5-2016

# Teacher and Student Perceptions on High School Science Flipped Classrooms: Educational Breakthrough or Media Hype?

Rebecca C. Hunley
*East Tennessee State Universtiy*

Teacher and Student Perceptions on High School Science Flipped Classrooms:

Educational Breakthrough or Media Hype?

_____

A dissertation

presented to

the faculty of the Department of Educational Leadership and Policy Analysis

East Tennessee State University

In partial fulfillment

of the requirements for the degree

Doctor of Education in Educational Leadership

_____

by

Rebecca C. Hunley

May 2016

_____

Dr. Eric Glover, Chair

Dr. John Boyd

Dr. Patrick Brown

Dr. Virginia Foley

Keywords: Science, flipped classroom, technology, high school, lecture delivered

content, video lecture

ABSTRACT

Teacher and Student Perceptions on High School Science Flipped Classrooms:

Educational Breakthrough or Media Hype?

by

Rebecca C. Hunley

For years educators have struggled to ensure students meet the rigors of state mandated

tests.  Challenges that often impede student success are student absences, school closings

due to weather, and remediation for students who need additional help while advanced

students can move ahead.  Many educators, especially secondary math and science

teachers, have responded to these issues by implementing a teaching strategy called the

flipped classroom where students view lectures, power points, or podcasts outside of

school and class time shifts to allow opportunities for collaborative learning.

The purpose of this research was to evaluate teacher and student perceptions of

high school flipped science classrooms.  A qualitative phenomenological study

was conducted to observe 3 high school science teachers from Georgia, North

Carolina, and Tennessee selected through purposeful sampling who have used the

flipped classroom method for a minimum of 2 years. Analysis of data from an

online survey, direct observation, teacher interviews, and student focus groups

helped to identify challenges and benefits of this teaching and learning strategy.

Findings indicated that teachers find the flipped classroom beneficial to build

student relationships but requires a significant amount of time to develop.  Mixed

student reactions revealed benefits of a flipped classroom as a successful learning

tool for current and future endeavors for college or career preparation.

DEDICATION

This has been a long arduous journey and I could not have made it without the continued support of my mom and my sister, Beth, both of whom were true encouragers from day one. When the light at the end of the tunnel seemed distant, they both reminded me that I could do it. To my precious mom and sister thank you for the many nights and weekends I had to write and you lovingly entertained the kids without hesitation.

To my precious three children, Daniel, David, and Gretchen, I hope that you witnessed determination and grit that will guide you throughout life. I worked hard to write when you were asleep, but even when I could not, you never complained. Thank you for the endless cups of coffee, the artwork you lovingly taped to my desk, the notes scribbled on whatever you could find, and encouraging me when I felt I had nothing left to say or write. You three are truly my inspiration as to why I tackled this monumental task and each of you are more than worth it. I hope you succeed at whatever inspires you and you can do anything.

To my neighbors and friends, Denna, Jessica, Traci, and Doug, who encouraged me often and graciously offered to entertain the kids when I needed to write. I simply cannot thank each one of enough for having the discernment to see how I needed that time to organize, think, and write. Thank you for your continued friendship.

To Dr. Eric Glover, my dissertation chair, words fail me in adequately expressing my gratitude to you, your investment in me long before the dissertation road began, and your continued support. I am forever grateful for what you have taught me and how this dissertation process taught me even more tenacity and determination.

To Dr. John Boyd, Dr. Patrick Brown, and Dr. Virginia Foley, thank you for your keen eyes, your insight early on, and your continued support. I have learned so much from each of you and I appreciate you being part of the team.

# ACKNOWLEDGMENTS

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

With technology incorporated into several aspects of modern education, options such as online courses, most students' ease of using technology, and many high stakes tests administered completely online, the topic of flipped classrooms merits research. Flipped Classrooms (FC) or Flipped Classroom Models (FCM) are defined as a method by which students gain exposure to new content outside of class, typically through reading, lecture videos, or power points. The educators and students then use class time to do the more difficult work of assimilating basic knowledge and translating it into problem solving, discussion, or debates (Brame, 2013). Increased implementation of technology raises additional issues such as ensuring teachers are competent in integrating technology and allowing instruction time to mimic similar testing situations. In addition, students can learn how to navigate online tests and tools and employ learning strategies that can accompany traditional learning and teaching strategies.

Districts and schools face challenges of how to distribute adequate funding to provide new or upgraded equipment within the system. This entails not only fiscal issues, but also concerns regarding appropriate space within many aging schools. As students have more opportunity to engage in learning with technology, teachers have the opportunity to learn about new teaching strategies using technology, and districts are required to allocate funding for equipment and training. In addition, the need to re-evaluate dated board policies that eliminate or restrict personal technology device usage within schools is an expanding and evolving topic. No two students learn in the same manner and it seems unrealistic to expect every student to process new material at the

same pace, in the same way, and produce the same results. With rigid standards and curriculum mastery expectations, policy makers have created a paradigm for student learners that seem to offer few opportunities for student centered learning. Education in the United States is often perceived to have fallen far behind other progressive nations. Whether or not this perception is accurate, overly restrictive education policies and practices designed to fix the problem may generate obstacles that actually limit students' learning. Perhaps a different approach to teaching and learning will be better suited for 21st century learners.

Statement of the Problem

Evidence from a recent online survey reported that the number of teachers who have flipped a lesson in their classroom increased from 48% in 2012 to 78% in 2014 (Sophia & The Flipped Learning Network, 2014). Of the teachers who have flipped a lesson, 96% said they would recommend the flipped classroom to a colleague (2014). Even though there was a reported increase in flipped classroom implementation, some teachers and districts remain apprehensive about flipping. Bergmann (2013) discussed what he considered the biggest hurdle to overcome when flipping a classroom: teachers should flip their own thinking about class time and how it is organized. Even though organization of time may be different for teachers who are new to the profession compared with those with many years of experience, the idea is the same. This reminded me of the importance to re-evaluate how new information is presented, disseminated, discussed, and assessed for students in a 21st century classroom. It is unfair and a disservice to guide and instruct my current students in the same manner I taught 10 years ago, and it would be even more detrimental to teach modern students how I was taught.

This study was an investigation into teacher and student perceptions of high school science flipped classrooms as an effective model for 21st century learners. Through this study, direct observation and interview of three classroom teachers that instruct using a FCM, viewing student engagement during class, results from an online survey, and discussing student perceptions the study revealed challenges and benefits of this teaching and learning model.

Opening Vignette

In a children's museum in Virginia my daughter and I both colored a sea turtle in the children's interactive room. While there we encountered a volunteer who was a recent graduate of a local high school in Virginia. The young lady was very poised and well-spoken as we talked and I learned about her individual goals and plans for education. As we continued to talk, I asked whether she had ever heard of a flipped classroom and she responded affirmatively, "Yes." As our conversation continued to evolve, I could sense she had some distinct opinions about being a student in a flipped classroom. I inquired if I could ask some questions about her perspective of a flipped classroom and she was willing to share her experiences.

Enrolled at a small public university in the fall to study political science she came from a supportive family that encouraged her educational endeavors. When I asked about her thoughts about a flipped classroom, she sighed and responded, "It was awful because we felt lost all the time." She described the class as a yearlong combined AP micro and macroeconomics course where the teacher was new to teaching the material required in this class. With the combination of a teacher unfamiliar with the subject content and inexperienced in a flipped classroom, disorganization and ineffectiveness was inevitable

as she recalled.  Within a few short days, a class full of frustrated and confused students arrived each day dreading a flipped class.  Initially she was optimistic about the potential of a flipped classroom, but as videos from outside teachers and other resources surfaced day after day, it was becoming more and more evident the teacher was inexperienced and overwhelmed.

As we finished our impromptu meeting, I thanked the young lady for her time, perspective, and insight. She finished by stating teachers cannot 'hide' behind a flipped classroom model as a camouflage for not adequately knowing the subject they are teaching especially when a class as this one was taught at such a fast pace. She felt it might have worked if the teacher really understood the content he was supposed to teach. As I reflected upon this conversation, I began to consider opinions of teachers and advantages or disadvantages that can occur when making the decision to flip their classroom.

To gain an educator's perspective on a flipped classroom, I interviewed a 20-year veteran high school biology teacher at one of the Suffolk County Public Schools in Virginia who has flipped her class for 4 years.   She taught at a high school comprised of students from urban downtown, suburbs, and rural farms with a population of 68% African American with the remaining percentage predominantly Caucasian with just over 43% of the students eligible for free or reduced lunch.

As I asked her about how parents and administration responded to her decision to flip, she said that administration was supportive but not engaged and parents were quite resistant the first year.  The following year she created a video explaining the flipped model and had fewer initial complaints. She also mentioned that most of her

students embraced the flipped model, yet some resistance surfaced when students recognized the personal accountability necessary in a flipped model.  In the design of a flipped class, she encouraged self-motivated responsibilities such as watching videos each night, collaboratively engaging in discussions online and in class, and students exhibiting ownership and responsibility for their own learning.

She mentioned several reasons for choosing to flip her class as the realization that she and her 21st century learners were bored with Power Point lectures and her distaste of lecturing every block.  Her solution was to employ the wealth of online resources by delivering content in a manner that was more engaging and dynamic than the same static lecture repeatedly.  From previous conversations with other educators who have chosen to flip their classroom, I had learned that most students prefer to watch their own teacher on videos. When I asked her about her preferred method of presentation, she responded by saying she used a variety of lecturers such as Bozemanscience.com or MOOC 101 biology, a class based out of Harvard.  She indicated it was important for students to learn from a variety of platforms and therefore did not prerecord her lectures.

When asked about the challenges she faced in implementing a flipped classroom, she listed three concerns.  First, she combats the idea from parents and students who believe that she is doing nothing because another educator delivered online lectures.  She said it is frustrating because they do not have the perspective for change except for the picture of 'how they were taught.'  It takes a lot of work to gather the best teaching materials and parents with concerns often forget that.  She goes on to say that if a student does poorly in the class, then it is easy for the student or parents to blame the

method of flipping for the failure. A second challenge is that some teachers are jealous of how much students like the flipped classroom atmosphere. Her final challenge came from administration who did not support her endeavor nor did they see the potential to help the very poor performing classes or students who could benefit from this model. She noted that administrators might realize that teachers who flip make very good facilitators of learning instead of solely being content givers. She hoped the administration would recognize the benefit of this approach. With some teachers bored and apathetic, perhaps a flipped classroom might resurrect some disconnected educators.

As I pondered her challenges, I was eager to hear about the successes she has experienced in a flipped classroom. One of the most rewarding accomplishments was that students were impressed with the ability to self-manage their time and effectively collaborate in teams. Second, students who are planning to attend higher education institutions realized their head start into online learning and felt comfortable navigating web learning tools. Finally, she emphatically said that it has been a huge personal success both professionally and intellectually as she has grown more in the last 4 years than in the previous 16 years. As she continued to search for new resources, activities, and simulations, she indicated she has become a better teacher by being a facilitator and motivator of learning all because of the flipped model. She concluded by mentioning that her students were glad they were not limited to learn only from her. As I thanked her for her time, my perplexed notions grew as I thought about these two starkly different perspectives on a flipped classroom from these two individuals and I began to consider why.

As I continued to wrestle with contrasting perspectives from a student and a teacher, I thought back to my own struggle as a teacher when I would introduce a new lab or a new teaching method to help students retain concepts. Students would bear the burden of my revolutionary and occasionally radical teaching strategy given with unbridled enthusiasm. As I quickly learned, students would copy off each other's paper, rarely choose in-depth projects or ideas to earn additional points, they used class time poorly, and they were mediocre in meeting the objectives across all levels. I still hold fast to the notion that this method has much potential to be successful and meet objectives, and I acknowledge there are some areas I need to re-evaluate before implementing this new method and strategy in the future.

Another struggle that I realized was that I, along with many other educators in K-12 school systems, seem paralyzed when weather closes schools. Within the previous two winters, weather forced my own school system to close for almost 3 weeks consecutively. The previous year missing 11 days without students due to inclement weather led to teaching with fewer labs and supplemental activities.  When we returned to school, even in my best attempts, my students received "adequate" instruction at best. As I worked feverishly to reconnect students into learning mode, I would quickly cover required complex concepts to prepare them for the (EOC) End-of-Course assessment later in the semester-typically administered the last week of April.  Unfortunately, I had to eliminate several labs and activities just to ensure they had grasped the basic concepts and assured that some of the content was adequately covered.  Even though this was unrealistic, unfair for the students, and extremely stressful for me, it was reality.

Determined to do things differently in my own classroom, I was unsure what strategy or resource I could implement to motivate students of all abilities and give students access to material at all times. Even though I knew I could not change the timing or rigor of testing nor the frequency or intensity of weather, I thought about what I could change within my own room. Therefore, I asked another teacher in a neighboring county that hammered by weather as well, "How in the world are you keeping up?" He very nonchalantly responded that his flipped classroom was actually ahead despite the continual closing of school. I took a deep breath and I uttered out a desperate, "how," and the initial conversation of a flipped classroom began to unfold.

Background of the Problem

As I thought about his response, I choose to delve further into looking into the purpose, structure, and possible benefits and challenges of a flipped classroom. Through research in the educational community, I learned about flipped classrooms as strategy for introducing new concepts, remediation, and a tool to meet the needs of all student learners. With continued demands on students, teachers, and district leaders to meet the requirements of high stakes testing administered online and paper and pencil, FC appeared to be a good teaching resource to consider. For educators teaching grades 9-12, conversations often focus on how to ensure all students receive an appropriate education that adequately prepares them for college, career, or technical school. Sheehy (2012) reported that more than 25% of students who took the ACT in 2012 fell short on all four of the college readiness benchmarks, which indicated a significant number of students are not prepared for success in college or the workforce.

Many of today's modern learners cannot remember a time without Internet, search engines such as Google to locate anything within seconds, and an entire computer that easily fits in the palm of their hand.  On the contrary, most are also oblivious to obsolete film projectors with distinct 'clicks' or infrequent trips to the computer lab that housed a few modest models of the latest technology available in 1980s.  Being a student of this formidable decade, I learned from teachers who offered the best resources and tools my school had at the time that was new and innovative. Twenty-first century students deserve to learn from educators well versed in their content area and educators who implement technology as a partnership with other resources to prepare students for college and career.

Purpose of the Problem Statement

This study was an investigation of teacher and student perceptions of high school flipped science classrooms. A qualitative phenomenological study was conducted to observe three different high school science teachers who have used the flipped classroom method for at least 2 years in some of the classes taught and evaluate benefits and challenges of teaching a flipped classroom.

The purpose of this study was to evaluate the efficacy of high school science flipped classroom models by analyzing educator and student perceptions.  Preliminary discussions and research surrounding common issues such as missed school days, providing 24-hour access to material for students of all abilities, meeting RTI (Response to Intervention) requirements, and providing alternate methods of access for students without Internet access or devices have been conducted for several months prior to the research.

<u>Research Questions</u>

The primary question addressed in this study is: What are the advantages and disadvantages of the flipped classroom model? The specific questions addressed are:

1. What are teachers' perceptions of advantages and disadvantages of a flipped classroom?

2. How does the use of the flipped classroom model impact student engagement and responsibility for learning?

3. What advantages and disadvantages does the flipped classroom model provide for assimilating content knowledge?

4. What are the students' perceptions of advantages and disadvantages of a flipped classroom?

5. How do students perceive that flipped classrooms support their current learning and preparation for future classes?

6. What are the students' perceptions of flipped classroom for learning high school biology or chemistry content?

<u>Importance of the Study</u>

Because I found it extraordinarily difficult to locate teachers in my region who met the criteria of high school science teachers who use a FCM as a teaching tool, I wanted to learn if there was any correlation with schools that have educators that use a FCM and their challenges and benefits in that implementation. In an effort to learn more about how each geographic region perceived flipped learning from the student's perspective, each selected school had the opportunity to participate in an online survey regarding flipped classroom learning. At the conclusion of the survey, analysis of

collected and coded data by each respective school occurred.  A holistic approach compared similarities and differences from the three schools with varying population size yet similar demographics and identify any correlations between schools.  From these results, development of focus group questions began with regard to student responses and their current perception of flipped classroom learning in science in addition to other content area classes.

Many education experts (Flipped Learning Network, 2012; Goodwin & Miller, 2013) agree that flipped classrooms are growing and an evolving teaching practice, yet limited research to evaluate teacher and student perceptions and benefits or challenges of this instructional method has occurred. Even though there is no scientific basis to indicate exactly how well flipped classrooms work, one survey of 453 educators indicated that there are benefits.  Two positive indicators noted were: 1) 80% of surveyed teachers indicated that student attitudes improved, and 2) 99% of surveyed educators said they would flip their classrooms again next year.  One teacher wrote, "Flipping the classroom enables me to better understand whether students understand the material that is presented to them because there is more time to interact with them" (Sophia & The Flipped Learning Network, 2014).

With empirical research indicating positive trends in teacher responses in implementing a flipped classroom, it is important to consider student perceptions as well. In a recent study Johnson (2013) revealed three major indicators:  1) students did less homework in a flipped classroom than in traditional classes, 2) students enjoyed learning in a flipped classroom setting, and 3)  students benefited from watching lectures in condensed video format.  Marlowe (2012) indicated three findings of the effect of flipped

classrooms and impact on student stress and achievement. Students reported less stress in a flipped class environment compared to traditional classes. Results revealed evidence that use of differentiation and independent study coupled with the flipped class model was successful. From a quantitative analysis, the majority of students gained an average of three points in semester grades in a flipped class (Marlowe, 2012).

Limitations

With any research, there are overarching issues of limitations and delimitations. Even though substantial efforts to select study participants and present truthful data occurred, there were still potential influences that could arise that are beyond my control as a researcher. These events could inadvertently limit or influence the results of the research. An initial limitation recognized and discussed with my dissertation committee early was the concern about my own ability to accurately record thorough notes without bias during the focus group. As we continued to discuss this issue, it was evident I needed to have the ability to observe the flow of the focus group, interpret interactions and responses, make clear notes, and it was clear that would be difficult to do alone.

In light of this challenge, the committee made two recommendations: 1) identify a graduate student or faculty member with current IRB status, and 2) invite them to attend the focus group session with the students after school and help take notes. The benefit of having a second person recording the responses from the group led us to agree that I could direct the flow and pacing of the discussion and use guiding questions to encourage more detailed or deeper responses from students. Two sets of notes resulted, one from the primary researcher and the second from the accompanying researcher. These notes showed overwhelming consistency in written responses recorded from two

different individuals listening to the same focus group discussion. Even though there were similarities within notes between researcher and assistant, differences or additions between written responses follow in Chapter 4.

In addition, being the sole primary researcher for three schools limits my own stamina in ensuring correct and accurate recording of all details, responses, and observations indicating the need for additional help recording responses. With distribution of the online survey, I anticipated getting feedback from current and former students about learning in a flipped learning environment. However, there can be unforeseen issues with students not having access to technology, technical issues, or not notified of their eligibility to take the survey. For the main part of the study, I used qualitative coding to tabulate, organize notes from observations, and disaggregate student responses in the focus group. My handwritten recorded notes from teacher interviews and observations within a flipped classroom used qualitative coding and triangulation.

A sample of the coding sheets for students and teachers found in Appendix D and E respectively reveal notes that were hand written originally and converted into digital means for triangulation. Even though implemented coding techniques helped disaggregate and categorize data, it remain difficult to record subtle interactions between students or student to teacher without the need for clarifying questions. Though it is possible to observe an interaction between a teacher and student and perceive it completely contrary to the meaning, during the research there were no overarching responses from teachers or students, unusual circumstances, or unclear situations that I felt warranted the need for further investigation or questioning.

<u>Delimitations</u>

In addition to limitations in a study, delimitations occur which involve boundaries that set intentionally by the researcher. I chose to not employ any type of video or audio recording during the classroom observations, interview, or focus group but instead use rigorous note taking and eye-to-eye observation. The main reason for opting out of video or audio recording was to eliminate the need for additional consent forms from students, teachers, and participating schools.

I chose to exclude student data from student ACT scores, state required tests, and teacher developed formative or summative assessments currently in a flipped classroom. There were no significant emergent ideas regarding test scores that evolved from teacher interviews and focus groups, yet other discussion of emergent ideas related to excessive technology use and student perceptions of improved ownership of learning revealed unexpected findings. Even though research with a correlation to test scores and flipped classrooms has great potential, it was not the focus of this study. I provided specific guidelines for teachers to participate and did not consider teachers in grades K-8 or postsecondary educators as well as teachers who teach subjects outside of science.

I did not observe students who were in a K-8 or postsecondary flipped classroom, any discipline outside of science, or students who were that not currently enrolled in a flipped science class. Each school had access to an online survey, which gave the opportunity for any enrolled student in a flipped classroom to anonymously participate and respond to the 10 questions.

The only analyzed quantitative data was for comparison between schools in three states and would be the statistical data obtained from the online survey for students.

Other quantitative measures such as attendance, including days missed due to sickness or weather, ACT scores, or other quantitative measures could emerge but were not the primary focus. The primary focus of this study was to discuss teacher and student views of teaching and learning science concepts in a flipped classroom, how students perceived their own learning in this model, and teachers' personal and professional opinion of incorporating a flipped model.

Definition of Terms

*Homework* - An assignment given to a student to be completed outside the

    regular class period or preparatory reading or research as for a discussion or

    debate (Merriam-Webster, 2015).

*Flipped Classroom* – A flipped classroom is one where students are introduced

    to content at home and practice working through those concepts at school

    (TeachThoughtStaff, 2014).

*Mastery Learning* – An instructional approach based on Bloom's Taxonomy (1976) in

    which instructors break down course material into manageable units and create

    formative assessments for students to complete on each of the units (Definition:

    Mastery Learning Teaching Method, n.d.)

*Teacher created videos* - Videos created by teachers that teach students to

    plan, organize, write, communicate, collaborate, and analyze material prior to

    attending class (Video in the Classroom, 2014).

*Technology* – NAEP (National Assessment of Education Progress, 2014)

    defines technology as any modification to the natural world done to fulfill

    human needs or desires.

*Traditional Classroom* – In a traditional classroom the instruction is teacher

centered, instruction is largely provided in a whole-group setting, and

teachers target instruction at the level of the middle achievers

(IRIS, 2015).

<u>Summary</u>

Contrasting stories from an educator and student on flipped classroom teaching and learning primarily helped to guide my initial thoughts for this research. The purpose of this study was to observe and interview three high school science teachers who use flipped teaching strategies in their class and discuss both challenges and benefits to this model of instruction.  In addition, I invited students to share their perspective of being a 21$^{st}$ century learner in a flipped classroom and discuss the advantages and disadvantages. From these findings, I gained insight into this teaching and learning model that provided valuable personal and professional information.  These results helped shape my own thoughts as I could consider piloting a flipped class in my own biology classes.   If results indicate strong positive trends, a district-wide initiative may unfold within two years.

The literature review in Chapter 2 outlined recent research on flipped classroom with evidence that most administrators are supportive, most teachers who flip will continue to flip, and that a majority of students in flipped classes report a positive experience.  Advocates also contend that a flipped classroom meets the specific needs of accelerated students and students with special learning needs and has the potential to stretch mid-level students.  Opponents of flipped classes argue that a majority of educators express they do not have the time or ability to create, edit, and upload videos

for student use; it remains costly for schools, districts, and students that do not have reliable Internet access.

Research methods were discussed in Chapter 3 and involve qualitative research using a phenomenological method which involves observing every day human activity and behavior and with the goal of gaining insightful information. Moustakas (1994) encouraged researchers who conduct phenomenological research to use triangulation methods such as observation, interview, and focus groups to give a broad perspective of the interactions and dialogue within the participant groups. Study participants purposely selected by specific criteria that educators must teach high school science and have flipped for a minimum of 2 years. To be eligible to participate in focus groups, enrolled students in the selected teacher's science viewed an introduction video about the research, teachers distributed consent and assent forms, and students opted to participate or not. If they chose to participate, students had the appropriate assent form signed and attend the focus group after school. Students that have previously been enrolled in any type of flipped class or currently enrolled in any flipped class in the school were encouraged to complete the short online survey which was available to each school 2 weeks prior and 2 weeks after the observation.

The findings of the research discussed in Chapter 4 included results from observations, interviews, and focus group discussions with students, and emergent ideas. Qualitative coding methods helped organize teacher and student interactions, responses, as well as nonverbal interactions. An analysis of parallel ideologies and differing theories among teachers regarding FC occurred. A comparison of demographics such as gender, geographical area, content area, and years of experience educators have in

flipping a classroom occurred.  Student correlations between gender, grade, and overall perception of a flipped classroom were evaluated using online survey results and focus group discussion.

Chapter 5 reveals the conclusions of the research, discussion of the process, specific findings that resulted, and suggestions for future research.  Specific limitations faced during the research, unforeseen circumstances between school sites, and rationale on how the researcher responded to these situations are given.  Suggestions on how to avoid these issues in future research and emergent ideas that could stem into further research regarding technology use in education is discussed.  Specific criteria for future research ideas such as inclusion of other states, evaluating only rural or metro schools, observing teachers with less than 1 year of flipped experience, or evaluating administrators' or parent perspectives are all potential future research projects.

CHAPTER 2

LITERATURE REVIEW

The institution of schooling will continue to change as the needs of society and children evolve. The U.S. government has led a number of education initiatives such as No Child Left Behind, Race to the Top, and Common Core that have increased demands on teachers and schools (Preparing for Change, 2015). These initiatives aim for improvements in standardized test scores grounded in the assumption that such increases represent improvements in teaching and learning. In addition, new technologies and easy access to it have rapidly changed students' learning habits and expectations of schools. Tucker (2015) observed that until recently many educators have deemed integration of technology in the classroom a distraction while others laud the importance of devices as they drive engagement, pique curiosity, and encourage creativity.

As implementation of many educational strategies and resources have unfolded over the past century, technology has stirred controversy and debate for the increased cost on strained school budgets, appropriate use, and effectiveness as an educational tool (Jimerson, 2005). One of the lingering issues is defining the appropriate use of technology as a learning tool in and outside the classroom. As technology continues to expand, elimination of previous geographical boundaries allows limitless communication through social media, videos, blogs, and news feed.

Many avenues of integrated technology exist in classrooms at all levels of learning. Tomlinson (2015, p. 87) wrote, "Teachers' relationship with technology, kids, content, and instruction" [with the support of their leaders] will write the unfolding story of how we all use mobile tech in the classroom." Scherer (2015) continued by

encouraging educators to let the story of technology unfold and let it be awesome. Pioneer educator John Dewey (n.d.) stated "if we teach today's students as we taught yesterday's, we rob them of tomorrow."

<u>What is a Flipped Classroom?</u>

Recently a growing number of teachers have flipped the traditional lecture class upside down and implemented a flipped class model of instruction in an effort to adapt to the changing needs of students and increased pressure and demands of policy makers. Overmyer (2012) described a flipped class as a learning tool that uses various means of technology such as a tablet, cell phone with Internet access, or computer, integrating teacher-created videos that enhance learning outside of the classroom.

Students view short videos or listen to lectures outside of class and complete notes, write reflections, or view demonstrations with the goal of coming to class prepared to discuss material and instead use the small window of class time engaged in collaborative activities. This has allowed the teacher more time for tutoring and small group instruction. Herreid and Schiller (2013) explained the inverted or flipped classroom as a learning model where homework typically completed at home has shifted to collaborative work at school with the guidance of the teacher while the viewing of the lecture or podcast occurs at home.

Gerstein (2011) illustrated a full flipped classroom model (Appendix A, fig. 1) by comparing learner-generated applications with educator-suggested learning experiences.  In Gerstein's model the learner transitioned from a "so what" mindset that activated and developed meaning to "now what" mindset that involved application through demonstrations, projects, or reflective writing. The educator-suggested model

moved from concept exploration that engaged the student through video or audio lectures and content-rich websites.  The application of preliminary knowledge expanded through experiential engagement through community projects, experiments, games, simulations, as well as others.  Gerstein connected the visual model of full flipped classroom as a continual learning cycle in which the learner acquired content knowledge and developed resources to demonstrate his or her knowledge.  In addition, the educator suggested and guided the learner through conceptual exploration into real experiences that actively engage the learner.

To evaluate Gerstein's model and compare strategies and resources necessary for a flipped class lesson plan with a traditional lesson plan, a hypothetical high school biology lesson plan (Appendix B) developed using traditional teaching methods.  The lesson met Tennessee standard SPI 3210.5.2 (TN Biology Standards, 2009) on natural selection and evidence of evolution and designed using Jefferson County High School TEAM lesson plan template. The traditional lesson plan implemented a review of vocabulary and concepts of theories of evolution during class time through power point and notes, guided vocabulary and image practice, a video on Charles Darwin, and homework in which students' graphed results of a hypothetical natural selection lab and a written reflection of the results.

The flipped lesson plan (Appendix C) covered the same concepts, but the approach is a stark contrast as students completed various activities at home or given time in the computer lab to complete online videos.  Students viewed an introductory video about Charles Darwin, completed notes, and wrote a reflection all prior to arriving to class.  The FCM encouraged independent student learning and responsibility outside of

class through assigning a video with accompanying notes and reflection. This allowed time for collaboration and discussion with other students for the hypothetical natural selection lab and assistance from the teacher during class to cover unclear concepts.

History of Flipped Classroom

Many view flipped classrooms as a new and innovative type of instruction. However, General Sylvanus Thayer, an engineering professor at West Point, implemented a conceptually similar process over a century ago. General Thayer guided engineering students to assimilate core content by distributing a specific set of materials for students to construct outside of class. This allowed class time for students to collaborate and discuss the successes, challenges, and outcome of the designed engineering projects (Musallum, 2014). Beginnings of early technology to communicate important information and educational information similar to flipped classroom models continued as the radio was used in the 1920s (Byrne, 1989) to a mass of eager radio listeners.

Overmyer (2014) described one of the first efforts of reaching vast numbers of individuals through video to deliver educational content as the Open University in the United Kingdom in the 1960s. The purpose of the Open University was to give access to basic educational information to lower socioeconomic groups throughout Europe. Even though the beginning of the Internet traces back to the late 1960s, most groups and individuals did not have access to the breadth of the network of the Internet until the early 1990s (History of the Internet, 1997). Twenty-five years later the Internet and the technologies that support it encompass many aspects of normal day-to-day life including education.

How Modern Flipped Classrooms Began

Even though it can be debated, evidence of an early flipped classroom occurred over a century ago. Twenty-first century models of the flipped classroom stemmed out of necessity for two veteran high school chemistry teachers, Jon Bergmann and Aaron Sams, during the spring of 2007. Both teachers were frustrated because students were not able to translate content and basic objectives from lectures into useful information that for deeper applications such as labs, group projects, and discussions (Bergmann & Sams, 2012). Both candidly admitted the design of the FC was to catch up students who were absent due to sports or other activities that occurred during typical school hours. After the teachers recorded a few videos for students who missed lectures to view, students could view the videos at home, pause, and rewind their teachers explaining a new concept or performing a lab demonstration. From these early attempts with mediocre videos, students voiced their appreciation and the flipped classroom was born. It did not take long for educators in surrounding districts to locate Bergmann and Sams's videos on YouTube and the foundation for the early flipped classroom began.

King (1993) asserted that to meet the needs of changing student learners, teachers must make an intentional effort to break the "sage on the stage" method of teacher led instruction and instead embrace the "guide on the side" (pg. 30). Hamden, McKnight, McKnight, and Arfstrom (2013) recommended shifting the ownership of learning to the student through means of digital technologies. As they suggested, strategic use of time allowed more flexibly and students who needed remediation can receive it while further progressed students could advance. Teachers who engaged in flipped classroom models are moving from the lecture driven instructional model by redirecting

the focus from curriculum pacing guides to the needs of the student as the catalyst of instruction (Hamden et al., 2013). With implementation of a flipped classroom teachers can devote more time as an instructional coach and assist with challenging projects, labs, research, and demonstrations that allowed students to gain independence and ownership of their own learning (Hamden et al., 2013).

Why Now?

Advocates for and opponents of flipped classrooms have debated its effectiveness as a transformational breakthrough or just another passing educational fad with more hype that promises to deliver substantial gains in high stakes test scores. Fulton (2012) expressed concern of the flipped model as educators are notorious for quickly jumping to new fads such as the open classrooms of the 1970s or the recent one to one (1:1) distribution of devices for students who have been implemented in many districts. Fulton added, that when the next *new* [my emphasis] thing in education arrived, the flipped classroom, and began rolling out in schools across America, many teachers, parents, and educational leaders were understandably skeptical and hesitant.

Price (2013) stated that opponents of the flipped classroom have argued that ensuring student access to devices, classroom management issues, and time investment of creating and editing videos are all valid reasons to consider whether the commitments are worth delving further into technology integration. Tucker (2012) agreed with the apprehension as there is fear that a flipped classroom, a seemingly simple concept that is profound in practice, has been reduced to a recent educational fad.

November and Mull (2012) cite common criticisms of the flipped classroom from educators.  Common arguments such as:  the teacher felt less important, students

would not watch boring lecture videos at home, students have no internet or unreliable internet access at home, uncertainty of whether students have watched videos or not, and many educators do not have the technological background to create, edit, and upload videos.  Critics of flipping continued by debating that flipping is yet another gimmick that appears clever in theory but does little to solve substantial issues (Apodaca, 2015) such as ensuring low-income students have access to technology and whether the videos are effective in improving student learning and engaging for all students.

Bishop and Verleger (2013) described student perceptions of a flipped classroom are somewhat mixed while positive feedback was noted from educators in academic circles at all levels. Herried and Schiller (2013) said that some STEM (Science, Technology, Engineering, and Math) educators have recognized the flipped classroom model allows more time to spend with students on authentic research and more time to work on scientific lab equipment. Ash (2012) interviewed flipped classroom advocate Deb Wolfe, an instructional coach in a 24,000-student district for her perspective on flipped classrooms.  In an interview Wolfe stated, "for students who had not been challenged in the classroom, this was an opportunity for them to just fly, for others it gave them the time to move slower, while others self-paced became no-pace" and deadlines were soon implemented by the teachers (Ash, 2012, pg. 7). Apodaca added flipping is "an inevitable step that capitalizes young people's native comfort with technology" (Ash, 2015, para. 4).

Previous Research

Even though there is limited yet growing research to evaluate the effectiveness on flipping classes, some data are slowly beginning to surface (Apodaca, 2015).

Apodaca cites an ongoing study that compares flipped classrooms with traditional instruction and the results thus far have found no discernible difference in outcomes. Bishop and Verleger (2013) report that some anecdotal evidence has shown promising results that improvement in student learning for a flipped classroom compared to a traditional classroom, yet there is little research analyzing student-learning outcomes objectively.

Students, teachers, and administrators have continued to express interest in providing and allowing increased opportunities with digital tools such as videos to broaden and enrich the learning experience. Evidence from 2013 Speak Up research from Project Tomorrow revealed how the flipped learning model has gained the attention of educators who are interested in improving student achievement and teacher effectiveness by leveraging digital tools to enable innovation (Project Tomorrow, 2014).

Carver pointed out, "Flipping is about taking your students to the next level so that they can see what they're learning and they can critique their knowledge and skills to use in their life after the class ends" (2015, p. 3). Arnold claimed that individualized pacing in a flipped classroom "flipping allows me to move very rapidly and students are able come in, work with me, and get the one or two things in a unit that they may have struggled in without bogging the whole class down" (personal communication, March 5, 2015).

In a study conducted by Project Tomorrow (2014), research from secondary students revealed that 75 % of students said a flipped classroom would be a good way for them to learn, 62 % said they would be more successful in a flipped classroom, and 41 % say preservice teachers should learn how to set up a flipped classroom before earning

credentials to teach.  Goodwin and Miller (2013) stated that even though traditional

lectures help students gain new knowledge, a common problem with lectures is often a

matter of pacing.  Students may struggle with content delivery as delivery and processing

of information occurred too slowly, too quickly, or the teacher may be covering content

they already know.  Following a lecture, students are frequently given homework to

assess understanding on content given during the hit and miss lecture in which many

students struggle in a "private world of hell of frustration and confusion" (Goodwin &

Miller, 2013, para. 2).

   Even though there is substantial evidence that flipped learning classrooms are

growing, there is little research.  Goodwin and Miller (2013) reported as of March 2013,

there was no scientific research base to indicate exactly how well flipped classrooms

work, but growing evidence from discussions, interviews, and other sources of

nonscientific data suggest that a flipped classroom may produce benefits for student

learners.

   From the Flipped Learning Network (2013) survey of 453 teachers who flipped

their classrooms, 67% reported increased test scores with specific improvements in

advanced placement classes and students with special needs.  In this same survey, 99% of

teachers surveyed said they would flip their classroom again.  The most commonly

flipped subjects are science 46%, math 32%, and ELA 12% with 95% of respondents

being secondary teachers (Flipped Learning Network, 2012).  Even though there is no

direct scientific research to conclusively establish whether flipped classrooms indeed

increase student learning, "absence of evidence is not evidence of absence" (Goodwin &

Miller, 2013, p. 79).  Carefully implemented flipped classrooms have potential to shift

the traditional paradigm of lecture driven classes to encourage students to be active producers in their own learning instead of being passive consumers of information (Evans, 2015).

When students and teachers navigate the changing waves of technology and education, Evans (pg. 12), reminded readers "education leaders are valiantly trying to reconcile their traditional views with this new learning order." Many teachers have reinvented traditional modes of instruction, yet it continues to be an ongoing battle. In many districts and schools banned cell phones, limited access, outdated, or even absent technology has the potential to hinder student learning with new available technologies. Many educators argue full access to cell phones and other devices are more distracting during class than being a productive learning tool. Tucker (2015) encourages teachers and administrators to manage mobile devices within the classroom with suggestions from her own experience and foremost not to make decisions from a place of fear. Tucker continued by stating "I've found allowing students to use their devices is absolutely transforming" (p. 25). Students today interact with technology very differently than 10 to 15 years ago and with that shift, the careful reconsideration of instructional modes evaluated. Traditional school experiences of lecture driven, content-led instruction is a fraction of the overall learning for students, and for many students it is largely the most unproductive and most restrictive component (Tucker, 2015).

With flipped classroom research being limited and relatively recent, research offers mixed results as seen from two studies conducted on student perceptions. In a study by Strayer (2007) students in the flipped classroom enjoyed the interaction, innovation, and cooperation, yet they were overall less satisfied with the class than a

traditional lecture structured class.  Graham (2013) more recently used both surveys and open-ended questioning of math students and evaluated student perceptions. Graham found that 84% of students agreed or strongly agreed with the statement:  The Flipped Classroom is more engaging than traditional classroom instruction.

From these initial findings this research is timely, pertinent, and applicable to teachers who are willing to make a shift and consider implementing a flipped classroom. Through research conducted in the last decade evidence supports a positive trend from teachers and students of an implemented flipped classroom.  Even though there are many benefits in considering a flipped classroom, some case studies have revealed some pitfalls of a flipped classroom. Some concerns identified from STEM teachers in a case study are:  1) students may be resistant because it requires work at home, 2) carefully tailored homework needs to prepare them for in class activities, and 3) creating the videos requires a considerable amount of time (Herreid & Schiller, 2013).  Modern learners will continue to be more technologically astute, require more outlets for learning, and need the support of educators as they continue to navigate ownership of their own learning.

Why have Teachers Flipped Classrooms?

Flipping a classroom involves careful planning and a role change for instructors that choose to forgo teacher-led instruction in favor for more student-led learning through collaborative contribution to the learning process.  In relation to Bloom's revised taxonomy (2001) one of the benefits of a flipped classroom is that students have the opportunity to engage in lower levels of cognitive work, such as gaining knowledge and comprehension, outside of class (Brame, 2013). When students entered class with basic conceptual knowledge and vocabulary from lectures viewed, this could engage higher

levels of cognitive work such as application, analysis, and synthesis and have the support

of peers and an instructor to work through higher cognitive levels of learning (2013).

Many reasons have been cited for choosing a flipped a classroom teaching

model.  Berrett (2012) said when teachers flip students are less likely to receive material

passively in class. In addition, teachers can teach with centralized ideas and concepts

around addressing the needs of the students instead of the teacher.  Bergmann and Sams

(2012) suggested the following as reasons to flip a classroom:

- It speaks the language of today's students

- Strong resource for busy, struggling, or advanced students

- Helps students of all abilities excel

- Allows students to pause, rewind, and review their teacher's instruction

- Increases student-teacher interaction and relationship building

- Allows teachers to know their students better

- Improves student-to-student interaction

- Increases ability for real differentiation

- Changes classroom management

- Structure of a flipped class can lead to flipped mastery learning (p. 23-33)

When unusual weather events forced multiple days of school closures as local

districts have faced in recent winter months, a flipped classroom can give access to

content even when schools are not open. St. George and Chandler (2014) cite that most of

what was lost during these closures was the enrichment, hands-on activities, and labs that

students typically enjoy.  When weather dictated excessive school closings, it was

particularly difficult for teachers to teach new concepts due to lost instructional time as

well as allow adequate time to re-teach concepts that students may have forgotten. The momentum of class time was tough to re-establish when school closure was frequent and imminent due to weather.

<u>FCM for Students with Special Needs</u>

Students with either physical or mental special needs require ingenuity on the part of the teacher and the ability to shape appropriate lessons within and beyond classroom walls. This can involve transitioning from traditional devices that are often very expensive and bulky to more efficient and cost effective tools.  Meeting the educational needs of nonverbal students can prove costly as a frequently used speech communicator called a Dynavox costs approximately $6,000 (McCrea, 2014). However, a district technology coordinator found a much more cost effective solution by implementing iPads and an app called Proloquo2 priced at $219.99 (McCrea, 2014). With the integration of this App, nonverbal students communicated by tapping buttons that represented commonly used words or phrases. By joining the flipped class model with cost effective apps, students completed their "pre-work" at home on their own devices and entered class the next day prepared to tackle the lesson (McCrea, 2014).

Wiesen (2014) reiterated how flipped classrooms can benefit students with learning disabilities as it encouraged balanced advantages for effective classroom participation.  Herron (2013) supported flipped classes for students with learning disabilities as students have the opportunity to watch content repeatedly if they are struggling with a concept and it allows extra time for students to process new material.

Advantages and Disadvantages of a FCM

Implementing a flipped classroom takes careful planning, support, and the intuitive nature of educators and administrators to foresee issues and have appropriate solutions in place for some common challenges.  However, when a teacher, a grade level, a department or even an entire school chooses to shift the paradigm of learning to a flipped classroom, the possibilities are endless.

Fulton (2012) listed seven key benefits to a flipped classroom:

- Students move at their own pace

- Completing "homework" in class gives teachers better insight into student difficulties

- A teacher easily customized and updates curriculum 24 hours a day, 7 days a week

- Class time is used more creatively

- Teachers report seeing increased engagement in student learning and interest

- Learning theory supports new approaches

- Use of technology is flexible and appropriate for 21st century learning (p. 12-17).

For Teachers

While many educators are already embracing or experimenting with the idea of flipping, some 16 % of math and science teachers surveyed say they initiated a flipped model using self-created videos or other online sourced videos.  Many educators chose videos such as those on the Khan Academy website (Project Tomorrow, 2013) while other educators remained hesitant or even resistant to attempting to flip their classroom

for a variety of reasons. In a poll conducted by Herreid and Schiller (2013) comprised of STEM teachers who consistently flip their class, two major problems were mentioned as challenges in a flipped classroom.

The first concern is that students who have never been exposed to a flipped classroom may initially experience resistance and opt not to watch videos. A second concern was that the content (readings, videos) tailored for the students to prepare them for in-class activities takes substantial time. In response to students who do not watch the video at home, most teachers reported giving a short quiz either online or in class that has specific content that can only be obtained through watching the video. For teachers who are not comfortable creating individual videos or simply do not have time to create the videos, many high school science teachers use prepared videos such as Khan Academy or Bozemanscience.com to introduce, review, or connect concepts and then apply to labs or other application activities. Herreid and Schiller (2013) concluded that preliminary discussion with teachers who have flipped for several years, consistently heard feedback from students that they prefer watching their own teacher on videos teaching, not someone else.

One of the most common concerns indicated by teachers was ensuring all students have reliable Internet access (Herreid & Schiller, 2013). Mcleod (2010) countered this concern by encouraging educators to interview families and research the correct percentage of families in a district that do not have Internet access at home rather using the 'digital divide' as an excuse to avoid assigning any homework that involved Internet usage. A rural east Tennessee school district continued to resist digital immersion in and outside of school due to a misconception of lack of Internet in rural

homes. Results from a survey distributed to student parents and guardians at the beginning of the 2014 school year revealed that 84% of student homes in the district have reliable access to Internet (K. Cline, personal communication May 2015). Other teachers provide material on flash drive devices or prerecorded DVDs that helped ensure every student has access to the material regardless of whether a student owned a device or not (G. Arnold, personal communication, 2015).

Another concern was students not watching the videos and therefore coming to class unprepared. Bergmann and Sams (2012) countered this common question by suggesting that students who have not viewed videos use class time to watch the video [and] miss out on the tutorial time when the teacher walked around and helped students. Assignments previously completed in class are now assignments to view and finish at home. It does not take long for the students to realize the benefit of the one-on-one time with the teacher and effective collaborative learning with their peers (Bergmann & Sams, 2012).

<u>For Students</u>

Teaching millennial students who have had access to some form of technology since a young age raised another concern, ensuring online safety of all learners. With eagerness of students to use devices accompanied with paralyzing fear from administrators and teachers, a complicated division surfaced. Fears that students will wander into digital distractions or stumble innocently into unchartered areas of the Internet during their educational learning during the day are valid concerns. Students voiced their desire to use technology in their learning as 71% of elementary, 67% of middle school, and 56% of high school students want to use mobile devices more in the

classroom than they do currently (Pearson Student Mobile Device Survey, 2014).

Many school leaders realized the need and now offer a class in digital citizenship at the beginning of every year (K. Alvarado, personal communication, June 2015). Tucker (2015) stated that many schools have established new norms in the classroom such as appropriate use of technological devices and creating a culture of sharing devices. A high school English teacher from a completely flipped high school responded with regard to this issue. "If one child drowns in a swimming pool, you don't close all the pools in the community…you teach the kids how to swim," therefore, "we need to teach these kids how to use technology appropriately instead of taking it from them" (D. Brown, personal communication, Mar 2015).

A final concern in students increased use of technology in education is over saturation and excessive dependence on technological devices. Nomophobia is a relatively new word. Defined as the fear of being without one's electronic device (ASCD, 2015) it is increasing worldwide. In Taiwan authorities urge parents to monitor their children's exposure to technological devices and face up to a $1,600 fine if determined a child is using his device for an "unreasonable" amount of time (2015). In recent years one teacher challenged students to set aside their digital devices for one day. The response and feedback was revealing as students boldly admitted they could not do it or many said that was much harder than they thought it would be.

<u>For School Districts</u>

Some schools and entire districts have sought the help of the community by reaching out to local businesses for donations of gently used laptops or devices so students can be loaned or given a device based on financial need (M. Hall, personal

communication, March 12, 2015).  A second reason school districts avoided digital

immersion was fear that not all students own a device such as an IPad, laptop, or phone

with a data plan.  As teachers continue to engage millennial students or digital natives, it

is evident that this generation of students raised on evolving technologies show less and

less tolerance for lecture classroom opportunities (Prensky, 2001; Roehl, Reddy, &

Shannon, 2013).  Other schools have considered offering extended school hours or

integrated time in the school day for computer lab access to students to obtain digital

material for class.

With advantages and disadvantages of a flipped classroom, it is imperative that

teachers and administrators consider this transition carefully and evaluate the pros and

cons before diving into a flipped a classroom environment.  With support forums such as

Flipped Learning Network, social media, and ongoing research, the evidence of the

benefits of a flipped classroom points toward a positive trend and perspective from

teachers, students, and district leaders. However, the move is not easy, as 20-year veteran

biology teacher Carolyn Durley states, "You have to be ready to change and you have to

be ready to embrace failure. It's really hard" (Canadian Education Association, 2012, p.

3).  A flipped classroom is clearly not a solution when a teacher is new to teaching, does

not have grounded knowledge in the content or the course, or as an excuse not to teach

(E. Mudd, personal communication, July 23, 2015).

Change is hard and especially difficult in education when outdated device usage

policies need to be rewritten, unknowns and fear outweigh the benefits of technology

implementation, and rigid and antiquated ideology shadows new opportunities. Gladwell

(2002) wrote regarding significant change, "The tipping point is that magic moment

when an idea, a trend, a social behavior crosses a threshold, tips, and spreads like a wildfire" (p. 23). Flipped classroom instruction has the potential to be the tipping point for students to engage in student-led learning and educators teach in a transformational, student-driven, and appropriately paced class that meets students where they are and allows opportunity for individual growth.

<u>Mastery Learning</u>

Many teachers have taken an additional step and adopted the flipped mastery classroom, or student directed learning (SDL) model to collaborate with the flipped classroom. Guskey (2010) referenced Benjamin Bloom's description of mastery learning from the 1920s that students vary in their learning styles and pace and methods of learning. Bloom (1984) strongly felt that if teachers could provide adequate time and suitable conditions for learning, nearly all students could reach a significant level of achievement. In addition, Bloom described the educational system as a race in which only the fastest learners were appropriately rewarded (2012).

Guskey (2012) described a flipped-mastery classroom as a class that uses modern technology to create a manageable learning environment that encourages sustained learning and is reproducible. Indicators of flipped mastery learning support active learning conceptual ideas such as experiential engagement, inquiry based learning, project based learning, problem based learning, and constructivism (Walsh, 2013).

Walsh (2013) viewed each aspect of active learning, particularly constructivism, by considering students' active participation through problem-solving and critical thinking centered on an activity they see as relevant. While many teachers work toward active learning, inevitably slower students fall behind while faster learners are typically

bored or disengaged. In response to this common concern, mastery learning took flipped instruction one step further by working hand in hand with active learning (Walsh, 2013) and allowing students to learn at their own pace.

The basic idea of a flipped-mastery classroom involves students learning a group of objectives entirely at their own pace (Guskey, 2012). At Research Triangle High School (RTHS) in North Carolina many classes have adopted a flipped-mastery model and have seen tremendous success. In a freshman biology class students work on varying levels of biology standards ranging from freshman Biology I to AP Biology objectives for the first 10 minutes of class.

The teacher unlocks the 8 to 10 question quiz to assess learning on that individual student's current objective viewed the previous night. When asked why the school had chosen to take flipping to the next level, Mamie Hall, English instructor and administrator stated, "even competent students lack the skill set to break through barriers that develop [in traditional classes]," and "the point is to teach independence… and accelerate learning" (personal communication, March 2015).

Summit Charter Schools in California pioneered Student Directed Learning (SDL), similar to flipped mastery classrooms in which there is a distinct separation of the teaching of content, students learning at their own pace with the teacher acting as coach, and finally the teacher leading cognitive application activities during class for deeper understanding. This was evident in both RTHS and L&N Stem Academy in Knoxville as students buzzed around the classroom to discuss issues or questions from the previous night's video, assignment, or notes prior to the active learning portion of class.

Flipped classroom models based around mastery teaching encourage teachers to be creative in their delivery of content and provides frequent assessment at students' current level to monitor if they need remediation or to move ahead. This strategy helps ensure mastery of content as 2011 Montana teacher of the Year and creator of Bozemanscience.com, Paul Anderson has discovered. Brunsell and Horejsi (2013) learned of Anderson's motivation techniques as he made the decision to reinvent his AP (Advanced Placement) biology classes. Anderson observed how much time his students spent mastering video games and they were intrinsically motivated to conquer a level and viewed each failure as a step to success (Brunsell & Horejsi, 2013). With student's innate love of games, Anderson created an educational game consisting of 55 levels of learning that involved quizzing, questions, investigations, and videos. Students attempt modules and are given an opportunity to improve their grade as they "level up" and earn points when levels are successfully completed or given additional attempts. Anderson mentioned a painful lesson learned through creating an online learning game, as a mastery technique is it has the potential to lead to procrastination among students (Brunsell & Horejsi, 2013). As this was recognized, Anderson has set up checkpoints along the way to keep students on track and on time with completion of modules (Brunsell & Horejsi, 2013). Another aspect Anderson anticipated improving was more collaborative work within the games where students can create and develop projects or connections laterally among other players.

Mastery learning is not only a successful model of student driven pace of learning but can be incorporated as a standard based grading scale. RTHS uses a tiered model to determine grades in which 40% of a student's grade is obtained through SDL

activities and designed around standards based questioning and learning.  Students are proficient if they score 80% on a quiz and with multiple versions of test questions, it is difficult but not impossible for a student to see previously missed questions reappear. The next 40% obtained through projects, problems, labs, and activities and the final 20% is through expansion content.  The intention of flipped mastery classrooms is to encourage students to work in small groups or individually at an appropriate pace, the teacher will use formative assessment to evaluate student's understanding, and students develop mastery of objectives on summative assessments. If there is no achievement of mastery, students receive appropriate remediation (Guskey, 2012).

Mastery learning objectives demonstrated in a variety of ways as Bergmann and Sams (2012) suggested such as summative unit exams, verbal discussions, and detailed power point presentations, short videos created by students, demonstration of understanding through writing, and other student guided projects.  Potential benefits of a flipped mastery classroom involved the furthering of personalized learning, encouraging students to take ownership of their learning and creating an environment where learning is occurring with each student at his appropriate pace.

Summary

Flipped classrooms have stirred much discussion about use of technology as an effective tool compared with traditional lectures.  Goodwin and Miller (2013) argued that inverted or flipped classrooms might not flip just the format of the classroom but the entire paradigm of traditional teaching.  Survey results (Speak Up 2014 National Research Project, 2014) indicated 28% of district administrators noted that flipped learning has transformed teaching and learning in their district, surpassing games and

mobile apps. In addition, students, teachers, and administrators are increasingly interested in tapping into digital tools such as videos to transform the learning experience (Goodwin & Miller, 2013). The flipped classroom continues to gain attention as a tool to leverage teacher effectiveness and improve student achievement by enabling digital tools to provide more innovative methods to reach millennial students on a level not possible before.

Flipped classrooms are showing optimistic results as 38% of middle school teachers, 40% of high school, and 17% of elementary school teachers report positive feedback in implementing a flipped classroom (Speak Up 2014 National Research Project, 2014). Byron High School in Byron, Minnesota reported that 30% of students were proficient in math in 2006 but after an implemented flipped model test scores revealed an increase of 9 to 12 percentage points in math classes that indicated a positive trend in flipped classes compared with traditional lecture classes (Hamden, McKnight, McKnight, & Arfstrom, 2013).

As advocates of flipped classrooms debate several positives of a flipped classroom, research shows there have been significant increases in teachers choosing to flip (Flipped Learning Network, 2012). Opponents argue the digital divide will continue to exist between students without devices or technology at home, students will not watch videos, districts policies prohibit technology use in the class, and many teachers are uncomfortable creating, editing, and posting videos. Choosing to flip a classroom takes careful planning, connecting with other educators in professional development, discussing with district policymakers the benefits of further technology integration, and

tenacity to stick with an innovative teaching and learning method that has the potential to flip traditional lecture-led instruction upside down.

In addition to playing games, many young people, and teachers included, like to generate and produce material of their understanding of the content.  This could lead to two implications:  students would collaborate with teachers or even create their own lectures for learning and in time, most teachers could be comfortable producing and editing video lectures, as this is normative for them.

CHAPTER 3

RESEARCH METHODS

<u>Research Design</u>

Merriam (2013 p. 15) stated the purpose of qualitative research is to "achieve and *understand* how people make sense out of their lives, delineate the process (rather than the outcome or product) of meaning –making, and describe how people interpret what they experience." Patton (1985) stated that the purpose of qualitative research is to gain insight, understand research participants, and how they perceive reality, experiences, and interpret their own world.

Patton (1987) described qualitative research as methods that "are particularly oriented toward exploration, discovery, and inductive logic" that allow the researcher to attempt to make sense of a situation without any pre-existing ideas or expectations. On the other hand, deductive approaches measure clear, attainable, and measurable goals. According to Patton (1987), inductive approaches begin two ways: within programs and between programs. The notion of within programs helps evoke thoughts and questions about the individual experiences of participants in a single program. In this research the participants and the schools represent diverse student populations, demographics, and geography. This diversity gives way to a perspective of an inductive approach that looks for unique institutional characteristics that make each unique setting a story unto itself (Patton, 1987).

<u>Types of Data Collection</u>

Patton (2002, pg. 4) noted that qualitative findings are gathered through three kinds of collection: 1) in-depth open-ended interviews; 2) direct observation; and 3) written documents. Researching teacher and student perceptions of a flipped classroom, I

employed two kinds of data collection, in-depth interviews and direct observation.  Boyce and Neal (2006) described in-depth interviews that involved the researcher conducting intense interviews with a small number of participants to inquire and learn about their perspective about a specific event, setting, or experience.  This questioning technique asked participants about their personal experiences regarding a flipped class model and their perceptions about the initial structure of the class, overall process, outcomes, and suggestions for improvement for future flipped classes.

Potter (1996) stated a second type of data collection, direct observation, as the process of obtaining data through direct contact with an individual person or group of persons.  Direct observation happened when the researcher watched the person or group in their natural setting as unobtrusively as possible.  A researcher immersed in the setting with no active participation is a passive observer and a researcher completely engaged in the setting is an active observer.  In the middle of these two paradigms would be an active observer where participation is allowed but somewhat limited. I employed active observer data collection techniques at all three classrooms observed by walking around the classroom, casually speaking to students about what they were learning, and asking their thoughts about using technology as a learning tool.

Interviews of participating teachers held on the day of observation using a predetermined interview script of guiding questions were drafted from initial discussions, primary research, and discussions from other educators, and forums for educators who currently flip their class. Student focus groups ranged from one to seven students from each flipped classroom and were held to discuss student perceptions of flipped classrooms.  Responses from teachers and students were recorded through rigorous note

taking, coded, and triangulated in final transcripts, and analyzed for similarities and differences using qualitative coding methods. Discussion of benefits, challenges, and overall perceptions of implementing and sustaining a flipped classroom presented in this research were from teacher and student perspectives.  Emergent ideas arose regarding student perceptions of courses that are and are not suitable for FCM, 21st century students' inherent dependency on technology and thoughts of transitioning from traditional learning models to flipped learning.

Teachers have been identified through purposeful sampling and have met the requirements of teaching high school science, teaching the science class flipped for at least 2 years which is defined as completely flipped class (100% of time), partial flip (50%-75%), or developing a flipped class (less than 50%) and agreeing to participate in the study.  Current students enrolled at the three schools were in a FCM or have received credit from a FC and had access to an online survey for 2 weeks prior to the date of the observation and 2 weeks following the date of observation.  Present students in each of the three teachersof teaching high school science, teaching the science class flipped for at least 2 years which is defined as completas given a child assent form, a passive parental consent form outlining the research, and a self-addressed stamped envelope to mail forms directly back to me.  Through notification prior to the date of observation, a random sampling of students could participate in the private focus group held after school. These potential participants returned by mail signed child assent forms.  Initially I had planned to randomly select students and notify each student through sealed letters mailed directly back to the school. That was not necessary because each school had fewer than 10 students participate in the focus group, which kept the focus group discussion manageable

Role of the Researcher

Because the researcher is the primary instrument for gathering and analyzing data, it is important that impartiality is evident if the findings are to be

accepted.  Humans are fallible, make mistakes, and unintentionally express

personal biases that could influence the interpretation of the data.  Merriam

(1998) suggested the following skills necessary for qualitative researchers:

- First, have an enormous tolerance for ambiguity

- Second, be sensitive in data collection (be acutely aware of nonverbal

  behaviors such as gestures, posture). Also, having a keen sense of timing

  and know when to probe, wait, or change direction of interview

- Third, be able to detect personal biases and recognize when personal

  beliefs or biases may creep into the observations or interviews.

- Fourth, be a skilled communicator by establishing rapport, asking good

  questions, and listening intently (p. 7-8).

Prior to identifying flipped classroom perceptions as the central focus of this

study, I had observed one high school chemistry classroom for about 10 minutes.  The

purpose of the school visit was to shadow an administrator at a STEM Academy in a

neighboring county and visit random classes that were in session.  My previous exposure

to a flipped classroom was limited to reading journal articles, attending short workshops

about flipped classrooms, and on-going discussion among colleagues about their

experiences and interest in flipping. Eventually other science educators in my own

district continued the conversation about flipped classrooms that helped launch this study.

Personal, Practical, and Intellectual Goals

Maxwell (2013) explained three different goals in qualitative research that

involve personal goals, practical goals, and intellectual or scholarly goals.  Personal goals

driven intrinsically motivate one to conduct the study although it may not be important

for others (2013).  My personal motivation in this research is my struggle to meet the

needs of all students due to lack of time during class, student absence due to illness or

weather related events, covering content at an appropriate pace for all students, and

ensuring advanced students are given appropriate opportunities for extension projects.

Practical goals, which include administrative or policy goals, have the purpose

of *accomplishing* something that may involve meeting a need, changing a situation, or

obtaining a certain objective (2013, p. 28).  In contrast, intellectual goals are focused on

*understanding* something and having insight as to what is going on and why it is

happening, or answering a question that previous research has not addressed sufficiently

are equally important. I conducted this research to evaluate the practicality of

implementing a science flipped classroom in my own rural district with limited internet

access in the community.  Intellectually, I have never flipped a classroom and I am

interested in learning more about the benefits and challenges.  I am also interested in how

metro cities, suburban, and rural areas approach a flipped classroom and address some of

the same common concerns.

Implementation of a phenomenological qualitative design for this research

encouraged engagement of participant's normal activities during and outside class that

directly involved the research questions resulted.  In addition, the possibility of emergent

ideas, thoughts, or congruent instructional methods may arise that can lead to further

discussion and study.

Phenomenological Research

For this research a phenomenological study was employed to research teacher

and student perceptions of flipped high school science classrooms. Smith (2013, para. 2)

defined it as a discipline that "studies the structure of various types of experience ranging from perception, thought, memory, imagination, emotion, desire, volition to bodily awareness, embodies action, and social activity, including linguistic activity." Smith (2013) cites philosophers Husserl, Heidegger, Merleau-Ponty, Sartre, et al. as they collectively touted phenomenology as the "prized proper foundation of all philosophy", which launched the first evidence of phenomenological tradition in the early 20th century. A phenomenological approach attempts to understand the meaning of ordinary events in particular situations with the researcher interpreting these events.

Participants

In this study there are two groups of participants: teachers and students. Teacher participants are three high school science teachers; one each from Northern Georgia, Eastern North Carolina, and East Tennessee who have taught a flipped class for at least 2 years. Teachers identified through my own previous observation of their flipped class or mutual connection with other educators provided three potential participants. Interviews with teachers regarding their perceptions of challenges and benefits of implementing and maintaining a flipped classroom resulted.

Student participants contributed to the study in two ways: by completing the online flipped survey or being a participant in the after school focus groups. A maximum of seven students per focus group who have completed permission forms to participate in the study were invited to participate in the after school focus groups. After assessing results from the flipped survey results, development of group questions according to online student responses occurred.

<u>Characteristics of Participating Teachers</u>

        The three teachers selected are high school science teachers and either have taught exclusively flipped classroom for two years or have used this model in at least 50%-75% percent of classroom instruction. Pseudonyms created for the represented schools and teachers follow. The teachers and the participating schools are:

1. Tina, Female Biology Teacher at Davidson High School, Northern Georgia with 27 years of experience teaching

2. Nancy, Female Chemistry Teacher at Reston Creek High School, Western North Carolina with 23 years of experience teaching

3. Gary, Male Chemistry Teacher at Leesburg High School, East Tennessee with 16 years of experience teaching

        I intentionally chose three teachers from different states that are similar geographically and socioeconomically to discuss challenges and benefits to implementing a flipped classroom.  Even though each state has different state standards with regard to Biology and Chemistry, I wanted to gain a broad perspective of FCM with science not specifically related to specific standards.  I researched the perceived method of FC from the perspective of a teacher as a teaching strategy students and as a learning tool. Further, I discussed if there were any resistance to a flipped class from administrators, parents, or students. In identifying potential teachers for the study, I found it particularly difficult to locate three to four teachers from my region in East Tennessee that met the two requirements for the research.  These initial barriers led me to consider broadening the study geographically and further consider reasons why the flipped classroom appear

to be integrated and embraced in some geographical areas such as metro or suburban districts and not to be as prevalent in rural areas.

Initial assumptions that very few high school science teachers in the East Tennessee region have implemented a flipped classroom led me to contact the Flipped Learning Network (FLN) headquartered in Boulder, Colorado. According to Flipped Learning Network website (2015) there are over 25,000 active members of the network that is comprised of educators, administrators, and district leaders who either are learning about flipping or actively flip their classroom. With over 25,000 current members of the Flipped Learning Network educator network I found that over 576 members reside in neighboring North Carolina. (J. Overmyer, personal communication May 2015) as I worked to identify potential participants. With this information, I realized there was a large population of teachers who flip their classroom and I had to make phone calls, write emails, and continue conversing with educators across multiple states to identify teacher participants and schools. Thus, the process to locate teachers to participate in this study began 10 months before asking the first interview question.

Venette (2013) describes purposeful sampling in research when a group of people recommends potential participants for a study or directly recruits them for the study. Using purposeful sampling, I intentionally identified specific characteristics for the participants and researched until I located three teachers who met the criteria and were willing to participate. I chose three teachers because I felt that would lessen any potential bias and describe the perspective of teacher and student perceptions of flipped classrooms in different regions, school backgrounds, and philosophies of flipped classrooms.

I choose three southern states because during my initial discussions as it appeared that this teaching and learning strategy is not as prevalent in southern states. In schools where technology was outdated, very rural schools, or even a large traditional public high school in suburban areas, it was less likely a flipped classroom was being used as a teaching and learning resource. As I spoke through email or phone with educators who flip their classroom in Michigan, Colorado, Virginia, and Montana, they collectively seemed perplexed as to why the flipped classroom is more common in northern or western schools regardless of the subject or grade level and not as much in southern states.

A third teacher from Virginia stated her interest to participate in the study. She met all the criteria to participate in the study and eagerly agreed to participate. After numerous phone calls and emails sent from my dissertation chair and me, requesting permission to conduct the study we received no response from her administrators or district leaders. As a result I eliminated both teacher and student participants from the study. A teacher who met criteria and eager to participate in this study and could contribute significant insight about flipped classroom learning were not able to because lack of administrative support.

Characteristics of Student Participants

Student participants could have an active role in the study in two ways: complete the online survey about flipped classroom learning or participate in the focus groups. Every student in the three participating schools had access to the online survey 2 weeks prior to the observation and 2 weeks following the observation. Students ranged from freshman to seniors with a good representation of gender as half of the online

responses were male (49.05%) and half were female (50.95%). Discussion of results from

the online survey presented in Chapter 4 present guiding questions tailored specifically

for each school based on the results from the survey.

Snacks were offered to students who participated in the focus group. No other

incentives such as extra credit or dropping a grade from the teacher resulted from their

volunteering.  This again ensured anonymity for the study as the teacher was not aware of

students who chose to participate.  Two participating schools (Davidson High School and

Leesburg High School) had one female student in the focus group, a freshman and

sophomore respectively.  Reston Creek High School had seven participants with five

male participants and two female participants ranked juniors or seniors. Evaluation of

results from the focus group discussions in Chapter 4 along with emerging ideas that

evolved from the discussion followed.

Participant Selection

Teachers were selected using purposeful sampling to identify potential

participants for studies where subjects are difficult to locate (Snowball Sampling, 2009).

Identified teachers met two specific criteria in order to participate: 1) taught a flipped

classroom for at least 2 years, and 2) a current high school science teacher.

After selected teachers were notified and agreed to participate in the study, a

preliminary discussion took place to identify the date and time for the observation of their

flipped class.  After the observation of one full class, the interview of each teacher

unfolded using guiding questions about his or her perception of flipped classroom

implementation and progress.  Discussion focused on perceptions of flipped classroom

and included inquiry questions about evidence that flipped classrooms are influential in

current learning and preparedness for college level learning. At the conclusion of the school day three to five students who had previously agreed to volunteer participated in a focus group to discuss student perceptions of learning in a flipped classroom.

<u>Student Access to Technology</u>

One of my initial concerns in flipped classrooms was, "How do all students afford or have access to technology when this method is so dependent on technology?" Interestingly most teachers gave appropriate and reasonable outlets that they use to ensure every student has access to technology.  Reston Creek High School has worked with local companies that donate gently used laptops to low-income students to ensure that every student has a device.  Teachers found there was a need for common items such as power cords, ear buds, batteries, and having extra laptops available that students use for daily work when they forgot these items at home or a device became damaged.

Other creative solutions discussed were that teachers burn all of the videos for a chapter, unit, or even a semester and distribute those DVDs or flash drives to students at the beginning of the term so students have access to the material all semester.  Students view teacher created DVDs on most DVD players and even some compatible game systems.  Students who do not have these resources at home to watch videos are encouraged to use opportunities within computer labs to complete videos or online work before or after school.  Many schools have realized the increasing need to provide access to students beyond these traditional times and have implemented study halls within the school schedule.  This use of time meets RTI (Response to Intervention) requirements yet also provides access to resources that may otherwise not be available to all students.

There were some emergent ideas that resulted due to my own experiences with

technology during this research. The discussion that was unveiled from both teachers and students regarding technology saturation in education and in day-to-day life was revealing and unexpected. Discussion of these ideas and opinions are presented in Chapter 4.

Data Collection

Collection of data from three high schools located within three neighboring states of Georgia, North Carolina, and Tennessee gave insight into differing schools embracing or rejecting FCM. The selected teachers were chosen primarily on their experience with a flipped classroom and school demographics had no impact on the selection process for participants. Teacher interviews followed a set of guiding questions (Appendix I) were developed through research and informal discussion among professional educators. Use of a qualitative coding chart (Appendix J) helped categorize and record teacher responses and record through hand written notes and eye-to-eye observation. Each of the three teachers in the three schools distributed a child assent form, a passive parental consent form outlining the research, and a self-addressed stamped envelope to mail forms directly back to me to each student. With the potential of several students wanting to participate, random sampling of students who returned signed child assent forms received an invitation to participate in focus groups held after school. Because a relatively few number of signed forms were received, it was not necessary to conduct random sampling in the three schools. Student participants ranged from one student after school to seven participants.

Collection of student data occurred in two ways: initial survey completed online and observation and focus group questions. Students at each school had the opportunity

to complete the survey (Appendix F) prior to the day of the observation. From these results, questions were developed based on the students' responses that revealed student perception of flipped classrooms. By identifying and notifying students several days prior to the focus group, this gave ample time for students to make arrangements to attend the focus groups.  A few students handed in permission forms anonymously the day of the observation and allowed to attend.  Students were in a room with their peers but without their teacher present and without an administrator present. A graduate student or faculty member from the university with current IRB (Institutional Review Board) credentials attended the focus group sessions to help record responses. This assistant had current IRB status and approved through IRB prior to assisting with the focus groups.

Snacks such as crackers, cookies, and drinks provided gave students an opportunity to relax, chat, and discuss during the focus group.  Students had a small placard placed in front of them with coding such as S5M12-NC (Student #5, Male, grade 12, North Carolina).  Responses categorized with coding, disaggregated, and inserted in Student Response Chart (Appendix J).  With this format my goal was that students were comfortable sharing their own perceptions of learning in a high school science flipped classroom and it appeared that they were. I asked students a set of guiding questions (Appendix H) and a qualitative coding sheet was used to record responses through discussion and eye-to-eye observation.

Data Analysis

Analysis of results by using qualitative coding methods from notes of classroom instruction observation, transcripts of the interviews, and focus group responses revealed insight into teacher and student perceptions of FC.  Using basic coding techniques, I

identified frequencies of particular phrases and statements from teachers and student responses during the observation, interview, and discussion.  Using techniques identified in Center for Evaluation and Research (n.d.) I used predetermined codes that exhibited common themes such as FCB (Flipped Classroom Benefit) or FCC (Flipped Classroom Challenge) and TCB (Traditional Classroom Benefit) or TCC (Traditional Classroom Challenge).

A second set of codes called emergent codes helped categorize answers that arose and shed light into surprising or unexpected areas that revealed interesting stories and outlined a major theme in the thread of the research (n.d.). Results are presented in detail in Chapter 4 of the dissertation. The potential themes for Chapter 4 were the teacher and student responses to benefits and challenges of teaching and learning in a flipped science classroom and challenges of flipped learning in subjects beyond science. Additional themes about flipped classrooms emerged: student ownership of learning, adequate preparation for college level courses, and investment of teacher time in preparation for flipped classroom learning. Some emergent themes identified were unique to particular districts.  Themes such as implementation struggles, lack of student motivation, and student and teacher discussion regarding saturation of technology and over-dependence on its use in and outside of school.

The research conducted was a phenomenological study evaluating teacher and student perceptions of a high school flipped classroom with regard to benefits and challenges in implementing a FCM. Selected participants were identified through purposeful sampling in which each teacher participant met specific criteria in order to be a candidate for the study. After conducting interviews, observations, and focus groups, an

analysis of transcripts and report of results follows in Chapter 4.

Validity and Reliability

Glesne and Peshkin (1992, p. 8) described the inquisitive aspect of qualitative research as "enjoying the rewards of both numbers and words," meaning that interviews and observations are imperative in the interpretive paradigm. Patton compared the quantitative nature of research, as the strength is unveiled in the construction of the instrument whereas in qualitative research, "the researcher is the instrument" (Patton, 2001, p. 14). In this respect validity and reliability in qualitative research as each are considered largely dependent upon the ability and effort of the researcher. Patton (2001) stated that validity and reliability are two important factors that qualitative researchers should be concerned about in designing a study, analyzing results, and considering the overall quality of the study. Lincoln and Guba (1985) stated that the following terms are essential in qualitative studies: credibility, neutrality or conformability, consistency or dependability, and applicability.

Golafshani (2003) recommended in ensuring reliability in qualitative research examination of trustworthiness is crucial while Seale (1999) stated that the "trustworthiness of a research report lies at the heart of issues conventionally discussed as validity and reliability" (p. 266). When considering validity, some researchers have argued that the term validity is not applicable to qualitative research (Golafshani, 2003) but at the same time realize the need for some type of qualifying check or measure for the research. Creswell and Miller (2000) suggested that while validity can be affected by the researcher's own perception of validity, in the study this choice of paradigm expectations can influence the strength of the research as well.

61

To assure reliability and validity, I employed three data sources by evaluating teacher and student responses from three different schools in three states and recorded using multiple means of data retrieval: initial online survey to guide focus group questions, eye-to-eye observation of teacher and students, interviews, and student focus groups. Return of transcripts of interviews, focus groups, and coding sheets sent back to each teacher and student participant for verification before presentation of results of the survey and external auditing by the dissertation committee ensured reliability.

Discussion and identification of ethical considerations in this study such as properly recording teacher and student interactions in the classroom and during the focus group sessions. Through much deliberation and advice from IRB committee and my dissertation chair, it was determined that eye-to-eye observation and rigorous note taking were ideal to ensure student anonymity and privacy. By just eye contact and hand written notes and qualitative coding on charts, parental consent was not required. Each student received a student letter of assent outlining the study (Appendix F) and a parental letter (Appendix G). Students returned the child assent letter in a self-addressed stamped envelope to the researcher. The return of parental letter occurred only if the parent did *not* wish for their child to participate in the study. Each school has returned a signed and dated letter of attestation that states the school meets state and federal guidelines for proper use of federal funding and resources. Teacher participants had no direct contact with the assent or consent forms after the initial delivery of the materials to the students therefore ensuring anonymity in student participation. My goal was to ensure that teachers were not aware of students who chose to participate in the focus group meeting after school. Deliberate thought and careful execution of preparatory steps occurred to

ensure teacher and student participant privacy maintained throughout the entire study and remains so even after the final report.

After conclusion of this research there continues to be great potential for additional study on this topic to include more states, international schools, differing content areas, and the increasingly growing area of flipped elementary and middle classrooms. With the results of this study, school districts in metro areas, suburban, or rural areas can discuss the practicality of implementing a pilot class, an entire content area, or grade level and evaluate the efficacy of a flipped classroom in their area.

CHAPTER 4

RESULTS

The purpose of this study was to evaluate teacher and student perceptions of teaching and learning in a Flipped Classroom Model (FCM). Data for this study were collected from three sources: results from on online survey completed by high school students from the three selected schools, responses from interviews of selected teachers, and results from questions from three student focus groups. Report of my observations of student-teacher interactions and student responses to my informal questions follow.

The organization of results from the 10-item survey according to student responses helped provide further insight into student perceptions prior to the date of the observation and focus group. With the survey results I developed questions designed to probe students into deeper inquiry based on the feedback regarding FCM.

The results from teacher interviews were synthesized into categories according to teacher perceptions of FCM and identified emergent themes. The categories provided further organization of teacher responses into five areas: Flipped Classroom Benefit-Teacher (FCB-T), Flipped Classroom Challenge-Teacher (FCC-T), Student Engagement and Responsibility (SER), Content Knowledge-Advantages (CK-A), and Content Knowledge-Disadvantages (CK-D). Emergent themes relating to technology implementation, heavy reliance on technology in education, and future implications of technology as a learning tool for students of the future revealed unanticipated data.

Focus group results were categorized by schools and grouped into categories according to student responses follow. Identifying emergent themes from focus group discussions as a part of the results proved revealing in unexpected data. The categories

provided further organization of student responses and were organized into six areas: Flipped Classroom Benefit-Student (FCB-S), Flipped Classroom Challenge- Student (FCC-S), Current Learning-Student (CL-S), Future Learning-Student (FL-S), Content Knowledge- Student (CK-S), and Student Engagement (SE).

<u>Demographics of Selected Schools</u>

The three selected schools employed three teachers who met specific criteria previously mentioned to participate in the research. The three schools selected were within a 500-mile geographical area and given pseudo names with state location:

1) Davidson High School, Georgia

2) Reston Creek High School, North Carolina

3) Leesburg High School, Tennessee

I selected three high schools in the southeast region recognized as innovative schools with strong technology implementation and at least one science teacher who met the criteria to participate. Each school has an open device policy meaning students can bring their own device to access videos, material, or other resources while in school. Each school ensures technology access during school by providing devices free of charge through a loan program or provide iPads or laptops for use while in school.

Davidson High School, located in northern Georgia, is a large public high school with a population of 1,822 in grades 9-12 comprised of a range of students from lower income to middle to upper class students. Student demographics are 64.5% Hispanic, 2.4% Asian, 5 % African American, 25.8% Caucasian, and 2.2% of students with two or more races. With 77.76% of student population receiving free and reduced lunch, adequate technology access and availability was one of my initial concerns and questions

to ask.  Davidson High School was the first school visited and the only school out of the three schools that I had not previously visited.  Tina, a 28-year veteran teacher, was recommended by a university professor and I contacted her about participating in the study.  After several emails and phone calls with district and school supervisors, permission to conduct the study was given.

My initial observations as I walked into the school led me to believe that there is strong school pride as student accolades are proudly displayed along the walls with athletic and academic achievements with professional pictures of students in the foyer of the school.  I also noticed that a significant number of students were wearing school t-shirts, sweatshirts, and other school pride gear that led to me believe that students really do love their school.  The teacher I observed has taught at Davidson High School for 28 years.  As we talked, she said she enjoys the familiarity at DHS.  From my observation, I felt there is a strong foundation of athletics, from well-manicured fields, and exceptional academic excellence present in the school with strong parental and community support for both.

Reston Creek High School is a public charter high school located in a prominent area of western North Carolina with two university campuses nearby and several research facilities within a few miles of this innovative school. Prospective teachers at Reston Creek High School are required to prepare a FCM lesson as part of their interview and each class is required to implement a fully or modified FCM. As of 2014, Reston Creek student demographics were 44% African American, 41% Caucasian, and 15% of students are Latino, Asian, and others (2014).  Data regarding free and reduced lunch were not available.  With no cafeteria on site, most students bring their lunch.  Students who are

eligible for free and reduced lunch are provided a sack lunch provided by a local agency each day.

Reston Creek High School was the second school I researched and I was somewhat familiar with the school, as I had visited this school about 8 months earlier at a National Flipped Classroom event.  This annual event encourages educators to visit schools that have implemented flipped learning as an innovative model.  I had briefly met the teacher chosen to participate in the research and was familiar with her classroom as well as familiar with the format of the school.  I felt quite at ease at this school as I remembered the layout and schedule of the school, reconnected with several teachers and administrators, and even recognized a couple students from my previous visit. Most teachers had boxes and supplies stacked along walls in the classroom because the school has outgrown its current structure and is moving about two miles to a recently purchased larger facility.

AP Chemistry began before school and was well attended with 21 students present (15 males, 6 female) and cotaught by the principal of the school, a former chemistry teacher and the current chemisty teacher.  In this class student groups were presenting results from a recent lab in which students measured temperature and gases and defended their answers.  Students described the objective of the lab, error analysis, and rationale behind possible erroneous results.  As groups presented the results of the experiment, students were poised, professional, and receptive to questions posed to the groups from the teacher and other students.  It was clear that professional, scientific presentations on difficult concepts were not new to this group and all students appeared poised as they discussed and disseminated complex and rigorous concepts.

Leesburg High School, a public magnet high school in Tennessee with strong STEM focus, accepts students from high schools in the large metro area where it is located. Leesburg also accepts a small number of students from out of county through an application process. With a total population of 565, student demographics reveal a population of 78.8% Caucasian, 14.2% African American, 3.9% Hispanic or Latino, and less than 2% are Asian (TN Dept. of Education, 2014). Students eligible for free and reduced lunch are 21.5% for Leesburg High School. Every student at Leesburg High School receives an iPad upon acceptance into the school and seniors keep the device upon graduation.

Leesburg High School has earned many accolades and awards both locally, regionally, and nationally. Founded in 2011, the curricular design of Leesburg is structured around a project based learning school with a STEM focus. The nontraditional atmosphere at LHS is obvious for several reasons: start of school is 9:30 and dismissal at 4:30, strong collegiate atmosphere, and unique nonacademic class offerings such as urban hiking, yoga, and Java Coding. Because of the unique location of Leesburg High school, students have flexibility in participating with local businesses, university facilities, and research partners to coincide with their high school learning experience. Gary, a 16-year veteran teacher, has taught at other schools in the county and it appeared that his students and his colleagues respect him.

Online Survey Results

From the online survey (Appendix H) I developed questions to learn more about how students at each of the three schools felt toward flipped learning prior to visiting each school. Responses were not solely the students of teachers participating in the study

but the survey was available to any student at each school. Of the 211 responses from students in three high schools 43.6% freshman, 20.85% sophomores, 21.3% juniors, and 14.2% seniors completed the survey. There was an fairly equal division of gender as 50.95% (107) were female and 49.05% (103) were male. I also wanted to learn what percentage of students who completed the survey had received credit in specific content areas classes that use a FCM: Science 98.21%, English 83.33%, Social Studies 83.33%, Math 80.95%, Foreign Language 53.57%, and Fine Arts 47.72%. The final question of the survey asks students what state their school is located and students that opted to respond to this question from each state are as follows:

- Davidson High School, Georgia 3.95% (7)

- Reston Creek High School, North Carolina 80.79% (143)

- Leesburg High School, Tennessee 15.25% (27)

Table 1 is a summary of student responses regarding FCM using a Likert scale.

Table 1

*Student Responses to Online Survey*

| Question | Strongly Disagree | Disagree | Undecided | Agree | Strongly Agree | No Response |
|---|---|---|---|---|---|---|
| I prefer FC instruction to traditional instruction | 3.83% | 9.84% | 16.39% | 39.34% | 30.05% | .5% |
| I have improved as a student after being in a FC | 7.18% | 11.6% | 23.76% | 40.33% | 16.02% | 1.1% |
| I would prefer if all my classes were FC | 11.1% | 21.67% | 23.33% | 23.33% | 18.33% | 2.22% |
| I feel my instructor understands the subject he/she teaches | 3.89% | 5.56% | 12.78% | 40% | 37.22% | .56% |
| I feel my instructor(s) enjoys teaching a FC | .56% | 3.93% | 27.53% | 47.75% | 19.1% | 1.12% |
| I feel better prepared for college or career after being in a FC | 4.47% | 12.29% | 33.52% | 31.84% | 17.32% | .56% |

Out of the three schools in the survey, Reston Creek had the highest percentage of students respond totaling 143 which is 31.7% of the entire school population of 450 students. Reston Creek High School is a STEM charter school with strong digital integration, especially FCM, that may account for the high percentage of respondents from this school. Davidson High School, a public high school, had the lowest number of respondents totaling 3.95% (7) which is 0.03% of the entire student population of 1,822. Leesburg, a STEM structured public school, had 15.25% (27) students complete the survey which is 4.7% of the total 565 student population.

One of the key questions in the survey asks, "I prefer flipped classroom instruction and learning to traditional instruction and learning. Reston Creek High School students overwhelmingly respond that they Agree (41.55%) or Strongly Agree

(32.39%) that they do prefer a flipped learning model over traditional instruction and learning.  Results indicate that 46% of students Agree or Strongly Agree that students would "prefer if all classes were flipped" while almost 25% are undecided if all academic and elective classes should use FCM.

Another question asked, "I feel my instructor understands the subject he/she is teaching," and 77.22% of students responded with Agree or Strongly Agree suggesting the three teachers chosen for this study are perceived by their students to exhibit strong content knowledge.  When asked "I feel my instructor enjoys teaching a flipped classroom," results were strong as students reported that 66.8% said they Agree or Strongly Agree their teacher enjoys a FC while 27.53% are Undecided and 3.9% Disagreed.

A concluding question encouraged students to think about their current learning and future learning opportunities by asking, "I feel better prepared for college and career after being in a flipped class," and the results are inconclusive.  Slightly over half of the students (50.35%) indicated they Strongly Disagree, Disagree, or Undecided if flipped learning has actually prepared them for college or career whereas 49.65% of respondents indicate they Agree or Strongly Agree that flipped classroom has prepared them for future endeavors in learning or career.

After reviewing the data, I began to consider how to develop and use guiding questions within the focus group that reflected what I had learned in the initial survey results from each school.  The results indicated that students from certain schools appear to have more a more positive perception of FC than other schools.  Another important factor to consider is the varied percentage of student respondents from each school that

most likely inadvertently skewed results. As a result, I looked at each school's responses individually as I developed questions for the focus group sessions. Because I am the research instrument in a qualitative study, it is necessary to be astute at note-taking, observation, listening, and asking relevant questions. The student responses from the focus group discussions appear later in Chapter 4.

Teacher Participants

Participants selected in the study relied on two specific criteria: the educator taught a high school science course and has implemented a complete or modified FCM for a minimum of 2 years. Pseudo names assigned to each teacher and categorized by the state where they are currently teaching:

1) Tina is a female teacher at Davidson High School in Northern Georgia with 27 years experience and currently teaches Biology, I/B Biology, and Honors Biology.

2) Nancy is a female teacher at Reston Creek High School in Western North Carolina with 23 years experience and currently teaches Chemistry I, AP Chemistry, and Honors Chemistry I.

3) Gary is a male teacher at Leesburg High School in East Tennessee with 16 years experience and currently teaches Chemistry I, Honors Chemistry I, and AP Chemistry.

Interview Data

An analysis of a second set of data from teacher interviews held during teachers' planning times during the date of observation reveals insight into teacher perceptions of FCM. The following section reports data collected from teacher participants in face-to-

face interviews during a typical school day.  Development of subsequent coding to

assimilate similarities and differences helped make correlations between various teacher

responses.

- Flipped Classroom Benefit-Teacher (FCB-T)

- Flipped Classroom Challenge-Teacher (FCC-T)

- Student Engagement and Responsibility (SER)

- Content Knowledge-Advantage (CK-A)

- Content Knowledge-Disadvantages (CK-D)

A summary of the results from questions posed during teacher interviews were

revealed in Table 2 with frequency of responses with qualitative codes shown above.

Table 2

*Frequency of FCM Coding in Three Teacher Interviews*

| Coding | FCB-T | FCC-T | SER | CK-A | CK-D |
|---|---|---|---|---|---|
| Question 1:  Describe early experiences with technology | N/A | N/A | N/A | N/A | N/A |
| Question 2:  Describe your first day teaching in a FCM | 4 | 3 | 5 | | |
| Question 3:  Benefits and challenges of a FCM | 11 | 8 | 7 | 2 | |
| Question 4:  Compare your FCM with traditional teaching. | 2 | 1 | 1 | 2 | |
| Question 5:  How does FCM support students in current and future learning? | 3 | 1 | | | |

Question number 1 related to previous experiences with technology not specifically related to FCM and responses were not applicable to coding. Participants' perspectives as they relate to each interview question and discussion of emergent ideas at the conclusion of this section follow.

*Interview Question 1*

Describe your early years in education with technology and who influenced your decision to use technology.

The three teacher participants described their own personal journey to make the decision to teach a FCM. Gary described his early years in teaching as a business and technology teacher transitioning to his current position, a chemistry teacher. He said, "Internet was not in a lot of homes back then but I organized clubs and made bulletin boards about technology."

Nancy recalls her early years with technology as she was adamant she did not want or need a computer in her classroom yet in 2007 her husband convinced her to purchase her first laptop. Now she admits, "I can't exist without my computer. When power point came out I thought I was hot stuff." She attended a workshop in 2011 about flipped classrooms, and her interest grew in learning about FC and her husband even mentioned, "Have you heard of this flipped thing?"

Tina mentioned that some of her colleagues were dabbling in creating a FCM and through extensive collaboration several teachers worked together to create videos for a unit and eventually a semester. She continued by saying, "The hardest part was trying to identify 'What do I want it to look like?'"

*Interview Question 2*

How would you describe your first day teaching in a flipped classroom?

Each teacher took a breath to recall what the first days of a flipped classroom revealed. Nancy responded, "I immediately knew I'd like it because I got to know the students and I wasn't tethered to the blackboard (FCB-T). I'm big on relationships and I try to make sure that they know it (SER)." She continued, "I was able to understand their misconceptions immediately and it was very enlightening to understand misconceptions (FCB-T and SER)." She finished by recalling a very quiet student mentioned he wanted to study or possibly major in chemistry in college and she said, "I would not have known that if I were standing at the board (SER)."

Tina discussed her thoughts by stating, "It was hard not to lecture because honestly I like lecturing (FCC-T). The more I've done it, the easier it is to let it go." Tina went on to describe the different platforms and software she has tried through the years to find the program that is easy to use yet allows the teacher to create effective videos in a timely manner and admits it is often overwhelming trying to find the right one (FCC-T).

Gary taught in an inner city school prior to his current school and one of the biggest problems was students who were not doing homework. He realized that some of the students probably did not have the support or resources at home to get the help they needed to do homework. In response, he read and researched Bergmann and Sams's book *Flip Your Classroom* and implemented the suggestions in their flipped classroom model. He purchased a tablet, webcam, and equipment to create videos with the support of his principal. His first days in a FCM revealed extensive preparation by informing

students and parents about what they would be doing.  He explained to the students, "We are doing something new…and I am here to help you and you can take notes anywhere (SER)."  He also realized the importance of explaining the model to parents by providing a parent introduction video that outlined the purpose and expectations of a FC Chemistry class (FCB-T).  He said, "I spent over 300 hours creating videos and editing the first year but I feel I could go back to lecture model and still be OK (FCC-T)."  He developed a standards-based learning model and gave concepts within class for students to grasp.  He concluded by saying, "I feel I can truly differentiate learning and I am a face-to-face human contact person (SER)."  He mentioned the first semester he flipped his Chemistry I class it went very well and "the videos give the initial boost and they can review as needed (FCB-T)."

*Interview Question 3*

What are some of the benefits and challenges of teaching science in a flipped classroom?

Each of the three teachers described benefits to trying a FC model:  increased student engagement, more time for labs and activities, and increase in student ownership of learning. Gary has the most experience of the three teachers with FCM as he has used this model for 5 years.  He explained, "I can spend 10-15 minutes with a student or small group that I couldn't with a lecture based class (SER and FCB-T)." He continued by saying, "I've got nothing but positive feedback.  A parent confirmed that it works as it helps pair down to the essentials (FCB-T)."  Gary also mentioned that the FCM allows ample face-to-face time, one-on-one small group interaction, and opportunity to work on extra problems (SER).  He stated, "This is personalized learning that is *not* adaptive

software.  I tend to know my students better than other teachers as I'm a relational teacher (SER, FCB-T, and CK-A)."  In conclusion he mentioned that his students average "94" on the Chemistry End-of-Course (EOC) exam (CK-A) and his students have the highest percentage of proficiency and advanced scores in the district.

When asked about benefits of a FC, Nancy responded additional time with students has been advantageous because, "That's when they need you, when they're doing homework (SER and FCB-T)."  A first-year teacher sat in during the interview and I asked him to share his thoughts about being a first-year teacher implementing a FCM. He said he noticed it enables students to be much more independent learners (FCB-T and SER).  When absent they are able to still get the material because they have access to the material.  He stated, "Flipped classrooms are good for strong independent learners but students that are weaker tend to need more help (FCB-T and FCC-T)"

Tina mentioned several benefits of a FC such as using the videos to help students get material that are absent and give them make-up work (FCB-T).  Teachers have mentioned the use of other videos created by other educators or professionals, and Tina occasionally integrates those along with her created videos.  One student remarked, "Can we just listen to you?" in response to a video from another source (SER).  She has found that a typical 100-slide power point now condensed into smaller chunks of 15-20 slides that has been much more manageable (FCB-T).  As she showed me several student projects around the room, she said, "If you flip a semester class, you can do these types of activities (FCB-T and SER)."  She also stated that administrators, other educators in the building, and parents were supportive of her decision to implement a FCM (FCB-T).

When asked about challenges of a FCM, all three teachers identified the significant number of students that do not watch the videos and which appeared to be a common thread educators face in this model (FCC-T). Gary provides flash drives or CDs with the recorded material for students so they have access to the videos even when Internet accessibility is an issue. Leesburg High School has scheduled time during the week where students can view videos, get additional help from teachers or participate in "extra" activities such as sewing, dance, or creative writing. Nancy's school offers additional time before and after school for students to access internet and catch up on videos. Tina's school provides tutoring during lunch to help students who may have fallen behind. From these three teachers' perspectives, they mentioned that unmotivated students or students without home support appear to struggle the most in keeping up with videos while honors or AP students did exceptionally well (FCB-T and FCC-T).

Tina mentioned one challenge was the awkwardness of creating videos and hearing her own voice and "simply trying to keep up and trying to front load everything was difficult (FCC-T)."

Nancy also stated one of the biggest challenges was making the videos and figuring out logistics such as, "should I be at the board?" Her first videos recorded with her phone and uploaded to the school's website proved to be challenging. She continued by saying, "It's OK to make mistakes because the kids are patient in learning the videos but implementing was the toughest (FCC-T)." As she continued to share, she stated her thoughts for maintaining and modifying the FCM for students as technology continues to evolve. She said, "I have grand plans. This year we added AP Chemistry and every now and again I add new videos." As far as how long it takes to develop a FCM, she stated,

78

"You can have a FCM in a year." As she is modifying her current teaching platform, she mentioned using Google Classroom and she continues to work to improve videos. She concluded by stating, "They [the students] are not going to learn anymore from the bells and whistles [of technology]." With a very cohesive staff, collaborative work on videos is common.

Gary mentioned three challenges in the FCM: when students realize he is not going to grade anything but one-to-five assessments per semester, getting students to watch videos, and students taking class time to watch the video during class. He followed his thoughts by stating, "High achievers don't like that [I don't grade any homework] because they got credit for everything in the past. I don't have due dates and [my goal is that] I want you to learn the material (FCC-T)." He continued that a struggle is the mid-year lull where students slack off and do not continue watching the videos even when he sends out a reminder (FCC-T). Gary was adamant that teachers should not rescue students from their choices. He allows them time to watch the video during class but they miss important one-on-one time with the teacher or working with peers.

With an open device environment embraced at Leesburg High School, Gary mentioned a problem as he indicated that "There are some kids here that technology is really like an addiction and they get upset when it is removed (FCC-T)." Gary has been recognized for his innovative teaching methods locally and statewide and when asked how other teachers feel about his FCM he said he often hears, "I think it's awesome he does that, but I don't think it would work for me." Within his own school, he said, "I feel that I aggravate them [teachers] because I don't have due dates and they argue that I am not preparing them for college or career." He also recognized when a teaching method is

not working as it did for one class this year because it did not work, he stopped the FCM. He said, "I can recognize when something isn't working and what works…and make changes."

*Interview Question 4*

How would you compare your teaching in a FCM with a traditional classroom?

All three teachers admitted that they enjoyed lecture-based instruction and it was somewhat of a struggle to release the familiarity of traditional classroom instruction. Tina stated, "I kind of like traditional classroom teaching because it is comfortable. I'm learning to appreciate the FCM." She paused, then said, "I thought about putting together a chemistry course for International Baccalaureate (I/B) using the FCM (CK-A)."

Gary said, "I have thought about going back to lecture based. They both have their place and teachers have to have autonomy." He continued, "If I have a group that doesn't like it, I'd switch back. I have to consider what works for the kids at the school that year (SER)." In response to keeping a FCM for most classes instead of a traditional classroom he stated, "A traditional system can be done only one way," and "It's a flexibility thing you can't do in a traditional setting (FCB-T)." He finished by stating, "To be perfectly honest, I love lecturing and I can bring in my performer anecdotes and I can speak about previous experiments (CK-A)."

With regard to FCM compared to traditional teaching, Nancy responded, "You've got to be prepared every day for FCM. There is no shooting from the hip in a FCM. That first year is *so* much work!" She finished by saying, "I would not want to go back to traditional teaching. You have to have really supportive administration to make it work (FCB-T)."

*Interview Question 5*

How do you feel a FCM supports students in their current learning of a subject and preparation for future classes?

An overarching question that continued was the discussion of the effectiveness of FCM in meeting the learning needs of students for current high school classes and teaching student accountability and ownership for college learning.  All three teachers admitted that it is unclear whether FCM actually helps students for future classes.

Nancy stated her concerns by stating, "When they go to college and they get lectured, will they know what to do?  Are we preparing them well (FCC-T)?"  She said even if they are uncertain about their preparedness for future learning she said, "We are doing well preparing them NOW! All indications show there is strong and good progress (FCB-T)."

Tina stated that students' inherent ability to use technology helps with their learning.  Because most students are so comfortable using technology as a learning tool as students can "immediately go to Canvas and download power points" and use the tools provided for them (FCB-T).  Even though she did not mention specific advantages for future classes, she did reiterate the benefits of technology for current students that has the potential to guide students to increased independent learning, which is core in higher education classes.

Gary responded, "I feel that the FCM supports their current learning by putting them in charge of it.  I think in the long run this prepares them for college where as we all know we have to do a lot of learning on our own (FCB-T)."  He concluded by stating, "It

[Flipped Classrooms] is less lecture centric, which of course is a different environment than college, but I think that colleges are starting to move away from that as well."

After speaking at length with each teacher, I believed I had broad view of three different veteran teachers' perspectives of benefits and challenges of FCM. From these conversations and classroom observation I concluded that each teacher had solid content knowledge of the subject, they admitted developing and maintaining a FCM was challenging, but the benefits outweigh the struggle. With each teacher well connected to students during class, I observed strong student engagement and responsibility in all three classrooms.

From the perspective of a first-year teacher who admitted the challenges of learning classroom management, implementing a flipped classroom and the first-year learning curve in teaching his vantage of FCM was not as positive as the three veteran teachers were. He spoke of trying to keep his head above water in learning the content and preparing videos and he seemed overwhelmed. From his honest and open conversation, my thoughts led me to believe that implementing a FCM for new or first year teachers would not be ideal in most teaching and learning environments but is possible with appropriate support from other teachers.

Student Participants

Nine student participants in this study returned signed assent and consent forms and volunteered to participate in the focus group after school. I received 15 signed consent forms from students: Davidson High School (2), Leesburg High School (6), and Reston Creek High School (7). Of the nine total students in the focus groups, one student from both Davidson and Leesburg High School participated which accounted for 22% of

the focus group population. Reston Creek had seven students (78%) who participated in the focus group indicating that over three quarters of the participants are from the same school.

Of over 250 forms mailed to participating teachers, return of only three parental assent forms indicated they did not wish for their child to participate in the study. Participating students categorized by gender, grade level, and participating school state and assigned codes to correlate responses:

- Student #1, female, grade 10, TN (S1F10-TN)

- Student #2, female, grade 9, GA (S2F9-GA)

- Student #3, male, grade 12, NC (S3M12-NC)

- Student #4, female, grade 11, NC (S4F12-NC)

- Student #5, male, grade 11, NC (S5M11-NC)

- Student #6, male, grade 12, NC (S6M12-NC)

- Student #7, male, grade 12, NC (S7M12-NC)

- Student #8, male, grade 12, NC (S8M12-NC)

- Student #9, female, grade 11, NC (S9F11-NC)

Responses from each student were reported and the following coding was used to assimilate similarities and differences and make correlations between various student responses:

- Flipped Classroom Benefit-Student (FCB-S)

- Flipped Classroom Challenge-Student (FCC-S)

- Current Learning-Student (CL-S)

- Future Learning-Student (FL-S)

- Content Knowledge-Student (CK-S)

- Student Engagement (SE)

<u>Focus Group Data</u>

A compilation of the third set of data from student focus group sessions conducted after school on the date of observation. Identifying appropriate locations within the school prior to the date of observation by administration and notifying students well in advance the location of the room ensured anonymity of the research. A conference room and unoccupied teacher work areas were the designated locations for the focus group sessions. In order to maintain anonymity instruction to students indicated not notifying their teacher if they were attending, nor were administrative staff aware of participating students. Crackers, cookies, and drinks provided during the focus group time gave students the opportunity to relax and discuss their thoughts in a nonthreatening environment.

As the focus group time began, I created simple placards that I placed in front of each participant with coding as shown previously. As I greeted and welcomed students, I thanked them for their time and willingness to participate. After reviewing the purpose of the focus group and general guidelines (Appendix H), I confirmed that I had received all the required documentation and reminded each student that I would not be using their name in any documentation and, if necessary, they could leave the discussion at any time. I explained that I would use codes as seen on their placards, and I asked if there were any questions. As questions arose I answered each individually and continued to proceed.

*Focus Group Question 1 and 2: Engagement*

Describe some ways that you use technology at school.

How do you use technology outside of school?

As an engagement question, I wanted to learn how students interact with technology as a learning tool during school and how they use technology for enjoyment out of school. I had several students in Georgia indicate through returned forms they would be attending the focus group, yet I only had one female student (S2F9-GA) attend. She appeared comfortable and chatty from the beginning. Before I asked the first question, she said, "I feel like we're the tested generation." I paused briefly to gather my thoughts, and she continued, "I'm the black sheep of the family…everyone is a teacher, my grandfather is a research professor in Ecuador and my mom is a principal at a kindergarten school." When I asked the engagement question, she said, "We use Canvas and I cannot live without it (CL-S). In seventh grade all the work was on laptop and you felt like you were alone in the classroom because the teacher wouldn't help (FCC-S). She went on to say, "One teacher would look over something that was handwritten and would say 'not enough detail,' but when I typed the exact same thing, she said 'it was good.'"

As for her use of technology out of school she mentioned, "I use technology with texting and Facebook, but no Twitter and no Tumbler. I do have Instagram, Snapchat, Pinterest, and Prezi."

I also had several students from Tennessee return signed consent forms but again, only one student (S1F10-TN) showed up to the focus group. When asked about her use with technology in school, she responded by stating, "I take all my notes on my iPad and submit my work digitally because this helps me keep up with deadlines." She added, "I really like deadlines but don't like slackers and some classes have less definite

deadlines." As for her use of technology out of school, she continued by saying she uses technology all the time but does not use any social media because, "I don't want to share every detail of [my] life."

Students from North Carolina shared similar technology usage in and out of school and were eager to share their thoughts. Six students initially arrived for the group, but a seventh student joined toward the conclusion. Students were respectful and allowed each student to share their thoughts and politely add to other students' statement, agree, or disagree. Students appeared comfortable in sharing their thoughts about technology use, flipped classroom benefits and challenges, and perspective when compared to traditional lecture setting.

Student S4F12-NC said, "I use technology to the maximum because it reminds me about projects and groups and I can communicate with others easily." She went on to mention that communication with the use of technology throughout her school is very strong. Another student S5M11-NC said, "I can use videos to learn and re-watch and when there are unclear concepts I can ask questions." Student S7M12-NC mentioned he attended a K-8 Montessori school and said, "We had only two computers at my middle school and we did very little homework. It was very different." A senior student (S8M12-NC) stated, "I use technology to primarily do research on the computer. Biology does a lot of research." A final thought from S9F11-NC was "I use Moodle for assignments and submit work and take quizzes. I conduct research, complete projects, and use Google slides."

As for technology use out of school, S9F11-NC said, "I watch videos online both for fun and for school, Facebook, Instagram." Three students S3M12-NC,

S5M11-NC, and S8M12-NC, noted their use of technology as mostly listening to background music when they study or as one student said when he runs. Student S6M12-NC joined in and stated, "I play video games and watch YouTube videos. If I want to learn something new outside of school, I just Google it. For example, I want to learn how an engine works, so I Google it and watch a video."

After hearing from each group, I noticed that all groups mentioned using technology as a core resource for school, research, project work, and communication to teachers and other students. It was interesting that the use of technology for pleasure such as social media, video games, or other endeavors was present but it appeared the overarching use of technology was indeed to learn something. Students in all of the groups appeared very comfortable sharing how they use technology as a learning tool and resource for school projects as well as a tool for communication and for pleasure.

*Focus Group Question 1: Exploration*

Who in particular has influenced how you interact with technology as a learning tool for school?

As I wanted to learn about each student's experiences with technology as a learning tool, I also wanted to hear who had significant influence on whether the use of technology would be embraced or rejected in their environment beyond school. As we began to discuss, student S1F10-TN said, "I had very little access to electronics until about age seven and I feel I'm bad about technology." She continued by stating, "My math teacher used ALEX and I didn't like it because he would hand it over to the technology. I don't think he was hiding behind technology, but he was just not good at articulation." She paused briefly and said, "I was very suspicious of technology as a

learning tool. People can't talk over the videos when I watch it." She said "My parents aren't huge fans of 'constant technology' but they think it's OK if it's productive." She laughed and said, "They both have iPhones and they're very high tech to be down on technology."

Another perspective from student S2F9-GA indicated that her positive view of technology resulted from influence by a teacher. She said she had a literacy teacher that used 'cool quotes' such as, "You're using technology in the wrong way." She said he encouraged students to find out what they want and encouraged students to think about their futures.

When I posed the same question to the North Carolina students, I feel most students interpreted the question as "Why did you choose to attend Reston Creek High School?" after evaluating their responses. "I didn't like the public school I was supposed to go to. I like the smaller classes" (S3M12-NC). Another student (S4F11-NC) said, "I went to a huge middle school and didn't like it because it's so large. I didn't want to come here because I was going through a stage where I didn't want to be around people." Two students (S5M11-NC and S8M12-NC) responded, "My dad works down the road." One of the more vocal students (S7M12-NC) of the group chimed in, "When I heard about this FCM, I was skeptical, but then I decided this school would be better. It wasn't too difficult of a transition from a small Montessori type school." Student (S7M12-NC) said, "This school is only one out of two high schools that I liked and applied and I got accepted." Student (S9F11-NC) stated, "I go here because my neighbor works in the area. I really like technology and took computer electives in middle school. Doing work online appealed to me."

*Focus Group Question 2:  Exploration*

How would you describe your first day in a flipped classroom?

From this question, I wanted to learn students' perspective on the transition from a lecture-based model of learning to a FCM and any feelings, concerns, or anticipation that students may have experienced with this new teaching model.  Student S2F9-GA shared that, "Everything is flipped.  At first I was curious and I have to interact with it.  When other students didn't have internet, they didn't have access."  She continued by saying she tried to help students who did not have Internet access and even a friend was bullied because he did not have Internet.  This led to "others' grades suffered and the teachers automatically paid less attention to them."  She interjected, "Teachers thought technology was faster so we could all work faster."

The first day for student S1F10-TN shared, "I really liked it, watched it and did the first video a week before it was due."  She continued by stating, "Flipped classrooms work well for students who are self-motivated.  Unmotivated students do not do well."  She reiterated, "My class is self-paced and other classes have had self-paced privileges revoked.  I think some people work well with solid deadlines."

Students from North Carolina shared some contrasting thoughts as some students reported the transition was smooth while others had opposing feelings.  S3M12-NC responded, "They took us into it [FCM] really nice and slow."  Another student (S4F11-NC) liked FCM because, "I thought it was pretty awesome to have no homework except for a couple of videos.  The idea is not only to be flipped but to be project based."  One student (S6M12-NC) compared it as, "It's a bit like flying for the first time-this plane could crash.  The teachers are great and handled transition well.  I

was skeptical, but it works." He continued, "It is like a plane, it's fast and gets you there quickly." A different perspective came from S7M12-NC as he stated, "I felt terror and loss. I had been in the same room with the same people for the last 9 years and a transition to a new school and just figuring out how to use a laptop." S8M12-NC stated, "I liked it my first day. In middle school, I spent 1 to 2 hours a night on homework. Now I have about 40 minutes of videos to watch each night." S9F11-NC said, "Starting out we did not do much and we didn't know how to take notes. In history we didn't know what to do, but we got used to it."

*Focus Group Question 3: Exploration*

What are some of the advantages and disadvantages of learning science in a flipped classroom?

This question was pivotal to the findings of the research, as I wanted to learn how students really felt about learning high school science in a modified or completely flipped classroom. Even though I had some background on student perceptions from the completed online surveys, the focus groups' perspectives could reveal completely different views about learning in a FCM.

Prior to attending the focus group, I had received a small number of online responses from Georgia students. With regard to advantages of a FCM, S2F9-GA said, it brought students together, gave new chances to learn, and teachers were close and collaborative. She also said, "Teachers are more like parents" and "it connected everything." As for the disadvantages of FCM, she brought up that teachers had favorites in class and projects sometimes overlap. She connected the breaks between classes and distractions as frustrating and a clear disadvantage. At this point, I felt she thought I

meant the changing of classes and I reminded her the definition of a FCM, yet she said she understood but her responses often did not reflect that she clearly understood.

Student S2F9-TN mentioned four specific advantages of FCM: the teacher cannot be talked over, you have a choice when to do it, get teacher's help in class, and you can be in contact with the teacher. I asked her thoughts about disadvantages of FCM she said, "You can procrastinate," and "Internet being out can be crippling" as well as the possibility that technology can break.

When I asked students from North Carolina about their thoughts of advantages and disadvantages, their responses clearly reflected the responses of 143 students from their school in favor of a FCM. As for advantages of a FCM, S3M12-NC said, "I like the flexibility, I've missed 4 days, and I'm not behind at all. I even got to present a project in class when I was visiting Asheville." S4F11-NC continued, "When you do miss school, you can't fall behind. You can have access to teachers." S5M11-NC and S6M12-NC respectively shared similar thoughts, "Access to anything on the Internet," and "Since we look at new material at home, it's a good chance to communicate with teachers." The idea of collaboration continued as S7M12-NC said, "When working on a project, you can work with other team members. You can create projects with other people and work on it no matter where you are." Because of the exposure to technology, S8M12-NC stated, "I know how to make professional presentations" (CL-S and FL-S).
S9F11-NC said, "With group projects I get to work with other people and collaborate at the same time."

As for disadvantages of FCM, this group of students continued to share their thoughts openly yet the overarching response appeared to relate to heavy reliance on the

91

internet and students' reaction when it is not working or not accessible. S3M12-NC
mentioned a disadvantage, "When technology is not working. Less motivated students
watch videos but they don't actively learn." S4F11-NC said, "Student directed learning
is flipped to the maximum. I like the format of this school." S5M11-NC stated, "It may
be hard to transition back to traditional lecture in college and it might be hard because we
will not be ready" (FL-S). S7M12-NC said the only disadvantage is, "When Internet is
down." Another student (S8M12-NC) said, "I do well at math and the teacher would take
me out to tutor others. Because we work at our own pace, when we get done they can use
us as teachers." S9F11-NC stated, "Teachers rely too much on the videos. Sometimes I
felt lost but teachers are willing to help." She finished, "I love flipped learning and I
can't imagine going to a traditional school. Even when I'm sick, I can work."

*Focus Group Question 4:  Exploration*

How would you compare your learning in a flipped classroom with a traditional
classroom?

S2F9-GA responded, "Flipped classrooms are so much easier because you know
what you're going to do." I then asked her, "So you feel more prepared?" She said,
"Yeah, more prepared. Traditional classroom is lecturing and so boring."

S1F10-TN compared her thoughts about flipped classrooms and traditional
lecture classrooms. She mentioned three components of a FCM: would have videos [at
home] and do homework at school, more conversation that is good for students, and a
close, friendly relationship with teachers. As for traditional classrooms she said, "I am
not a fan of Geometry as a lecture class," and "I'm not talked 'at' but it is teacher-led
instruction."

S3M12-NC said, "I like the flipped [classroom] a lot better. Compared to a traditional school, I can get in contact with the teacher and teachers seem to go out of their way." He went on to explain, "We had a unit in math where 50% failed and were given the opportunity to re-take assessments. If you do need a break, you can take it by taking a walk or getting a snack." S5M11-NC stated, "Flipped classes are smaller, more personalized, and SDL (Student Directed Learning) is more self-paced." S6M12-NC said, "I don't miss slaving away at a worksheet or poster. We do a lot of slaving away during class. You can do your work when you are actually awake." S7M12-NC stated, "Different classes have different paces. There's no lecture and the teacher is not talking over anything." S9F11-NC said, "If you don't understand, watching the videos is helpful. Group projects are shared that everyone can work on together."

*Focus Group Question 5: Exploration*

How do you feel a flipped classroom supports your current learning of a subject and preparation of future classes?

Through conversations with educators in both secondary and higher education, I learned there is considerable concern that there is not adequate preparation of students for learning and studying at the collegiate level, which led to this question. S2F9-GA said, "We are getting used to the change in the environment. It is preparing for the real world and we should be ready for college. It's good for most classrooms but not all of them." She felt history would be fine to use a FCM but definitely no videos with math.

S1F10-TN stated, "Flipped has taught me to be independent and not confined by the time I have in class. I feel like I'll be more prepared to work by myself."

S3M12-NC said, "Future learning you can go back to videos.  [I] learned how to find our own materials."  S4F11-NC stated, "[I] can use the Internet effectively." S7M12-NC joined, "Had no idea about computers prior to this school.  [I] learned a lot about how to use a computer and technology."  S9F11-NC said, "We share flipped videos with friends from transitional schools and it helps others."

*Focus Group Question 6:  Exit*

Is there anything else you would like to say about learning in a flipped science classroom?

In conclusion S2F9-GA said, "I like it but not everyone has a quiet atmosphere at home because at home I have to take care of my sister and my dad fixes dinner and I clean.  Honestly, I think it is a good idea.  I feel it is good for most all [subjects] but not all like literacy.  I don't like videos on math, just when the teacher explains it."

S1F10-TN responded, "I think you have to roll with it.  Most teachers are good at their jobs and I tend to think teachers are teachers for a reason.  My mom says I should be a teacher.  I really like it personally because no one can talk over the teachers.  I feel I'm 50 out of 100 on comfort level with technology."  She finished, "I may not have the forethought to create videos, but I can teach when questioned."

With the final question posed with the focus group in North Carolina, our time had concluded and I asked students if they had any final thoughts.  Students responded they did not.  During the focus group time, emergent ideas from groups as well as my own emergent thoughts reveal interesting insight into unexpected results and discussed.

<u>Classroom Observations</u>

At each of the three schools, I sat in the back of the classroom, walked around the class and observed, and wrote notes as each class proceeded throughout a typical day. Depending on the structure of the class and student assignments, I did have the opportunity to speak to a few students about learning in a FCM. Each school has an open device policy and I made note of when cell phones or iPads seemed to be a distraction instead of a learning tool. Grouping of observations are according to school location.

At Davidson High School student-created announcements edited and uploaded by digital media students are the first 5 minutes of class each day. Tina teaches seven 50-minute period classes all year. During first period students appeared engaged in the short video and ready to start class immediately. Tina goes over the homework with students, asks if there are any questions, and begins notes. Students are engaged and taking notes. She reminds them frequently that notes are on Moodle and they can sketch images from her website if they do not finish. During this class one student struggles to stay awake but otherwise all students are engaged and taking notes. She reminds students where the location of the notes are posted online and students can finish at home if necessary.

As the day progressed I spoke to random students and asked their thoughts about learning in a flipped classroom. Two female students appeared indifferent when I asked what they thought about FCM but then said they preferred lectures at school. This class does not appear as engaged as the previous class as students are passing notes, five students are listening but not taking notes, and a student remained asleep the majority of the class. I asked four students (3 males, 1 female) at the end of class their thoughts and

they agreed having material accessible at home and having resources available if they miss class is helpful.

As differing students entered throughout the day, I continued randomly choosing students to ask their thoughts on learning in a FCM. In large part students throughout the day appeared engaged and on task. As I asked three males working on a magnet activity, they appeared very reluctant to answer. One male finally said, "It's OK," while one would not respond either way. I asked a final group of four students (2 males, 2 females) and they chatted back and forth. One student said, "I prefer face-to-face," and another said, "I prefer FCM as an option, not as a requirement."

Reston Creek High School offered an early AP Chemistry class called class "zero" prior to the start of school. Students presented results of a recent lab experiment and explaining error analysis with the collaboration of peers, the teacher, and the assistant principal. The caliber and complexity of these presentations exceeded most typical high school students written and oral skills. As other students and the teacher politely questioned groups about their results, they explained possible errors and gave rationales of how to improve experimentation for future tests. During the second class I asked three students (2 males, 1 female) about their thoughts and they responded that they all prefer a flipped classroom to traditional classrooms even though the female seemed apprehensive to respond, she agreed. Eleven students had laptops open and no cell phones were out. As I walked around the room, power cords are scattered all over the floor charging depleted iPads, laptops, and cell phones. During this class I did notice one male student took my picture with his phone using an app called Snapchat. I gave a glance in his direction that clearly indicted I was aware of what he did and he quickly put his phone

away.  Four male students offered their thoughts and they all agreed that math and English are classes that should not flip, whereas history, science, and foreign language are all suitable for FCM.

One male who had planned to attend the focus group but could not wanted to share his thoughts.  He said, "I really don't like FCM.  I really don't like math flipped." He went on to say he came from a Montessori school and said, "They could not survive without their technology.  I can't imagine learning without technology."  He went on to say he liked foreign language, science, and history flipped and repeated his disdain for math classes flipped.

I observed one class period of another science teacher who flips her class to gain additional perspectives and opinions.  Students were discussing mercury levels in fish and had a rich and moving discussion.  It was clear that the students are comfortable enough to disagree and share opposing thoughts and views in a respectable manner.  As students worked, I asked two male students their thoughts and they said, "I like lecture time and videos a lot," and "I feel like I have become a better student and have ownership of learning and gained confidence."  They both agreed that they do not like videos that are longer than 10 minutes in length.   A female joined in and said, "FCM can be extremely effective if followed through with it.  The more flipped the better yet some electives are not flipped."  She said a clear benefit is, "I can relisten to the material if I don't get it the first time.  Material is condensed and deliberate."  She finished by stating, "Students connect with other students easily and effectively with Internet system and I usually get help from other students or my teacher twice a week."

The final class of the day was a large class of 30 Biology students in a male teacher's class. At the beginning of class, a revealed pass code allowed students to unlock the next timed assessment they were to complete given twice a week. During class the teacher's computer depleted battery left him without technology and he clearly seemed frustrated. As I walked around some students did the assessment while others did everything but the assessment. The teacher went quickly over a comparison of concepts relating to DNA and RNA and gave students instructions for homework.

Leesburg High School began school an hour later to accommodate for transportation of students across the large metro city. As first period began, 34 students filled a lab and lecture type room with lab tables. Most students had all materials out and were ready when class began. As they reviewed material a couple students had notes out to help and Gary jokingly "took up" the notes from the students. Early on it was clear that the teacher-student relationship was fun yet productive in this classroom. Every student was engaged and even smiling while the teacher covered electron configurations. I observed students tutoring one another often and collaborating between groups. I asked a female student her thoughts about FCM and she said, "We work at our own pace and we can review as needed. I think English and Latin would work as a flip. I really enjoy it." A male student joined in, "I really like it. It has changed my mind and I did not like science. I feel I am a better student overall. I am not so stressed about due dates. I still have opportunities. This is my favorite class."

Another male student stated, "It [FCM] can be difficult at times. I appreciate it a lot, but when I have something personal going on it sets me back. I like the free will and I'm on track right now." A male freshman said, "I would like it if all classes were

flipped." He went on to say he felt lucky he got into that school because of specific zoning he should attend another school in the district. Every student was working on an iPad, paper assessment or white board and it was clear that every student knew how to use technology well.

Two females shared, "It [FCM] only works for some concepts such as English and maybe science, but definitely not math." Prodigy hour takes place at Leesburg and involved tutoring in a number of classes or opportunity to take fun classes such as sewing, urban hiking, or a lengthy list of others. When Gary arrived at his room for Prodigy hour, 30 students were present. Most students were working on chemistry and he walked around the room to guide, help with questions, and just interact on a personal basis with students. As Prodigy hour winds down, two students were playing games on a device, several were texting, some are watching videos for homework, while a few were doing written homework. I noticed one student playing a game on his phone while simultaneously watching a movie on the iPad.

The next class is a small AP Chemistry class of 18 students working through a difficult two-question quiz. Students struggled with the questions and appear stuck often but did not give up. As students asked about the option of videos regarding the quiz format, Gary said, "No." Another student said, "Can you make them?" Gary responded, "Uh, no." The student asked, "Are we your favorite class?" He responded, "Until last week." He paused briefly and said, "If you guys were stock, I would've sold you last week." I noticed one student kept interrupting Gary throughout the class and had an iPad open playing a game during class. I asked two females their thoughts and they said, "We love flipped because we get to watch it again."

During the last class of the day, I asked several students their thoughts on FCM. Three males said they like FCM much better compared with traditional classrooms. I then questioned four students (3 females, 1 male) and the females said, "I like it but I don't get to ask questions right then." The male responded, "It's OK for motivated students but not for those that are not. I feel school in general is not good in the set-up we now have." He did not elaborate further on that statement. All students are completing an assessment on a device except one student completing it on paper because he forgot his device. One student is texting and not doing assessment. Students can take and retake assessments throughout the semester. Two students stated, "I like it a lot but other classes have due dates." A female student said, "Not that this class isn't important, but I can put it aside for now. I like this class best even though the content is hard. I wouldn't like it if all of my classes were flipped."

Findings

Through triangulation methods through online surveys, interviews, focus groups, and direct observation data collected showed some positive correlations between teacher and student perceptions. Triangulation uses multiple data sources in an investigation to reveal understanding of a setting or a phenomenon. Qualitative researchers use this method to ensure that an account is rich, robust, comprehensive, and well developed (Cohen & Crabtree, 2006). The results of the online surveys, teacher interviews, student focus groups, and direct observation and anecdotal data were placed into categories according to emergent themes. The categories provided organization of the participants' responses into three areas: teachers' perceptions of a FCM, students'

perceptions of a FCM, and an unexpected emergent theme, cultural reliance on technology.

Teacher Perceptions of Flipped Classroom

The three teacher participants in the study teach high school level science and each teacher has more than 15 years' experience teaching. Three overarching themes revealed that participants agreed that beginning a FCM was an intensive time investment, the benefit of increased student interaction was well worth the effort, and two teachers felt that FCM is not ideal for every student.

Gary realized the potential of a FCM as he struggled with students neglecting homework in an inner city school. With an initial investment of over 300 hours creating and editing videos, Gary developed his first flipped chemistry class. He added, "I feel I could go back to a lecture model and be OK." Nancy stated it was difficult trying to work out logistics and organize the concepts to make the video flow. She admitted she recorded her first videos with her phone propped up at the back of the classroom recording her lecture. Tina used both her own created videos and videos from other sources and said, "It free you up to do more activities and labs" and she is hopeful that it will give her more time to enjoy teaching. She also admitted, "Sometimes it [FCM] is very stressful. Many Sunday afternoons are spent uploading videos and power points. It would take a minimum of three years to be comfortable with a FCM."

When asked how impacting FCM appeared on student engagement and responsibility, each teacher felt that individualized time with students was the most influential benefit. Tina said, "It's how kids learn and it is so different than how I learned." Nancy stated, "An advantage is spending time with students because that's

101

when they need you, when they're doing homework.  I would not want to go back to traditional teaching."  Gary said, "The biggest advantage is student engagement shifted from teacher led to student led and we can talk as we work.  We have the ability to have those awkward conversations like 'you may be struggling.'"

Both Nancy and the first-year flipped classroom teacher mentioned that FCM might not be ideal for all students, especially students who are not motivated.  Even though each teacher gave suggestions how they ensure students watch videos such as take up notes, give quizzes, check viewing time online, or when it is consistently a problem, they call home, the issue remains.  Nancy said, "One would assume that a lower level student would benefit from this concept, but they simply don't benefit.  The low, low performing students aren't getting what they need."  The other teacher stated, "FCM is good for strong independent learners as students that are weaker tend to need more help.  In regard to lower students, open devices during class tend to be distracted by their device instead of using it as a learning tool."

Student Perceptions of Flipped Classrooms

Student participants completed an online survey anonymously prior to date of observation and/or participated in the focus group after school.  Student perceptions from these groups revealed three major themes:  students prefer a FCM to a traditional classroom with the exception of math, students prefer some content as FCM while others are not ideal, and students report increased teacher engagement because of FCM.

Results from the online survey indicated that almost 70% (127) students reported they prefer learning in a FCM compared to a traditional classroom.  Focus group data revealed similar responses.  S3M12-NC said, "I like the flipped a lot more because

of the personal interaction with teachers." S2F9-GA stated, "I prefer FCM because you know what you're going to do and traditional classes are lecturing and that is so boring." S1F10-TN said, "I'm not a fan of lecture classes. I do not need all of the talking the teacher does for everyone else." A group of three students said they preferred a FCM to traditional even though their learning platform, Moodle 'goes down a lot.' A female student indicated because of the FCM, "I feel like I will be more prepared to work by myself without assistance from others."

Online data indicated that the overwhelming majority of course credit obtained from a FCM was science with 98.2%. Tied for second was English (83.3%) and Social Studies (83.3%) and math was fourth (80.9%). From these results, the majority of classes students earned credits with a FCM were core curriculum classes. One student said, "With some AP classes, some are great at FCM while some do their best." During focus group conversations and informal questioning during class, I heard a consistent theme that math was not liked as a FCM from both male and female students from each school. As I asked a group of males at one school their thoughts about a FCM, they were adamant that some classes should not flip such as math and English, but that all said, "We hate math flipped." This contradiction led me to consider why students in three states felt so strongly against a flipped math class.

I asked participants if they felt they had improved as a student learner because of FCM and results indicated over 56% Agreed or Strongly Agreed they felt they had improved as a student learner. This initial question led me to ask students if their personal improvement as a student learned was a result of increased interaction and engagement with their teachers since being in a FCM. One male student said, "I feel like

103

I have become a better student and I do have ownership of learning and I have gained confidence." S2F9-GA stated, "Teachers are close and collaborative and we are more like family. Teachers are more like parents." S1F10-TN said, "[An advantage] is the teacher's help during class and I can email and keep in contact with my teacher."

Cultural Reliance on Technology

The design of this study was to consider how technology, specifically FCM, has the potential as a powerful learning tool for students and teaching resource and strategy for educators. Three emergent themes arose regarding reliance on technology: the researcher's dependence on technology, students' dependence on technology, and teachers' dependence on technology. I asked students in the focus group on day 2 of my research trip the unscripted question, "Describe a day without technology." Events that preceded my unscripted question occurred during the previous 24 hours and all are related and closely tied to technology dependence.

I would be absent for 4 days conducting research and my own students needed to review for their Biology EOC. I worked for over 15 hours creating and editing unit videos explaining questions and answers to questions in their practice exam. After trying three different recording applications, I found a simple one that I felt would work. Converting and uploading videos to my Wikispaces website was a different story. As I quickly learned, videos longer than 15 minutes would not upload because of the large size; therefore, my students only had access to two of the six videos in my absence. As I was packing up to leave the hotel after the first day of research in Northern Georgia, I noticed the water was off in the room and later learned the hotel had flooded due to a guest hanging a sweater from a water sprinkler in the room. Water poured down the wall

just a couple doors down from me.  As I tried to upload another video for my students to watch that morning, electricity was cut and therefore I no Internet access.  Frustrated, I packed my few belongings and began the 450-mile journey to my next school.

A couple hours into my trip, I realized I had not heard from anyone in a couple of hours.  Dismissing it that most people were at work or in school, I tried to send a text to a friend but instead I got a prerecorded message indicating recent disconnection of my phone.  With no phone, I also had no map, no email, and no connection to anyone at home.  I felt completely paralyzed. As I drove further west, I was unsure if I was in the right direction, I pulled off at a gas station outside of a city in North Carolina to check a map and go to the restroom.  I noticed the women's restroom covered in yellow "Do Not Cross" tape, I slowly walked away, and my frustration continued to mount.

At the gas station I looked for a map to purchase. When I could not locate one, I went to the counter to ask to look at one.  Two employees said, "I know we had one at one time," but no map ever surfaced.  Almost in tears I began to walk out, a man had his iPhone out, and I asked him to see if headed in the right direction to my next location. Fortunately, headed in the right direction, I still needed to let my family know why they could not get in touch with me.  I found a fast food restaurant that offered free Wi-Fi and sent a couple emails explaining my predicament.  Within about 3 hours, my phone back on and headed to research site number two, I realized how incredibly dependent I have become on technology.  As I drove I could not shake the paralysis I experienced when I suddenly became unplugged from technology especially when I was in an unfamiliar place.  This shook me to the core and led me to ask the following two focus groups to describe a day without technology.  I wondered if absence of technology would be as

revealing to them as it clearly was to me. I had my first experience of nomophobia, the fear of being without one's technological device.

After I had asked the engagement question and a couple of the exploration questions, I asked the unscripted question, "So what would you do without technology for 24 hours?" Before the last syllable was off my lips, there was a collective gasp, students exchanged glances, and they quickly began to chime in. S3M12-NC said, "I would run a lot and play with siblings and take a lot of naps." S4F11-NC stated, "I would crochet, bake something, and I love to clean. I love being detached from technology because it's like a refresh button." S5M11-NC said, "I would train for karate," while S6M12-NC said, "I would read, sketch book, drive, or work on broken machinery." The thoughts continued as S7M12-NC said, "I would read, work on robotics, or sit and think," and S8M12-NC said, "I would run and do a Bible study. I also have three siblings and I would play with them." When I asked S1F10-TN how her school handled when Internet went down, she responded, "Teachers print hard copies or students got study hall. Some students would use their phones as hot spots." When I asked her to describe what it felt like to have not have technology at school temporarily she said, "Lots of students were happy at first, but then realized a lot of things needed Internet access. Though several questions arose that day and people scrambled, but it was fun. It was sort of like a snow day."

Teachers also echoed their love as technology as Gary said, "I am a video gamer, and I have a computer on all the time. I have three to four computers and three tablets. I love technology." Tina stated, "I'm always on the Internet looking up pictures for class and for power points." She added that her school embraces social media and

uses it to notify students of important information.  Nancy said, "I can't exist without my computer."  She had taught at another school where administration refused her the opportunity to flip her classes because they wanted the interactivity of teaching and the school would not allow her to record videos.

<u>Summary</u>

Chapter 4 was comprised of research data obtained through triangulated data collection of online surveys accessible to students, teacher interviews, student focus groups, and direct classroom observation.  The purpose of this qualitative study was to investigate the perceptions of teachers and students regarding high school flipped classrooms.  The participants in this study were high school science teachers, either chemistry or biology, who have taught a flipped classroom for a minimum of 2 years, and students in grades 9-12 who were enrolled in one of the three selected schools.  Focus group participants were current students in a high school science flipped classroom. Selection of teachers and students occurred through purposeful sampling to identify and choose information-specific cases related to the event of interest (Palinkas et al., 2013).

Each school had access to the 10 question online survey 2 weeks prior to the date of observation.  Any student enrolled in the school was encouraged to complete the survey.  Surveys remained open at least 2 weeks after the date of observation and all surveys closed on the same date.  Results were organized initially by individual state results and then further analyzed to reveal any emergent themes.  These questions helped shape the direction of questions for the focus group for each state.  Categories were developed to help establish patterns among the groups and relatedness among themes. This type of organization helped shaped the theoretical structure of the study.  The

categories identified through this research were teachers' perceptions of a high school science FCM, students' perceptions of a high school science FCM, and cultural reliance on technology.  With the implementation of triangulation, interview, focus group, and observation, the intention was to get a broad and rich perspective of teacher and student perspectives and emergent themes in three different settings by evaluating each question holistically, correlating teacher, and student responses with the corresponding categories.

CHAPTER 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this qualitative phenomenological study was to investigate teacher and student perceptions of a high school flipped classroom model. I observed and interviewed three high school science teachers who have implemented and maintained a FCM for at least 2 years. I also held focus groups sessions with small groups of students at each school and discussed their perceptions of being a student learner in a FCM. In addition, I developed an online survey accessible to all students at each school to respond to their thoughts of learning in a FCM.

There are several reasons I conducted this study: I was concerned about the content that my own biology students missed due to weather or absence, I wanted to learn about a strategy that had potential to increase student commitment for their learning, and I was interested in whether a FCM had the potential that led to improved teacher-student relationships. Based on the research reviewed in Chapter 2, several studies indicated that FCM does provide a successful outlet for students to access material outside of school. In addition, when a FCM is well structured, students do show improvement in commitment to learn, and both teachers and students report improved relationships in class. A major theme that emerged from this research was the heavy reliance and dependence on technology. Technology saturation in both education and normal day-to-day life discussed by teachers, students, and even the researcher led to unexpected results. As a potential administrator, I hope to discuss these findings with colleagues, students, and key stakeholders as my school district makes current and future fiscal decisions regarding technology access and implementation in the future.

Interviews conducted using qualitative methods help gain insight into each teachers' perspective on the benefits and challenges of a FCM.  The data consisted of the hand written notes taken by my research assistant and me. Three selected teacher participants identified for the study based on purposeful sampling.  Participants met the qualifications to be in the study by being a current high school science teacher and implementing and maintaining a FCM for at least 2 years in the three selected states.  The structure of interview questions resulted in three main components:  Engagement, Exploration, and Exit.

The structure of the first questions helped me to learn about the participants' prior and current experience with technology as a teaching resource as well as a resource outside of school.  The next set of questions were foundational questions for the research with structured questions progressing from individuals that influenced their interaction with technology, describing first days teaching a flipped classroom, to benefits and challenges of teaching a FCM.  With the questions structured to encourage open-ended responses, participants had flexibility to describe in detail and expand on responses as necessary.

Analysis started with multiple layers of coding.  Hoepfl (1997) described open coding as the identification of themes emerging from the raw data where the researcher must identify, name the conceptual categories, and group the observed phenomena.  With open coding the researcher developed a broad view of the research by assimilating information and descriptive details from conducted interviews, focus groups, and observations to describe the events of the phenomenon using a conceptual model.  The resulting model depicted teacher and student perceptions of FCM in high school science.

The conceptual ideas of teacher perceptions of benefits and challenges examined and compared for similarities and differences.  After transcribing and coding responses from each teacher, I organized responses into specific emergent theme categories according to participants' responses.  Concurring and unexpected themes were organized. The emergent themes identified in teacher interviews: teachers agreed that beginning a FCM was an intensive time investment, the benefit of increased student interaction was worth the effort, and two teachers felt that FCM is not ideal for every student, especially lower level students.

Student focus groups conducted at each school helped learn more about students' perceptions of learning in a FCM.  Students had access to an online survey, and from these individual state results, I developed open-ended questions to learn about students' perception of benefits and challenges of a FCM.  Emergent ideas related to students' discussion were frustration about unmotivated students, heavy dependence on technology for education, and candid discussions about classes that they feel should not flip were evaluated.  The themes in student focus groups were; 1) students in this study prefer a FCM to a traditional classroom, 2) students indicated certain classes taught as a FCM work well while others are not ideal, and 3)  students report increased teacher engagement because of FCM.

An emergent and unexpected theme that evolved was the dependence on technology voiced by three groups: students' dependence on technology, teachers' dependence on technology, and the researcher's dependence on technology. This emergent theme led to an unscripted discussion with questions and responses that were not anticipated but revealing.   A summary of the findings and conclusions presented here

relate to the two central main research questions followed by recommendations for further research.

<u>Summary of Findings</u>

The findings from this study regarding teacher and student perceptions of teaching and learning in a flipped classroom model presented as they relate to the research questions. The research questions focused on teacher and student perceptions regarding the benefits and challenges of teaching and learning in a FCM. The findings revealed teachers' perceptions of a FCM indicated the benefits were improved teacher student relationships and open access to learning material. Further, the teachers indicated challenges of a FCM were creating, editing, and uploading videos was a significant time investment and the structure of a FCM was not conducive to struggling or unmotivated students.

The findings revealed students' perceptions of a FCM identified benefits were improved teacher student relationships and students' ability to access material anytime. The findings revealed that students indicated some classes are not well suited for a FCM while others work well and most students prefer a FCM compared to a traditional lecture. Findings revealed that teachers indicated implementation of a FCM works best with supportive administration, parents, and the increased engagement of students is well worth the effort. Student participants identified a FCM as a useful learning tool to accompany teacher-guided instruction during class, allowing opportunities for students to take ownership of their own learning, and improved teacher and student relationships.

The following section presents discussions from the findings in Chapter 4. The two main research questions were foundational in developing interview, focus group, and

112

online survey questions.  Conclusions revealed the efficacy of piloting a FCM science classroom in a rural district high school as well as to improve current and future practice for myself and other science educators.

<u>Research Question #1</u>

What are the advantages and disadvantages of a flipped classroom model from a teachers' perspective?

Kay, Knaack, and Petrarca (2009) reported that teachers who used web-based learning tools as part of their lessons indicated they perceived their students were more successful and engaged during class.  Each teacher in the study implemented and maintained a FCM and described advantages and disadvantages for this teaching model and described various perceptions.

All three teachers indicated a disadvantage of an implemented and maintained FCM was a significant investment of time through creating, editing, and uploading videos.  Other concerns discussed were students not watching videos outside of class. None of the teachers mentioned students not having access to devices or Internet as a significant issue.  Another disadvantage discussed was two teachers clearly felt the FCM was not ideal for struggling students and felt the structure of a FCM was more for motivated students with strong intrinsic drive.  One thought could be that motivated students may monopolize a teacher's time during the class and unmotivated students simply do not have the confidence to pose questions.  Another thought is that there could be external factors outside of school that inhibit the learning of unmotivated students and without appropriate support or resources they likely fall further behind.   This idea contradicted research I have read and I believe it is inconclusive and should receive

further investigation.  Teachers indicated one of the major benefits of a FCM was improved student engagement after implementing a FCM compared with traditional lecture classes.

<u>Research Question #2</u>

What are the advantages and disadvantages of a flipped classroom model from a student's perspective?

Students had the opportunity to share their perceptions of being a student learner in a FCM.  With 211 online survey responses, nine students participating in the focus group, and several students casually questioned during observation, I discovered three themes from these data.  Students prefer a FCM to a traditional classroom; students believed that the content and design of some classes are more conducive to FCM; and students report increased teacher engagement because of FCM.  Most students indicated they preferred a flipped learning class to a traditional class even when several students indicated this was their first flipped class.  Students who did not like FCM indicated they prefer the opportunity to ask questions immediately and that can be difficult if viewing a video at home.  Several students indicated that they feel that some classes were better suited for FCM, while others, such as math were not.  Most students did not elaborate why they felt the structure and design of math classes are not conducive to a FCM yet students in each state repeated the same theme.  Students reported increased engagement and one-on-one time with the teacher as a significant benefit to a FCM.  Most students said they have more accessibility to their teacher because of the model of a FC.

<u>Conclusions</u>

The purpose of this study was to learn about teacher and student perceptions of a flipped class in a high school science classroom as more districts are implementing increased technology use and open accessibility. The goal was to learn the efficacy of implementing a FCM in a high school setting as a teaching and learning tool as evaluated from the perspective of teachers and students. After collecting and analyzing data, I learned that teachers felt that implementing a FCM was a significant time investment and may not be suitable for all levels of student learners but benefits of increased student relationships are worth taking into consideration. From online surveys, focus groups, and informal discussion from students I learned that the majority of students in this study do prefer a FCM to a traditional classroom lecture as an additional tool or resource to access material for school. Students mentioned that classmates who have access to videos but opt not viewing the videos outside of class is a frustration. Students also reiterated that teacher-student relationships improved and communication was more frequent and productive.

The information I learned from teachers and students helped me understand the benefits and challenges from two very different perspectives of a FC environment. Each school had a slightly different approach in FC structure and strategy: flipped classes occurred most days if not every day or a few flipped classes were intermittent or taught as units. Based on their thoughts and ideas, I listened to teachers' insights on what worked on FC, such as student access to resources and improved relationships and what they would do differently, such as collaborate with other teachers in creating and editing videos. With regard to student discussions, I learned most students at the three schools do

appreciate the access to online resources at their convenience, with implementation of FC most felt they had improved as a student learners and improved relationships with their teachers.

Recommendations for Practice

With these results, I can be an advocate for my own district as we are working with several entities to improve online access to all areas of the county. With this advancement, more families would have online access for not only educational needs but also access to adult online learning as well as many other facets. The findings of this study will enable me to evaluate and develop a pilot science class at the high school level using strategies in the FCM. After identifying a teacher willing to pilot the program, I would suggest he or she remotely attend a Flipped Classroom seminar held in the summer, read Bergmann and Sams's book *Flip Your Classroom* and visit at least two science classes that have been flipped. The schools I visited for the study are located within metro city limits or higher socioeconomic school districts. I would also recommend the identified teacher visit a rural school and evaluate how that school handles common concerns such as student accessibility of technology outside of school, providing devices, and internet usage policies during school. Meetings with other teachers in other schools in elementary and middle school settings would be encouraged to observe the teacher selected and reflect upon the feasibility of a FCM in their school at their grade. I would help organize, plan, and guide the teacher on beginning a FCM. Based on findings from this research, some specific examples of areas I could assist would be:

- Work closely with the teacher chosen to pilot the high school science flipped classroom by ensuring registration on the Flipped Learning Network forum and access to resources in print and online.

- Ensure the teacher has adequate resources such as a webcam, software to create and edit videos, and additional supplies such as burnable CDs or flash drives to provide to students who may not have internet access.

- Write and submit grant and budget proposals to request funding for additional technology supplies and resources.

- Advocate for professional development time to visit other schools, attend workshops, and after one semester, share in a professional learning community (PLC) perspectives on the feasibility of a FCM for this or other schools.

- Attend community and school board meetings to share insight on the benefits of increased technology implementation and giving additional opportunities for students to interact with technology as a learning tool prior to graduation.

My principal has inquired about the findings of this study and has already approached me about possibility of implementing this as an additional learning resource and tool for students in the upcoming year but not the sole learning tool. Currently our school has a no cell phone usage policy in that students caught with a cell phone on will have it confiscated for 30 days, no exceptions. The debate on iPads, tablets, and laptops is still undecided as no updated policy is in place on these devices. On the other hand, 12 newly built computer labs help to accommodate frequent online testing. Interestingly, allowing students to engage with their own technological device such as a laptop or cell phone during class has not occurred. I feel our school is on the edge of a breakthrough in

recognizing the need to allow students to interact with technology appropriately as a learning tool and are currently working to rewrite outdated school board policies regarding technology usage, specifically cell phones and tablets.

I intend to present data from this study to administrators, central office staff, and parents to reinforce that modern student learners have stated they prefer to learn using technology with their teacher available to help and assist if they have questions. Most students implied that a hybrid learning setting would be ideal and be most beneficial for current and future learning. From these discussions with diverse stakeholders in education and the community, it would likely be an opportunity to investigate and plan further installation of fiber network throughout the county for internet accessibility as well as rewrite antiquated board policies regarding technology usage.

Recommendations for Research

The purpose of this study was to evaluate teacher and student perceptions of teaching and learning in a high school science flipped classroom. With limited research on teacher and student perspectives on high school science flipped classrooms, I felt it was important to consider both perspectives in this study. Most empirical quantitative data involved populations and data that are not considered in this study: secondary education classes and evaluation of test scores or grades of students in a FCM compared with a traditional lecture setting. Even though research is growing, the input from educators at the K-12, level indicates that additional quantitative and qualitative research is necessary.

Recommendations for further investigation are as follows:

1.  Research of this nature replicated within rural school districts where internet access is limited.  By identifying teachers who use a FCM and conduct similar qualitative studies to reveal challenges and benefits of a FCM from teacher and student perspectives in rural settings, issues regarding internet access and ensuring students have access to a device can reveal interesting results.  A comparison between rural, metro, and inner city schools could reveal how low income schools face technology issues and connectivity for students out of school.  These results could lend to further quantitative research involving test scores, ACT scores, and graduation rates.

2.  The design of the study evaluated high school science classrooms that use a FCM as a teaching and learning tool.  I suggest that additional grades and content areas should be evaluated using similar qualitative techniques.  Through purposeful sampling, this could be accomplished by identifying teachers at various grade levels and different content areas.  Further expansion to include teachers in multiple school systems as well as multiple regions can provide a broad perspective of this model.

3.  This study evaluated the perspectives of teachers and students that are in a FCM.  I recommend a study investigating administrators' perspectives would provide valuable insight into other areas such as cyber security, fiscal decision-making, and the challenges of finding solutions to providing technology access to students before, during, and after school.  Parental perspectives would also provide valuable information as 21st century students are undeniably learning content with innovative tools and resources not available to their parents.  Evaluating how parents reconcile their child's current learning methods with previous traditional lecture classes could provide insightful information as the learning of 21st century students continues to change.

4.  As I wanted to learn about how students relate current learning of content to future learning, I recommend a study to measure undergraduate content knowledge of core academic areas such as math, English, and science and compare the results from students taught primarily with a FCM with students with a background in a traditional lecture model.  From these results one could learn if FCM is a correlating factor in students' maintaining strong or weak content knowledge or if other factors could contribute to their scores of content knowledge.

REFERENCES

Anderson L. & Krathwohl D. (2001). *A taxonomy for learning, teaching, and
   assessing: a revision of Bloom's taxonomy of educational objectives*. New
   York, NY: Longman.

Amos, A. (2012, October 1).  STEM teacher uses 'flip' method to put classroom
   focus on students, not educator. *The Knoxville News Sentinel,* p. D1.

Apodaca, P. (2015, January 31). Patrice Apodaca: Backlash arises over 'flipped'
   classrooms. Retrieved July 12, 2015, from http://www.latimes.com/tn-dpt-me-
   0201-patrice-apodaca-column-20150131-story.html

Ash, K. (2012, September 12). Educators evaluate 'flipped classrooms'  Retrieved July 6,
   2015, from http://www.edweek.org/ew/articles/2012/08/29/02el-
   flipped.h32.html

Bergmann, J., & Sams, A. (2012). *Flip your classroom reach every student in every class
   every day*. Eugene, OR: International Society for Technology in Education

Berrett, D. (2012, February 19). How 'flipping' the classroom can improve the traditional
   lecture. Retrieved June 21, 2015, from http://chronicle.com/article/How-
   Flipping-the-Classroom/130857/

Bishop, J., & Verleger, M. (2013).  *The flipped classroom:  A survey of the research.
   American Society for Engineering Education.* (Rep. No. 6219).  American
   Society for Engineering Education. Atlanta, GA:  ASEE Annual Conference and
   Exposition.

Boyce, C., & Neal, P. (2006, May 1). Conducting in-depth interviews: A guide for
   designing and conducting interviews for evaluation input. Retrieved July 24,

2015, from

http://www.uwex.edu/ces/4h/evaluation/documents/m_e_tool_series_indepth_int
erviews.pdf

Brame, C., (2013). Flipping the classroom. Vanderbilt University Center for Teaching.
Retrieved June 20, 2015 from http://cft.vanderbilt.edu/guides-sub-pages/flipping-
the-classroom/.

Brunsell, E., & Horejsi, M. (2013). Using web tools to generate learning. National
Science Teachers Association, 80(8), 8-9. Retrieved July 11, 2015, from
http://digital.nsta.org/publication/index.php?i=178562&m=&l=&p=10&pre

*Center for Evaluation and Research #18.* (n.d.). Retrieved July 13, 2015, from
http://programeval.ucdavis.edu/documents/Tips_Tools_18_2012.pdf

Cohen, D., & Crabtree, B. (2006). "Qualitative research guidelines project." July 2006.

Definition of homework. (2015). Retrieved October 13, 2015, http://www.merriam-
webster.com/dictionary/homework

Definition: Mastery learning teaching method. (n.d.). Retrieved October 17, 2015, from
http://technologysource.org/extra/407/definition/1/

Dewey, J. (n.d.). A quote by John Dewey. Retrieved March 21, 2015, from
http://www.goodreads.com/quotes/833916-if-we-teach-today-s-students-as-we-
taught-yesterday-s-we

Evans, J. (2015). More verbs, fewer nouns. Educational Leadership, 72(8), 10-16.

Explorable.com (2009, April 24). Snowball sampling. Retrieved Jul 13, 2015 from
Explorable.com: https://explorable.com/snowball-sampling

Flipped learning model increases student engagement and performance. (2013).

Retrieved July 12, 2015, from

http://assets.pearsonschool.com/asset_mgr/current/201320/Byron_standalone_ca

sestudy.pdf

Flipped classroom | Sophia. (2014, February 1). Retrieved October 12, 2015, from

https://www.sophia.org/flipped-classroom-survey

Flipped Learning Network. (2012). *Improve student learning and teacher satisfaction*

*with one flip of the classroom.* Retrieved from

http://www.flippedlearning.org/cms/lib07/VA01923112/Centricity/Domain/41/cl

assroomwindowinfographic7-12.pdf

Flipping, podcasting, and friendly competition. (2015, March 1). Retrieved March 21,

2015, from http://assets.techsmith.com/Downloads/mkt-

camtasiaformac/MikeGarver-Case_Study.pdf

Fulton, K. (2012). Upside down and inside out: Flip your classroom to

improve student learning. *Learning and Leading with Technology,*

*39(8),* 12-17.

Gerstein, J. (2011, June 13). The flipped classroom model: A Full Picture.

Retrieved July 11, 2015, from

https://usergeneratededucation.wordpress.com/2011/06/13/the-

flipped-classroom-model-a-full-picture/

Golafshani, N. (2003). Understanding reliability and validity in qualitative

research. The Qualitative Report, 8(4), 597-606. Retrieved from

http://nsuworks.nova.edu/tqr/vol8/iss4/6

Goodwin, B., & Miller, K. (2013). Research says/evidence on flipped classrooms is still

coming in. Educational Leadership, 70(6), 78-80.

Growth in flipped learning. (n.d.). Retrieved September 19, 2015, from

http://flippedlearning.org/cms/lib07/VA01923112/Centricity/Domain/41/New

Flipclass Survey.pdf

Guskey, T. (2010, October 12). Lessons of mastery learning. Retrieved June 28, 2015.

Hamdan, N., McKnight, P., McKnight, K., & Arfstrom, K. (2013, January 1). A Review

of flipped learning. Retrieved March 21, 2015, from

http://www.flippedlearning.org/cms/lib07/VA01923112/Centricity/Domain/41/Li

tReview_FlippedLearning.pdf

Herreid, C., & Schiller, N. (2013). Case studies and the flipped classroom. Journal of

College Science Teaching, 42(5), 62-66.

Herron, K. (2013, June 20). Can special education students benefit from flipped

classrooms? Retrieved June 30, 2015, from

http://remakelearning.org/blog/2013/06/20/can-special-education-students-

benefit-from-flipped-classrooms/

History of the Internet. (1997, April 13). Retrieved July 10, 2015, from

https://www.msichicago.org/scrapbook/scrapbook_exhibits/commex/history.html

#Start

IRIS | Attributes of a traditional classroom and a differentiated classroom. (2015).

Retrieved October 13, 2015, from

http://iris.peabody.vanderbilt.edu/module/di/cresource/q1/p01/di_01_link_tvsdi/

Hoepfl, M. (n.d.). JTE v9n1 - Choosing qualitative research: A primer for technology

    education researchers. Retrieved January 31, 2016, from

    http://scholar.lib.vt.edu/ejournals/JTE/v9n1/hoepfl.html

Jimerson, L. (2005). *Special challenges of the "No Child Left Behind" Act for rural*

    *schools and districts.* The Rural Educator, *26*(3), 2-3.

Johnson, G. (2013). Student perceptions of the flipped classroom. *Thesis*. Retrieved

    March 21, 2015, from https://circle.ubc.ca/handle/2429/44070

Kay, R., Knaack L., & Petrarca D. (2009). Exploring teacher's perceptions of web-based

    learning tools. Interdisciplinary Journal of E-Learning and Learning

    Objects, **5**, 527-550.

King, A. (1993). From sage on the stage to guide on the side. *College Teaching, 41*(1),

    30-35. Retrieved March 21, 2015, from

    http://www.jstor.org/discover/10.2307/27558571?sid=21105719347601&uid=23

    815&uid=62&uid=67&uid=23814&uid=2&uid=3&uid=3739912&uid=3739256

Marlowe, C. (2012, July 1). The effect of the flipped classroom on student achievement

    and stress. Retrieved October 12, 2015, from

    http://scholarworks.montana.edu/xmlui/bitstream/handle/1/1790/MarloweC0812.

    pdf?sequence=1

Maxwell, J. (1996). Goals: Why are you doing this study? In Qualitative research design:

    An interactive approach (pp. 24-28). Thousand Oaks, CA: Sage.

McCrea, B. (2014, June 30). Flipping the classroom for special needs students -- THE

    Journal. Retrieved June 30, 2015, from

    http://thejournal.com/articles/2014/06/30/flipping-the-classroom-for-special-

needs-students.aspx

Merriam, S. (1998). Qualitative research and case study applications in education. San

Francisco, CA: Jossey-Bass.

Merriam, S. (2009). What is Qualitative Research? In Qualitative research: A guide to

design and implementation (p. 14). San Francisco: Jossey-Bass.

Moustakas, C. E. (1994). Phenomenological research methods. Thousand Oaks, CA:

SAGE.

Musallam, R. (2014, December 10). Should you flip your classroom? Retrieved July 4,

2015, from http://www.edutopia.org/blog/flipped-classroom-ramsey-musallam

November, A., & Mull, B. (2012, March 29). Flipped learning: A response to 5 criticisms

-What's flipped learning? Retrieved July 10, 2015, from

http://novemberlearning.com/educational-resources-for-educators/teaching-and-

learning-articles/flipped-learning-a-response-to-five-common-criticisms-article/

Overmyer, G. (2014). *The flipped classroom model for college algebra: Effects on

student achievement.* Retrieved from author by permission.

Overmyer, J. (2012, September 5). Flipped classrooms 101. Retrieved March 21, 2015,

from http://www.naesp.org/principal-septemberoctober-2012-common-

core/innovation-flipped-classrooms-101

Palinkas, L.A., Horwitz, S.M., Green, C.A., Wisdom, J. P., Duan, N., & Hoagwood, K.E.,

(2013). Purposeful sampling for qualitative data collection and analysis in mixed

method implementation research. New York, NY: Springer Science.

Patton, M. (2002). The nature of qualitative inquiry. In Qualitative research and

evaluation methods (3rd ed., p. 4). Thousand Oaks, CA.: SAGE.

Potter, W. (1996). An analysis of thinking and research about qualitative methods. Mahwah: NJ. Lawrence Erlbaum Associates.

Preparing for change in the US education system. (2015). Retrieved August 2, 2015, from http://www.technical-vocational-schools.com/united_states_education_system.aspx

Price, P. (2013). *The effects of the flipped classroom model in a physical science classroom* (Paper No. 25). St. Catherine University:    Masters of Arts in Education Action Research Paper.

*Project Tomorrow/Flipped Learning Network* (2013).  A second year review of flipped learning and 2013 trends in digital learning:  Students' views on innovative classroom models.  Irvine, CA.

*Project Tomorrow/Flipped Learning Network* (2014).  A third year review of flipped learning and 2014 trends in digital learning:  Students' views on innovative classroom models.  Irvine, CA.

Psathas, G. (1973).  *Phenomenological Sociology:  Issues and Applications.* London, England:  John Wiley & Sons.

Research Triangle High School. (2014, May 6). Retrieved June 28, 2015, from http://www.researchtrianglehighschool.org/#!history/cvdf

Rosenberg, A. (2011, September 28). An assembly-line education. Retrieved September 19, 2015.

Scherer, M. (2015). Let them be awesome. Educational Leadership, 72(8), 7-7. doi:  May 10, 2015

Sheehy, K. (2012, August 22). High school students not prepared for college, career.

Retrieved September 19, 2015, from

http://www.usnews.com/education/blogs/high-school-notes/2012/08/22/high-school-students-not-prepared-for-college-career

Smith, D. (2013). "Phenomenology", *The Stanford Encyclopedia of Philosophy* (Winter 2013 Edition). Berlin, Heidelberg: Springer Science + Business Media.

St. George, D., & Chandler, M. A. (2014, March 22). Severe winter has taken a toll on classroom learning, especially for struggling students and college-bound. Retrieved May 15, 2015, from

https://www.washingtonpost.com/local/education/snow-and-severe-winter-take-a-toll-on-classroom-learning/2014/03/22/58557250-ae0b-11e3-96dc-d6ea14c099f9_story.html

Strayer, J. (2008). The effects of the classroom flip on the learning environment: A comparison of learning activity in a traditional classroom and a flip classroom that used an intelligent tutoring system. *Doctoral Dissertation*. Retrieved March 21, 2015, from http://etd.ohiolink.edu/send-pdf.cgi/Strayer Jeremy.pdf?osu1189523914

Strayer, K. (2015, February 26). Some East Tenn. school systems over amount of allotted snow days. Retrieved March 21, 2015.

The definition of the flipped classroom. (2014, January 16). Retrieved October 13, 2015, from http://www.teachthought.com/learning/the-definition-of-the-flipped-classroom/

TN biology standards. (2009, July 10). Retrieved August 2, 2015, from

https://tn.gov/assets/entities/education/attachments/std_sci_3210.pdf

Tomlinson, C. (2015). Mobile tech: Great potential, great challenges. Educational

      Leadership, 72(8), 86-87. doi:  June 12, 2015

Tucker, B. (2011, October 4). The flipped classroom - Education next.   Retrieved July 6,

      2015, from http://educationnext.org/the-flipped-classroom/

Tucker, C. (2015). 5 tips for managing mobile devices. Educational Leadership,  72(8),

      25-29.

Venette, S. (2013, April 4). What is snowball sampling? Retrieved October 17, 2015, f

      from http://www.researchgate.net/post/What_is_snowball_sampling

      Video in the Classroom. (2014, April 1). Retrieved October 13, 2015, from

      http://edtechteacher.org/tools/multimedia/video-classroom/

Walsh, K. (2013, November 3). Awesome free ed tech resources eBook! Retrieved July

      11, 2015, from http://www.emergingedtech.com/2013/11/flipping-the-

      classroom-facilitates-these-5-active-learning-methods-and-much-more

Wiesen, N. (2014, February 11). Flipping the classroom for students with learning

      disabilities. Retrieved June 30, 2015, from

      http://www.scilearn.com/blog/flipping-the-classroom-for-students-with-

      learning-disabilties
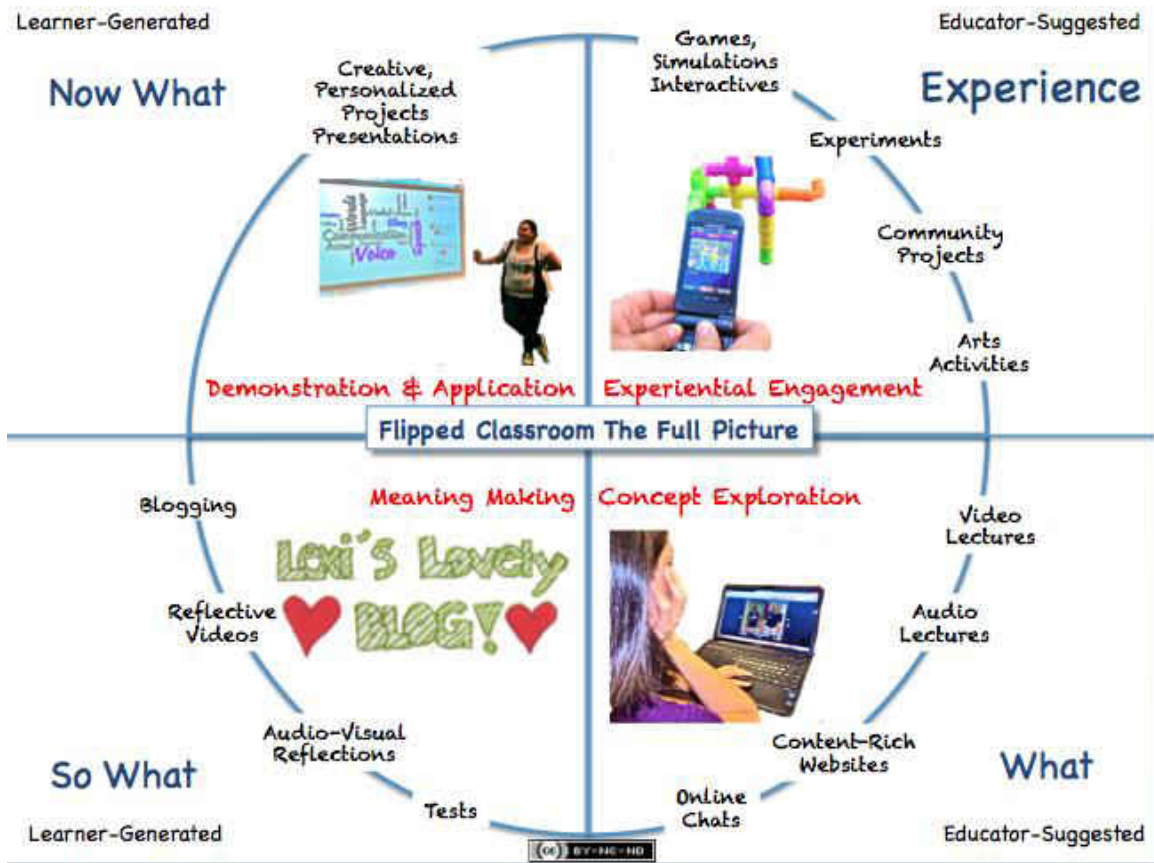
APPENDICES


Appendix A

The Flipped Classroom Model



Fig. 1 "The Flipped Classroom Model: A Full Picture" (Gerstein, 2011)

Appendix B

Traditional Lesson Plan, Evidence of Evolution

## 🏇 Jefferson County High School Lesson Plan Template 🏇

Teacher:  Rebecca Hunley
Grade/Subject: 10, Honors Biology I
 Unit:  Evolution
Lesson Title:  Review Natural Selection (Pepper Moths) and Evidence of Evolution

| STATE STANDARD(S) | **Identify what you want to teach.**  Reference State, Common Core, ACT College Readiness Standards, and/or State Competencies. |
|---|---|

## SPI 3210.5.3.  Recognize the relationships among environmental change, genetic variation, natural selection, and the emergence of a new species.

| LESSON OBJECTIVE | Clear, Specific, and Measurable – NOT ACTIVITIES Student-Friendly:  "The student will…" Explicitly Stated for Students |
|---|---|

A)   The student will relate Natural Selection to the phenomenon of the pepper moth and environmental changes and adaptations over a very short period of time.
B)  The student will graph the relationship of light/dark moths on graph paper in lab notebook.
C)  The student will identify examples of evidence of evolution through various images and glue in lab notebook
D)  The student will compare and contrast differing relationships in
     Convergent/divergent evolution
     Allopatric/sympatric speciation
     Macroevolution/Microevolution
E)  Reflect on the observations of Darwin and note adaptations of animals in the Galapagos

| ASSESSMENT/EVALUATION | Measures Student Mastery In More Than Two Ways Aligned with the Lesson Objective Includes Measurable Formative and Summative Assessments Requires Written Task |
|---|---|

A)  Students will watch short video to review concepts of natural selection.  Verbal prompting and discussion will be used for assessment of this activity/warm-up.
B)  Students will complete lab on Natural Selection that began on previous day (Light/dark moths).  Students will complete Data Analysis 15.3 through discussion and complete graph as homework.  Will be assessed when lab notebooks are graded.

C) To review, students will be given 5 images (difficult to sketch concepts) and predict what evolutionary term correctly identifies each image. Work in groups, discuss, and visual checking for accuracy.
D) Students will complete notes on Darwinian Theory and discuss challenges, new terminology, etc. A short exit ticket will be given to assess learning.
E) As a final exit ticket, students will watch a short video *Beyond Darwin: Charles Darwin* and consider ideas surrounding his theory. Students will answer 5 questions as an exit ticket assessment.

| MATERIALS | Aligned with the Lesson Objective Rigorous & Relevant |
|---|---|

Computer with Internet connection
A) Video: Evolution of the Pepper Moth
   http://www.youtube.com/watch?v=LyRA807djLc
B) Graph paper, glue sticks, and access to Data Analysis information in textbook. (Show numbers to students to graph) Can be completed as homework after assessing that all students grasp concept.
C) Scissors and images of camouflage, mimicry, analogous structures, homologous structures, and vestigial structures.
D) Notes on Darwinian Theory and accompanying power point.
E) Exit tickets (5 questions) and access to video: *Beyond Darwin: Charles Darwin* http://science.discovery.com/video-topics/earth-science/galapagos-beyond-darwin-charles-darwin.htm

| ACTIVATING STRATEGY | Hook Essential Higher Order Question(s) Activates Prior Knowledge Real-World Connections |
|---|---|

A. Show students warm-up image and directions:
B. Watch the video to re-visit the evolution of the pepper moth in Britain.
   Consider the Data Analysis Lab on your desk.
   Complete the thinking critically questions with your group (Answer in lab NB)
   Complete the graph with the numbers of pepper moths over several years as homework (Glue in lab NB)

As students complete warm-up, walk around the room checking work and asking engaging questions. Encourage students to work collaboratively.

Real-world Connections: Quick!!!Think- Can you name 5 modern day organisms that have evolved adaptations to their environment? Share with your group.

| INSTRUCTIONAL PLAN | Step-by-Step Procedures and Times |
| --- | --- |
| | Modeling Strategy – "I Do" |
| | Planned Questioning (Knowledge/Comprehension, Application/Analysis, Creation/Evaluation) |
| | Multiple Thinking and Problem Solving Strategies |
| | Grouping Strategies |
| | Differentiated Instructional Strategies to Provide Intervention & Extension |

10 Minutes:  (A)  Hook and warm-up  (See above procedure)

10 Minutes:  (B) Continue to monitor graph of pepper moths and allow students to ask questions, assign any    unfinished work as homework.

10-15 minutes:  (C) Connect evolution glossary terminology to images.  Check for understanding and guide students to complete any missing glossary images such as types of selection, etc.

35 minutes: (D) Complete notes and discussion on Darwinian Theory

20 minutes:  (E) Hand out exit tickets and let students read over questions.  Give ample time for students to discuss within their group.  View 3-minute video and if time permits, view a 2nd time for understanding.  Give 10 minutes to complete and take up as students leave.

5 minutes: (Homework) Remind students about lab tomorrow and graphing of pepper moths for homework.

Quiz over evolutionary glossary prior to lab tomorrow.

| GUIDED & INDEPENDENT PRACTICE | "We Do"-"You Do" |
| --- | --- |
| | Student Work Encourages Higher Order Thinking & Problem Solving |
| | Relevance to Students' Lives |
| | Differentiated Strategies for Practice to Provide Intervention & Extension |

Guided practice:  Graph work with pepper moth data, discussion.  Teacher monitors progress and student collaborate using a set data of numbers.

Students place images of various structures in lab notebook to create a visual glossary.

Independent practice:  Students complete notes as a class.  Study notes, engage in discussions and labs, and have unit assessment the following week.  Students also complete exit ticket to check for learning about Darwin ideas and concepts

| CLOSURE | Reflection/Wrap-Up |
| --- | --- |
| | Summarizing, Reflecting, Restating, Connecting |
| | Provides for Student Engagement |

Do you think Darwin's ideas would be received differently today instead of the roaring controversies that surrounded him in 1859?  His own wife questioned his thinking and doubted his sanity.  Explain your thinking using the Accountable Talk sheet.

As you turn in your exit ticket, you should have a good starting point to complete your pepper moth graph, a complete evolutionary visual glossary and completed notes.  Think about how Darwin's idea

explained adaptations in animals and over the next few days, see if you can find organisms that exhibit one of the several types of adaptations we have discussed.

Appendix C

FC Lesson Plan, Evidence of Evolution

## 🦋 Jefferson County High School Lesson Plan Template 🦋

Teacher:  Rebecca Hunley
Grade/Subject:  10, Biology
 Unit:  Evolution, FCM
Lesson Title:  Review Natural Selection (Pepper Moths) and Evidence of Evolution

| STATE STANDARD(S) | **Identify what you want to teach.**  Reference State, Common Core, ACT College Readiness Standards, and/or State Competencies. |
|---|---|

## SPI 3210.5.3.  Recognize the relationships among environmental change, genetic variation, natural selection, and the emergence of a new species.

| LESSON OBJECTIVE | Clear, Specific, and Measurable – NOT ACTIVITIES Student-Friendly:  "The student will…" Explicitly Stated for Students |
|---|---|

Using strategies implemented in a FCM, students will have access to technology during typical class time and school hours:

F) The student will relate Natural Selection to the phenomenon of the pepper moth and environmental changes and adaptations over a very short period of time.

G) The student will graph the relationship of light/dark moths using Excel or online simulations

H) The student will identify examples of evidence of evolution through various images and develop a 5 minute presentation using technology

I) The student will compare and contrast differing relationships in
Convergent/divergent evolution
Allopatric/sympatric speciation
Macroevolution/Microevolution

J) Reflect on the observations of Darwin and note adaptations of animals in the Galapagos

| ASSESSMENT/EVALUATION | Measures Student Mastery In More Than Two Ways Aligned with the Lesson Objective Includes Measurable Formative and Summative Assessments Requires Written Task |
|---|---|

Because not all students have reliable access to internet outside of school, videos, created teacher videos, and simulations will be accessed during class time in a computer lab.

F) Students will watch short video to review concepts of natural selection.  Verbal prompting and discussion will be used for assessment of this activity/warm-up.

G) Students will complete lab on Natural Selection that began on previous day (Light/dark moths).  Students will complete Data Analysis 15.3 through

135

discussion and complete graph online and submit results through Dropbox to teacher.  Peer to peer assessment will take place the following day.

H) To review, students will look up 5 images online (difficult to sketch concepts) and create a short power point and predict what evolutionary term correctly identifies each image. Work in groups, discuss, and visual checking for accuracy.

I) Students will complete notes on Darwinian Theory by watching a video (http://www.bozemanscience.com/004-evidence-for-evolution) and complete notes at their own computer.  Students can discuss challenges, new terminology, etc.

J) As a final exit ticket, students will watch a short video *Beyond Darwin:  Charles Darwin* and consider ideas surrounding his theory.  Students will answer 5 questions as an exit ticket assessment.

| MATERIALS | Aligned with the Lesson Objective <br> Rigorous & Relevant |
|---|---|

Computer with Internet connection

F) Video:  Evolution of the Pepper Moth
http://www.youtube.com/watch?v=LyRA807djLc

G) Previous knowledge of students' ability to interpret data and put into Excel program.  For low students provide graph paper, glue sticks, and access to Data Analysis information in textbook. Then if time allows, explain to students how to insert data in to Excel (Show numbers to students to graph)  Can be completed as homework after assessing that all students grasp concept.

H) Notes on Darwinian Theory and accompanying power point.

I)  Exit tickets (5 questions) and access to video: *Beyond Darwin:  Charles Darwin* http://science.discovery.com/video-topics/earth-science/galapagos-beyond-darwin-charles-darwin.htm

| ACTIVATING STRATEGY | Hook <br> Essential Higher Order Question(s) <br> Activates Prior Knowledge <br> Real-World Connections |
|---|---|

C. Show students warm-up image and directions:

D. Watch the video to re-visit the evolution of the pepper moth in Britain.
Consider the Data Analysis Lab on your desk.
Complete the thinking critically questions with your group (Answer in lab notebook)
Complete the graph with the numbers of pepper moths over several years as homework (Complete graph through Excel program)

As students complete warm-up, walk around the room checking work and asking engaging questions.  Encourage students to work collaboratively.

Real-world Connections:  Quick!!!Think- Can you name 5 modern day organisms that have evolved adaptations to their environment?  Share with your group.

| INSTRUCTIONAL PLAN | Step-by-Step Procedures and Times |
| --- | --- |
| | Modeling Strategy – "I Do" |
| | Planned Questioning (Knowledge/Comprehension, Application/Analysis, Creation/Evaluation) |
| | Multiple Thinking and Problem Solving Strategies |
| | Grouping Strategies |
| | Differentiated Instructional Strategies to Provide Intervention & Extension |

10 Minutes:  (A)  Hook and warm-up  (See above procedure)

10 Minutes:  (B) Continue to monitor graph online of pepper moths and allow students to ask questions, assign any    unfinished work as homework.

10-15 minutes:  (C) Connect evolution glossary terminology to images.  Check for understanding and guide students to complete any missing glossary images such as types of selection, etc.

35 minutes: (D) Complete video and notes (online) on Darwinian Theory.  Re-watch if necessary.

20 minutes:  (E) Hand out exit tickets and let students read over questions.  Give ample time for students to discuss within their group.  View 3-minute video and if time permits, view a 2nd time for understanding.  Give 10 minutes to complete and take up as students leave.

5 minutes:  (Homework) Remind students about lab tomorrow and graphing of pepper moths for homework.

Quiz over evolutionary glossary prior to lab tomorrow.

| GUIDED & INDEPENDENT PRACTICE | "We Do"-"You Do" |
| --- | --- |
| | Student Work Encourages Higher Order Thinking & Problem Solving |
| | Relevance to Students' Lives |
| | Differentiated Strategies for Practice to Provide Intervention & Extension |

Guided practice:  Graph work using Excel with pepper moth data, discussion.  Teacher monitors progress and student collaborate using a set data of numbers.

Students develop a media project of images of various structures to create a visual glossary that can be accessed digitally.

Independent practice:  Students complete notes individually and watch video.  Study notes, engage in discussions and labs, and have unit assessment the following week.

Students also complete exit ticket to check for learning about Darwin ideas and concept

Do you think Darwin's ideas would be received differently today instead of the roaring controversies that surrounded him in 1859?  His own wife questioned his thinking and doubted his sanity.  Explain your thinking using the Accountable Talk sheet.

As you turn in your exit ticket, you should have a good starting point to complete your pepper moth graph, a complete evolutionary visual glossary and completed notes.

Think about how Darwin's idea explained adaptations in animals and over the next few days, see if you can find organisms that exhibit one of the several types of adaptations we have discussed.

Appendix D

Sample Coding Sheet for Student Focus Groups

Black color indicates primary researcher notes
<span style="color:green">Green color indicates research assistant notes</span>

Focus Group RTHS
Held after school in small conference room with 6 students present.

| Student ID | Question: Engagement |
|---|---|
| S1M12 | Every presentation is through a computer. |
| S2F12 | Use it to organize myself to the maximum. Reminds me about projects and groups. Helps communicate with others easily. Resolves a lot of issues. Mentioned that communication throughout school is very strong. |
| S3M11 | Use videos to learn and can re-watch. Unclear concepts they can ask questions because most things are on prezi or ppt. |
| S4M12 | FC is 8th grade and didn't like it but eventually learned to like it. Teacher and admin have specific email groups.<br><span style="color:green">Algebra teacher flipped in 8th grade at first did not like it but after getting used to it, liked it. If I was tired videos aren't bad.</span><br><span style="color:green">Teachers and Admin send email groups with information.</span> |
| S5M12 | With some AP classes, some are great @ FC while some "do their best." Each student is given their own school email account. For their projects, they use computer lab, during his K-8 there was only 2 computers at a Montessori school (Middle school) and they had time to do work at school.<br><span style="color:green">If given a project we don't have to go to library or a computer lab. Just use what we have on hand. If a teacher doesn't want to make a video, they can use different videos. "don't just give me a ppt, give me something different." In Montessori school had not done a lot of HW. Varied teacher ability. AP classes tend to be less videos. Not really flipped.</span> |
| S6M12 | I use technology to primarily do research on the computer. AP History would drift from flipping. Biology does a lot of research.<br><span style="color:green">Primary used technology for research. AP history would drift from flipping. Research is my main use.</span> |
| S7F11 | Not in group yet |

Question #2 Engagement

| Student ID | Question #2: Engagement |
|---|---|
| S1M12 | Listen to background music |
| S2F12 | |
| S3M11 | Netflix, Youtube, Music, FB |
| S4M12 | Looks up "how to…." |

| | |
|---|---|
| | Video games, You tube.  Learn something new outside school I just Google it.  "I want to learn how a engine works so I google it and watch a video." |
| S5M12 | Shoot an email to the group, video games |
| S6M12 | I do just school work and listen to music, not enough time for anything else when I run I will listen to music. |
| S7F11 | |

At this point, I was just coming off the day "of hell" with my own phone cut off and realized my complete dependence on technology so I asked this unscripted question,
"So what would you do without technology for 24 hours?"
Before the last syllable was off my lips, there was a collective gasp and the air in the room almost seemed to be sucked inward as the students exchanged glances and they quickly chimed in….

| Student ID | Emergent Question: NO technology |
|---|---|
| S1M12 | Run a lot and play with siblings and take a lot of naps |

Appendix E

Sample coding sheet for Teacher Interviews

Notes were originally hand written and then transcribed digitally for ease of triangulation between teacher interviews.
*Pseudonym

Reflection on RTHS

Date of observation Thursday December 3, 2015

The next class was Nancy's* planning period so we went into another teacher's class and I was able to interview her.
Background: 23 total years in education, 3rd year at RTHS and has worked within private schools and other schools (but not certified)
Engagement
1) In 2007 husband bought laptop and Nancy was very reluctant to use it because she didn't want it. She felt like she didn't need it and wouldn't 'get it.' Now she says, "I can't exist without my computer." When ppt came out, I thought I was hot stuff.
She was not allowed to flip at previous school b/c they wanted the interactivity of teaching. School would not allow her to record videos.
I asked about teachers "hiding" behind a flip because they may not know or understand the content: "I have never thought about hiding behind it. I felt more of a pressure to NOT make mistakes." I do not know of a teacher that hides behind the flip b/c they don't know the content.
As we continued this conversation another "young" teacher chimed in and said of another graduate student in his cohort that teaches and environmental science class, "I am flipping because I don't want to stand in front of a class and teach content I'm not comfortable teaching."
Norma felt she had to create videos with her own face, but she doesn't now.

2) Technology outside of school?
Continue to use technology thru FB to keep in touch with friends. At this school all educators are on FB and tend to "like" one another.

Exploration
1) How/whom influenced your decision to flip?
In 2011 attended a workshop. Struggled with student attendance and this seemed to be a reasonable avenue to pursue. Husband actually said, "have you heard of this flipped thing?"

2) When I started here, everything was new to me- public school was new to me, flipping was new to me, everything was new. I immediately knew I'd like it. I got to know the students and I wasn't tethered to the blackboard. I was able to

understand their misconceptions immediately.  As I quickly learned, it was very enlightening to understand their misconceptions.  "I'm big on relationships and I try to make sure that they know it."  You have time to build those relationships. One example was that I was able to find out a particularly quiet kid wanted to do chemistry in college and I would've never known that standing at the board.

3)  Challenges:
Implementing:  Making the video and figuring out the screen flow and logistics. Should I be at the board instructing or not?  Some of it and learning through that its OK to make mistakes.  The kids are very patient in learning the videos but definitely implementing was toughest.  Moodle is the platform they use and she recommends Google classroom.
Maintaining:  I have grand plans.  This year we added AP.  Every now and again I add more videos.  It is possible to have a flipped classroom in 1 year.  She creates all new videos for AP and post videos for review.
Modifying:  Try Google Classroom, constantly trying to improve videos.  She said, "Honestly, they're not going to learn anymore from the videos that have all the bells and whistles."  Staff gets along well and are very cohesive.

4)  Advantages:
Spending time w/students-"That's when they need you, when they're doing the HW."  Concern:  The kids can't ask questions when watching videos.  Students tend to ask more questions.  Students will re-watch videos.  If students are absent they can still get content.  I asked to describe and ideal classroom: "watch a video, then do an activity or lab."
How do you check to see if they've watched videos?  Check notes or at least look every day.

# Appendix F

## Student Letter of Assent

SCHOOL *of*
GRADUATE STUDIES
EAST TENNESSEE STATE UNIVERSITY

501 Warf-Pickel Hall
Johnson City, TN 37614
P 423-439-4430
F 423-439-7636

Department of Educational Leadership and Policy Analysis

### ASSENT TO PARTICIPATE IN RESEARCH

*Teacher and Student Perceptions of High School Science Flipped Classrooms*

1. My name is Rebecca Hunley. I am from East Tennessee State University.

2. We are asking you take part in a study because we are trying to learn more about how high school students feel about being in a high school science flipped classroom. We want to learn about benefits and challenges of being in a flipped classroom.

3. If you agree to be in this study you will participate in a few ways.
   - I will ask you to complete a short online survey that will be available for approximately three weeks prior to the date I come observe your class. Other students that have been enrolled or currently enrolled in a flipped class are encouraged to complete the survey.
   - I will ask that you will attend your normal science class during the day I will be observing.
   - I may ask you to participate in a small focus group in a private room at your school after school without your teacher present and with other students from your school. A graduate student or university faculty member will be present to assist during the focus group. Three to five students will be randomly selected to participate in the focus group.
   - I will ask questions about being a student learner in a flipped classroom. Your privacy will be protected, as I will use codes such as S1, S2 (Student 1, Student 2) instead of names to organize student responses.
   - I will ask you questions about how you feel about learning in a flipped classroom.
   - I will not use any type of audio or video recording of your classroom or the focus group time. I will use note taking to ensure I understand your statements and may ask you to expand or clarify a response if necessary.

4. I do not believe that you will be hurt or upset by being in this study. If you participate in this study and believe that you have been hurt or upset in any way, you may withdraw from the study. I will not disclose the information you share with me about participating in a flipped classroom or anything you tell me about yourself or any other person. But if you tell me that someone is hurting you, I must report it to the proper authorities.

DATE OF IRB APPROVAL: 11/5/15
IRB NUMBER: c0915.37sw
PROJECT EXPIRATION DATE: 11/4/15

APPROVED
By the ETSU IRB

NOV 09 2015

By
Choir IRB Coordinator

DOCUMENT VERSION EXPIRES

NOV 04 2016

ETSU IRB

ETSU.EDU

1

143

SCHOOL of
GRADUATE STUDIES
EAST TENNESSEE STATE UNIVERSITY

Department of Educational Leadership and Policy Analysis

5. Please talk this over with your parent(s)/guardians before you decide whether or not to participate. Your parent(s)/guardian have been given a letter to review about the study. Your parent(s)/guardians will only return the letter I gave them if they do not want you to participate. If you agree to participate, then please return this form signed to the address below with appropriate postage.

6. If you do not want to be in this study, you do not have to participate. Remember, being in this study is up to you and no one will be upset if you do not want to participate or even if you change your mind later and want to stop. If you choose not to participate in the study you will be expected to attend class and participate in the activities and homework required of your teacher. Your decision to withdraw from the study will not affect the grade you receive.

7. You can ask any questions that you have about the study. If you have a question later that you did not think of now, you can contact me by email at zrcp14@goldmail.etsu.edu or call 865-397-3182 ext. 1221 between 2:00-3:30 p.m. EST.

8. Signing your name at the bottom means that you agree to be in this study. You will be given a copy of this form after you have signed this letter. You will not return this form to your teacher. You will return this letter in the self-addressed stamped envelope I have provided for your teacher.

_____

Signature of Participant

_____

Printed Name of Participant                Date

Return completed letters to:

Rebecca Hunley
115 W. Dumplin Valley Rd
Dandridge, TN 37725

**APPROVED**
By the ETSU IRB

NOV 09 2015

By _____
Chair IRB Coordinator

DOCUMENT VERSION EXPIRES

NOV 04 2016

ETSU IRB

DATE OF IRB APPROVAL: 11/5/15
IRB NUMBER: c0915.37sw
PROJECT EXPIRATION DATE: 11/4/15

2

ETSU.EDU

# Appendix G

## Passive Parental Consent

SCHOOL *of*
GRADUATE STUDIES
EAST TENNESSEE STATE UNIVERSITY

501 Warf-Pickel Hall
Johnson City, TN 37614
P 423-439-4430
F 423-439-7636

Department of Educational Leadership and Policy Analysis

November 6, 2015

Dear Parent or Guardian:

I am a graduate student at East Tennessee State University. I am conducting a study on Teacher and Student Perceptions of High School Science Flipped Classrooms. A flipped classroom is an approach in which basic instruction is introduced through videos or podcasts and viewed at home while class time is structured for collaborative work, activities, lab work, and guidance from the instructor.

I am interested in learning more about the advantages and disadvantages from teacher and student perspectives of implementing and learning in a flipped classroom. Prior to the date of observation, students in the school that are currently in a flipped classroom or have previously been enrolled in a flipped class will have the opportunity to complete an online survey about their perceptions of a flipped classroom. The online survey can be taken during school or at home and should only take 5-10 minutes to complete. I will be observing your child's science class during regular class time for one day only. Student focus groups comprised of three to five student participants will be held at the end of the same school day and will take approximately 60-90 minutes. A graduate student or university faculty member will also be present to assist in facilitating the focus group. I am requesting permission for your child to participate. There are no foreseeable risks in participating in this study. Benefits of participating in this study are students can discuss with me their perceptions of a flipped science classroom in an environment where his/her teacher is not present and they can speak openly about benefits and challenges of being a student in a flipped classroom.

The study consists of your child attending his/her normal science class during the day and participating in typical activities associated with the instructional time. At the end of the school day, I will be holding a focus group for students that are in a flipped science class to discuss their perceptions of learning in a flipped classroom. I will be observing, interviewing, and discussing with teachers and students from three different schools in different states. The project will be explained in terms that your child can understand and your child will participate only if he or she is willing to do so. Only I will have access to information from your child. At the conclusion of the study, student's responses will be reported as group results only. At the conclusion of the study, a summary of group responses will be made available to all interested parents. Please contact me through email at zrcp14@goldmail.etsu.edu to obtain a copy of the results.

Participation in this study is voluntary. Your decision whether or not to allow your child to participate will not affect the services normally provided to your child by your school.

**APPROVED**
By the ETSU IRB

DOCUMENT VERSION EXPIRES

1

DATE OF IRB APPROVAL:
IRB NUMBER:
PROJECT EXPIRATION DATE:

NOV 1 2 2015

NOV 0 4 2016

Chair IRB Coordinator

ETSU IRB

ETSU.EDU

SCHOOL of
GRADUATE STUDIES
EAST TENNESSEE STATE UNIVERSITY

501 Warf-Pickel Hall
Johnson City, TN 37614
P 423-439-4430
F 423-439-7636

Department of Educational Leadership and Policy Analysis

Your child's participation in this study will not lead to the loss of any benefits to which he or she is otherwise entitled. Even if you give your permission for your child to participate, your child is free to refuse to participate. If your child agrees to participate, he or she is free to end participation at any time. You and your child are not waiving any legal claims, rights, or remedies because of your child's participation in this research study.

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission as required by law. Confidentiality will be maintained by means of an anonymous numerical coding for student identification for my records only to aggregate and code responses. Data will be kept on a secure encrypted server in which I will be the only person able to gain access to the data. Although your right and privacy will be maintained, the ETSU IRB will have access to the study records. After publication of the report the data will be kept for 10 years and then will be destroyed.

Normal activities and class instruction will be observed by myself employing eye to eye contact only and rigorous written notes will be taken to ensure accuracy in recalling procedures, statements, and normal interactions within the classroom. No audio or video recording will occur. I will be the only person to have access to these recordings and these will be used for educational purposes only. Ten years after publication of the report, all videos and recordings will be destroyed.

Students will be expected to complete any assignments, labs, or activities during the day of observation and choosing to not participate in the study will not affect the grade received.

Should you have any questions or desire further information, please call at 865-397-3182 ext. 1221 (Jefferson County High School, Dandridge, TN) or email at zrcp14@goldmail.etsu.edu. By signing this letter, you do not wish your child to participate in the study. If you wish for your child to participate, you do not need to return the letter. Keep a copy of this letter after signing and mail the following page of the document to the address shown on the final page.

You may call the Chairman of the Institutional Review Board at 423-439-6054 for any questions you may have about your rights as a research participant. If you have any questions or concerns about the research and want to talk to someone independent of the research team or you cannot reach the study staff, you may call an IRB Coordinator at 423-439-6055 or 423-439-6002.

DATE OF IRB APPROVAL:
IRB NUMBER:
PROJECT EXPIRATION DATE:

APPROVED
By the ETSU IRB

NOV 1 2 2015

By
Chair IRB Coordinator

DOCUMENT VERSION EXPIRES

NOV 0 4 2016

ETSU IRB

2

ETSU.EDU

SCHOOL *of*
GRADUATE STUDIES
EAST TENNESSEE STATE UNIVERSITY

501 Warf-Pickel Hall
Johnson City, TN 37614
P 423-439-4430
F 423-439-7636

Department of Educational Leadership and Policy Analysis
Sincerely,

Rebecca C. Hunley
East Tennessee State University
Educational Leadership and Policy Analysis
Doctoral Student

If you DO NOT want your child to participate, then please send this form back signed by November 30, 2015 to the following address:

Rebecca C. Hunley
Jefferson Co. High School
115 W. Dumplin Valley Rd.
Dandridge, TN  37725

Please return in the stamped self-addressed envelope provided to the student.  Sign both copies and keep one for your records.

_____I do not grant permission for my child to participate in Rebecca Hunley's focus group on Teacher and Student Perceptions of High School Science Flipped Classrooms.

_____          _____
Signature of Parent/Guardian                              Printed Name of Parent/Guardian

_____          _____
Printed Name of Child                                         Date

DATE OF IRB APPROVAL:
IRB NUMBER:
PROJECT EXPIRATION DATE:

APPROVED DOCUMENT VERSION EXPIRES
By the ETSU IRB

NOV 1 2 2015          NOV 0 4 2016

By

Chair IRB Coordinator          ETSU IRB          ETSU.EDU

3

Appendix H

Online Survey for Students

Procedure:

Each school will have access to the survey for a minimum of three weeks prior to the scheduled date of observation. Even though the questions are the same format, same sequence, each school will have a different URL to help correlate similar data from the school.

Defining a Flipped Classroom: A flipped classroom is a teaching and learning model in which the typical lecture and homework elements of a course are reversed. Students at home view short video lectures before the class session, while in class time is devoted to exercises, projects, discussions, or labs (Educause, 2012).

1. What year are you currently enrolled in high school?
2. How many flipped classes have you received credit?

Drop down menu:

3. Select the subjects of flipped classes you have received credit:
   English, Science, Math, Other

Respond to the following statements regarding flipped classrooms:
On a scale of 1 (Strongly Disagree) to 5 (Strongly Agree)

|  | Strongly Disagree | Disagree | Undecided | Agree | Strongly Agree |
|---|---|---|---|---|---|
| 4. I prefer flipped classroom instruction and learning to traditional instruction and learning. | 1 | 2 | 3 | 4 | 5 |
| 5. I feel I have improved overall as a student as a result after being in a flipped class. | 1 | 2 | 3 | 4 | 5 |
| 6. I would prefer if all my classes were flipped. | 1 | 2 | 3 | 4 | 5 |
| 7. I feel my instructor(s) understands the subject he/she teaches. | 1 | 2 | 3 | 4 | 5 |
| 8. I feel my instructor(s) enjoys teaching a flipped class. | 1 | 2 | 3 | 4 | 5 |

9.  I feel better prepared       1            2            3            4            5
for college or career after
being in a flipped class


10.  Please indicate what state your school is located.
Drop down menu:
Georgia, North Carolina, Tennessee

Appendix I

Teacher Interview Questions

Hunley:     Interview Script for Teachers

Audience:  High School science teachers currently teaching a flipped classroom
In developing the interview three types of questions will be addressed (Eliot &
Associates, 2005):
1.  Engagement questions: Remind participant of the purpose of the study and ask
    general "hook" questions to help participant feel comfortable with interview.
2.  Exploration questions:  get to the core of the discussion.  Ask probing questions
    and ask to elaborate.
3.  Exit question:  check to see if anything was missed or needs to be addressed

Even though communication with each teacher has occurred over several months, thank
the teacher again for his/her willingness to participate in the study. Their participation
will provide valuable insight into benefits and challenges for other teachers if they are
considering a flipped model. Remind the teachers that I will be tape recording the
interview.  I want to capture everything you have to say.  I will not identify anyone by
name in my report.  You will remain anonymous.  Identification will be by the state in
which you teach only.

Engagement questions:
1.  When did you first use technology (any type) as a learning tool or resource at
    school?  Ask to elaborate how you learned to use the tool.
2.  How do you currently use technology outside of school?

Exploration questions:
1.  What individual, group, or fellow educator influenced your decision to teach a
    flipped science classroom?  (Was there a workshop, class, research that led to this
    decision?)
2.  How would you describe your first few days teaching a flipped classroom?
3.  What were some biggest challenges you faced in implementing a flipped science
    classroom?
4.  What were some of the advantages you realized after you flipped your science
    classroom?
5.  How would you compare your teaching in a flipped classroom with a traditional
    classroom?
6.  How do you feel a flipped classroom supports your students' current learning of
    science and preparation for future classes?

Exit questions:
1. Is there anything else you would like to say about learning in a flipped science classroom?

How to Conduct a Focus Group. (2005).  Retrieved September 12, 2015 from https://assessment.trinity.duke.edu/documents?How_to_Conduct_a_Focus_Group.pdf

Appendix J

Student Focus Group Questions

Hunley:     Focus Group Script

Audience:  High School science students currently enrolled in a flipped classroom

In developing the focus group three types of focus group questions will be addressed
(Eliot & Associates, 2005):
4. <u>Engagement questions:</u>  introduce participants to the topic and make them
   comfortable with the topic of discussion.
5. <u>Exploration questions:</u>  get to the core of the discussion
6. <u>Exit question:</u>  check to see if anything was missed or needs to be addressed
7.
FOCUS GROUP INTRODUCTION

<u>WELCOME</u>
        Thank you for agreeing to be part of the focus group.  I appreciate your
willingness to participate in this study to learn about student perceptions of high school
science flipped classrooms.

<u>INTRODUCTIONS</u>
        Moderator (PI): Students will have seen me in the classroom earlier in the day.

<u>PURPOSE OF FOCUS GROUPS</u>
        You have been asked by myself to participate in this focus group.  Remind
students of the signed assent forms that were signed and returned earlier.  Again, remind
them it is voluntary to participate and they can withdraw at any time.  As we discuss a
flipped classroom, I need your input and want you to share your honest and open
thoughts with me.

<u>GUIDELINES</u>
1. I want YOU to do the talking.  I would like everyone to participate.  I may call on
   you if I haven't heard from you in a while.
2. There are NO right or wrong answers.  Every person's experiences and opinions
   are important.  Speak up whether you agree or disagree.  I want to hear a wide
   range of opinions.
3. What is said in this room stays here.  When reporting your responses, I will be
   using coding instead of names to aggregate data.
4. I will be tape recording the group.  I want to capture everything you have to say.  I
   won't identify anyone by name in my report.  You will remain anonymous.

Engagement questions:
3. What is your favorite way to use technology at school?
4. How do you use technology outside of school?

Exploration questions:
7. Who/whom in particular has influenced how you interact with technology as a learning tool for school?
8. How would you describe your first day in a flipped classroom?
9. What are some of the advantages and disadvantages of learning science in a flipped classroom?
10. How would you compare your learning in a flipped classroom with a traditional classroom?
11. How do you feel a flipped classroom supports your current learning of a subject and preparation for future classes?

Exit questions:
2. Is there anything else you would like to say about learning in a flipped science classroom?

How to Conduct a Focus Group. (2005).  Retrieved September 12, 2015 from https://assessment.trinity.duke.edu/documents?How_to_Conduct_a_Focus_Group.pdf

VITA

REBECCA C. HUNLEY

Education:              Ed.D.  Educational Leadership
                              East Tennessee State University, 2016
                              Johnson City, Tennessee
                       M.A.E.D.  Curriculum and Instruction
                              Tusculum College, 2012
                              Morristown, Tennessee
                       B.S.  Biology
                              Carson-Newman University, 1998
                              Jefferson City, Tennessee

Professional Experience:  Jefferson County High School, 2005-present
                              Dandridge, Tennessee
                                     Biology Teacher, 2005-present
                                     Data Team, 2010-present
                                     STEM representative, 2011-2013
                                     Mentor, 2006-2010
                       Dandridge Elementary, 2003-2005
                              Dandridge, Tennessee
                                     Computer Lab Coordinator, 2003-2005
                                     Teaching Assistant, 2002-2003
                       Oak Ridge National Laboratory, 2007-2010
                              Oak Ridge, Tennessee
                                     ACTS (Academies Creating Teacher
                                     Scientists)

Publications:          Hunley, R. (2009).  *Imperfect Marriage, Imperfect People,*
                       *Perfect Redeemer:  A Journey of Purpose through the*
                       *Potholes of Life.*  Memphis, Tennessee:  Innovo
                       Publishers.

Honors and Awards:     Graduated Summa Cum Laude, Tusculum College
                       James Quillan Graduate Student Scholarship Recipient
                       ELPA Department Scholarship Recipient
                       Graduate Studies Dissertation Scholarship Recipient
                       STEM (Science, Technology, Engineering, and Math)
                              Representative for Jefferson County 3 years