree of first-hand knowledge from administrative team, and the high degree of similarity in perceptions of benefit between Megan and Frank are indicative of a common familiarity with the flipped classroom that was not present at any of the other school sites. Megan and Frank also expressed none of the sentiments of isolation that the other three participating teachers did in reference to their adoption of the flipped classroom.

Isolation is an expected finding in Rogers' model of adoption given the novelty of the flipped classroom. However, given that all of the participant teachers asserted a completed adoption process, it was unexpected to observe the majority displaying sentiments of isolation. Additionally, it is contrary to expectation that the teachers who

expressed feelings of isolation are those whose introduction to the flipped classroom occurred within their school settings. Rogers' Innovation Diffusion Theory (IDT) does not explain these contrasts in experience between teachers practicing independently and teachers sharing the model in the same school fully beyond initial adoption.

The literature outside adoption theory offers some insights into these contrasting cases, particularly the lens of Professional Learning Communities (PLC). Often aligned with Communities of Practice (CoP), PLCs are a means to understand the four aspects of school change and reform namely: membership, leadership, culture, and knowledge sharing (Blankenship & Ruona, 2007). The largest difference between PLCs and CoPs resides in their origin. CoP is based in constructs of situated cognition, social learning theory, and ultimately a grounding learning theory (Blankenship & Ruona, 2007). While also oriented to systems of education, PLCs are historically directed towards the process of knowledge acquisition by professionals and more directly geared to school reform (DuFour & Eaker, 1998).

While Sean, Allison, and Brian were members of departments at their schools, with corresponding support structures, only Megan and Frank were supported by membership in a PLC around their classroom practice using the flipped classroom. The isolation that Sean, Allison, and Brian describe is similar to the isolation experienced by music and arts specialists studied in school buildings as the practice in the classroom is divergent to peers in other disciplines (Battersby & Verdi, 2015). This includes being evaluated by supervisors who do not have training in the flipped model of instruction, not having access to professional development that is aligned with their method of instruction, and not have a community of peers with which they can collaborate with on

the flipped classroom. Chris, Brian's academic administrator, largely echoed all three of these challenges in working to support Brian (Chris, Interview, 2015). Robert, Sean's academic administrator, also identified these conflicts as he lacked familiarity with the model completely (Robert, Interview, 2015).

Megan and Frank embody professionals who work in a school where they share their practice with peers collaboratively and have access to models of instruction that are similar to their own. While they still had conflicts with direct supervisors who did not have a complete understanding of the flipped classroom; the peer group they reside in appear to be supportive enough to eliminate feelings of isolation. Emerging research suggests that on-line PLC's could be a means to connect teachers in isolation to improve their efficacy and ultimately support student learning (Battersby & Verdi, 2015). Primarily this is because on-line communities are seen as means of increasing collaboration, and social/emotional support, but their impact on the internal aspects ill-informed supervision remains unclear.

**Summary of isolation and professional learning communities.** With regard to the flipped classroom, Brian, Sean, and Allison expressed feelings of isolation. While all three experienced adoption of the flipped classroom largely within a school setting, their ultimate practice with the model has become largely independent. In contrast, both Megan and Frank asserted that they discovered the flipped classroom outside of their schools and brought it to the school independently. Their experience in practicing the model lacks the sentiments of isolation described by Brian, Sean, and Allison. As peers, they described first hand-hand knowledge of each other's practice with the model and some degree of collaboration with professional development within Fairfield. Their

administrative team also appears to have a greater amount of firsthand knowledge regarding their practice of instruction and appear to regard it favorably.

The contrast in sentiments of isolation between the participating teachers is explained by the development of a Professional Learning Community around the use of the flipped classroom at Fairfield. Megan and Frank appear to have benefits from their experience including access to professional development that is aligned with their method of instruction and a community of peers with whom they can collaborate with on the flipped classroom. As Fairfield appears to have developed a PLC, Megan and Frank appear less inclined to feel isolated and less impacted by the lack of knowledge on the part of their supervisors regarding the flipped classroom.

### **Chapter V Summary**

The above chapter highlights the themes that emerged across all five cases, with a goal of establishing contrasts between the cases as well congruencies. As a result of this analysis, five major themes emerged. First, two distinct definitions of the flipped classroom were described by participants including an inversion of lecture and homework or a definition that emphasizes student engagement, collaboration, and a rejection of classroom lecture. The contrast is a significant finding because it aligns with the variable definitions found in the literature (Bishop & Verleger, 2013). It also influences the degree to which the flipped classroom serves as an enabling mechanism for constructivist pedagogy which will be addressed Chapter VI.

Second, participants presented a spectrum of practice with the flipped classroom. This is significant because it denotes a difference in the affordances perceived by the participants with regard the flipped classroom and supports the unique pathways to their

individual adoption. Additionally, the spectrum of practice found suggests a variance in the application of the flipped classroom among these five teachers that is not accounted for in the literature in K-12 private schools.

Third, the adoption of the flipped classroom included degrees of re-invention, problem solving, and triability for each participating teacher. These characteristics are significant because they appear to be embedded in the adoption process of the flipped classroom at the outset. Fourth, the teachers described a distinct variation in the relative advantages and affordances of the flipped classroom. These were demonstrated with the addition of a spectrum of practice for all five teachers. Variation in classroom practice and flipped video use is significant in that it indicates that the flipped classroom is not being implemented as a uniform pedagogy. Additionally, as will be explored in Chapter VI, it indicates a degree of contextual variation that is likely to impact future studies of efficacy and perception.

Lastly, a subset of participants described sentiments of isolation. This theme is in contrast to the participants who described their practice with a Professional Learning Community (PLC) at Fairfield. The contrast between these teachers, relative to the support they received in their unique schools, is significant because it indicates that the context of an adoption impacts the adopter and their individual experience with the flipped classroom.

Chapter VI will review and briefly summarize the findings of the research, and discuss the five emerging themes relative to findings in the literature. It will also discuss findings relative to the two guiding research questions. Recommendations for research, policy, and practice will also be addressed.

## **CHAPTER VI**

### **DISCUSSION AND RECOMMENDATIONS**

#### **Introduction**

Education is a decidedly cultural endeavor. As such, any new method of instruction must be carefully considered and defined in the context of complex social and structural hierarchies. Furthermore, any method of instruction utilizing technology in education, including the flipped classroom, must be understood both in practice and context (Selwyn, 2011). The need for rich, qualitative description of practice in context is paramount as a basis of further studies, including those that wish to examine efficacy of the flipped classroom.

The flipped classroom resides in the intersection of school world and the home world. As the model is enmeshed in the divide between the classroom and home, it plays a significant role between these two domains. As shown for example in this study, it enables parents to observe individual teacher's direct instruction via flipped videos at home (Sean, Interview 2, 2015). It enables teachers to provide frameworks of instruction that afford student control over content at home. The model also appears to impact the roles of the teacher and student in the classrooms under study. This study highlights that the flipped classroom is an emerging model of instruction, reflective of the context in which it is practiced.

Many have argued that the flipped classroom is on the cusp of a rapid expansion in practice as a diffused innovation of pedagogy (Fitzpatrick, 2012; Kahn, The one world

school house education reimagined, 2012; Rosenberg, 2013). This study was geared at investigating the adoption of this innovation of pedagogy, situated in the unique contexts of five teachers practicing in four schools. The flipped classroom is a pedagogy largely mediated by technology as means to send direct instruction home to students, outside of the classroom space. Understanding the growth of a technology in teaching, put simply, is essential because technology is that with which humans do more (Selwyn, 2011). Examining how the flipped classroom might be doing more in the context of these five teachers required a careful consideration of their adoption relative to their context, practices, and products (Selwyn, 2011).

### **Research Summary**

The purpose of this study was to better understand the flipped classroom of instruction as an emerging practice and to offer a greater understanding of why teachers choose to implement the flipped classroom in their classrooms. This study aimed to describe in rich detail what pedagogical approach teachers utilized in their unique contextual classroom settings, as a way of revealing the de-facto practice of the flipped classroom. Research questions included:

1. Why do private school K-12 teachers choose to adopt the flipped classroom?
  - 1a. What are their beliefs about teaching and learning that would inform their adoption of the flipped classroom?
  - 1b. What contextual/environmental factors inform their adoption of the flipped classroom?
2. How do private school, K-12, teachers implement the flipped classroom?

Through a lens of Innovation Diffusion Theory (IDT) (Rogers, 2003), the study examined the flipped classroom as implemented by five teachers, in four school settings, using a multi-site case study design. This methodology identified, through rich description and analysis, the developing practices of teachers with the flipped model, and also the teachers' experiences in adoption of a new method of instruction facilitated by technology (Merriam, 2009). The purpose of this chapter is to review the major components of the study, discuss the results, and offer recommendations for future inquiry. The chapter contains four sections: a research summary, discussion, recommendations, and a conclusion.

### **Review of Emerging Themes**

In conducting a thorough cross-case analysis, described in Chapter V, five major themes arose:

- Theme 1: Two competing, emerging definitions
- Theme 2: Spectrum of practice
- Theme 3: Re-invention, Problem Solving, Triability
- Theme 4: Relative advantages and affordances
- Theme 5: Isolation in adoption and a contrast to Professional Learning Communities (PLC).

### **Two Competing, Emerging Definitions of Flipped Classroom**

Across the five cases, two competing definitions emerged. First, Megan and Sean mirrored the definition presented in the literature most closely by practicing an inversion of the lecture and homework paradigm (Shultz et al., 2014), and in their relative frequency of flipped video use. They also used class time as a means to mediate the

process of students working on math problems. As an apparent result, their primary behavior in class was one-on-one student to teacher interactions.

Megan and Sean's pattern of use appeared to align with their subject matter. As math teachers who would have asked students complete problem sets at home in previous instructional practice, they have established the flipped classroom to complete those activities in class. The students, while paired, spent most of their time in independent activity and their progress is largely supported by the teacher with direct one-on-one intervention. In contrast, recent literature argues against this observation of alignment between subjects and the application of flipped classroom. For example, Helgeson (2015) suggested that contrary to perceptions of the flipped classroom being a suitable for math only, it is a valuable tool for teachers to meet individually with students in any subject area. Critically however, Helgeson (2015) asserted the same teacher-centric definition of the flipped classroom that relies on one-on-one teacher to student interactions to maintain progress in the classroom. This also aligns with Ash's (2012) criticism that the flipped classroom is being primarily used as a time shifting tool and not as a means to foster a student-centered classroom.

In contrast, Frank and Allison presented a broader definition of the flipped classroom as they demonstrated a preference for utilizing class time for collaborative exercises and reduction of classroom lecture. While Meagan and Sean also sought to reduce classroom lecture time, their classroom activities tended to be student independent work, rather than collaboration in nature. Moore et al.'s (2014) experimental study supported this observation that the flipped classroom affords opportunities for students to engage with peers in class because of a reduction in lecture. This is also in strong

alignment with the assertions in the current literature that the flipped classroom is designed to increase student collaboration, offer greater student autonomy, and reduce lecture in class (Bergmann and Sams, 2012, Strayer, 2007; Tucker 2012).

Between these two perspectives, Brian, like Frank and Allison, rejected the predominant use of class time for lecture in favor of student collaboration, yet included some alignment with the traditional perspective on the flipped classroom offered by Megan and Sean. In observation, when Brian had students solve problems, his students and his own primary behaviors were very similar to those of observed for Megan and Sean. He typically mediated student behavior by moving around the room in one-on-one teacher-student interactions and students, while paired, worked largely independently. During laboratory exercises, however, Brian's behavior expanded to include increased small group interactions, and his students worked in greater collaboration on tasks associated with the activity.

All five participants embodied, to some degree, a belief that the flipped classroom offers an alternative to lecture in favor of constructivist classroom practices that are supported by technology, which is consistent with the literature (Bishop & Verleger, 2013; Steinmetz, 2013). However, a subset of teachers, including Megan and Sean, are primarily using the flipped classroom as a means to increase teacher support for problem solving in place of lecture. This approach is the basis of the criticism in the literature that the flipped classroom could still largely be defined as lecture based and used primarily as means to manipulate time in the classroom (Ash, 2012; Bergmann & Sams, 2014; Kahn, 2012).

One possible explanation for the discrepancy in definitions lies in the nature of the adoption of the flipped classroom by all five teachers in this study. As noted in the literature, the flipped classroom represents largely a grassroots movement of teachers adopting the model (Bergmann and Sams, 2014). This, in conjunction with the adoption of the model as a process of problem solving by the teachers, appears to significantly influence the variety of ways in which flipped classroom is defined and practiced. Looking across all of these participants, a spectrum of practice emerges which provides a complex picture of the definition of the flipped classroom; the spectrum of practice among teachers is in critical contrast to the representations of much of the literature regarding the flipped classroom.

### **Spectrum of Technology Use and Classroom Practice**

As noted in Chapter V, participants presented a number of similarities with their implementation of flipped videos. With the exception of Allison, all the participants described a need to create their own videos exclusively and four of the five teachers, when creating their videos, used annotations with voiceover. YouTube was also an initial framework for hosting videos for four of the five teachers. There were also numerous contrasts between teachers which was in alignment with varied definitions offered by participants described above. The largest difference between participant teachers was their spectrum of technology use and classroom practice with the flipped classroom. This spectrum of practice aligns with the variation found in Bishop and Verleger's (2013) literature review of pedagogical theory associated with flipped classroom. It also indicates a contrast in the affordances perceived by teachers with regard to the flipped classroom. It reflects a variance in practice among teachers, one that is not accounted for

in the literature, which describes a heterogeneous implementation of the flipped classroom that aligns with teachers' individual experience and contexts.

Participating teachers exhibited significant variation in the unique aspects of flipped classroom in regard to the technologies that are implemented including the production, hosting, and delivery of flipped videos. Teachers also differed in their implementation of the videos including differences in delivery formats, formative assessment strategies, the use of outside content, and the frequency of video delivery. Emerging research also suggests that differences in video products can have an impact on student engagement. Guo et al. (2014), for example, asserted that there is a positive correlation with the use of a talking head in videos used for instruction. They also asserted that there is a negative correlation associated with fully recorded lectures compared to videos with pre-production when measuring student engagement (Guo et al., 2014). This is significant, for example, in considering Sean's approach and the relative convenience of recording lectures live relative to their ultimate efficacy. Other factors are also associated with improved student engagement including shorter length videos over longer videos, Khan-style tutorials, or real-time handwriting over static computer fonts. The differences indicate a relationship between the affordances of screen casting tools, or methods, and the products produced by the teachers. As emerging research shows significant impacts on student outcomes given variation in practice resulting from affordances in technology, it is essential to continue to describe this variation as it applies to the specific contexts of adoption of the flipped classroom (Guo, Kim, & Rubin, 2014).

### **Re-invention, Problem Solving, and Triability**

Common among the participating teachers was a propensity to alter their instructional practice, evidenced by the fact that they adopted the flipped classroom as largely a problem-solving endeavor. The teachers adopted the flipped classroom in order to address a perceived problem or need, and then re-invented the flipped classroom to fit their own particular problem or need. This is in contrast to adoption from other sources such as peer pressure, administrative edict, or perception of the flipped classroom being in vogue. In some cases, teachers re-invented their implementation of the flipped classroom several times. This is consistent with Rogers' notion of re-invention as a promoting factor for the ultimate adoption of the flipped classroom (2003). The re-invention teachers undertake in using the flipped classroom also appears to impact their practice with it in the classroom and with their flipped videos.

In adopting the flipped classroom, each teacher appears to have rejected some form of their prior instructional practice as unsatisfactory, which aligns with Rogers' assertion that in order to adopt innovations, previous practices must be determined to be inferior (2003). The literature has some limited support for the notion that the flipped classroom is predominately a phenomenon of rejection of lecture (Mazur, 2009; Steinmetz, 2013). All five teachers mirrored this desire to reduce lecture in the classroom but not eliminate it through their adoption of the flipped classroom. More so, their adoption of the model was driven by problem solving with regard to specific hardships with their previous classroom practice. These include concerns regarding a need to reduce lecture, to increase a constructivist use of available class time, and a need to foster increased student engagement. Although the degree to which they rejected lecture and

implemented constructivist classroom activities fell across a spectrum, the participants' practices ultimately represent a rejection of previous instructional practice in favor of the flipped classroom.

Teachers also described a degree of triability with regard to the flipped classroom. This included access to the technology needed to produce, host, and deliver the flipped video. It also included a classroom structure that was compatible with the adoption of the flipped classroom at the outset of their adoption. These structures included subject compatibility and an alignment with the teachers' individual instructional practices.

### **Relative Advantages and Affordances**

Relative advantage of the flipped classroom lies in the perception of benefit from the five participant teachers relative to their previous practice. As extensively addressed in Chapter V, the advantages of any innovation are defined by the individual and are products of the context of that innovation. The participating teachers all defined the relative advantages of the flipped classroom differently but areas of convergence included: student control over content in the use of the flipped classroom videos, differentiation, and increased class time. These advantages are among those supported in the literature (Herreid & Schiller, 2015; Schultz et al., 2014). There was significantly less alignment between teachers and administrators' perceptions of relative advantages of the flipped classroom. The number of perceived affordances found in the literature as advantages of the flipped classroom, coupled with those reported by participants, and the lack of congruence between administrators and teachers in this study are not unexpected.

### **Isolation in Adoption and Contrast to Professional Learning Communities**

A major contrast between the participating teachers was a sentiment of isolation when applying the flipped classroom. Brian, Sean, and Allison expressed feelings of isolation with regard to their implementation of the model. These three teachers adopted the flipped classroom through communication channels established within their school setting and now practice the model independently. Alternatively, Megan and Frank discovered the flipped classroom through communication channels outside of their schools, but now practice it within a Professional Learning Community (PLC) at Fairfield. In contrast to Brian, Sean, and Allison, they have significant, practical knowledge of each other's use of the flipped classroom and collaborate on teaching with the flipped model in a professional development setting at Fairfield. Megan and Frank's administrative team has a greater degree of knowledge regarding their individual utilization of the flipped classroom, and a positive opinion of their use of the flipped classroom.

As noted in Chapter V, Megan and Frank appear less isolated and less impacted by the lack of knowledge on the part of their supervisors regarding the flipped classroom than participating teachers at the other three sites studied. The contrast is best explained by the development of Fairfield's PLC regarding the use of the flipped classroom. The PLC appears to support Megan and Frank's experience because of access to a professional development network and a community of peers with whom they can collaborate (Battersby & Verdi, 2015). The isolation of experienced by Brian, Sean, and Allison is not thoroughly explained through a lens of adoption theory other than to indicate their status as early adopters (Rogers, 2003). In contrast, the lack of isolation

between Megan and Frank is a consequence of their membership in professional learning community and not a consequence of the communication channels that led to their individual adoption of the flipped classroom.

### **Discussion**

The goal of this research was to better understand the rationale of adoption among teachers of the model and how this adoption was influenced by the contextual and environmental factors of each case setting. It also aimed to describe the practice of teachers with regard to the flipped classroom, using rich description to illuminate the specific contexts of each case. The preceding section provided a summary of themes that emerged from the study. The following addresses the findings with regard to each of the research questions posed at the outset of study.

#### **Research Question 1: Adoption**

In examining the adoption of the flipped classroom across all five cases, it is clear that teachers choose to adopt the model because it offers a relative advantage over their previous instructional practice (Rogers, 2003). All five participating teachers also exhibited a propensity to experiment with their instructional practice in order to solve problems. Ultimately, each teacher was able to identify affordances of the flipped classroom and attribute relative advantages to these aspects of the model in alignment with Innovation Diffusion Theory (IDT) (Rogers, 2003). The three common advantages attributed to previous instructional practices were an increase in student control over content in the use of flipped classroom videos, an increase in differentiation in instruction, and an increase in class time afforded for other activities. While the degree to which any one relative advantage was offered as the impetus for adoption varied

among participants, the underlying sentiment was a rejection of previous practice with a lecture-based model of instruction. This rejection of lecture has limited support in the literature as rejection was an early impetus for the preceding frameworks of flipped classroom including Peer Instruction (PIP) which have not been re-enforced recently (Mazur, 2009; Steinmetz, 2013). Some critics also suggest that the flipped classroom is still a lecture-based means of instruction but with a shift in the location and time of that direction instruction (Ash, 2012; Bergmann & Sam, 2014; Kahn, 2012). This work shows that the degree to which the flipped classroom may be reducing direct instruction in favor of student-centered activities and practices is dependent on its application. It also highlights that in practice the flipped classroom is impacted by the individual teacher's experience and context.

All five teachers presented a practice of adapting or re-inventing instruction based on the needs of their students and the constraints of their schools. This led to unique pathways of adoption and ultimately unique applications of the flipped classroom in both the pedagogy and technology applied. The result of this variation between teachers is a practice of instruction with the flipped classroom that is not easily codified, or represented, as a single application of the flipped classroom – in other words, there is not one, homogenous flipped classroom.

Finally, the context and environment of the adoption played key roles in each case of the flipped classroom and are highlighted in the contrast between the experiences of Brian, Sean, and Allison, and those of Megan and Frank. While communication channels played a key role in the adoption of the flipped classroom, the ultimate development of a community of practice in one site appears to have had a positive impact on reducing

sentiments of isolation. In contrast, participants without a cohort of peers practicing the flipped classroom expressed significant feelings of isolation even after having adopted the flipped classroom. Megan and Frank's experience also appears to have positively impacted the administrative teams' overall knowledge and deference toward the flipped classroom. The nature of the support in Megan and Frank's experience appears to be derived from the development of a Professional Learning Community (PLC) within their school context (Battersby & Verdi, 2015).

### **Research Question 2: Implementation**

Each participant suggested different relative advantages of the flipped classroom, which helps to explain differences in participants' prior views of the affordances of the flipped classroom model (Gibson, 2014; Norman, 2002). Ultimately, a spectrum of practice is present across all five teachers using the flipped classroom, one that differs in the areas of video production, hosting, and delivery. The implementation of the flipped classroom, the variation in delivery, presence or absence of assessment, the use of videos that were not self-authored, and the ultimate frequency of video use, all offer a distinct spectrum of practice among the five teachers. The variety of practice among the participants supports Bergmann and Sams' (2014) assertion that the flipped classroom embodies an organic or grassroots initiative rather than a top-down or proscribed practice. The variety of ways that the flipped classroom is implemented has implications for future research, policy, and practice that will be discussed below.

### **Adoption Informing Practice: Connections Between the Two Research Questions**

As noted above, individual teachers adopted the flipped classroom within their unique practice and context. Their exploration of the flipped classroom was largely a

problem solving endeavor, and a rejection of their prior instruction, due to the affordances of the flipped classroom. In perceiving these affordances, or in terms of IDT, relative advantages, teachers selected to use the flipped classroom as they perceived it to have value over previous instructional practices. The five teachers in this study uniquely situated the flipped classroom within their instructional frameworks, re-inventing aspects to suit their needs. A consequence of these varied adoption pathways is a spectrum of practice that ranges from limited rejections of classroom lecture for the use of class time to solve problems to broader conceptualizations of a rejection of lecture in class for alternative student-centered classroom activities.

The resulting observed practices of these teachers suggests a wide range of applicable classroom activities, video formats, video application, and video frequency with the flipped classroom. This range of application is not clearly represented in the literature for K-12 private schools. Specifically, differences in the technologies used to create, host, present, and mediate the flipped videos suggest a broad array of application also not accounted for in the literature. In order to continue to support these novel approaches to instruction, future research must focus on filling in these gaps of understanding with regard to the flipped classroom.

### **Recommendations**

The results of the study inform the following recommendations for future research, policy, and practice.

#### **Research**

Understanding the application of the flipped classroom in its context of adoption is useful in order to gain a deeper understanding of the actual practice of flipped

classroom in K-12 private schools, as this research has shown. However, it is important to continue to understand the nature of that application of method and practice relative to established pedagogical theory. It is essential to establish a defining architecture under which the flipped classroom resides in practice and theory. As the literature review suggested, some teachers implement the flipped classroom without a clear theoretical or pedagogical framework (Bishop & Verleger, 2013). Also, Bergmann and Sams (2014) asserted in their most recent work that, from a behaviorist model of instruction, the flipped classroom could result in no change in the practices of the teacher towards a constructivist model. All five teachers in this study displayed some degree of constructivist ideology in reflection of their practice. All five of the participating teachers were observed with a high number of behaviors that could be considered constructivist in nature including: numerous peer student interactions in the classroom, a tendency to reduce lecture in favor of student activity, and a lot of movement in the class. However, it is possible that Bergmann and Sams' assertion could be valid in observation of Megan and Sean who still included a high number of teacher-centered activities in their daily practices including numerous one-to-one student-teacher interactions. This contradiction could also be true in other settings and for other teachers. Therefore, additional research into teacher implementation of the flipped classroom is suggested in order to establish what components and behaviors constitute constructivist application on the part of the teacher.

This research described the variety of individual practice in a small sample of teachers who implemented the flipped classroom in their private school classrooms. It also exhibited significant variation in perceived benefits of adoption by both teachers and

administrators. Because teaching and learning are both social constructs, deeply embedded in the personal perceptions of individual teachers, administrators, and students, future studies need to carefully consider the flipped classrooms implementation in unique contexts. Also, as an emerging practice of instruction, future research needs to continue to establish the relevant and essential conditions of the flipped classroom as they apply to the day-to-day practices of educators across the country. Continued inquiry is also needed with regards to the impact of adoption pathways on application of novel instruction like the flipped classroom. Given the variation in practice identified in this study, future research needs to carefully consider and describe the relevant aspects of the practice with regard to the flipped classroom when examining questions of performance and perception, especially when studying small sample populations.

This research specifically supports further examination of the classroom practices as they relate to items such as formative assessment, technologies used, and classroom support. First, as substantial variability was shown in the practice of teachers with formative assessment within their videos and in class, it is essential that future research examines the impact of this variability with regard to efficacy and student perception. Second, as a variety of flipped video products were produced by participants ranging from direct recordings of lectures, reduced tutorials with talking heads, to screen-cast overlays, it is important to examine the impact of this variation on outcomes for students in learning, motivation, and achievement. Emergent research in post-secondary settings suggests measurable differences in the quality of the instruction and differences in the outcomes associated with variable practices (Guo, Kim, & Rubin, 2014). This analysis needs to be expanded to include K-12 settings.

Lastly, differences were observed in the amount of classroom support given to students with the flipped classroom as measured by student-teacher interaction or peer interaction, especially with regard to the subject matter taught. For example, the math teachers studied included a significant amount of 1-to-1, teacher-centered interaction with students relative to the teachers in the other disciplines. These differences need to be examined for their impact on the efficacy of the flipped classroom as they may constitute a major functional difference of discipline specific practices for teachers with the flipped classroom.

### **Policy**

From a lens of policy, the adoption and implementation of the flipped classroom in this study appears to benefit from structures and policies geared around supporting continuous learning and professional development in cohorts of like professionals. For example, this would include formally established Professional Learning Communities (PLCs) but also, less formally, the access teachers have to new examples of pedagogy and to peers engaged in novel teaching practices. It is vital that policy makers consider how they engage teachers in ongoing learning and experimentation with new teaching methods. It is also important that they address structures that support teachers in their problem-solving endeavors and enable teachers to take risks in seeking out these new practices. Specifically, in these private school settings, that means including both teachers and administrators in the study of novel methods of instruction, in order to align professional assessment with practices and stave off isolation among teachers in their methods of instruction.

**Practice**

Teachers need to consider their own practices and subject-specific disciplines in adopting new or novel teaching methods. In looking across the teachers observed in this study, their variation in practice, relative to the variation in subjects taught, suggests larger structural differences related to the pedagogy of discipline specific practices. These differences may have an impact on the implementation and outcomes for the flipped classroom. For example, teachers in math subjects could consider how their practices could be informed by teachers in disciplines less focused on teaching sequential problem solving. Teachers must consider the relationships between discipline specific practices and the flipped classroom when choosing to implement it, including how normative behaviors in a given subject might impact the teacher's and students' experience of the flipped classroom. This is not to restrict the flipped classroom to only specific ages or subjects, but rather to assert that implementation will be contextual and should be informed by a broader dialog oriented around learning theory.

Teachers also need to begin to examine components of the flipped classroom constituting best practice as they emerge. This includes the incorporation of short video segments and embedded assessments with-in the videos (Guo et al., 2014) as well as expanded classroom practices as suggested by participants in this study. The resulting efficacy and capacity of the flipped classroom to garner a student-centered classroom will reside in educators being able to identify, explain, and reproduce components of best practice. This includes those aspects of instruction that could also be construed of as discipline specific applications of the flipped classroom.

### **Intersections Between Research, Policy, and Practice**

While the preceding paragraphs address implications for the flipped classroom on research, policy, and practice individually, there is an intersection between the three areas. The shifting role of the teacher in the flipped classroom is the salient example of this interaction. For example, a teacher willing to experiment with the flipped classroom must also be present in school setting in which experimentation in pedagogy is accepted. He or she must also have had the relevant exposure to the new instructional approach that stems from the current research agenda. This requires a continued emphasis on policy that maintains access to research in these specific settings. Without continued access to research in K-12 private schools, individuals will not have the benefit to craft improved policy or practice.

It is important to note that as all of the participating teachers self-selected to use the flipped classroom, they may have a native propensity to exhibit the behaviors of a mentor or coach and not a lecturer prior to study. Unruh, Peters, and Willis (2016) noted for example, differences in the attitudes and beliefs of six teachers using the flipped classroom when compared to six of their peers using, what they termed, a “traditional class model” (p. 38). At the same time, teachers develop their skill set for classroom practice over the course of years. Should the flipped model require a propensity to alter these skill sets, it could have a major impact on the teacher and students in both adoption and in implementation. Even teachers who have adopted the model, like Allison, expressed some discomfort with their changing role. These barriers to adoption need to be better understood for the benefit of both teacher and students as the practice materializes in schools. A model that might be pedagogically sound is not a solution if it

alienates teachers. Nor will the flipped classroom be impactful if, despite its intention to shift teaching and learning toward constructivist ideology, it is being modified in practice to re-enforce behaviorist pedagogy.

### **Conclusion**

As an emerging pedagogy, the flipped classroom is purported to be a mechanism capable of shifting from a teacher-centered classroom to one that is more aligned with constructivist ideology. In examining the day-to-day practice of five teachers in four private schools in the mid-Atlantic, a clear spectrum of implementation is present, including variations in the frequency of use of the flipped videos, the types of classroom activities and roles of teachers and students, and the video products being produced and utilized. Appendix M presents an attempt to capture this spectrum in a working definition of practice, as a starting point for moving forward with future research and practice. The affordances of the flipped classroom also impact each individual teacher's adoption of the model, as well as the administration's perception of the model in each school context. Peer support appeared to play a role in adoption, and future research should seek to further understand the role of PLCs in regard to adoption of flipped classrooms. An analysis of the relative advantages imparted by the diffusion of increased student-centered methodologies into the classroom has also shown that teachers in K-12 settings are experimenting with, and re-inventing, their classroom instruction with technology. Continued research is needed that examines the relationship between the spectrum of flipped classroom practice as it relates the efficacy of the flipped classroom in terms of learner achievement and other outcomes.

The ultimate impact of the flipped classroom on instruction and learning will reside in its adoption pathway, implementation, and capacity to foster student-centered learning environments. As Bergmann and Sams cautioned in their most recent work, *Flipped Learning: Gateway to Student Engagement* (2014), the flipped classroom may in fact be failing to transition classroom environments away from teacher-centered instruction as a technology mediated pedagogy. Further examination of adoption pathways and implementation of the flipped classroom will help researchers, policy makers, and practitioners establish best practices for its development and application. This will also help leverage, where possible, the capacity of the flipped classroom to foster a student-centered learning environment. The degree to which this is accomplished will determine the ultimate diffusion of the flipped classroom as an emerging pedagogy.

## APPENDICIES

### Appendix A: IRB Approval



#### EXEMPTION NUMBER: 15-X035

To: Dean Whitfield  
 From: Institutional Review Board for the Protection of Human  
 Subjects, Peggy Korczak, Member YD  
 Date: Monday, November 24, 2014  
 RE: Application for Approval of Research Involving the Use of  
 Human Participants

Office of Sponsored Programs  
 & Research

Towson University  
 8000 York Road  
 Towson, MD 21252-0001

t. 410 704-2236  
 f. 410 704-4494

Thank you for submitting an application for approval of the research titled,  
*Examining the Adoption of the Flipped Classroom Instructional Model in  
 Private Schools: A Case Study*

to the Institutional Review Board for the Protection of Human Participants  
 (IRB) at Towson University.

Your research is exempt from general Human Participants requirements  
 according to 45 CFR 46.101(b)(2). No further review of this project is  
 required from year to year provided it does not deviate from the submitted  
 research design.

If you substantially change your research project or your survey  
 instrument, please notify the Board immediately.

We wish you every success in your research project.

CC: Sarah Lohnes-Watulak  
 File

## Appendix B: Search Schema

| <i>Literature Review Method</i>               |   |  |                  |           |   |
|---|---|--|------------------|-----------|---|
| Phase   | Search Term   | Data Bases   | Article          | Dates     | Result  |
| 1   | 'flipped classroom*'  | Academic Search Complete, Education Research Complete, ERIC, Library, Information Science & Technology Abstracts, Primary Search, Professional Development Collection, Psychology and Behavioral Sciences Collection | Peer Review Only | 2000-2015 | 378 items returned – new search phase conducted to limit returns.   |
| 2   | flipped classroom* [and] secondary education [or] high school [or] junior high [or] middle school   | Academic Search Complete, Education Research Complete, ERIC, Library, Information Science & Technology Abstracts, Primary Search, Professional Development Collection, Psychology and Behavioral Sciences Collection | Peer Review Only | 2000-2015 | 22 articles returned – 6 removed as being 'off topic', one page editorial, or studying college students. Total of 16 of which 5 were found in my original search in the spring of 2014.   |
| 3   | Flipped classroom [or] flip [or] Inverted Classroom* [or] reverse classroom* [or] Flipped Instruction [and] secondary education [or] high school [or] junior high [or] middle school                                      | Academic Search Complete, Education Research Complete, ERIC, Library, Information Science & Technology Abstracts, Primary Search, Professional Development Collection, Psychology and Behavioral Sciences Collection | Peer Review Only | 2000-2015 | 29 articles now returned. 6 duplicates removed. 1 new article available for a current total of 23 articles.   |
| 4   | Flipped Classroom* [or] flip [or] Inverted Classroom* [or] reverse classroom* [or] Flipped Instruction [and] secondary education [or] high school [or] junior high school [or] middle school [or] K-12 [or] K-8 [or] 7-12 | Academic Search Complete, Education Research Complete, ERIC, Library, Information Science & Technology Abstracts, Primary Search, Professional Development Collection, Psychology and Behavioral Sciences Collection | Peer Review Only | 2000-2015 | 80 articles returned: 49 off topic, 16 from previous searches, 8 in a college setting, 2 editorials, 2 from a 2014 search, 1 in adult education, 1 in teaching K-12 teachers (PD), leaving 1 new article from this search with a new current total of 24 articles found.  |
| 5   | "Flipped Classroom*" and Secondary Education  | Google Scholar   | Articles Only    | All       | 4,730 returned – worked through first 100 by 'relevance'<br>Already Found – 9<br>Off topic/not peer-reviewed – 39<br>Post-Secondary Education – 29<br>Not available from Towson – 6<br>Policy Paper – 3<br>New peer-reviewed Article – 3<br>Periodical – 8<br>Literature Review – 1<br>Thesis (Masters) – 1<br>Books – 2<br><a href="https://scholar.google.com/scholar?q=%22Flipped+Cla">https://scholar.google.com/scholar?q=%22Flipped+Cla</a> |
| Total number of articles reviewed in K-12: 33 |   |  |                  |           |   |

## Appendix C: Recruitment Letter to Technology Leaders

January 19, 2015

Dear Dean Whitfield\*,

My name is Dean Whitfield and I am a doctoral student in the College of Education, Department of Educational Technology & Literacy at Towson University. As part of the research for my dissertation, I will be conducting a series of case studies in the Spring of 2015 that aim to observe the application of the flipped classroom instructional model by teachers in schools ..... Schools. I am seeking your assistance with gathering some background information about the application of the flipped classroom in ..... private schools, as well as your assistance with identifying teachers who currently use the flipped classroom. This information will be used to aid in the selection of schools sites and teachers for the case study research.

If you are willing to participate, please use the following link to take a short (9 question) survey that asks general questions about the flipped classroom at your school which should take no longer than 5 minutes. You will be entered into a drawing for a \$50 gift card to Amazon for completing the survey.

**Survey:** <https://www.surveymonkey.com/s/MV6NDTH>

Please let me know if you have any questions.

Thank you for your time and consideration.

Respectfully,

Dean Whitfield, M.Ed.  
 Doctoral Student, ISTC Towson University  
[whitf2@students.towson.edu](mailto:whitf2@students.towson.edu)

Director of Technology, .....  
[dwhitfield@.....](mailto:dwhitfield@.....)

## Appendix D: Technology Leaders Follow-up

Dear\*,

I am just following up to an email I sent previously regarding a study I am conducting for my doctorate at Towson University. I am hoping to find teachers in ..... schools who are utilizing the ‘flipped classroom’ method of instruction in their classrooms to conduct a series of case studies.

If you have any teachers who you think would be willing to participate could you please forward them my contact information or respond with theirs.

Below you will find a link to participate in a very brief administrative survey attempting to capture the breadth of adoption for the ‘flipped classroom’ in ..... You will be entered into a drawing for a \$50 gift card to Amazon for completing the survey.

**Survey:** <https://www.surveymonkey.com/s/MV6NDTH>

Please let me know if you have any questions.

Thank you for your time and consideration.

Respectfully,

Dean Whitfield, M.Ed.

Director of Technology, .....  
[dwhitfield@.....](mailto:dwhitfield@.....)

Doctoral Student, ISTC Towson University  
[whitf2@students.towson.edu](mailto:whitf2@students.towson.edu)

## Appendix E: Teacher Recruitment Letter

February 3<sup>rd</sup>, 2015

Dear\*,

My name is Dean Whitfield and I am a doctoral student in the College of Education, Department of Educational Technology & Literacy at Towson University. As part of the research for my dissertation, I will be conducting a series of case studies in the spring of 2015 that aim to observe the application of the flipped classroom instructional model by teachers in ..... private schools.

Test has indicated that you are flipping your own classroom instruction. I am seeking your assistance with gathering some background information about the application of the flipped classroom in ..... private schools. This information will also be used to aid in the selection of school sites and teachers for the case study research.

If you are willing to participate, please use the following link to take a short (8 question) survey that asks general questions about your experience with the flipped classroom at your school which should take no longer than 10 minutes.

<https://www.surveymonkey.com/s/M9QCT7J>

Please let me know if you have any questions.

Participants who complete the survey will be entered into a drawing for a \$50 amazon gift card.

Thank you for your time and consideration.

Respectfully,

Dean Whitfield, M.Ed.  
Doctoral Student, ISTC Towson University

## Appendix F: Teacher Recruitment Follow-up Letter

Dear\*,

I am just following up to an email I sent previously regarding a study I am conducting for my doctorate at Towson University. I am hoping to find teachers in ..... schools who are utilizing the ‘flipped classroom’ method of instruction in their classrooms to conduct a series of case studies.

\* indicated that you are flipping your own classroom instruction. I am seeking your assistance with gathering some background information about the application of the flipped classroom in ..... private schools. This information will also be used to aid in the selection of school sites and teachers for the case study research.

If you are willing to participate, please use the following link to take a short (8 question) survey for teachers that asks general questions about your experience with the flipped classroom at your school which should take no longer than 10 minutes.

<https://www.surveymonkey.com/s/M9QCT7J>

Please let me know if you have any questions.

Participants who complete the survey will be entered into a drawing for a \$50 amazon gift card.

Thank you for your time and consideration.

Respectfully,

Dean Whitfield, M.Ed.  
Doctoral Student, ISTC Towson University

## Appendix G: Revised Interview Questions

Proposed interview questions for semi-structured Interview 1 for teachers and associated school leaders, adapted from Jwaifell and Gasaymeh (2013).

For Teachers:

- 1a. Tell me a little about yourself (how long you've been at this school, how many classes you teach, your background)
1. Tell me a little about your teaching philosophy (example, belief's about teaching, how you view learning).
2. How do you define flipped classroom? Can you give me an example of a flipped lesson from your own teaching?
- 3a. Where did you first hear about the flipped classroom?
3. Why did you decide to flip your classroom?
4. What are some advantages and disadvantages of using the 'flipped classroom' for instruction for you as teacher, and for your students learning?
5. Tell me a little about how the flipped classroom fits with your teaching philosophy?
6. What are the challenges that you faced when you use the 'flipped classroom' during your teaching experience?
7. Have you received any training in relation to the uses of the 'flipped classroom' (such as training sessions, workshops, online training etc.)?
8. Walk me through a typical flipped lesson. When do you flip, what type of content do you typically flip, what technology do you use, what do you have your students do at home, etc?
9. Can you list some of the ways in which you think the flipped classroom benefits your students' learning?
10. What are the factors that promote or limit the use of the 'flipped classroom' in teaching and learning from your perspective?

For School Leaders:

- 1a. Tell me a little about yourself (how long you've been at this school, what you taught or teach, your background, etc.)
1. Tell me a little about your teaching philosophy (example, belief's about teaching, how you view learning).
2. How do you define flipped classroom? Can you give me an example of a flipped lesson?
- 3a. Where did you first hear about the flipped classroom?
3. How did a flip classroom become a part of your academic program?
4. What are some advantages and disadvantages of using the 'flipped classroom' for instruction for you as an administrator, and for students learning?
5. Tell me a little about how the flipped classroom fits with your teaching philosophy?
6. What are the challenges that you faced when you applied the 'flipped classroom' in your school setting?
7. Have you received any training in relation to the uses of the 'flipped classroom' (such as training sessions, workshops, online training etc.)?
8. Walk me through a typical flipped lesson. When do you flip, what type of content do you typically flip, what technology do you use, what do you have your students do at home, etc?
9. Can you list some of the ways in which you think the flipped classroom benefits your students' learning?
10. What are the factors that promote or limit the use of the 'flipped classroom' in teaching and learning from your perspective?

Proposed interview questions for semi-structured Interview 2 for teachers

1. Do you have any reflections on the experience of being observed using the flipped classroom instructional model?
2. Is there anything you feel like I have not observed in the utilization of the flipped classroom?
3. Others have defined the flipped classroom as:

(use responses from interview 1)

4. Others have identified the following advantages using the flipped classroom for instruction as teacher, and for their students learning? Do you agree?

(use responses from interview 1)

5. Others have identified the following disadvantages using the flipped classroom for instruction as teacher, and for their students learning? Do you agree?

(use responses from interview 1)

6. What, in your mind, are the essential elements contained in a flipped classroom of instruction?
7. Because I have only watched your flipped class sessions, can you tell me how your in class sessions are similar and/or different to your traditional classrooms?
8. How have you have changed the way you teach in order to flip classroom? What effects have you felt with regard to student learning?
9. Flipped teaching appears to involve primarily one-on-one or small group interactions in your classroom. Is this how you typically teach/taught in non-flipped classes? What effect do you think the individual attention has on your students learning?
10. How do you plan to use the flipped classroom in the future? What changes or improvements do you plan to make in regards to your implementation of the model in the future?

Appendix H: Interview Questions for Semi-Structured Interview 2 for Brian

**Badwell\_interview2\_Brian\_4-13-2015**

**Interview questions for semi-structured Interview 2 for Brian**

1. Do you have any reflections on the experience of being observed using the flipped classroom instructional model?
2. Is there anything you feel like I have not observed in the utilization of the flipped classroom?
3. Others have defined the flipped classroom as:  
 “how the classroom time is managed and modeled and used. And using that time for activities that, that benefit most from student and, student to student interaction, and student to teacher interaction. And flipping back out of the classroom to the homework zone activities, academic learning activities, that are equally well done independently by the student. So, essentially preserving the classroom time for the human engagement. Teacher to student, student to student, and leaving for the independent time the kind of work that is equally well done in an independent setting”
4. Others have identified the following advantages using the flipped classroom for instruction as teacher, and for their students learning? Do you agree?

Primarily the following advantage - “For certain types of learners to be able to access that information via the videos to stop, rewind, pause and do all those things as opposed to the traditional classroom delivery.”

5. Others have identified the following disadvantages using the flipped classroom for instruction as teacher, and for their students learning? Do you agree?

Paraphrasing – as a new instructional model it gets blamed (and the teacher) for a student’s struggles regardless of the myriad of other factors that go into the success of a student in the 10<sup>th</sup> grade.

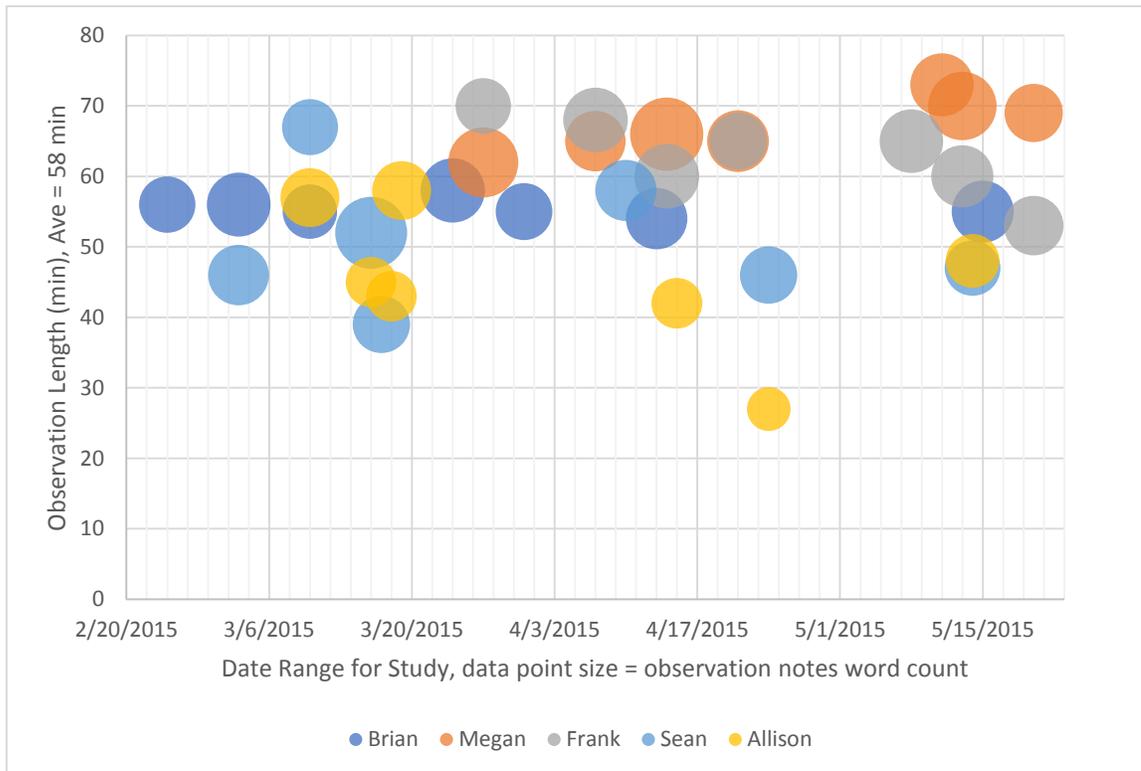
6. What, in your mind, are the essential elements contained in a flipped classroom of instruction?
7. Because I have only watched your flipped class sessions, can you tell me how your in class sessions are similar and/or different to your traditional classrooms?
8. How have you have changed the way you teach in order to flip classroom? What effects have you felt with regard to student learning?
9. Flipped teaching appears to involve primarily one-on-one or small group

interactions in your classroom. Is this how you typically teach/taught in non-flipped classes? What effect do you think the individual attention has on your students learning?

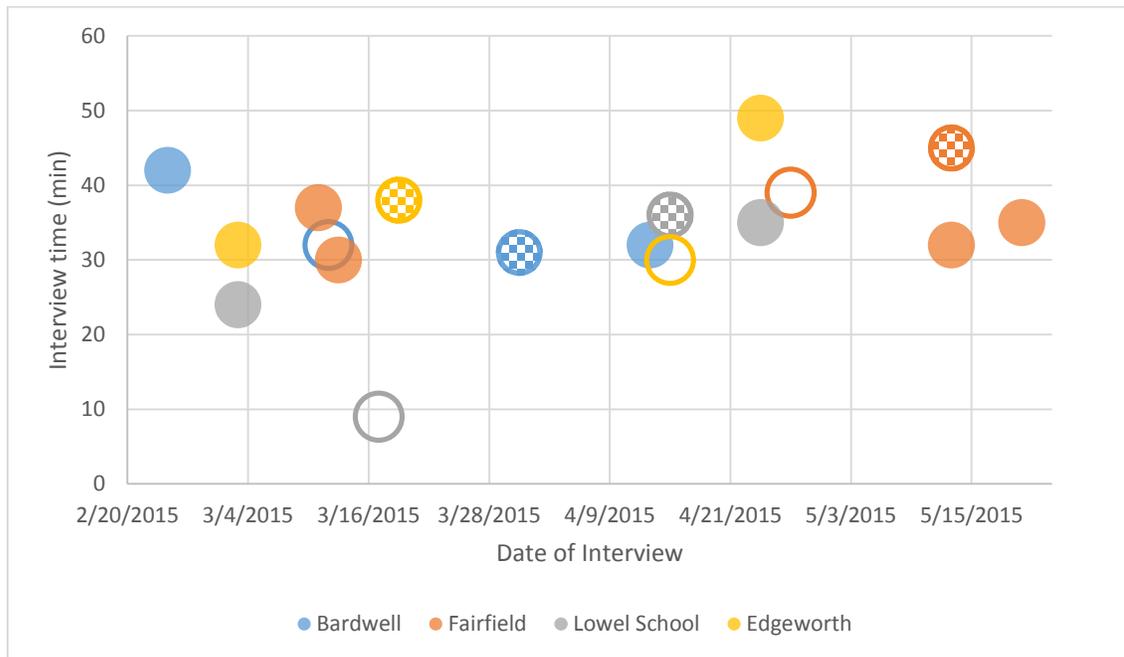
10. How do you plan to use the flipped classroom in the future? What changes or improvements do you plan to make in regards to your implementation of the model in the future?

## Appendix I: Frequency Plots of Teacher Observations and Teacher and Administration Interviews

### *Frequency and Duration of Observations of Teachers*



*Frequency and Duration of Teacher and Administrators Interviews*



Hash = technology administrator

Open = academic administrator

Solid = teacher

## Appendix J: Complete Code List - Alphabetical

*Complete Code List - Alphabetical*

| Code Name                              | Sources | References |
|--|---------|------------|
| Admin - Admin or teaching experience   | 7       | 10         |
| Admin - Concern with the flipped model | 6       | 10         |
| Admin - Dean of Students               | 1       | 1          |
| Admin - Job history or transitions     | 7       | 8          |
| Admin - Teaching Philosophy            | 8       | 24         |
| Admin - Training workshop              | 8       | 10         |
| Adoption                               | 32      | 123        |
| adoption - Bottom up                   | 5       | 9          |
| Adoption - Communication channels      | 15      | 58         |
| Adoption - Early adopter               | 4       | 4          |
| Adoption - Facilitated by Technology   | 14      | 28         |
| Barrier to adoption                    | 16      | 80         |
| Bergman and Sams                       | 5       | 5          |
| BYOD                                   | 3       | 3          |
| Calculator                             | 1       | 1          |
| Collaborative teaching model           | 3       | 4          |
| Camtasia                               | 1       | 1          |
| cell phone                             | 7       | 7          |
| Change in Education                    | 2       | 2          |
| Changing role of the teacher           | 8       | 21         |
| Chrome book                            | 2       | 4          |
| Classroom - Environment                | 20      | 47         |
| Classroom - Visitor                    | 8       | 13         |
| Classroom - Volume                     | 17      | 36         |
| Classroom Culture                      | 6       | 6          |
| Constructivist                         | 9       | 11         |
| Distance education                     | 1       | 2          |
| DuoLingo                               | 2       | 2          |
| Educanon                               | 2       | 2          |
| Educreation                            | 5       | 6          |
| ELMO                                   | 4       | 5          |
| Engagement                             | 31      | 83         |
| Explain Everything                     | 5       | 7          |
| False perception of flipped classroom  | 9       | 18         |
| Final Site                             | 1       | 1          |
| Flipped Classroom                      | 19      | 63         |
| Flipped Classroom - Active             | 12      | 19         |

|   |    |     |
|---|----|-----|
| Flipped Classroom - Adaptation                              | 30 | 72  |
| Flipped Classroom - Admin and teacher differences           | 4  | 6   |
| Flipped Classroom - Admin evaluation                        | 1  | 1   |
| Flipped Classroom - Adoption                                | 34 | 126 |
| Flipped Classroom - Advantages                              | 30 | 161 |
| Flipped Classroom - Age appropriate                         | 2  | 3   |
| Flipped Classroom - Area of improvement                     | 5  | 8   |
| Flipped Classroom - Asynchronous                            | 15 | 26  |
| Flipped Classroom - Blended Learning                        | 5  | 9   |
| Flipped Classroom - Classwork                               | 32 | 128 |
| Flipped Classroom - Connection with students                | 21 | 37  |
| Flipped Classroom - Definition                              | 17 | 20  |
| Flipped Classroom - Differentiation                         | 25 | 60  |
| Flipped Classroom - Disadvantage                            | 19 | 46  |
| Flipped Classroom - Efficiency                              | 1  | 1   |
| Flipped Classroom - Feeling isolated                        | 1  | 3   |
| Flipped Classroom - Formative Assessment                    | 18 | 32  |
| Flipped Classroom - Guided Notes                            | 9  | 12  |
| Flipped Classroom - Guided practice                         | 20 | 53  |
| Flipped Classroom - Hands-on                                | 7  | 9   |
| Flipped Classroom - Homework                                | 41 | 91  |
| Flipped Classroom - Humanities Instruction vs. Science Math | 7  | 10  |
| Flipped Classroom - Independent Learner                     | 14 | 24  |
| Flipped Classroom - Individualized Instruction              | 18 | 49  |
| Flipped Classroom - Lab or activity in class                | 7  | 29  |
| Flipped Classroom - Limitation                              | 15 | 31  |
| Flipped Classroom - Missing school solution                 | 8  | 13  |
| Flipped Classroom - Not flipping                            | 8  | 11  |
| Flipped Classroom - Parent Perceptions                      | 12 | 22  |
| Flipped Classroom - Peer support or interaction             | 36 | 77  |
| Flipped Classroom - Preparation for College                 | 3  | 4   |
| Flipped Classroom - Project and lab introductions           | 3  | 4   |
| Flipped Classroom - Reduce lecture in class                 | 14 | 24  |
| Flipped Classroom - Re-enforcement                          | 20 | 32  |
| Flipped Classroom - Reflection                              | 6  | 16  |
| Flipped Classroom - Skills or Problem Solving               | 5  | 7   |
| Flipped Classroom - Social Justice                          | 3  | 4   |
| Flipped Classroom - Student created screen-casts            | 2  | 4   |
| Flipped Classroom - Student performance                     | 4  | 9   |
| Flipped Classroom - Student responsibility                  | 19 | 46  |

|   |    |     |
|---|----|-----|
| Flipped Classroom - Student Voice               | 11 | 15  |
| Flipped Classroom - Teacher movement            | 25 | 136 |
| Flipped Classroom - Teacher scanning            | 20 | 49  |
| Flipped Classroom - Technology issue            | 12 | 16  |
| Flipped Classroom - Time                        | 16 | 63  |
| Flipped Classroom - Tip of the Iceberg problem  | 8  | 13  |
| Flipped Classroom - Tool to reach every student | 16 | 30  |
| Flipped Classroom - UDL                         | 1  | 2   |
| Flipped Classroom - Variety of class materials  | 7  | 10  |
| Flipped Classroom - Video                       | 44 | 148 |
| Flipped Classroom - Video - Pre-made            | 2  | 2   |
| Flipped Classroom - Video frequency             | 22 | 34  |
| Flipped Classroom - Video length limit          | 8  | 11  |
| Flipped Classroom - Whole class activity        | 8  | 20  |
| Flipped Model                                   | 12 | 16  |
| Frustration with traditional teaching           | 9  | 13  |
| Gamification                                    | 1  | 1   |
| Google  | 3  | 3   |
| Google doc                                      | 3  | 4   |
| Google Form                                     | 6  | 10  |
| Google Sheet                                    | 1  | 2   |
| Headphones                                      | 5  | 7   |
| Homeroom  | 1  | 1   |
| iMovie  | 1  | 1   |
| Inquiry Based Learning                          | 3  | 8   |
| Inversion of Instruction                        | 13 | 18  |
| iPad  | 23 | 74  |
| iPhone  | 4  | 6   |
| IT support                                      | 6  | 8   |
| IXL   | 2  | 7   |
| Kahn Academy                                    | 9  | 15  |
| laptop  | 5  | 6   |
| Learning Management System - LMS                | 3  | 6   |
| Limitation of Study                             | 2  | 2   |
| Mac or Macs or Apple                            | 3  | 3   |
| Measurement                                     | 2  | 2   |
| Moodle  | 8  | 9   |
| Off topic                                       | 9  | 12  |
| Online Learning                                 | 4  | 5   |
| Passion for teaching                            | 1  | 1   |
| Peer Interaction - Academic                     | 15 | 27  |
| Projector                                       | 14 | 33  |

|                                      |    |     |
|--------------------------------------|----|-----|
| Reflection - Note made in review     | 35 | 341 |
| Researcher behavior or actions       | 15 | 25  |
| School Culture - Independent schools | 7  | 13  |
| Screen Casting                       | 7  | 13  |
| Screen Chomp                         | 1  | 1   |
| Screen Flow                          | 1  | 1   |
| Screencast-O-Matic                   | 5  | 7   |
| Smart Board                          | 1  | 1   |
| Smart Notebook                       | 1  | 1   |
| Smart Recorder                       | 1  | 1   |
| Spotify                              | 1  | 2   |
| Student - Behavior                   | 36 | 271 |
| Student - Behavior - Off Task        | 27 | 104 |
| Student - Comment on lesson          | 10 | 23  |
| Student - Description of             | 10 | 10  |
| Student - Entering class             | 12 | 15  |
| Student - Number                     | 28 | 37  |
| Student - presentation               | 1  | 4   |
| Student - Question                   | 29 | 103 |
| Student - Using a computer           | 1  | 2   |
| Student - Writing or notes           | 9  | 15  |
| Student Age                          | 1  | 1   |
| Student Centered                     | 14 | 25  |
| Swivil                               | 1  | 1   |
| Tablet                               | 5  | 5   |
| Teacher - Admin task                 | 28 | 90  |
| Teacher - Affect                     | 5  | 7   |
| Teacher - Aspirations and goals      | 1  | 1   |
| Teacher - Beginning class            | 32 | 36  |
| Teacher - Board work                 | 29 | 133 |
| Teacher - Choral Question            | 14 | 36  |
| Teacher - Choral Questions           | 4  | 15  |
| Teacher - classes taught             | 2  | 3   |
| Teacher - Classroom Management       | 30 | 122 |
| Teacher - Coaching - Mentoring       | 25 | 98  |
| Teacher - Description of Dress       | 15 | 15  |
| Teacher - Digital Tool               | 19 | 35  |
| Teacher - Direct Instruction         | 31 | 155 |
| Teacher - Direct question            | 12 | 24  |
| Teacher - Education or Training      | 2  | 2   |
| Teacher - Email                      | 1  | 1   |
| Teacher - Ending class               | 32 | 33  |
| Teacher - Engagement with students   | 5  | 10  |
| Teacher - Formative assessment       | 3  | 3   |

|   |    |     |
|---|----|-----|
| Teacher - Frequency of Support                  | 5  | 10  |
| Teacher - Giving Quiz                           | 4  | 12  |
| Teacher - Giving Test                           | 3  | 16  |
| Teacher - Guided Practice (Group or Pair)       | 18 | 45  |
| Teacher - Homework                              | 12 | 20  |
| Teacher - Humor                                 | 14 | 23  |
| Teacher - Job transition                        | 6  | 6   |
| Teacher - New skill to flip                     | 2  | 2   |
| Teacher - One-on-one interaction                | 36 | 162 |
| Teacher - Organization                          | 3  | 5   |
| Teacher - Posture                               | 20 | 43  |
| Teacher - Proximity                             | 18 | 33  |
| Teacher - Reflection on flipped classroom study | 4  | 4   |
| Teacher - Teaching Experience                   | 5  | 13  |
| Teacher - Teaching Philosophy                   | 5  | 15  |
| Teacher - Training workshop                     | 6  | 15  |
| Teaching is a constant evolution of practice    | 3  | 3   |
| Technology constantly change                    | 4  | 4   |
| Ti-84 Virtual Calculator                        | 1  | 3   |
| Tiered Instruction Model                        | 3  | 7   |
| Time  | 13 | 29  |
| Traditional Instruction                         | 19 | 47  |
| Twice Exceptional                               | 2  | 2   |
| Twitter   | 1  | 2   |
| Varied Assessment                               | 1  | 1   |
| Video-cast                                      | 2  | 3   |
| Vimeo   | 1  | 1   |
| Web-Assign                                      | 2  | 5   |
| Whipple Hill                                    | 4  | 6   |
| YouTube   | 9  | 15  |
| Zone of Proximal Development                    | 1  | 1   |

---

## Appendix K: Observation Overviews and Flipped Video Frequencies for Teachers

| <i>Brian's classroom observation overview and flipped video frequency</i> |  |   |   |   |
|---|--|---|---|---|
| Observation   | Primary Activity   | Teacher's Primary behavior  | Work from the night prior                             | Homework                                |
| Monday<br>2/24/2015   | Group Inquiry Activity with students broken into pairs       | Moving constantly throughout the lesson between pair groups   | None  | Flipped video                           |
| Tuesday<br>3/3/2015<br>(No School Monday)                                 | Quiz   | Moving constantly answering student questions   | Webassign problems                                    | Reading assignment and penny collection |
| Tuesday<br>3/10/2015  | Laboratory exercise with students broken into groups of 3-4. | Stationed at reagents to facilitate their dispersal, some movement between groups appearing to motivate student action    | Pre-lab questions and Read lab instructions           | Webassign problems                      |
| Tuesday<br>3/24/2015<br>(No School Monday)                                | Review and then class activity on electron configuration     | Review using choral questions and then constant movement in one-on-one and small group interactions.                      | None (Flipped Video prior to Spring Break)            | Flipped video and incomplete classwork  |
| Tuesday<br>3/31/2015  | Review and then in class Webassign classwork                 | Review at the board using choral questions and then constant movement in one-on-one interactions occasionally with pairs. | None (Webassign and Flipped Video from previous week) | Complete Webassign from class           |
| Monday<br>4/13/2015   | Review and then in class assignment packet                   | Review at the board using choral questions and then constant movement in one-on-one interactions occasionally with pairs. | Complete Laboratory Assignment                        | Webassign, study for test Thursday      |

|                      |   |  |               |               |
|----------------------|---|--|---------------|---------------|
| Tuesday<br>5/12/2015 | Simulated laboratory exercise on the computer | Review at the board using choral questions and then constant movement during the lab exercise engaging in primarily one-on-one interactions with the students in pairs | Flipped Video | Flipped Video |
|----------------------|---|--|---------------|---------------|

| <i>Megan's classroom observation overview and flipped video frequency</i> |  |   |                                       |   |
|---|--|---|---------------------------------------|---|
| Observation   | Primary Activity   | Teacher's Primary behavior  | Work from the night prior             | Homework  |
| Friday<br>3/27/2015   | Problem packet (Pink) then direct instruction for remaining time.                                      | Moving constantly between individual or pair groups then for direct instruction using remotely connected tablet laptop and projector.   | None                                  | Finish problem packet (Pink) flipped video                  |
| Tuesday<br>4/7/2015   | Direct instruction in whole class problem review then individual practice problems for remaining time. | Stationary at the front of the room using remotely connected tablet laptop and projector to show problems then moving constantly answering student questions during practice problems | None                                  | Review flipped videos for test tomorrow                     |
| Tuesday<br>4/14/2015  | Problem packet from previous day continued in pairs.   | Short review using choral questions and then constant movement in one-on-one and small group interactions.  | None (Flipped video from last Friday) | None  |
| Tuesday<br>4/21/2015  | Quiz Flipped videos and packet of problems   | Stationary at the front of the room occasionally moving to answer questions and pass out packet of problems   | worksheet                             | 2 Flipped videos and complete packet of problems from class |
| Friday<br>5/08/2015   | 5 min review then a short session of   | Review at the board using choral questions  | Flipped video                         | Homework worksheet  |

|                     |  |   |               |   |
|---------------------|--|---|---------------|---|
|                     | independent work on iPad app and then direct instruction for remaining period of time.   | and then constant movement in one-on-one interactions occasionally with pairs with students on iPads and finally stationary at the front of the room using tablet and projector to show problems and ask questions chorally.            |               | and Flipped video   |
| Wednesday 5/13/2015 | Review for 20 minutes and then independent work on iPad app or watching flipped video assignment and then a packet for homework given with 20 minutes left in class. | Review at the board using choral questions and tablet laptop and projector to show problems and then constant movement in one-on-one interactions occasionally with pairs for the remainder of class.                                   | Flipped video | Complete homework packet.   |
| Wednesday 5/20/2015 | Direct instruction of plotting lines on a calculator for 20 minutes and the remaining time on a review packet of problems in pairs                                   | Review at the board using choral questions and tablet laptop and projector to show steps on the calculator and then constant movement during the review packet engaging in primarily one-on-one interactions with the students in pairs | None          | Flipped videos are to be reviewed for the past two chapters over the next week. |

| <i>Frank's classroom observation overview and flipped video frequency</i> |   |   |   |   |
|---|---|---|---|---|
| Observation   | Primary Activity  | Teacher's Primary behavior  | Work from the night prior   | Homework "Devoirs"  |
| Friday<br>3/27/2015   | Warm-up – Pair share, homework corrections, 4 questions from Socrative, movie descriptions on the boards (in pairs).  | Warm-up check with each student, direct instruction during homework review and while given assessment questions on Socrative Moving constantly between individuals or pair groups during remaining half class while students work on movie descriptions.                                | Flipped Video, embedded assessment questions in a google form, and workbook worksheet | Workbook exercises 3 and 4 on pg. 31, Flipped video and embed questions on Moodle, and for Thursday, April second complete their Film critique. |
| Tuesday<br>4/7/2015   | Warm-up – Pair share, pairs of students and individuals working on classwork from workbook, students completing a google doc shared with the teacher independently. | Warm-up check with each student, classwork assignment given including the workbook and google doc.,” Moving constantly between individuals or pair groups engaging in one-on-one interactions during remaining half class stopping once to share a student's google doc with the class. | None (Quiz on Monday)   | Flipped video and embedded questions on Google Forms. Workbook exercises 1 p. 32 and 11 p. 69   |
| Tuesday<br>4/14/2015  | Warm-up – Pair share, homework check in workbook, individual classwork and class review, pairs and groups working on a  | Warm-up check with each student, homework check calling on a few select students. Moving constantly between individuals or pair groups engaging in  | None (Teacher decided not to present class assignment via a video as he had           | Socrative assignment, Quizlet cards, and a test tomorrow.   |

|                      |   |  |  |   |
|----------------------|---|--|--|---|
|                      | movie pitch via a shared google doc.  | one-on-one interactions during remaining majority of class helping students with their movie pitches.  | done in the past)  |   |
| Tuesday<br>4/21/2015 | Review of the homework, Each student is individually watching 4 of the five videos made and filling out a shared class google doc. Teacher asks a direct question of each student about the movies watched, students paired to discuss the movies with each other. Begin homework | Stationary at the front of the room reviewing the homework, constantly moving from individuals while they write their reviews of the movies, direct questions of students about the movies they reviewed, moving from pairs while they discuss the movies, for half the period the teacher has been moving constantly from pair to pair or group engaging in one-on-one conversations with students. | Flipped video with 2 embed assessment questions in a google form. Movie from the week prior made by students in pairs. | 1 Flipped video and embed questions on Google Forms. Workbook exercise 2 on p. 36                         |
| Friday<br>5/08/2015  | Warm-up = Pair share, finish creating a script in google docs and then a video introduction of a recipe in educations individually, working in pairs to create a super hero script  | Warm-up check with each student, moving from individuals working on their scripts and videos, moving from pairs working on their super hero scripts and videos again primarily in one-on-one interactions with students throughout the lesson.   | None   | Choose an exam topic, watch the Flipped video on unit 7, and complete the quiz questions using Socrative. |

|                        |   |  |   |  |
|------------------------|---|--|---|--|
| Wednesday<br>5/13/2015 | Warm-up = Pair share, direct instruction on concepts from flipped video, individual classwork in workbooks followed by group review, group exercise on shared google sheet. | Warm-up check with each student, direct instruction from the front of the room. Moving from individuals working on their workbooks and then google sheet answers primarily in one-on-one interactions with students throughout the lesson. | Flipped video with embed assessment questions in a google form and workbook assignment. | 2 Flipped videos and embed questions on Google Forms. Study guide for upcoming test. |
| Wednesday<br>5/20/2015 | Warm-up = Pair share, iPad questions, and classwork in workbooks individually for the majority of class.  | Warm-up check with each student, then moving constantly between individuals working in one-on-one interactions with students throughout the entirety of the lesson.  | None  | Review flipped videos from unit for exam and complete quiz on Moodle for review.     |

| <i>Sean's classroom observation overview and flipped video frequency</i> |  |  |                                  |                    |
|--|--|--|----------------------------------|--------------------|
| Observation  | Primary Activity   | Teacher's Primary behavior   | Work from the night prior        | Homework           |
| Tuesday<br>3/3/2015  | Football toss homework review, homework correction, review of two examples from flipped video, students paired or working individually on classwork problem set. | Homework check student by student, homework correction on Elmo by teacher (direct instruction), direct instruction at the board of two problems, continuous movement between pairs or individuals in one-on-one interactions for | Flipped video and problem set 69 | None on the board. |

|  |  |  |   |  |
|--|--|--|---|--|
|  |  | remaining 30 minutes of class.   |   |  |
| Tuesday<br>3/10/2015<br>(Shortened period because of PTA breakfast for teachers) | Independent Times-table review, homework correction, students paired or working individually on classwork problem set.   | Homework check - student by student, homework correction on Elmo by teacher (direct instruction), continuous movement between pairs or individuals in one-on-one interactions for remaining 15 minutes of class. | Flipped video and problem set for 71      | Flipped video and problem set for 72       |
| Monday<br>3/16/2015<br>(Test on Previous Friday)                                 | 15 minute review on whiteboard, classwork in individually or in pairs as the teacher calls on one student at a time to review their tests.   | Review using choral questions through problems similar to flipped video, 35 minutes reviewing tests individually with students in order from highest score to lowest at the teacher's desk.                      | Flipped video #73 from previous Wednesday | Battleship flipped classroom video         |
| Tuesday<br>3/17/2015   | 5 minute review of playing 'battleship' with coordinate pairs, remainder of time spent with students playing in pairs behind dividers.   | Short review of coordinate pairs at the board and the remainder of class moving from student pairs engaging in one-on-one interactions.  | Battleship game video                     | No Homework (Spring break starts Thursday) |
| Friday<br>4/10/2015  | 5 minutes of administrative tasks and review of finding the area of a rectangle, majority of period spent working on inquiry activity in pairs then groups of 4, closing with answering inquiry questions. | Review of the schedule, choral questions on how to find the area of a rectangle, moving around class from pairs and groups during inquiry activity, finally direct instruction using choral questions to answer  | No homework                               | None listed on the board                   |

|                       |  |   |                           |                                    |
|-----------------------|--|---|---------------------------|------------------------------------|
|                       |  | inquiry activity questions.   |                           |                                    |
| Friday<br>4/24/2015   | 10 minutes of administrative tasks and review of flipped video content, then a series of challenge problems done individually with the teacher at the board. | Review of schedule and homework, for the remainder of the period the teacher places a series of challenge problems on the board and solves them with the students using choral questions. | Flipped video 8.3 and 8.4 | homework 'IXL-V.9' a math website. |
| Thursday<br>5/14/2015 | Test for the entire period given.  | Teacher stayed at his desk and marked each as it was turned in. He reviewed scores one at a time during the end of class.   | Study for test            | Study for final Thursday.          |

| <i>Allison's classroom observation overview and flipped video frequency</i> |  |   |   |   |
|---|--|---|---|---|
| Observation   | Primary Activity   | Teacher's Primary behavior  | Work from the night prior                             | Homework  |
| Tuesday<br>3/10/2015  | 25 minutes reviewing homework and the schedule for the week. Remainder of the class is direct instruction with choral questions. | Direct instruction during the review and schedule. The remainder of the class period the teacher is stationary at the front of the room at her laptop.          | Lab on blood types.                                   | None  |
| Monday<br>3/16/2015   | 20 minutes directions on class assignment and then 15 min for students in pairs to complete scavenger hunt with iPads.           | Direct instruction during instructions with choral questions. one-on-one interactions with pairs and individual students as they return from scavenger hunt for | Pre-made 1:30 min video of abiotic and biotic factors | Complete the chart of 10 biotic and 10 abiotic factors from class scavenger hunt. |

|                        |  |   |      |  |
|------------------------|--|---|------|--|
|                        |  | remaining portion of class.   |      |  |
| Wednesday<br>3/18/2015 | 10 minutes to give directions and prepare project for student presentations. 10 minutes for each group to scroll through their images. Remaining class with direct instruction on breaking species into classifications.                         | Teacher stationary at the front of the room giving directions, and for student presentations, then seated at the lectern during directions and then at the board giving direct instruction on species classification using choral questions.                                    | None | Complete 10 classifications for a species of a student's choice. |
| Thursday<br>3/19/2015  | 15 minutes to give directions for three flipped videos as an in-class assignment. Students paired watching videos on their iPads with head phones for majority of class, last five minutes spent on review of terms and introduction of project. | Teacher stationary at the front of the room giving directions, alternating between writing at the board the 'critter cam project' requirements, and moving between pairs of students. Last five minutes spent in direct instruction on reviewing terms and introducing project. | None | Critter cam project assigned.                                    |
| Wednesday<br>4/15/2015 | 25 minutes for the majority of students completing a test. Remainder of time used to select biomes for student projects in pairs.  | Teacher moving between students taking the test answering questions and working with three students writing out note cards. Remainder of the time teacher is stationary at the front of the room while selecting pairs and  | None | None   |

|                       |   |   |  |                                   |
|-----------------------|---|---|--|-----------------------------------|
|                       |   | introducing biome project.  |  |                                   |
| Friday<br>4/24/2015   | 15 minutes on directions and homework from previous night. The remainder of time spend on a special presentation of a solar cooker on the school's patio. | Teacher stationary giving directions then again stationary at solar cooker during presentation using choral questions.  | Flipped Videos made by peers with required note taking | Materials for building terrariums |
| Thursday<br>5/14/2015 | 5 minutes on directions for class. Remainder of time is given to groups of students to work on their 'African Magazine Project.'                          | Teacher moving after directions from groups of students checking their note cards then moving from groups working on their 'end of year project' which was introduced with a Flipped Video the previous week. | Note cards on a species.                               | None.                             |

## Appendix L: Described Participant Benefits – Sorted by Frequency, High to Low

Student control over video  
"Differentiation"  
More time in class  
Developing student accountability/responsibility  
Videos resource for review  
More student support from teacher  
Solves absent student problem  
"Individualized Instruction"  
Independent Learners and engagement  
Supports advanced students  
More time in class (labs and activities)  
Change in Teacher role to mentor  
More time in class (higher order applications)  
"Student-Centered"  
Student cooperation  
Reach Every Student Every Day  
Important exposure to on-line learning/college  
Motivating students in class  
"More efficient"  
Parents can view Instruction  
Advantage to auditory learners  
Viewed by Parents (transparent teaching)  
Developing 'grit' on the part of students  
Increases modalities  
"Social Justice"

### Appendix M: Flipped Classroom – A Definition of Practice

As this research described a lack of a coherent definition of the flipped classroom it is prudent to now offer a functional definition of the flipped classroom for future research as product of this study:

*A mechanism of instruction that uses digital video lectures, usually authored by the teacher, to present direct instruction to students, prior to the classroom lesson, in order to afford an increase in student-centered learning activities in the classroom that can include peer interaction, inquiry, problem-solving, and individualized teacher support.*

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## CURRICULUM VITA

Dean Whitfield  


### Professional Experience

|   |             |
|---|-------------|
| <p>Director of Technology<br/>           Jemicy School (grades 1-12)<br/>           Owings Mills, MD</p>  | 2014 - 2015 |
| <p>Director of Educational Technology<br/>           Jemicy School (grades 1-12)<br/>           Owings Mills, MD</p>  | 2013 - 2014 |
| <p>Instructional Technology Specialist and Physics and Robotics Teacher<br/>           Jemicy School, upper campus (grades 7-12)<br/>           Owings Mills, MD</p>          | 2012 - 2013 |
| <p>Department Chair: Science and Math &amp; Instructional Technology Coordinator<br/>           Shoshana S. Cardin High School (grades 9-12)<br/>           Baltimore, MD</p> | 2008 - 2012 |
| <p>Physics Teacher<br/>           Shoshana S. Cardin High School<br/>           Baltimore, MD</p>   | 2006 - 2008 |
| <p>Volunteer Service Specialist<br/>           American Red Cross<br/>           Baltimore, MD</p>  | 2005 - 2005 |
| <p>Science Teacher<br/>           Amelia High, West Clermont Schools<br/>           Cincinnati, OH</p>  | 2004 - 2005 |

### Education

|  |                |
|--|----------------|
| <p>Doctoral Candidate in Instructional Technology<br/>           Towson University, College of Education (ISTC)<br/>           Baltimore, MD</p> | 2009 - Present |
|--|----------------|

Advisor: Sarah C. Lohnes Watulak, Ed.D.

2005

Master of Education in Secondary Education  
University of Cincinnati  
Cincinnati, OH

2004

Bachelor of Science in Secondary Education  
University of Cincinnati  
Cincinnati, OH

### **Publications and Presentations**

Whitfield, D. & Lohnes Watulak, S. (2016, March). The application of the Flipped Classroom in five private school classrooms: A multi-Site case study. Roundtable conducted at the annual meeting of the Society for Information Technology and Teacher Education, Savannah, GA.

Whitfield, D. & Copperthite, B. (2014, May). Small scale assistive technology interventions for greater adoption among students. Presentation at the annual technology retreat for the Association of Independent Schools in Maryland & the Nation's Capital, St. Michael's, MD.

Lohnes Watulak, S., & Whitfield, D. (2011, December). One of these things is not like the other: Technology and literacy practices and identities of college students. Paper presented at the annual meeting of the Literacy Researchers' Association, Jacksonville, FL.

Lohnes Watulak, S., & Whitfield, D. (2011, December). Examining the role of technology in college students' academic literacy practices. Paper presented at the annual meeting of the Literacy Researchers' Association, Jacksonville, FL.

Whitfield, D., & Meyer, H (2005). Learning from our students: Photovoice and classroom action research. *Science Education Review*, 4, 97-105.

Meyer, H., Clark, W., & Whitfield, D. (2005). Images of Science: preparing urban pre-service teachers to teach culturally relevant science. Paper presented at the national meeting of American Educational Research Association. Montreal, Canada.

### **Awards and Honors**

Terminal Degree Fellowship 2015-2016, Towson University

General Studies Educator Award 2012, Center for Jewish Education, Baltimore

Outstanding Student Award 2004, graduating class in Secondary Education, University of Cincinnati

Eagle Scout 1998

### **Volunteer Commitments**

Member at Large - Sycamore Community Schools Advisory Commission 2015-Present

Coach - Greater Sycamore Soccer Association (GSSA) 2016-Present

