UNDERSTANDING MALE UNDERACHIEVEMENT
IN MIDDLE SCHOOL SCIENCE:
CHALLENGING THE ASSUMPTIONS

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ABSTRACT

The overall purpose of this collaborative action research study was to explore the experiences of eight middle school science teachers. This collaborative action research study concerned itself with male student underachievement in science at the middle school level. The study was conducted at Sherwood Forest Middle School (a pseudonym) with sixth through eighth grade science teachers with more than three years of experience, various teaching backgrounds within academic subjects as well as special education, and different grade levels. The interviews probed the teachers’ personal experiences and insights regarding male underachievement in science. This collaborative action research study relied on qualitative data from interviews and other pieces of evidence that might support the teachers’ observations, specifically standardized test data and class grades. In addition, four of the seven teachers participated in a focus group, developing strategies for more effective teaching in science for all students. Understanding the experiences of science educators for sixth through eighth grade students can assist local, state, and federal policymakers in educational decision-making processes for the future.
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CHAPTER I: INTRODUCTION

In the last several years, science education and the need for a scientifically literate society (Willcuts, 2009) have received renewed attention in the United States. Our country is part of a global community in which other nations increasingly compete for international standing and a share of the global market (Willcuts, 2009). This contest is not just for products but also for intellectual property – the ideas that can come from a well-educated population of scientists and engineers. Regardless of the country, in which they attend school, many males, are struggling with underachievement in similar ways and their teachers and parents all share similar concerns and offer similar insights about the problem (Alloway et al., 2002; Martin, 2002; Younger & Warrington, 2005). However, in recent years, it has been difficult for the United States to keep up with the demand for both well-trained scientists and engineers as well as the teachers who are needed to prepare them (National Research Council, 2007).

With many reforms within science education, the focus has brought to the attention of a possible decline of male student underachievement in science. Historically males have outperformed females in science per data retrieved from the Camelot (a pseudonym) State Department of Education (2010, 2015). However, in recent years within Sherwood Forest Middle School (a pseudonym), males’ standardized test scores and grades have declined at Sherwood Forest Middle School.

Over the past several years, there has been a steady increase of claims regarding a male crisis in school achievement. Student achievement in all levels of education especially that of
the males has been a focus in education and other venues since the early 2000s. In the past few years, there have been numerous television programs, magazine covers, and books that paint a picture of a gender reversal in American education (Conlin, 2003; Camelot State Department of Education, 2010; Kimmel, 2006; Landstedt & Gadin, 2012).

Studies conducted in Australia, United States, and the United Kingdom demonstrate that the concept of a boy problem in relation to academic achievement, which includes science, is apparent (Connell, 1993, 1995, 2002, 2003; Foster, Kimmel, & Skelton, 2001). The boy problem was first mentioned in other countries as a concern and thus, more studies regarding male students’ underachievement coming out of Australia and England from the past have transformed our ability to understand and respond effectively to the issue (Conlin, 2003; Connell, 1993, 1995, 2002, 2003; Deschenes, Cuban, & Tyack, 2001).

According to scholars, the problem of male student underachievement is often pushed under the rug. Nevertheless, there are those who maintain it is an issue, while there are those who maintain there is not an issue (Cleveland, 2011). Over the last several years, there has been a steady increase of claims regarding a boys’ crisis in school achievement by public media (Foster, Kimmel, & Skelton, 2001; Gurian, 2001; Hansot & Tyack, 1998), although the research studies and literature that I reviewed were not conclusive. This collaborative action research project was designed to find out what teachers’ experience regarding boys’ academic achievement as well as shed some light on this area of research.

**Statement of the Problem**

The problem I studied is male student underachievement in science at Sherwood Forest Middle School. As the school counselor, I am also the assistant testing coordinator and I have noticed the science scores have dropped over the past few years. The trend of dropping science
scores has also been noticed at the local school and at the district level. Finally, the sixth through eighth grade science teachers have noticed male student underachievement in science. This issue was brought to the Sherwood Forest school staff’s attention when reviewing student growth in each individual academic subject.

**Positionality Statement**

My role as a counselor, has led to numerous events that I have been witness to, such as teacher concerns/complaints about boys. According to Herr and Anderson (2005), the counselor role puts me into the action research category of insider to an organization. For example, as I often hear from my colleagues, “Are you going to come get this one or should I bring him to you?” This has prompted and attracted my attention to male student science underachievement as an area of study. In addition, the subject of science is near and dear to me, since I was a science teacher for many years and noticed in my own classes the males tended to do better with hands-on projects, while the girls succeeded with the paper and pencil projects. This affects me as a counselor, because I want to be an advocate for my students as well as provide them strategies to overcome issues. This has resulted in my interest in conducting this collaborative action research study.

As a beginning educator, the test grades I noticed reflected the fact that the girls obtained the higher grades than the boys did. I often wondered why this was the case and spoke to my colleagues regarding this thought. Others noticed some of the same cases but as young educators, we attributed the differences to how students learn and their work ethic. Now as a seasoned educator and school counselor, I often wonder if there was something else that I should have provided my students, so that all students would achieve to the best of their ability.
I have noticed when working with teachers, parents, and students the most common subject that our conversations center around is science and why males do not seem to perform as well as they should. In addition, the professional development of science teachers is not as hands-on, but more of a course and workshop type atmosphere. As part of my conversations with teachers, we have discussed strategies to research and possibly implement as part of our focus group. Below is the synopsis of a student named David (pseudonym) and our journey through middle school science as well as his up and downs.

As I begin another day of work, I notice I have received another referral for David. This young man is in the eighth grade and has been a regular in my office since the sixth grade. This student is not a self-referral but a teacher, parent, or administrator referral. Typically, boys do not want to go see their school counselor for any reason.

The numerous times I have spoken to this student were not always his choice. Those who referred him expressed concerns, which included laziness, lack of motivation, and acting like the class clown especially in his science classes. The parents expressed that they had done everything they knew to do to no avail. Within my mind, the students are all individuals who learn differently. Over the past two years, I have inquired of each of the academic teachers their strategies they are using in classes with David and I have focused on science, since science seems to be the major area of concern for this student.

As I look over the latest referral, I shake my head and sigh as I contemplate what I am going to hear. David has had many academic issues since kindergarten. He has relayed to me that he feels the teachers ignore his requests for help with the assignments, feels his teachers have given up on him, and he just does not fit in. David has expressed these factors especially about his science classes. I have found David to be an intelligent young man. David can carry on
a conversation, as well as explain in his own words what he thinks along with strategies that he can employ to help his situation. David is more interested in “doing” rather than writing down what he is supposed to do. He can explain to me what is expected of him in the science classroom, but he continually speaks of boredom. I have worked with his teachers and parents on many occasions and I have asked myself, “What is the problem?” I have noticed David is not alone. Many boys within the school have the same difficulties as well as complaints in science. These young men are intelligent, but for some reason it seems our education system is not meeting their needs or they are refusing to meet the demands of the educational system.

Parents contact me on a regular basis regarding their children, grades, academic and social concerns, and any other matter of importance. Most contacts are about their children’s academic performance in science class. Because each child is different and each child learns differently, there is no one specific way to solve all concerns. For example, there are students who make attempts, yet struggle to achieve. But no matter how hard they try, their efforts seem fruitless. Students are like a puzzle; one must figure out what works best for each student.

The recurring problems associated with boys drew my attention to research that claims the existence of a “boy crisis” in education (Conlin, 2003; Camelot State Department of Education, 2010; Kimmel, 2006; Landstedt & Gadin, 2012). Even the news media outlets such as MSNBC and Newsweek suggested an alarming decline in boys’ scholastic abilities at every grade level (2006). Since the media grasped this topic in the 2000s, the topic has died down and not as much emphasis has been given to it in recent years. More generally, however, magazines, television programs, and books still do not convey a positive picture for males and suggest a gender reversal in American education (Cleveland, 2011).
As a school counselor, I receive parent requests to arrange parent/teacher conferences and most of the time, these meetings are requested with a science teacher in sixth grade through eighth grade. Parents express their frustrations with their male child’s lack of understanding, note taking, participation in class, non-completion of assignments, as well as low standardized test scores. Parents are aware that grades, standardized test scores, and teacher recommendation are the measures used to populate classes within the advanced sciences.

Parents have expressed they want the best for their male student; however, they are at a crossroads with science. They often ask, “What can I do differently?” “What about tutoring?” “And why can’t my kid get it?” This is a frequent conversation that I have with parents of male students in sixth grade through eighth grade.

On the other side, the conversations I have with their science teachers are often the same. Teachers are frequently visiting me for access to their male students’ academic record and standardized test scores. They are looking for any possible avenues to help their male students to be successful in the science classroom. As part of our interviews and focus group, teachers and I have discussed research based strategies to implement with students and better ways of planning these implementation strategies.

**Purpose of the Study**

The overall purpose of this collaborative action research study was to better understand the factors that are playing a role in the decline of male student science scores at Sherwood Forest Middle School. The factors explored and understood through teacher interviews are their experiences of dropping science test scores at Sherwood Forest Middle School, their class grades, and standardized test data. The data collected through the collaborative action research
study may be used to inform further research on this topic such as teacher(s) strategies and in terms of practice, better address students’ needs.

**Research Questions**

The over-arching research question explored was what are teachers’ experiences with male student underachievement in sixth through eighth grade science? Two questions arise because of the over-arching one: 1) how do sixth through eighth grade science teachers understand male underachievement in science; and 2) how do sixth through eighth grade science teachers respond to male underachievement in science at Sherwood Forest Middle School?

**An Overview of Relevant Literature**

For educators and parents, even the news regarding the reauthorization of federal legislation of No Child Left Behind (NCLB) and Title IX (1972) has led to more scrutiny of the educational system and the differences in gender (Conlin, 2003; Camelot State Department of Education, 2010; Kimmel, 2006; Landstedt & Gadin, 2012). One may ask why this is important. It is important because we must be able to define the problem of male underachievement in science before we can investigate male underachievement in science.

**Definition of Male Underachievement in Science**

Shaw (1964) and Shaw and McCuen (1960) provide the basis for defining underachievement. According to more recent scholars who have quoted Shaw, underachievement is defined as when a child's performance is below what is expected based on the child's ability (Peterson & Colangelo, 1996; Silverman, 1993). For the past several years at Sherwood Forest Middle School, there has been a decrease in the standardized science test scores for all students (Camelot State Department of Education, 2015).
Historically, females tend to adjust better to the formal schooling than males. According to Cleveland (2008) and the United States Department of Education (2001), females often earn better grades, are often the teacher’s “pet,” and outperform their male peers. In the early grades, females seem to have fewer problems than their male counterparts do, and the first years of academic learning are crucial for further success. When children enter school, whether it is preschool or kindergarten, there is an emphasis on academics for young children (Camelot Department of Education, 2010, 2015). The goal in educating a child is for them to be able to compete in a global economy; so therefore, academics are emphasized at even earlier ages (Cleveland, 2011).

Compared to females, from the moment they step in to the classroom, males begin to struggle (Cleveland, 2008; Conlin, 2003; Kimmel, 2006). They are expelled from preschool nearly five times more often than females are, and males are diagnosed with learning disorders four times as often as females before they reach the sixth grade (Cleveland, 2011; Kimmel, 2006). According to scholars, males are prescribed medication for attention related disorders at twice the rate of their female counterparts (Cleveland, 2008; Kimmel, 2006). By the time they reach eighth grade, large numbers of boys are reading below basic level, and by high school, they are outnumbered in Advanced Placement classes (Cleveland, 2008; United States Department of Education, 2001). Males now account for less than 43 percent of those enrolled in college and the gap widens every semester (Tyre, 2009).

More specifically, since 1992, females have been taking more science and mathematics courses than their male counter parts. Females have consistently outperformed males in reading and writing, while historically males have outperformed females in mathematics and science.
Per the United States Department of Education (2010, 2015), this trend is changing due to females closing the gap in science.

**Importance of Science**

In the last several decades, science education and the need for a scientifically literate society have received renewed attention in the United States. Our country is now part of a global community in which other nations increasingly compete for international standing and a share of the global market (Willcuts, 2009). This contest is not just for products but also for intellectual property – the ideas that can come from a well-educated population of scientists and engineers. However, in recent years, it has been difficult for the United States to keep up with the demand for both well-trained scientists and engineers as well as the teachers who are needed to prepare them (National Research Council, 2007).

The concern with science lies in the fact that science is a part of everyday life. Science is often a part of many professions such as chemistry or meteorology. Science is also a basis for understanding how many things in our world work and function. Tweed (2009) argued that the teaching and learning of science requires continuous learning to be effective as well as high-quality professional development for science educators (Darling-Hammond, 1997; Loucks-Horsley et al., 2003; National Staff Development Council, 2001; U.S. Department of Education, 2002). Banilower and Tweed (2009) stated that the goal for science teachers is to maintain a balance so that it is not about working harder to keep up with the new research based findings, but about working together to implement the best practices in the classroom (Shulman, 1987; Thompson & Zeuli, 1999).
There are different ways of addressing the problem of boys’ underachievement. For example, in science, a large proportion of teachers in each grade range believe that inadequacies in students’ science background can be overcome by effective teaching (Banilower, Smith, Weis, Malzahn, Campbell, & Weis, 2013). Effective teaching, as noted by scholars, leads to student achievement and academic growth (Darling-Hammond, 1997; Loucks-Horsley et al., 2003; National Staff Development Council, 2001; U.S. Department of Education, 2002; Tweed, 2009; Banilower, Smith, Weis, Malzahn, Campbell, & Weis, 2013). An effective teacher can demonstrate from one school year to the next the growth of knowledge in his/her students. This is evident with an attention to the content of science and the pedagogical content knowledge of the science classroom (Shulman, 1987).

Examinations of student transcripts, teachers’ opinions, and test scores have indicated that the males tend to generate the lower grades, present less intrinsic motivation, and do not like school (Banilower, Smith, Weiss, Malzahn, Campbell, & Weis, 2013). Gallagher (2014) argued that teachers need to involve their students in all aspects of the learning process. A student within a teacher’s classroom is comparably their apprentice (Gallagher, 2014). Students glean knowledge from their teacher to broaden their knowledge base (Tweed, 2009; Banilower, Smith, Weis, Malzahn, Campbell, & Weis, 2013). Students learn from their teachers and apply that knowledge to what they have learned. They can apply the knowledge to answering a question in a paragraph form or verbally explaining what they have learned in their own words. This is important to teachers because as part of their responsibilities, the students should demonstrate academic growth from one academic year to the next as well as involve teachers both as learners and as teachers (Darling-Hammond, 1997; Loucks-Horsley et al., 2003). Teacher experiences are
important to this study, because they have added a personal observation made in the classroom where student achievement and underachievement occurs.

**Significance of the Study**

Educators are constantly reviewing their practices, procedures, and methods of delivering instruction and the success and/or failure of student achievement (Shulman, 1987; Darling-Hammond, 1997; Loucks-Horsley et al., 2003; Conlin, 2003; Camelot State Department of Education, 2010; Kimmel, 2006; Landstedt & Gadin, 2012). The growth of a student academically year to year is essential to a student’s overall academic success. This study contributes to the field of education by providing understandings of the experiences of educators for sixth through eighth grade male students in science and can assist local, state, and federal policy-makers in educational decision-making processes for the future.

**Methodology**

The process of research involved emerging questions and procedures, data collected in the research study setting, data analysis generating themes, and the researcher making interpretations of what the data means. This chapter examines those topics.

**Theoretical Framework**

**Qualitative Research**

Qualitative research refers to research about the lives, lived experiences, behaviors, and emotions of individuals (Strauss & Corbin, 1994). Within qualitative research, the researcher is the primary data collection instrument, and data are collected in the participants’ natural setting (Creswell, 2007, 2009). Data may be gathered in multiple forms, including observations of participant behavior, interviews, documents, or audio-visual materials, and the data are analyzed inductively by the researchers (Creswell, 2007, 2009). Qualitative research, for the purpose of
this study, was to observe and record participant’s reactions and responses as well as probe for further information. Qualitative research was important to this study because it provided the basis for the development of the interviews, focus group, and strategies employed to address the middle school teachers concerns.

This action research study can also be considered as a collaborative action research study that achieves equitable power relations between insiders and outsiders to the organization (Herr & Anderson, 2005). This study uses a specific qualitative method, collaborative action research, to investigate teachers’ experiences regarding or in response to male student underachievement in science at Sherwood Forrest Middle School. The study is a qualitative design study using open-ended interviews and data from standardized test assessments along with students’ grades. The data from the interviews cover teachers’ experiences and responses to male student underachievement in science and explore practices that bring improved achievement.

**Collaborative Action Research**

Collaborative action research is practiced in organizational contexts and in education, where professionals collaboratively question their practice, make changes, and assess the effects of those changes (Kemmis & McTaggart, 2005; McNiff & Whitehead, 2003; Sagor, 2005). Action research is a qualitative research method that encourages the researcher to be reflective of his or her own practice with the aim of improving a system (McNiff, 1994). A collaborative action research project in this case is one that involves the school with educators who want to address the concern or issues. Reason and Bradbury (2006) stated that action research has three important purposes: (a) to “bring an action dimension” into the tradition of research; (b) to expand the realm in which research is conducted; and (c) to “add impetus to the movement away
from a modernist worldview based on a positivist philosophy” toward a more participatory worldview.

My goal as the school counselor was to conduct this study as a collaborative action research project to learn how science teachers have dealt with male student underachievement in science to inform my own practice in supporting teachers and aiding students. Working collaboratively with teachers to determine strategies to implement to address the concerns of declining male student science scores. At the end of the study, I engaged in critical self-reflection on the process of researching and completing the study.

Setting

This research took place in a middle school located in northwestern Camelot. I used the pseudonym of Sherwood Forest Middle School. The middle school serves grades sixth through eighth grade and is a Title I school with approximately 50% of the school population on free or reduced lunch. The student population consists of 70% white, 20% black, approximately 5% each Asian and/or Hispanic.

For the 2016-2017 school year, there were approximately 70 faculty and staff members employed. There were approximately 60 women or 86% of all teachers and staff members and there were approximately 10 males or 14% of the total school population. Since the school has been open, these data have remained consistent. The racial demographics have remained consistent within the faculty of the school. There is very little racial diversity.

All teachers must be certified in the area they teach. Certified personnel are individuals who are qualified to teach a subject or specialized subject kindergarten through twelfth grade. An individual completes certification through the Camelot Professional Standards Commission, which grants professional recognition to an individual who has met certain predetermined
qualifications specified by the agency. Professional standards also refer to standards set by other recognized national organizations/accrediting agencies that evaluate professional education programs (e.g., National Association of Schools of Music).

Teaching certificates are issued in fields that prepare an individual to teach the subject matter offered as a part of the school curriculum for either pre-kindergarten through twelfth grade, P for Early Childhood Education, four through eight for Middle Grades, and sixth through twelfth grade for all secondary fields (Camelot Professional Standards Commission, GAPSC, 2014). For an individual to work in the state of Camelot, he or she must apply for and qualify for a certificate and/or license to be able to be employed in any teaching, service, or leadership certificate, license, or permit issued by authority of the Professional Standards Commission.

**Participants**

There are eight participants who were all highly qualified per the Camelot Professional Standards Commission. The eight participants consisted of two science teachers per grade level and two teachers serving students with special needs. There were seven females and one male. Ages range from thirty-five to fifty-seven and the total number of years of teaching experience was forty-six. The participants were asked to volunteer their time before and after their work responsibilities to participate in the interview process and the focus group. More descriptive data about the participants will be provided in chapter 4 following the discussion of the interviews.

**Data Collection**

The use of semi-structured interviews with educators assists the researcher in understanding teachers’ experiences with males regarding educational achievement in science. Through these interviews, the researcher engaged participants in conversation, which allowed all participants to share their experiences and opinions from various worldviews.
**Data Analysis**

The purpose of data analysis was to organize large amounts of information so that the data can be synthesized, interpreted, and communicated to others; for qualitative data, a major portion of this process involves the organization and management of massive amounts of narrative data (Creswell, 2007; Marshall & Rossman, 2006). Marshall and Rossman (2006) described the phases of typical analytic procedures, which was used to guide data analysis for this proposed study.

A detailed description of coding will be provided in Chapter III, and data interpretation will be provided in Chapter IV. As an overview, in this process, data are first organized, and the researcher becomes immersed in the data. During immersion, categories and themes become generated, and the researcher codes the data accordingly. Interpretations of the data are offered through analytic memos, and the researcher searches for alternative understandings. Finally, the researcher wrote the final report to present the research study and findings (Marshall & Rossman, 2006).

**Limitations**

The researcher, as the data collection instrument, accurately and to the best of her ability collected data, analyzed data, and discerned the participant’s honesty through cross-case analysis. Despite the significance of this study, there are important limitations that need to be considered. First and foremost, this study was not intended to be generalizable, so practitioners and researchers should consider their own contexts when evaluating the findings. Another limitation involves my decision to end data collection at the end of July. While I feel comfortable that I stopped collecting data after reaching a point of saturation, I certainly could have lost some
important information because of that decision. Finally, my choice of collaborative action research was an incredible strength of this study.

Delimitations

This study was confined to Sherwood Forest Middle School sixth through eighth grade science teachers’ experiences regarding male’s underachievement. The study was delimited to interviewing eight teachers who teach science at Sherwood Forest Middle School, which was in a rural setting in the southeastern part of the United States.

Summary

Within the Camelot School System, there has been a noticeable trend of male student underachievement in sixth through eighth grade science. The school district has focused on student underachievement because the mission statement includes student achievement and preparation for post-secondary options, as well as preparing lifelong learners. The purpose of this study is to investigate male student underachievement in science at Sherwood Forest Middle School. The collaborative action research project was conducted at Sherwood Forest Middle School with sixth through eighth grade science teachers. The sixth through the eighth-grade science teachers have identified male student underachievement in their science classes and the underachievement in science is a district focus; this dissertation will examine the ways that the sixth through eighth grade science teachers are responding to male underachievement in science at Sherwood Forest Middle School.
CHAPTER II:

REVIEW OF LITERATURE

Within the confines of this collaborative action research study, the researcher researched and investigated the following areas in relationship to the collaborative action research study. The researcher investigated the history and beginnings of the middle school concept, the professional development of science teachers and the relationship to student learning, state mandated testing and impact on student growth, as well as, research on development of science education and reform. After reviewing the literature, the researcher continued a literature review on research on middle school science teachers and research on science teacher’s experiences with male student underachievement. These topics are related to the collaborative action research study in providing information on the current research in lieu of the lack of research on male underachievement.

Brief History of the Middle School

The history of how middle school came to be is important in understanding the make-up of the middle school as well as the students who inhabit the middle school. The middle school is an institution that offers a transition from elementary school to high school. Within the United States, local public control as well as private alternatives have allowed for some variation in the organization of schools (Department of Education, 2014). School organization is based primarily upon individual state laws, local Board of Education policies, and the specific needs of a school district. Despite those laws, policies, and needs, school districts have a variation of primary, elementary, middle and/or junior high, and high schools.
In the early 1900s, the traditional school organization consisted of eight years in the elementary school and four years in the high school. As of 2015, there were about 3.6 million children in each school grade in the United States (Digest of Educational Statistics, 2016). Elementary teachers were assigned to teach multiple subjects to a single group of students, including science and mathematics, in addition to other content areas. In the past, elementary schools included kindergarten through eighth grade. Basic subjects taught within an elementary school include reading, mathematics, and language arts with an integration of science and social studies. Students in the elementary school often remain in one classroom throughout the school day, with the exception of physical education, library, music, and art classes.

Historically, high schools have traditionally included grades ninth through twelfth. Originally, high schools provided students with the opportunity for basic academic skills and curriculum as well as vocational training. This traditional establishment allowed only a small number of students to pursue a college education. Neither the elementary nor the high school concept adequately addressed the needs of students such as personal, emotional, and social which are especially evident in the middle school (Alexander & Williams, 1968; NMSA, 2014).

The middle level school is the only part of our American school system that is truly American (NMSA, 2013). The concept of a middle level school began as junior high schools about one hundred years ago to educate the non-college bound pupil. The first three-year junior high schools were established in Columbus, Ohio, in 1909 (National Middle School Association (NSMA), 2014). The curriculum that dominated the then newly structured junior high schools consisted of academic programs for those heading to college and vocational programs for those heading to the job market (NSMA, 2014). The middle school movement in the United States saw
this model as inadequately addressing the intended purpose of transition by maintaining an emphasis on the high school model, as reflected in the junior high designation (NMSA, 2014).

During the 1950s, questions began to rise among educators as to the whether the junior high schools served the needs and interests of adolescents (NMSA, 2014). In 1950, following debates among educators, the first middle school established was in Bay City, Michigan (Digest of Educational Statistics, 2016; Department of Education, 2014; NMSA, 2014). The new middle school model began to gain popularity in the mid-1960s. Wiles (2009) stated, “At first, it was difficult to determine the difference between a junior high school and a middle school, but as the middle school became established, the differences became more pronounced” (p. 3).

Middle level schools have many grade configurations. Middle school usually includes sixth, seventh and eighth grades, while junior high typically includes seventh and eighth grades. There are other grade configurations, including grades five through eight, five through nine, seven through eight, seven through nine, and even kindergarten through eighth grade (NMSA, 2013). The range defined by either is often based on demographic factors, such as an increase or decrease in the relative numbers of younger or older students in a district, with the aim of maintaining stable school populations (Wiles, 2009). The key to differentiating between a middle school and a junior high school is whether or not the school includes grade seven. Any school that includes grade seven is a middle level school.

Presently, students are given more independence, moving to different classrooms for different subjects, and being allowed to choose some of their class subjects (electives), especially in the middle school setting. The grading record from kindergarten through 8th grade is solely maintained within the student’s permanent record. Starting in ninth grade, grades become part of a student’s official transcript for grade calculation regarding class rank, scholarship eligibility,
and secondary school enrollment (Digest of Educational Statistics, 2016; Camelot Department of Education, 2014).

The middle school format has now replaced the junior high format by a ratio of about ten to one in the United States, though some school districts have integrated both systems successfully (Digest of Educational Statistics, 2016). The middle school concept often involves a group of teachers from different disciplines working as a team to educate a homogenous group of students of the same grade level, with each teacher teaching a different subject. This format facilitates interdisciplinary units, where part or all of the team teaches on the same general topic from the perspective of different disciplines. Students are assigned a homeroom. Various discussions and activities occur in homeroom (NMSA, 2014). This is intended to foster a sense of belonging, for social and emotional support to students transitioning from the usual single classroom in elementary school, to the departmentalized middle school setting.

The term middle school began being used in the early 1960s, although both the junior high school and the middle school are intended for the same age group, approximately twelve to fourteen-year-olds. The following table displays the differences between a middle school versus a junior high school (NMSA, 2013). The synopsis of the table below from National Middle School Association (2013) compares a junior high school to a middle school while the review of literature defines what a middle school is and determines that a middle school is not upper elementary nor is it a traditional junior high school.
Table 1

*Comparison of Junior High School and Middle School Concepts*

<table>
<thead>
<tr>
<th></th>
<th>Junior High</th>
<th>Middle School</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Philosophy</strong></td>
<td>Emphasis on knowledge.</td>
<td>Emphasis on positive self-concept.</td>
</tr>
<tr>
<td></td>
<td>Treats learner as a teenager</td>
<td>Considers the uniqueness/learning differences of the adolescent.</td>
</tr>
<tr>
<td><strong>Curriculum</strong></td>
<td>Focus is learning a body of knowledge.</td>
<td>Focus is on learning how to learn a body of knowledge.</td>
</tr>
<tr>
<td></td>
<td>Emphasis is on competition between learners and mastery of content.</td>
<td>Emphasis is on exploration of content and creativity rather than mastery.</td>
</tr>
<tr>
<td><strong>Instruction</strong></td>
<td>Teacher-centered.</td>
<td>Flexible and variable.</td>
</tr>
<tr>
<td></td>
<td>Group-paced.</td>
<td>Individualized.</td>
</tr>
</tbody>
</table>

As illustrated in the above table, there are distinct differences between a middle school and a junior high school. The middle school concept developed in response to a need for a nurturing environment for young adolescents transitioning to high school who are neither children nor adults and require a school setting that meets their unique developmental and educational needs (Manning, NMSA, 2014). The education community began to strive to develop strategies to meet the needs of students and this was completed through the use of professional development opportunities for teachers (Darling-Hammond, 1997; Loucks-Horsley et al., 2003; National Staff Development Council, 2001; U.S. Department of Education, 2002; Shulman, 1987).
Professional Development

Professional development is the key to developing a successful learning community in all academic and career areas. The professional development of science teachers is required to innovate teaching practice in the kindergarten through twelfth grade class rooms. According to Loucks-Horsley et al. (2003), 1) significant numbers of teachers have few or no professional development opportunities; 2) a large percentage of the opportunities come in the form of workshops, courses, and institutes that may not be appropriate to learning goals nor provide sufficient support over-time for teachers to apply what is taught in classrooms; 3) a focus on individual development, one teacher at a time, places no attention to organizational development; and 4) some pockets of innovation occur, but with minimal means for greater impact, both within their own system or beyond.

Among scholars there is minimal disagreement that improving teaching and learning depends on sustained, high-quality professional development (Darling-Hammond, 1997; Loucks-Horsley et al., 2003; National Staff Development Council, 2001; U.S. Department of Education, 2002), but accomplishing this effective professional development must involve teachers both as learners and as educators (Darling-Hammond, 1997). With all of the discussion going on, what types of professional development meet the new way of thinking in teaching science? Loucks-Horsley et al. (2003) described a shift from providing teachers with opportunities to learn generic instructional strategies to designing professional development around the essential scientific (2003) identified eighteen different strategies for professional learning that planners of professional development can choose from when designing a professional learning program. The strategies are grouped into six categories; aligning and implementing the curriculum, collaborative structures, examining teaching and learning, immersion experiences, practicing
teaching, and vehicles and mechanisms. Each strategy described by Loucks-Horsley et al. (2003) is an example of professional development in science and mathematics that is intended to be matched to the purpose and context of a professional development program.

**State Mandated Testing and Impact on Student Growth**

With the historical context of the middle school revolutionized and the professional development practices in place, the National Research Council (1996) formally established the *National Science Education Standards*. These standards combine the previous publications of the American Association for the Advancement of Science entitled, *Science for all Americans* (1991) and *Benchmarks* (1993), into a streamlined and cumulative framework of effective science instruction from elementary through high school. State Departments of Education across the United States have used the National Science Education Standards as a foundation for science education and assessments following the federal government mandate of *No Child Left Behind* in 2001.

The state mandated assessment used referenced for this collaborative action research study was the Camelot Regional Competency Test (CRCT). Though, presently it is not a state required assessment, the data gleaned from the CRCT provides imperative information regarding male underachievement in middle school, which is the focus of this collaborative action research study.

The Camelot Regional Competency Test (CRCT) was an achievement test designed to measure student’s acquisition of skills and knowledge addressed in the state mandated content standards for reading, English/language arts, mathematics, science, and social studies. The assessment not only yielded information on academic achievement for individual students, but also provided class, school, system, and state level statistics (Department of Education, 2014).
This information was used to diagnose individual student strengths and weaknesses as related to the instruction of the state standards, and to gauge the quality of education throughout Camelot.

Criterion tests, such as the CRCT, are designed to measure how well students acquire the knowledge and skills set forth in grade specific curriculum for each academic domain. In addition to student achievement, the testing curriculum is norm referenced and compares the student’s growth academically from one year to the next. The CRCT, therefore, was specifically intended to test Camelot's performance/content standards outlined in the GPS (Camelot Performance Standards). State law, as amended by the A+ Education Reform Act of 2000, required all students in grades first through eighth to take the CRCT in the content areas of reading, English/language arts, and mathematics. In addition, students in grades third through eighth were assessed in science and social studies.

In the spring of the 1999-2000 school year, CRCT was administered as an end-of-year summative assessment in reading, English/language arts, and mathematics in the fourth, sixth, and eighth grades. Assessments in science and social studies were first administered in grades three through eight in the spring of 2002. Also in 2002, full implementation of the CRCT assessments in reading, English/language arts, and mathematics also began in spring of 2002. Also in 2002, reading, English language arts, and mathematics assessments were fully implemented in grades in one through eight for the first time.

**Camelot Regional Competency Test (CRCT) Scores**

Underachievement is defined as performing below what is expected based on the child's ability (Shaw, 1964). For the past three years, Sherwood Forest Middle School has experienced a decrease in the performance tests in science per academic report cards, counselor and teacher
observation, and results from the CRCT (2014) for all students (Sherwood Forest Middle School data from Camelot State Department of Education, 2014).

As previously stated, the CRCT is the mandated standardized test that were administered in the first through eighth grades in Camelot. The third, fifth, and eighth grades had to meet a standard as required by Camelot law in order to be promoted to the next grade level (Department of Education, 2011). Scores of 799 and below does not meet the standard, while scores 800 to 849 meet the standard, and scores 850 to 990 exceed the standard. After reviewing the CRCT data for Sherwood Forest Middle School, it was determined that out of 273 current 8th graders, 69 of the students, or 21.2% scored at or below 799 in science on their fifth grade CRCT. Within the same group of students, fifty-seven students or 25% scored at or below 799 in science on the seventh grade CRCT. Of the group of students who did not meet the standard in seventh grade science, thirty-three or 57.8% were male.

Science Education

After reviewing the history of the United States science education system, it is clear that there are those who indicate a critical moment that created a heightened interest in science education reform (American Association for the Advancement of Science, 1993; Dickson, 2007; Michaels et al., 2008; National Research Council, 2007). With the launch of the Sputnik program by the Soviet Union, this realization that the Russians had beaten the Americans in space began a revolution in science education in the United States.

The American scientific community seized this opportunity to push for a rejuvenation of the science curriculum being taught in schools. Many science education reform projects came into fruition from the 1950s through the early 1970s because of the renewed interest in space exploration (American Association for the Advancement of Science, 1993). There was some
encouragement in the preparation of teachers to develop mastery of the science content, as well as the pedagogy to conduct activity based learning program. However, by the 1980s, science education turned back to the traditional science book within the science classroom.

There were changes in thinking about education after the publication by the National Commission of Excellence in Education of *A Nation at Risk*, in 1983, which called for more rigorous and measurable standards. In 1989, the American Association for the Advancement of Science responded to the report by releasing *Science for all Americans*, which provided a blueprint for the knowledge an individual should possess in regard to science. In 1993, the American Association for the Advancement of Science continued its quest and produced another report, *Benchmarks*, which detailed how students should progress towards scientific literacy. These two publications provided a vision for education on how to bring scientific ideals back to the forefront.

In 1996, the National Research Council published the *National Science Education Standards* connecting the two prior publications that describes a picture of effective science instruction from elementary school through high school. It is from these standards that states across the United States have built their own state standards and assessment systems. After reviewing the history of science education in the United States, it seems as though there would be an overage in qualified science educators. Yet according to James Rutherford (1998), school systems were still having difficulty finding qualified staff to teach in a classroom. Rutherford spoke to the belief that the education of all students is important to consider.

All students in kindergarten through twelfth grade and beyond should have access to science education from teachers who understand science, how students think about and learn science and what a teacher needs to know to be able to understand science. According to
Michael, Shouse, and Schweingruber (2008), if teachers are to create an inviting science learning experiences for their students, they themselves need to be supported to become learners and investigators of the science they teach, of their students’ thinking, and of the best ways to orchestrate their students’ learning of complex concepts, tools, and practices. Thus, science teachers need to understand the content as well as the pedagogy to teach the content to their students in a way that provides understanding and an opportunity to

**Middle School Science Teachers**

According to the National Survey of Science Education (2013), much of the science teaching force was over the age of 40 with a smaller percentage aged 30 and younger. Elementary teachers that were assigned to teach science, mathematics, and other academic subjects to one group of students do not feel equally prepared in each area (Banilower et al., 2013). Roughly 80% of elementary teachers felt very well prepared to teach reading/language arts and mathematics, but fewer than half felt very well prepared to teach science. Another elementary teacher concern in teaching science was having enough class time allotted to science education without sacrificing basic reading, writing, and mathematics skills.

There has been a recent movement and incentives for K-12 teachers to explore qualifications to teach science, technology, engineering, fine arts, and/or mathematics (STEAM) in an environment characterized by a highly diverse student population and the highest education standards ever set in the United States (Michaels, Shouse, & Schweingruber, 2008). The K-12 education system struggles to “feed the pipeline” with talented, scientifically literate men and women who are qualified to work within the scientific community and career pathways. There is a sense of urgency regarding encouraging young people to choose the fields of science,
technology, engineering, fine arts, or mathematics and to cultivate the teachers needed to prepare them well (Michaels, Shouse, & Schweingruber, 2008; National Research Council, 2000, 2007).

Smart and Marshall (2013) argued that teacher practices influence student learning in a variety of ways in all academic core subjects. The relationships science teachers have with their students have the potential to shape the course of student learning (Van den Oord & Rossem, 2002). Duit and Treagust (2003) stated that the communication between the science teacher and the student guides the student in making meaning of science concepts.

Science teachers have focused on the identification, documentation, and sharing of best practices (Oliveira, Wilcox, Angelis, Applebee, Amodeo, & Snyder, 2013). These best practices are instructional strategies conducive to higher student achievement and/or performance in school science. Best practices in science education and teaching have been examined mostly at the school classroom level and do not consider practices located outside of the classroom (Oliveira, Wilcox, Angelis, Applebee, Amodeo, & Snyder, 2013). Best practices identified by the NSTA (National Science Teachers Association), include concise clear learning goals, use of content to apply to a performance standard, yet warn that student engagement does not necessarily reflect student learning. After extensive searches through the education research, there was literally nothing specific to science teaching in middle school.

Tweed (2009) argued that even with the best laid plans, not all students will be successful in science. NSTA, Tweed, Banilower, et al. showed that student performance on national assessments especially that of science, are poor. That is why is it so important to delve into the research and implement options of strategies to help teachers, as well as students, to focus on and gain success in the science classroom.
Science Teachers Experiences with Male Student Underachievement

After much investigation, no research has been found specifically related to science teachers and male student underachievement in science in the United States. There is, however, research regarding science teachers and effective teaching of science, although not specifically regarding male underachievement. After extensive searches, the researcher was unable to locate specific research on middle school science and teaching.

Weiss et al. (2003) revealed that science teachers are often unaware that research has identified teacher knowledge and skills that support the development and delivery of science lessons that foster student learning. Many scholars on teaching and learning have found that designing high-quality science lessons that include research-based instructional practices is a logical first step to improving all student’s science learning (American Association for the Advancement of Science, 1991, 1993; Darling-Hammond, 1997; Loucks-Horsley et al., 2003; National Staff Development Council, 2001; Shulman, 1987).

Another factor within the science classroom is the expectation of males and their role. The manifestation of a “boy crisis” is not contained within the educational system of the United States, nor has the “boy crisis” developed within the past decade. Scholars note the manifestation of a “boy crisis” has become evident in regard to history (Connell, 1993). Throughout history, the male has held the dominant role in society. Connell traced the views of masculinity throughout history, links masculinity theory to historical events, and as a female continues this work along the same path. This role has included being the breadwinner of a family, as well as being the ruler or leader of a nation (French & Rothery, 2008). Connell indicates that what direction gender relations move will in part be determined by the politics that happens in this arena (Connell, 1993). Politics include history and the events that have occurred throughout
history to influence the role of masculinity. Even though historical events helped to define masculinity, they also helped to question it as well by questioning what masculinity is and is not. Masculinity is not a gender issue it is a cultural issue (Connell, 1993).

**Summary**

There are many factors that affect the learning of science. They include the historical development and needs of the middle school child and the development of middle schools, the professional development of teachers, the mandated state testing and standards set forth by the educational system, and the development of science education reform which is still progressing. There is a growing emphasis on the importance of science education with well-designed science literacy within the kindergarten to twelfth grade classrooms. With the creation of national standards and benchmarks in science classes, we now have a vision of what students need to know and learn. Research conducted on teaching and learning demonstrates a deeper understanding of the professional development teachers need to help their students succeed, yet challenges remain. This collaborative action research study examines the roles of the curriculum, standardized assessments, the teacher and masculinity in male student underachievement at the middle school level.
CHAPTER III:

METHODOLOGY

Review of the Problem

This chapter explains the methodology and research method that was used to examine teachers’ experiences regarding or in response to male student underachievement in science within a collaborative action research framework. The goal of this research endeavor was to better understand teachers’ experiences with boy’s underachievement in science and the strategies used to address underachievement in science. While there are some studies (Conlin, 2003; Landstedt & Gadin, 2012) that investigate various aspects of academic underachievement, there is a lack of studies that look directly at male student underachievement in science in the sixth grade through the eighth grade.

Research Questions

The overarching question was what are teachers’ experiences with male student underachievement in sixth through eighth grade science? Two additional subquestions, which were answered through this research, included the following: 1) how do sixth through eighth science teachers understand male student underachievement in science at Sherwood Forest Middle School; and 2) how do sixth through eighth science teachers respond to male student underachievement in science at Sherwood Forest Middle School?

Given the research questions that are central to this study, a collaborative action research framework guided by teacher’s responses in semi-structured interviews has been chosen to contribute to observe boys’ underachievement in science because this is an area I have noticed is
a concern to educators at Sherwood Forest Middle School. In response to the teacher’s interviews, we developed a focus group and implemented strategies that address male underachievement in science at Sherwood Forest Middle School.

**Theoretical Framework**

Theoretical perspectives provide both researchers and readers alike with an orienting lens; in addition, they assist the researcher with the development of research questions, and inform how data will be collected and analyzed (Creswell, 2009). This study used qualitative research (specifically, collaborative action research) as a theoretical framework for understanding teacher’s experiences with male underachievement in science at Sherwood Forest Middle School.

**Qualitative Research Design**

Qualitative research refers to research about the lives, lived experiences, behaviors, and emotions of individuals, as well as about “organizational functioning, social movements, cultural phenomena, and interactions between nations” (Strauss & Corbin, 1994). Within qualitative research, the researcher is the primary data collection instrument, and data are collected in the participants’ natural setting (Creswell, 2007, 2009). Data may be gathered in multiple forms, including observations of participant behavior, interviews, documents, or audio-visual materials, and the data is analyzed inductively by the researchers (Creswell, 2007, 2009).

**Collaborative Action Research**

This study used collaborative action research as a method to examine teachers’ experiences regarding or in response to male underachievement in Science at Sherwood Forrest Middle School. The study was a qualitative design study using semi-structured interviews to collect data about teachers’ experiences and responses to male underachievement in science and
to explore practices that bring improved achievement, with additional review of standardized test score results and students’ grades.

Action research is a qualitative research method that encourages the researcher to be reflective of his or her own practice with the aim of improving the system (McNiff, 1994). Reason and Bradbury (2006) stated that action research has three important purposes: 1) to “bring an action dimension” into the tradition of research; 2) to expand the realm in which research is conducted; and 3) to “add impetus to the movement away from a modernist worldview based on a positivist philosophy” toward a more participatory worldview. Action research involves a collaborative relationship between stakeholders who share a common issue and a need to uncover a potential solution to a problem they confront in their everyday lives leading to some improvement in practice (Greenwood & Levin, 1998; Miller & Pine, 1990; Reason & Bradbury, 2006; Stringer, 2007). Action research and qualitative research overlap by taking into consideration collection of data such as interviews, focus groups, and notes. Researchers and the participants are co-researchers in tune with each other and there is no significant value placed on the importance of “taking action” (Stringer, 2007).

My goal as the school counselor was to conduct this study as a collaborative action research project to learn how middle school science teachers are dealing with male underachievement in science to inform my own practice in supporting teachers and aiding students. See Figure 1.
Figure 1. Action research

Action research is based upon the belief that teachers are the best judge of their teaching. In relation to education, action research provides a teacher an avenue to bridge the gap between theory and practice (Kahn, 2000; Kemmis & McTagert, 2005). Teachers can test some of their personal theories in the classroom using action research.

In addition, action research can lead schools to make informed decisions about their practices based upon their data. In turn, this can lead to desired outcomes such as improved student achievement. Action research leads the teacher to come to their own understandings about their own teaching. That is, action research seeks to change some of the beliefs teachers have about how students learn and to improve the quality of education (Kahn, 2000; Kemmis & McTagert, 2005).

Action research in education is called several different names such as classroom research, self-reflective inquiry, teacher research, teacher self-evaluation, collaborative action research, and teacher as the researcher. Within an educational setting, educational problems and issues are best identified and investigated where the action is, within the classroom (McGusky, 2000). Action research is not problem solving or consulting in the sense that a researcher is trying to find out what is wrong, but rather a quest for knowledge about how to improve.
Action research adopts a spiral approach comprising of four steps: planning, acting, observing, and reflecting (see Figure 2). One cycle of planning, acting, observing, and reflecting usually leads to another, in which the researcher incorporates improvements suggested by the initial cycle. Because action research is carried out in real world circumstances, and involves close and open communication among the people involved, the researchers must pay close attention to ethical considerations in the conduct of their work.

![Figure 2. Cyclical flow of action research](image)

**Qualitative Interview Approach**

Throughout the process of collaborative action research, I implemented each aspect of plan, act, observe, and reflect. Using the cyclical approach of action research, plan, act, observe, and reflect, I used the data to collaborate with local school officials and teachers of practices that teacher reports bring improved student achievement. The collaborative action research plan employed the semi-structured interviews. More descriptive detail regarding the participants, observations during the interviews, and the themes generated from the interviews will be discussed in Chapter IV and Chapter V.

Using qualitative research, I collected data through a 45 to 60-minute interview with the participants. Semi-structured interviews were employed for data collections within this research.
Interviews “may be used as a means for exploring and gathering experiential narrative material that may serve as a resource for developing a richer and deeper understanding of a human phenomenon” (Van Maanen, 1990, p. 66). The process of interviewing serves multiple purposes: it gives access to the observations of others, permits inquiry about people’s experiences, opens a window on the past, allows for learning about settings otherwise forbidden, and rescues events that would otherwise be permanently lost (Weiss, 1994).

**Participants**

Participants for this study included male and female teachers, who were interviewed individually for exploring their experiences of male student achievement in science. There were eight participants, two science teachers per grade level and two teachers serving students with special needs. The teachers who serve the students with special needs work hand in hand with the regular education science teacher. They are a part of the science classroom and the teachers work together, collaborate, and plan the science lessons. There were seven females and one male. Their ages ranged from 35 to 57. Originally, eight participants were invited, however; one participant declined to participate in the research. More specific detailed information regarding each of the participants specific ages, individual years of experience, and professional background in education will be provided in Chapter IV.

**Purposive Sampling**

For the collaborative action research study, eight teachers were selected through purposive sampling. Participants were recruited through communication provided by the researcher and approved by the school administration.

Qualitative research must purposefully select participants to best aid the researcher in understanding the problem and the research question, it is essential that all participants share the
Creswell, 2009). Purposive sampling assisted the researcher in narrowing down the pool of potential participants to a manageable and workable number of individuals that represented people who have experiences with male student underachievement. For this study, a purposive sample was sought for educator participants located within a rural area of the southeastern United States.

### Data Collection

Prior to any contact with potential participants, my academic institution’s Institutional Review Board (IRB) and school district have completely and thoroughly reviewed the proposed study to ensure that it is consistent with the safe and ethical treatment of humans as subjects of research. Once approved by IRB, the data collection began.

I used purposive sampling to select participants who can give informed data to answer the research question(s). I collected the following types of data through semi-structured interviews. Data collected for this group of participants involved participation in a 45- to 60-minute interview conducted in a private room. The room allowed for uninterrupted audiotaping. There was minimal risk of physical or psychological harm to participants within this study.

If the participant veered the conversation away from what the researcher had prepared, it indicated an area of importance for the participant, and the researcher was encouraged to help the participant explore further meanings for such experiences. As this study progressed, the researcher kept notes, memorandums, or reports maintained in a secured file.

Semi-structured interviews with educators assisted the researcher in understanding teachers’ experiences with males in regard to educational underachievement in science. Through these interviews, the researcher hoped to engage participants in conversation, which allowed all participants to share their experiences and opinions from various worldviews.
Setting

The research activities for this study took place in a rural, northwestern school district located in the state of Camelot. The middle school pseudonym name is Sherwood Forest Middle School. The middle school serves grades 6 through 8 and is a Title I school with over 50% of the school population on free or reduced lunch.

Sherwood Forest Middle School is part of the Camelot County School System. The school is in the southeastern part of the United States in a rural area. Sherwood Forest Middle School has been open since 2009. Sherwood Middle School serves approximately 700 students in grades sixth through eighth. This enrollment number is not stable and tends to vary on a weekly basis by one to four students who have either enrolled or withdrawn. The school enrollment has a transient population (Sherwood Forest Middle School records, 2014). A transient population refers to those students who change schools as frequently as every couple of months. Approximately 8% of the student body is classified as transient. Sherwood Forest Middle School also has a clientele of low socioeconomic to middle class status families. As of January 1, 2017, there were 100 students on reduced priced meals and 303 students on free meals.

Within the past five years, of the 700 students, there were approximately 400 discipline events with five of those resulting in out of school suspension (OSS). These discipline events included classroom disruptions, student and/or teacher incivility, possession of drugs and/or alcohol, possession of ammunition, bus behavior, possession of a weapon, and fighting.

School attendance has not been a priority for students and their families. The attendance rate for the school was 88% over the past five years, which is below average for the school
district, and average are considered 95% or higher. There were 45 truancy referrals to the school social worker due to student absences totaling 15 days or higher.

The implications of the discipline and truancy are that students are not in class receiving direct instruction from their teachers. When students miss direct instructional or face-to-face time with their teacher for missing class, they may get behind and a combination of chronic absenteeism as well as discipline intervention and other factors contribute to student underachievement (Source: Sherwood Forest Middle School records).

Of the 700 students, about 360 were male and 340 were female. Within the school, 2% of the school population are classified as homeless. Of the homeless students, 6 of the 17 (36%) did not meet the standards required on the CRCT and did not meet the standard for their grade level. Approximately 32% of all the 6th, 7th, and 8th grade students did not meet the state test requirements.

Sherwood Forest Middle School follows a traditional grading system: 90 to 100 is equivalent to an A, an 80 to 89 is equivalent to a B, and a 70 to 79 is equivalent to a C, and a 69 or below is equivalent to an F. The male students tended to generate lower grades, presented less intrinsic motivation, and did not have an affection for school based on my observations as their school counselor.

As measured by grades and standardized tests, males in Sherwood Forest Middle School tended not to do well in science sixth through eighth grade. The reasons may vary. As their school counselor, I inspect the grades and make note of any student who is not doing well in any subject or class. I also collaborate with the teachers to determine the best practices of intervention.
Interview Design

On the day of the designated interview, the researcher arrived at the location early to begin set up of any equipment. The researcher greeted the educator, and offered an introduction of the interview. During this introduction, the confidentiality of data was discussed and it was stated that the interview would be audio taped. The interview lasted approximately 45 minutes to 60 minutes. The educators were given the opportunity to choose their own pseudonym for the research. However, the group decided to number themselves off rather than choose a made-up name.

The interviews were conducted once I received IRB approval from my academic institution and school district. Interview questions included the following:

1. In your opinion, what is achievement;
2. In your opinion, within your classes and reflecting on your years as an educator of science, are there differences between males and females regarding achievement;
3. Describe underachievement;
4. What have you noticed determines success in science;
5. What are strategies do you use to respond to underachieving students? Are the majority of students male or female;
6. Why do you think underachievement occurs in science; and
7. For the past 4 years, there has been a noticeable drop in science scores at Sherwood Forest Middle School. What are possible explanations?

All interview questions were developed to get a better understanding of the central research question, which was: What are teacher’s experiences with male student underachievement in sixth through eighth grade science?

Ethical Considerations

There was minimal risk of physical or psychological harm to participants within this study. Action research is an inquiry that is done by or with insiders to an organization, but never to or on them (Herr & Anderson, 2005). Since action research is participatory in nature ethical considerations work in a different way.
All stakeholders have the same rights to care, safety, and informed consent as would apply in other methods of research. In action research, the process is transparent to all involved. The teachers in this collaborative action research study were asked to sign a letter of consent with the option to refuse to participate or to withdraw from the study at any time but each agreed to take part in the study. As I met with each individual, they decided on a pseudonym to protect their identity and privacy. To remain consistent, the participants eventually decided on a name pseudonym as the best way to keep their identity anonymous. Some of the pseudonyms originally chosen by the participants represented symbols that could easily identify them by those who know them. So, after receiving several questions regarding anonymity, we as a group decided the anonymous name pseudonym worked best. These actions gave the participants ownership in the study and created a feeling of mutual agreement in being a part of the study.

**IRB Approval**

IRB approval from my academic institution’s Institutional Review Board was granted to ensure that this study is consistent with the safe and ethical treatment of humans as subjects of research. Prior to applying to the board, the researcher completed and passed the Social and Behavioral Human Subject Training located on the academic institution’s Research Compliance website. In addition, study approval was obtained from the Camelot School District.

**Confidentiality**

Confidentiality refers to how information disclosed by a participant is treated, with the expectation that it will not be used or divulged without permission in ways other than which it was originally disclosed (Rudestam & Newton, 2007). Confidentiality of all data collected through the individual interviews were maintained by using pseudonyms to ensure that specific information cannot be traced back to any individual.
All interviews were conducted in a private room to preserve confidentiality. At the time of the interview, participants were informed of procedures to ensure confidentiality, as well as procedures for the maintenance of audiotapes, transcripts and other confidential information. Participants were also informed of local laws requiring disclosure of specific events (e.g. abuse, threats to harm oneself or others) as an exception to maintaining confidentiality.

**Researcher Bias**

Prior to beginning the interview process, the researcher identified and documented personal biases related to the topic being studied as best as possible. Every effort was made to create a safe, nonjudgmental position during interviews and throughout the course of the study. Participants were encouraged to share all information that they desired; it is recognized that the researcher may hear comments, opinions, attitudes, expressions, and thoughts that directly conflict with her own personal belief system or professional code of conduct. The researcher was diligent in withholding judgments, and took care to abstain from voicing personal beliefs, opinions, or biases to the participants.

In order to maintain validity of the study and to decrease researcher bias, the chair of the researcher’s dissertation committee was consulted frequently throughout the course of this study. Similarly, peer reviews were sought to assist in keeping the researcher honest, providing insights into meanings and interpretations, and offering the researcher a cathartic outlet through which to discuss one’s feelings (Creswell, 2007; Lincoln & Guba, 1985).

**Data Analysis**

The purpose of data analysis was to organize large amounts of information so that the data can be synthesized, interpreted, and communicated to others; for qualitative data, a major portion of this process involves the organization and management of massive amounts of
narrative data (Creswell, 2007; Marshall & Rossman, 2006). During the interviews, the conversations were recorded, transcribed verbatim, re-read by researcher, and as themes began to emerge, the researcher coded the data for interpretation.

Marshall and Rossman (2006) described the phases of typical analytic procedures, which were used to guide data analysis for this proposed study. In this process, data are first organized, and the researcher becomes immersed in the data. During immersion, categories and themes are generated, and the researcher codes the data accordingly. Interpretations of the data are offered through analytic memos, and the researcher searches for alternative understandings. Finally, the researcher writes the final report to present the research study and findings (Marshall & Rossman, 2006). To begin this analytic process, however, audio-recorded raw data must first be transcribed.

**Transcription**

Transcription refers to the process of converting spoken word into another representation, such as written text; data that has been transcribed is no longer considered raw data, but rather “processed data” (Wengraf, 2001, p. 7). Each interview was transcribed verbatim for analysis. Copies of the transcriptions were kept in hard copy in a locked filing cabinet inside the researcher’s office for a minimum of seven years. Digital copies of the transcriptions were saved as PDF files and were kept on the researcher’s personal computer and as a backup copy on a jump drive. Each digital copy of the transcriptions was password protected to ensure the confidentiality and security of the transcript and the participants. No one may access these digital files without first typing in the correct password, which is known only to the researcher. All audio recordings were destroyed following the completion of data analysis.
As part of the transcription process, the transcriber indicated through symbols in the written text who is speaking by designating “R” for the researcher, and an appropriate initial to indicate the participant, based upon the pseudonym of the participant’s choice or pseudonym assignment.

Data Organization

Data were transcribed and organized by emerging themes. Data immersion occurs as the researcher reads, and rereads the data to become intimately familiar with the content (Marshall & Rossman, 2006). The researcher questioned and reflected upon the data, and eventually categories/themes became generated as patterns expressed by participants were noted. Such categories of meaning should be internally consistent but distinct from one another (Guba, 1978; Marshall & Rossman, 2006). Once categories began to emerge, they then served to act as baskets into which segments of text are placed for organization, also referred to as coding (Marshall & Rossman, 2006).

Coding Data

Coding is a process of qualitative data analysis that involves reducing data into meaningful segments, assigning names for those segments, combining the codes into broader categories or themes, and displaying and making comparisons in the data graphs, tables, and charts (Creswell, 2007; Madison, 2005; Wolcott, 1994). The researcher transcribed the data and then organized the data by themes. The researcher read and re-read the data in order to familiarize herself with the content. As the researcher read the data, the following themes began to emerge; the learning of science, curriculum or the teaching of science, and non-academic factors such as access to information away from school. After these themes took shape, the researcher then began the process of coding the data into meaningful segments.
Marshall and Rossman (2006) stated that it is necessary to describe the phases of typical analytic procedures, which was used to guide data analysis for this proposed study. During the interviews, the researcher observed as well as recorded participant responses. Interviewing involves asking questions and getting answers from participants in a study. The participants of the study participated in a semi-structured interview of approximately 45 to 60 minutes. The researcher followed an interview guide of prepared questions designed to open conversation around the topic. This included a series of follow up questions or probes, prepared in advance, to elicit certain types of information. It is the responsibility of the researcher to be open, a good listener, and give the interviewee time to think and speak (Gubrium & Holstein, 2001; Rubin & Rubin, 2004; Warren, 2005).

The data were first organized, and then the researcher became immersed in the data. One becomes immersed in the data by studying, looking for themes, similarities, and absorbing the data. The researcher must become one with the data so to speak so he or she can interpret the meaning of the data. The process of analyzing data into similar group’s forms preliminary categories of information about the subject being studied (Strauss & Corbin, 1994). The researcher was looking at the raw data searching for themes and categories.

During immersion, the researcher generated categories and themes, and the researcher coded the data into themes and categories accordingly. Strauss and Corbin (1990) stated that axial coding is a set of procedures whereby data are put back together in new ways after coding, by making connections between categories. As the themes began to emerge, the researcher looked for connections between the themes and data. This information was then divided into categories by theme. This is done by utilizing a code paradigm involving conditions, context, action/interactional strategies and consequences. Finally, the researcher writes the final report to
present the research study and findings (Marshall & Rossman, 2006). The researcher began the process of coding the data into meaning pieces of information, which included the participant’s thoughts on science curriculum and professional development opportunities with an emphasis on science. Throughout this entire process, the ideas that kept coming out were the timelines when science curriculum was stressed and where this begins, which is middle school. In addition, the professional development opportunities often are presented with the integration of all academic subjects and not just one particular subject. With all of this in mind, the researcher attempted to pull all this data together and developed a focus group made up of volunteers from the interview group.

**Interpretation**

The goal of interpretation is to bring meaning and coherence to the themes, patterns, and categories, and to develop linkages and a story line that makes sense and is engaging to read (Marshall & Rossman, 2006). This process occurs after categories, themes have been developed, and coding is well under way as the researcher begins to reflect and interpret what has been learned. This involves evaluating the usefulness of the data as it relates to the research questions and the unfolding story about the phenomena of interest. As the researcher finished the verbatim transcriptions, the researcher read and re-read the data and looked for commonalities among the interview responses. Once the commonalities were marked, the researcher listed these commonalities on a separate sheet of paper and looked for themes.

During the final stages of interpretation, the researcher also evaluates the understandings that were developed, and explores the data again for the purposes of challenging those understandings and seeking negative instances of the patterns (Marshall & Rossman, 2006). In searching for alternative understandings, the researcher must identify and describe them, and
must further demonstrate why the explanation offered is the most plausible. The themes that began to emerge consisted of the learning of science, curriculum or the teaching of science, and non-academic factors such as access to information away from school. After these themes took shape, the researcher then began the process of coding the data into meaningful segments. The final stage of interpretation and data analysis is writing the report that summarizes the findings of the research. Marshall and Rossman (2006) considered this also a highly interpretive process, as one chooses carefully the words that summarizes and reflects upon the complexity of the data.

**Development of Focus Group**

From the initial eight interviews, a focus group was developed to collaborate and strategize for improvement in male science scores. This process was guided by the researcher who collaborated with the teachers to develop a plan of action. A major advantage of a focus group is its efficiency, as researchers can collect information from many individuals within a short time frame. Within focus groups, participants react to what is being shared by others. This type of interview works best when participants are similar and cooperative with one another (Creswell, 2007).

**Summary**

This chapter described a proposed method of collaborative action research design, data collection, and data analysis for understanding the experiences of educators with male student underachievement in 6-8th grade science. The specific goals of this research are to understand how educators perceive academic achievement in regard to male student underachievement.

Qualitative research offers a pragmatic, in-depth, and humanistic method of exploring phenomena and examining information on concepts, populations of people, or both, as the concepts relate to the population in question. Semi-structured interviews with educators assisted
me in understanding their experiences with boys in regard to achievement in the field of science. Through these interviews, I have engaged the participants in conversation with me that allows all participants to share their experiences and opinions from various worldviews. This study not only provided me, as the researcher, with an opportunity to view possible evidence of male student underachievement through the perspective of educators and improve the staff’s ability to work with those students, but also provided insight as to why the male and female students at Sherwood Forest Middle School are not achieving in science and possibly inform other educators and policymakers.
CHAPTER IV:

FINDINGS

Introduction

This chapter describes the participants as well as presents summaries of their interviews and common threads of information. In addition, after the participants’ descriptions, a review of the interviews and the focus group are discussed. Examining the teachers’ individual discernment of male underachievement in science and the ways they understand or dealt with their students reveals a great deal about how they operate within the classroom. Drawing on these sources of data (teacher interviews, standardized test data, and class grades) reveals a group of teachers highly influenced by their surroundings as well as their own backgrounds. In addition, the focus group discussion provides specific actions for the improvement of teaching middle school science.

Collaborative Action Research

This study details a collaborative action research project that examined the understanding of male underachievement in middle school science by teacher interviews, standardized test data, and classroom grades. The overall purpose of this collaborative action research study was to better understand the factors that are playing a role in the decline of male student science scores at Sherwood Forest Middle School and to develop a plan to address that decline. The study was a qualitative design study using semi-structured interviews to collect data about teachers’ experiences and responses to male underachievement in science and to explore practices that bring improved achievement, with additional review of standardized test score results and
students’ grades. The data and results from this collaborative action research study may be used to inform further research on this topic such as teacher(s) strategies and in terms of practice, better address students’ needs.

Sherwood Forest Middle School was the site for the research study. The middle school serves grades sixth through eighth grade and is a Title I federally funded public middle school with approximately 50% of the school population on free or reduced priced meals. The school is made up of approximately 70 faculty and staff members. There are approximately 60 women or 86% of all teachers and staff members and there are approximately 10 males or 14% of the total school population. Since the school has been open, these data have remained consistent. The racial demographics have remained consistent within the faculty of the school.

In keeping with the focus of collaborative action research, Stringer calls action research “a methodical process of inquiry” that is repetitious in nature, where co-researchers engage in a basic research cycle of plan, act, observe and reflect around a problem. In working with the participants of the study, we worked together cohesively through the interview process and then the focus group in order to identify the best implementation of strategies for the students.

**Plan**

During the first phase of plan, the researcher thoughtfully considered and planned the research study under the guidance of the dissertation committee chair. During this phase, the researcher invited participants to consider their participation before or after their work responsibilities. The researcher also planned how to understand the problem and how to gather the data.

The proposed participants consisted of eight teachers, one of whom is male. Seven of the eight teachers chose to participate in the interviews and be a part of this study. The participants...
are each in a science classroom and work hand-in-hand with each other as well as the special education department to ensure student needs are met.

**Participants and Action**

Within the action phase of research after the researcher received the necessary approvals, the researcher’s goal was to shed light on the problem being investigated. Once I received approval from The University of Alabama IRB and the Camelot school district’s approval I employed a purposive strategy to select the teachers. The group was diverse in terms of age, teaching experience and knowledge base. The middle school science teachers were notified by the administrator at their grade level meetings and asked to consider participation in the study.

After the administrator, had delivered the request, the researcher approached each science teacher individually to discuss with him or her if they were interested in participating in the interviews and a focus group. At this meeting, the researcher provided the potential participant a copy of the informed consent as well as a description of the study that would take place at Sherwood Forest Middle School. Seven of the eight teachers chose to participate in the interviews and be a part of this study. Four of the participants were willing to be part of a focus group whom I interviewed and with whom I collaboratively developed an intervention plan.

All the participants have worked together for the past eight years at Sherwood Forest Middle School and are well versed in their knowledge of science. After much discussion with the participants, the individual participants decided on a pseudonym for themselves as an efficient way to keep up with the data the researcher has collected. The following is a brief description of each of the participants who agreed to participate in the collaborative action research study at Sherwood Forest Middle School.
Teacher Heath is a very spirited individual who is an advocate for her students no matter their background. She is forty-seven years old and has been in education for twenty-three years. She has primarily taught science and has also taught special education science students as well as advanced science course content. Teacher Heath is very opinionated and shares her thoughts freely. Teacher Heath is certified to teach science in the elementary school which is kindergarten through fifth grade, as well as, the middle school setting which is grades four through eight. In middle school, she is certified to teach gifted language arts, mathematics, science, and social studies, which is grades four through eight. Teacher Heath holds additional certifications in the following special education fields; language arts, mathematics, reading, science, and social studies in grades four through eight.

Teacher Argo is very serious and very much the scientist. She has been teaching for twenty-one years and specializing in the gifted and talented students and has on occasion taught special education students in a co-taught setting with another teacher. Teacher Argo is also very opinionated and looks at the world around her through a scientific lens. She is very concerned with her students’ learning and is often frustrated when the learning does not go as expected. For example, Teacher Argo stated, “When I have a class of advanced students and their prior knowledge and background are not what it should be, it is often difficult to play catch up and get these kids where they should be.” Teacher Argo is certified to teach the following subjects in the middle school setting which is grades four through eight: language arts, mathematics, reading, science, and social studies.

Teacher Eugene has fifteen years of teaching experience and works very closely with Teacher Heath and Teacher Argo. Teacher Eugene has primarily taught the students who have difficulty learning or are in the special education classes. Teacher Eugene did leave the school
district for two years to work in another school system that was closer to his home. He stated, “I thought things would be better and the kids would be more up to date with where they should be in their knowledge base. However, I have since learned the grass is not always greener on the other side.” It took him two years to get back at Sherwood Forest Middle School and he stated, “The administrative support was not where it should have been in the other school system. Here at Sherwood Forest Middle School, I have the administration support as well as support from my colleagues.” This is important because he has seen what another school system is dealing with in terms of science education and even though it was in a completely different school system, throughout his interview, Teacher Eugene stated he had the same issues with student’s prior knowledge of science at each school. Teacher Eugene is certified to teach gifted middle school mathematics, science, and special education mathematics and science.

Teacher Lyons is forty-seven years old and has a combination of fifteen years of teaching experience in science and in special education. She has taught within the special education setting as well as within the co-taught classroom. A co-taught classroom is a class where there are regular education students as well as special education students. Both sets of students are seamless, that is one should not be able to tell the regular education student from the special education student. Within a co-taught class room, there is a regular education teacher as well as a special education teacher who work together in order to assist all students in the learning environment. Teacher Lyons is certified to teach special education language arts, reading, mathematics and science.

Teacher Parks is fifty-two years old and has ten years’ experience of teaching science. Teacher Parks and Teacher Matthews (see below) have worked together for the past eight years and are a cohesive unit within their grade level; the researcher has observed them working
together, collaboratively planning for successful student learning outcomes, and following the curriculum map together. Teacher Parks is certified to teach gifted middle school science and social studies.

Teacher Matthews is fifty-five years old and has thirteen years of teaching experience in science. As stated previously, she works very closely with her colleague, Teacher Parks. They are fortunate to have taught together for the past eight years within the same grade level. Their students may not be able to tell a difference in who is teaching their class because if one of them is absent, then the other one is able to assist the substitute across the hall in keeping the students working and not just giving them busy work to complete. Teacher Matthews is certified to teach gifted middle school science and social studies.

Teacher Hayes is fifty-five years old and has thirty-two years of teaching experience with twenty-four of those in science. Teacher Hayes has multiple experiences within the educational setting from teaching adaptive subjects for special situations to having multiple certifications that enable her to be used efficiently within the district as needed. Teacher Hayes is certified to teach gifted social studies and science in the middle school setting.

The following table outlines the teacher’s years of experience, certifications, degree level, and specific training in science during their college and graduate school work.
Table 2

*Participants’ Teaching Experience, Certification, and Science Preparation*

<table>
<thead>
<tr>
<th>Teacher Name</th>
<th>Years of experience</th>
<th>Certification(s)</th>
<th>Degree Level &amp; Major</th>
<th>Science pedagogy in bachelor course work or graduate course work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heath</td>
<td>23</td>
<td>Middle School &amp; Special Education: Language arts, mathematics, science, social studies and gifted</td>
<td>Ed.S. Education</td>
<td>yes</td>
</tr>
<tr>
<td>Argo</td>
<td>21</td>
<td>Middle School: Language arts, mathematics, science, social studies</td>
<td>Ed.S. Education</td>
<td>yes</td>
</tr>
<tr>
<td>Eugene</td>
<td>15</td>
<td>Middle School and Special Education: Mathematics &amp; science and gifted</td>
<td>Ed.S. Education</td>
<td>yes</td>
</tr>
<tr>
<td>Lyons</td>
<td>15</td>
<td>Middle School Special Education: Language arts, mathematics, reading, &amp; science</td>
<td>Ed.S. Education</td>
<td>no</td>
</tr>
<tr>
<td>Parks</td>
<td>10</td>
<td>Middle School: Science, social studies and gifted</td>
<td>Ed.S. Education</td>
<td>yes</td>
</tr>
<tr>
<td>Matthews</td>
<td>13</td>
<td>Middle School: Science, social studies and gifted</td>
<td>Ed.S. Education</td>
<td>yes</td>
</tr>
<tr>
<td>Hayes</td>
<td>32</td>
<td>Middle School: Science, social studies, and gifted</td>
<td>Ed.S. Education</td>
<td>no</td>
</tr>
</tbody>
</table>

Out of all of the participants who work together, Teacher Heath, Teacher Argo and Teacher Eugene are the most cohesive within the school; that is, they plan together collaboratively and then work with Teacher Parks and Teacher Matthews on how to progress their student’s learning to the next grade level. Teacher Lyons and Teacher Hayes also collaborate. The teachers have the opportunity to work, plan, and collaborate on a weekly basis within their grade level settings as well as within a professional learning day setting. During a professional learning day, the science department sits down as a department and discusses any
concerns or issues. This is an opportunity that is provided on a monthly basis where students are sent home two hours early so the departments and the school as a whole can participate in professional learning communities.

All of the participants are diverse in nature and often struggle with both male and female students. By being teachers employing diverse strategies, the educators can apply the same lesson in differing situations. For example, in one class the teacher may have a variety of students who are at differing learning levels. The teacher has to teach a lesson and be able to differentiate the lesson to meet the needs of all students within their classroom. Through their interviews and collaboration many of these approaches were discussed. Each participant shared their innermost thoughts, insights, observations, and candid opinions regarding their experiences and interpretations.

**Interview Summary and Observations**

Within the observation phase, the researcher began the process of engaging the participants, data analysis that would shed light on “how teachers experience and respond to the events that makeup the research” (Stringer, 2007). The data analysis included the participant interviews, transcribing and coding the participant’s interviews, and looking for common threads of information or themes.

Prior to the interviews, the researcher scheduled another meeting with each participant who gave permission to participate in the study in order to answer any last-minute questions and address any concerns they may have. At this meeting, the researcher secured all of the necessary signed forms in order to begin the research for the study. The next step involved scheduling the interviews at days and times that were convenient to the participants. Once the interview scheduled was finalized, the researcher secured a private conference room with a large table and
comfortable chairs located at Sherwood Forest Middle School for the days and times of the scheduled interviews. The researcher made sure the participant had access to a notepad, pen/pencil, the closest rest rooms, and a glass of water.

At the beginning of each interview the researcher welcomed the participant and described the researchers’ role and the goal of the scheduled meeting. The researcher went over all of the study information in detail for a third time to make sure the participant had a good understanding of what was happening and how the study was going to be conducted. The researcher made sure each participant knew where the restrooms were located, placed a sign on the outside of the door to ensure no interruptions, and the researcher received confirmation from each individual that they were comfortable. The researcher thanked each participant at their scheduled appointment and told them how much the researcher appreciated their willingness to assist in this research project. Throughout the interview process the researcher emphasized the focus of male underachievement in science and encouraged the participants to relate their answers specifically to the male students within their classroom experience.

The researcher began the interview by describing some of the history related to the research study and then asked the question “In your opinion, what is achievement within your classes and reflecting on your years as an educator of science, are there differences between males and females regarding achievement?” According to Teacher Heath, Teacher Argo, and Teacher Lyons, males tend to struggle with immature behavior which might impact achievement more so than girls; that is, males tend to act out more than girls and they also tend to struggle in reading comprehension more so than the girls. In contrast, Teacher Argo stated and Teacher Lyons agreed “that in 6th grade all of the students love science. However, most often my female
students do well when her parents or guardians require her to do well and on the other hand the female students will do just enough to get by if no one at home requires her to do well.”

Teacher Lyons also added to this thought in her interview by stating the following:

When looking at a student’s demographics, children who do not live with their biological parents but with a grandparent tend to have to grow up sooner and take more responsibility because their grandparents and the older generation have raised their children and are now burdened or blessed with raising their grandchildren. Sometimes this is a good thing and sometimes it is out of necessity; I get that. Times have changed, parents have more than one job in order to make ends meet and this does not mean they do not care about their children but they do not have that extra time to spend with them to ensure they are reading and studying like they are supposed to.

Teacher Heath stated and Teacher Lyons agreed,

At the beginning of each week all of the science homework is distributed to the students on Monday. The students are then instructed they can work on the homework as they have time to complete it. The homework is due on Thursday during their science class. Should the student decide to complete all of their homework and turn it in earlier they may. As a science department, we require the homework to be turned in on Thursday and we will accept the homework on Friday, however; the student will not receive full credit. In a meeting or a phone conference with a parent, they are often unaware of this procedure. This procedure is communicated to the students, posted on the teacher websites, school website, e-mailed, and texted through remind services.

Teacher Argo also added that males will do well or do poorly in class based on interest. Their parents could require them to do well but unless they are interested in the topic, most males will perform poorly. Teacher Argo offered interesting reflections on a lack of interest:

I think male students perform poorly because in the elementary school science is integrated and when they reach the sixth grade is its own academic class. The students are overwhelmed with this huge change and do not always perform well. In addition, the literacy and vocabulary for science is not where it should be and a lot of it has to be reinforced.

Teacher Eugene brought out an interesting topic of comparing science education to the early 2000s when there was a lot of press on a boy crisis. He stated, “Males performed better in the early 2000s but over the past seven years’ females have asked more questions, performed
better at labs, and put forth better work.” The researcher asked Teacher Eugene to discuss this
more and in addition Teacher Parks and Teacher Hayes agreed with his statement:

Education seems to go in cycles; that is, some years the males stand out and then they
decline and then the females are the stand outs. Everything in education seems to circle
around. Even though the males have declined, I have noticed within the last year they are
coming back stronger and working almost as hard as the females in my classes. Don’t get
me wrong; the males have a lot of catching up to do but the females are still my strongest
students in science.

Teacher Parks offered a different perspective, stating that “when comparing the boys and
the girls, they are fairly even in my experience.” Teacher Matthews works very closely with
Teacher Parks, who tended to disagree with her colleague in the regard that:

My classes are typically mid-range upper level classes. I do see more male achievement
but in the end, it always averages out. On the lower level, males and females struggle,
however; there is more female achievement within my experiences as a science educator.

Teacher Lyons also stated:

There is always the internal desire to be right and good for girls. Girls have they need for
approval while boys not so much; that is, boys have to catch up with their maturity level.
This is more apparent with their reading scores. There is a big difference between the
boys and the girls within literacy and comprehension.

As each interview progressed with each of the participants, the answers were all very
similar consisting of student growth and mastery of a standard, with varying levels of concern
about gender differences. When the participants were asked about the differences between
females and males during their tenure as a science teacher, the researcher received responses
from Teacher Hayes of “none” to Teacher Argo stated and Teacher Parks agreed “it depends on
the group we are teaching and how they are scheduled.” The researcher followed up on this
scheduling idea and learned from Teacher Heath and Teacher Argo that when some of the
participants taught their students in the morning, the same lesson in the afternoon was a little
more difficult for the males. As the researcher probed some more Teacher Lyons, Teacher
Matthews, and Teacher Hayes indicated to me that if it were a hands-on project such as a science
lab the males were more interested than just a paper, pencil notetaking while working together project.

Moving forward with another interview questions, describe in your own words underachievement, there were varying degrees of interpretation. Teacher Parks stated, and Teacher Matthews and Teacher Hayes agreed:

In my opinion, underachievement is succeeding to a lower amount. The student’s try and try and they never seem to succeed or achieve at the same level as higher achieving kids. I think this is because the science curriculum is not as rigorous and not pushed from the elementary school.

Teacher Hayes also stated, “Underachievement is the difference between the ability of the student and the student’s performance in school.” Teacher Heath stated and Teacher Argo agreed, “I view underachievement as to not working to one’s potential but electing to do as little as possible to get by.” Teacher Heath stated, “I see students who are not very smart and struggle with everyday tasks such as reading, writing, comprehension, and simply following directions.”

Teacher Eugene stated and Teacher Lyons agreed, “Underachievement defined as a student not performing at grade level and not performing at their own level of ability. Also, one has to take into consideration the number of students in each class.”

Teacher Argo added, “Underachievement can be viewed as a student who does not make the minimum level goals or progress.” The researcher probed Teacher Argo by asking, “How do you think this could be addressed?” Teacher Argo stated:

Underachievement could be addressed by requiring the students to make goals. We would have to teach the students how to make a goal and then determine what those goals would be. I would like for my students to have goals that are academic, attendance and behavioral for each grading period.

As a result of teacher input, Sherwood Forest Middle School as a collective whole had decided to embrace this idea of having students develop school goals. This was a school-wide decision with
teacher, parent, and student agreement. The goals that are developed are centered on academic, attendance, and behavioral. The academic goal that is set for each student involved passing five of the six classes and not missing assignments for the grading period. The behavioral goal is not having write-ups to the office or in school suspension time. The attendance goal was to encourage students to be at school each day, although the final goal was set to have three or less absences.

For the most part, when asked about underachieving males in science, all the participants stated in one way or another that males tend to struggle in science and there are differences in each group from one year to the next, indicating one aspect of the complexity of the problem. For example, on the one hand Teacher Heath stated, and Teacher Lyons agreed, “Males tend to struggle with immature behavior which might impact achievement more so than girls.” On the other hand, Teacher Argo stated, and Teacher Eugene and Teacher Lyons agreed in summary:

In 6th grade all the students love science. However, most often my female students do well when her parents/guardians require her to do well and will do just enough if no one at home required her to do well. Whereas, the male students will do well or poorly in class based on interest.

After the lengthy discussion of each teacher’s views on underachievement, the researcher went on to probe this idea further by asking each participant, what have you noticed determines success in science? Teacher Heath stated, and Teacher Parks, Teacher Matthews, and Teacher Hayes agreed, “Those students who possess self-worth and self-discipline tend to be more successful. That is the student who has an intrinsic motivation to do their best and ask questions when they do not understand something.” Teacher Heath offered another thought, “Then there are those who do not understand and believe they can sit through class doing nothing and be passed on to the next grade level when they are not ready and have not mastered the standards in their current grade level.”
Teacher Argo stated:

The teacher along with support from home. As a teacher, I have to provide lessons that draw on a student’s interest and I have to level the new knowledge to meet my student’s ability to learn. However, when a student has a particular set of problems that may prevent them from learning, the child needs extra help from school and home. I would have to communicate those needs to parents so they can assist me with their child’s learning needs. The ways in which I communicate with parents are by phone calls, e-mails, texts through remind 101, online with our parent portal and canvas which is an online tool where I can post all of my assignments as well as notes from my classes that the student and their parents can access from home. In order to access canvas, the student and parent need to know their student’s identification number which is the same as their lunch number and the child’s birthdate for the password. The feedback I receive from parents is positive because they are busy as well. Sometimes just reaching out to them is as important as meeting with them face to face.

Teacher Eugene also agreed with Teacher Heath and stated, “As they understand more than they should ask more in-depth questions. Science is the process of questioning the world around us.” Teacher Lyons agreed with Teacher Eugene and added:

Vocabulary and reading comprehension are paramount to understanding what is going on in the science classroom. I understand mathematics and language arts are the builder classes and the gateway classes from elementary school on toward high school and postsecondary education; however, with science there is new content introduced each year in middle school. The students are taught earth science in sixth grade, life science in seventh grade, and physical science in eighth grade. They are learning new content each year in science. And as far as testing goes, these students are tested way too much. We should be thinking outside of the box and ensuring our students are meeting the standards and are able to demonstrate their understanding in order to determine what they have learned.

In order to address success in science, the researcher went on to discuss strategies that are employed within each participant’s classroom setting. Teacher Eugene stated and Teacher Heath, and Teacher Lyons agreed:

I frequently use positive verbal praise, real life connections, cooperative learning, and one on one instruction in my classes. I find if a child is doing their best and their best is the best they have then verbal praise encourages them to strive even harder to succeed. Science is a part of real life and the sooner the kids realize and make that connection the better off they will be in wanting to learn real life scenarios.
Teacher Eugene also added, and Teacher Heath, Teacher Matthews and Teacher Hayes agreed, “I use many visuals in my classroom to relate material to all students. These include word walls, anchor charts, and concept maps.”

Teacher Argo stated and Teacher Eugene, Teacher Lyons, and Teacher Matthews agreed, “The first step is to determine why they are underachieving. From there I may talk with parents about helping their child with vocabulary and literacy. If literacy is their weakness. I may re-teach a concept if I see that is a simple lack of understanding.” Teacher Parks and Teacher Matthews agreed with Teacher Eugene, “I may tutor the student before or after school if they require more explanation. I may pair a struggling child with another student to work with them to explain how to complete a task. In addition, I use hands-on projects.” Teacher Hayes also agreed with Teacher Eugene, “With these type of projects, some students may perform better actually demonstrating their knowledge.” Teacher Parks also re-stated that “the foundations for science are not met within the elementary school setting in order to prepare the students for middle school.”

As the discussions continued, the researcher probed each of the participants individually to describe strategies they used in their classes and did they use different strategies with males and females? Teacher Heath stated, and Teacher Eugene agreed, “Not necessarily.” Teacher Heath also stated and Teacher Lyons agreed, “Sometimes more restrictive behavior or planned educational experiences are used for males such as preferential seating, pairing students up for peer tutoring, or assigned projects.” Teacher Argo stated, “Most of the strategies I use are based on need.” Teacher Argo also stressed the need to examine scheduling.

Teacher Parks, Teacher Matthews, and Teacher Hayes also mentioned the same sort of ideas in regard to strategies, Teacher Matthews gave the example:
Look at the European countries with their views on education. In Germany, students are exposed to hands on apprenticeships and assigned their post-secondary careers. There are not enough options for our students; we should have more survey classes with exposure to post-secondary options and look at how the students are scheduled. The scheduling is not optimal for students.

The participants were asked to give their candid thoughts on why they thought underachievement was occurring in science. Teacher Heath stated:

A lack of literacy in school and not an emphasis at home, lack of focus on medications for those who may need them, not able to make connections between what they have learned in science and real life, and finally taking the time to understand as well as ask questions.

Teacher Argo stated, “Too many videos and too much book work. Students need to be to explore and share what they can do with their new knowledge. This builds true confidence and give them the control over their own identity and self-worth.” Teacher Hayes agreed with Teacher Argo and added:

Science is not a solitary discipline. I spend a large chunk of my time helping students understand how they must use what they learn in other subjects to be successful in science. The students need to use their reading and writing skills to gather and research information and communicate their ideas. Data analysis and drawing conclusions require them to think with numbers and geography helps them to apply their knowledge to what has happened and what is happening in our world.

Teacher Eugene stated and Teacher Lyons agreed that “the major cause of underachievement in science is the lack of understanding and vocabulary knowledge.” Teacher Lyons also added, “Middle school science is not important especially if they are struggling with language arts and mathematics. As far as grades, a ‘C ‘is good enough as long as it is passing.” Teacher Lyons stated and Teacher Parks and Teacher Hayes agreed, “The kids think science does not matter especially in the sixth and seventh grade because it is not part of the mandated state testing program. Only language arts and mathematics are tested for the sixth and seventh graders.” Teacher Matthews stated and Teacher Argo agreed, “Many students are not prepared due to elementary school. The application level and foundation are not the same. Females are
more advanced in their thinking and knowledge base and boys are not mature in their learning processes.”

Out of the initial interviews, four participants expressed a desire to be a part of the focus group in order to implement strategies to address the concerns of male underachievement in science.

Focus Group Discussion and Plan Implementation

The researcher began the process of coding the data into meaning pieces of information, which included the participant’s thoughts on science curriculum and professional development opportunities with an emphasis on science in order to share these results with the focus group members. Throughout this entire process, the ideas that kept coming out focused on when the science curriculum is stressed and where this begins, which is middle school. In addition, the professional development opportunities often are presented with the integration of all academic subjects not just one particular subject. With all of this in mind, the researcher attempted to pull all of these data together and developed a focus group made up of volunteers from the interview group.

The focus group members, Teacher Heath, Teacher Eugene, Teacher Parks, and Teacher Hayes, worked together to develop strategies from success in male science scores. The researcher guided this process which included meeting several times throughout the summer in order to plan, research student academic data, and develop a plan of action. The focus group was very efficient and along with the researcher collected a large amount of data within a short time frame. The data collected by the focus group was then shared and each participant relayed their ideas on a course of action. From this extensive collaboration, the focus group developed a plan.
Once the focus group was established, the researcher and the participants looked at research in relationship to strategies for success, vocabulary and literacy, and outside of the school support. The focus group’s first activity was to examine the mandated state testing results that demonstrated the weaknesses overall for sixth through eighth grade science. The first task after reviewing the data was to decide on the best way to support the underachieving male students in science.

Before we could begin, the focus group decided to look at male underachievement in science using the classroom grades of a seventy-five or below, mandated testing scores of beginning learner or a score of 799 or lower. After reviewing the CRCT data for Sherwood Forest Middle School, as noted earlier, out of 273 current 8th graders, 69 students, or 21.2% scored a 799 or lower on their 5th grade standardized testing. Looking at these same students in the 7th grade, 25%, or 57 of these 273 students did not meet the CRCT standard in science; that is, they scored a 799 or lower. Out of these students 33 are boys, 57.8% of the group that did not meet the standards on CRCT Science. So, the question arose, where do we go from here? After much thought and discussion, the focus group decided to focus on building relationships with the male student as well as his parent/guardian. Cleveland (2011) suggested rebuilding as well as creating a non-threatening learning environment. In order to build these relationships, the focus group worked together as a team to encourage communication between school and home.

This concept included use of a school agenda with notes sent home to parents regarding each student’s progress and asking parents their thoughts on how their student was doing. The focus group wanted to create a cycle of growth and learning closely related to the cyclical format of collaborative action research (Focus Group Teachers). The first phase of plan was to put in place and provide support for the underachieving male student. This looked like building a
relationship with the underachieving male and his parent/guardian and providing a non-threatening learning environment.

The next task the focus group participants strategized was to decide on the best ways to guide and reinforce positive learning. The focus group developed clear expectations for the underachieving male student in science, feedback that was specific to their learning, and the use of positive reinforcement. The focus group teachers also reviewed tools for communication and collaboration; they wanted to have a direct link between home and school.

Within the next task, the focus group looked at their classrooms as a laboratory of learning. That is, what can they do to make their rooms more inviting as well as appealing to their underachieving male students? According to the focus group, this included a reduction of distractions within the class room, such as pictures or other items that were not directly related to the learning taking place. We began strategizing by reviewing what the student should have learned in the prior grade as well as what the student should learn in the present grade. Below is the standard for science in the Camelot County School System.

The Performance Standards are designed to provide students with the knowledge and skills for proficiency in science. The Project 2061’s Benchmarks for Science Literacy is used as the core of the curriculum to determine appropriate content and process skills for students. The GPS is also aligned to the National Research Council’s National Science Education Standards. Technology is infused into the curriculum. (Department of Education, 2017)

According to the State of Camelot Performance Standards are provided to guide instruction. They are written to include four major components:

1. The Standards for Science Courses. The Characteristics of Science co-requisite standards are listed first followed by the Content co-requisite standards. Each Standard is followed by elements that indicate the specific learning goals associated with it.

2. Tasks that students should be able to perform during or by the end of the course. These tasks are keyed to the relevant Standards. Some of these can serve as activities
that will help students achieve the learning goals of the Standard while others can be used to assess student learning. Many of these tasks can serve both purposes.

3. Samples of student work. As a way of indicating what it takes to meet a Standard, examples of successful student work are provided. Many of these illustrate how student work can bridge the Content and Characteristics of Science Standards. The Camelot DOE Standards web site will continue to add samples as they are identified and teachers are encouraged to submit examples from their own classroom experiences.

4. Teacher Commentary. Teacher commentary is meant to open the pathways of communication between students and the classroom teacher. Showing students why they did or did not meet a standard enables them to take ownership of their own learning. (Department of Education, 2017)

To become literate in science, students need to acquire understandings of both the Characteristics of Science and its Content. The Performance Standards for Science require that instruction be organized so that these are treated together. Therefore, a content standard is not met unless applicable characteristics of science are also addressed at the same time. For this reason, the science standards are presented as co-requisites incorporating hands-on, student-centered, and inquiry-based approaches (Department of Education, 2016).

The focus group members evaluated their own teaching practices as compared to the standards for performance in science. The focus group determined effective teaching also means assessing what their students know as well as taking that information to adjust to instruction. According to Tweed (2009), this focus on formative assessment processes in science classrooms is consistent with the research on how students learn (Minstrell, 1989; Donovan & Bransford, 2005). The focus group discussed the importance of assessing prior student understanding, actively involving students in the learning process, help student to be more mindful of their understandings and performance of understanding the science concept to be mastered.

Finally, the focus group stated they wanted to ignite and empower their students. They decided the best way to accomplish this was to have active learning taking place along with
literacy-building activities. This is where the vocabulary piece came into play with a word wall and interactive flash cards. The entire group synthesized the data and developed strategies they were willing to implement with their underachieving male students. This enormous task was delved into by looking what is currently taking place within the classroom as well as learning outcomes. That is, the participants engaged in a discussion with the researcher detailing where the gaps were and possible interventions to fill the gaps of instruction. For example, participants identified the incorporation of vocabulary as an important step toward improving male student achievement in science as well as female student achievement.

Traditionally vocabulary is introduced to the class on a Monday with instructions to look up the words and be prepared for a vocabulary test on Thursday or Friday. With the current generation of students, this does not always work due to non-academic factors that often play a role in students’ lives. So, to help students overcome the challenge of vocabulary, they were introduced to a new way to learn their vocabulary. Some of the teachers used anchor cards; these are three by five or six by eight note cards and the students wrote one vocabulary word on one note card and on the reverse side of the note card, the student wrote the definition of the word. As each student completed this task, the task was modelled by the teacher and the teacher assisted students as they needed help.

Action research adopts a spiral approach comprising of four steps: planning, acting, observing, and reflecting; see Figure 3. One cycle of planning, acting, observing, and reflecting usually leads to another, in which the researcher incorporates improvements suggested by the initial cycle. Because action research is carried out in real world circumstances, and involves close and open communication among the people involved, the researchers must pay close attention to ethical considerations in the conduct of their work. Figure 3 is a demonstration of the cyclical
Within our interview and focus groups discussions, the focus group participants as a whole stated that most teachers think of science as a body of fact, science is taught as a product not as a process, and the way science is often taught develops misconceptions and misrepresentations about what science is and what scientists do. The focus group examined when science is first introduced to the student, and this occurs in elementary school. Within the elementary school, science is not emphasized separately but integrated into language arts and mathematics. It is only when a student reaches the sixth grade that science is its own academic course. Focus group participants also noted that from kindergarten through twelfth grade, science education should reflect the interconnected nature of science and inquiry as it is practiced and experienced in the real world. The science concepts should build coherently from kindergarten through 12th grade.
Addressing Research Questions

To understand the complexity of our conversations I looked at my research questions through the eyes of the teachers who are in the trenches working with student day in and day out. The research questions are as follows: The overarching question is “What are teachers’ experiences with male student underachievement in sixth through eighth grade science?” Two additional subsidiary questions, which were answered through this research, include the following: 1) how do sixth through eighth science teachers understand male student underachievement in science at Sherwood Forest Middle School; and 2) how do sixth through eighth science teachers respond to male student underachievement in science at Sherwood Forest Middle School? Upon reflection, the responses gathered revealed clues regarding the dilemma of male student underachievement in science.

As I probed this further, one of the focus group members pointed out “that in elementary school grades science and social studies are incorporated with English Language Arts and mathematics and the focus group members agreed that science as well as social studies should be taught as an independent subject at the elementary school level.” This is because when the students come to the middle school in sixth grade, they now have four academic classes that they are responsible for. All participants made note of the fact that children approach and solve problems differently.

The members of the focus group agreed and stated the challenge for them was the reading levels expected from the students. The students are not accustomed to an independent science class and the level of reading that is expected. In other words, the teachers learned that their professional development included a process rich in vocabulary that was introduced through a word wall. Teacher Matthews stated, and Teacher Hayes agreed, “The world as well as the
society is changing rapidly, learning and teaching are challenging tasks for teachers and their students.”

One member of the focus group participants also stated, “We as teachers do not need to know [only] the subject matter of science but also how to teach the subject in a meaningful way to our students.” Teacher Parks stated and Teacher Heath, Teacher Eugene, and Teacher Hayes agreed, “Everything including professional development, teaching practices, and curriculum alignment takes time and should be considered more like a cultural challenge.” Another of the focus group members stated, “Teachers talking with their colleagues about learning and the way in which their students learn is a strong component of high quality professional development.”

As the researcher continued the interviews, all four members of the focus group agreed to develop strategies to enhance their curriculum. According to the members of the focus group, these strategies included directional vocabulary, content vocabulary, and interactive vocabulary. As part of the focus group plan and instructional practice, all of the vocabulary strategies were integrated into a word wall in each participant’s class room as a suggestion from the focus group to all of the research participants (Teacher Heath, Teacher Eugene, Teacher Parks, and Teacher Hayes). The word wall was interactive and contained the vocabulary that was previously learned as well as vocabulary to study and learn. To further this strategy, the teachers (Teacher Heath, Teacher Eugene, Teacher Parks, and Teacher Hayes) had each student create a flashcard in which the student demonstrated understanding of the science concept. The flash card had on one side a drawing of the vocabulary word and then on the opposite the definition. Teacher Eugene and Teacher Lyons indicated the males were more interested in this type of activity than the females.
One of the group members stated and the others agreed, that within their interviews that “there is a major concern regarding reading comprehension and there has to be an internal desire to be right. Teacher Lyons also stated, “Girls often possess that innate desire or need for approval while males not so much.”

Teacher Hayes stated, “When the males felt successful in science their grades reflected how they felt as well.” Regardless of the grade level, the major concern across the board was reading comprehension. The focus group participants noted that reading comprehension, understanding and application of vocabulary in science was fundamental to success in science. Although, in general, Teacher Heath had noted in her individual interview previously, “If a male student had self-worth, was confident, and had parental/guardian support, they tended to perform better in science.”

For the most part, the research questions were based on the researcher’s observations and not the participants’ input. After receiving the participants’ input through the individual interviews and focus group discussions, the researcher determined there are limited occurrences with male underachievement specifically within sixth through eighth grade science. As one member of the Focus Group stated, “Every year is different, we have no idea of what to expect because the students are different each and every year.” The researcher confirmed with the participants that there are some cases of male underachievement; however, it appears the underachievement affects the girls as well as the boys.

Summary

In summary, I did not expect all of the answers I received from the research questions nor did I expect for one potential individual not to want to participate. The overarching question was “What are teachers’ experiences with male student underachievement in sixth through eighth
grade science?” The teacher’s experiences varied. The most popular answer received was it
depends on the group from one year to the next (Teacher Heath, Teacher Eugene, Teacher
Lyons, Teacher Parks, and Teacher Matthews).

The teachers also reported they felt male underachievement was greatly exaggerated and
the data collected from the mandated state testing was not one hundred percent valid (Teacher
Heath, Teacher Argo, Teacher Eugene, and Teacher Parks). That is, a lot of students do not test
well under pressure and time constraints. Many students suffer from anxiety, fear of failure, and
the pressures placed upon students that eventually reflects on teacher evaluations is too much
(Focus Group). The teachers all agreed that the particular data set we reviewed of class room
grades, state testing data, and their interviews did not particularly point to male
underachievement in science, but to the ability of the particular group we looked at. Teacher
Argo stated and Teacher Eugene, Teacher Parks, Teacher Matthews, and Teacher Hayes agreed
“on the role of television and media” as accentuating perceptions of male student
underachievement in science.

Despite teacher skepticism about a continuous male underachievement problem, they
agreed on teaching and learning approaches to improve science achievement that included a
focus on working with the elementary school from fifth to sixth grade, working with the high
school from eighth to ninth grade, more emphasis placed upon science as an individual subject to
be studied and not as a generality. The sixth-grade student studies earth science, the seventh-
grader studies life science, and the eighth-grader studies physical science; this continuum leads
to the foundation and building blocks for high school science studies that are even more narrow
in their field. The ninth graders study biology, the tenth graders study chemistry, and from there
the science becomes more specialized depending upon the career aspirations for the student. The
most important factor from the interviews and the focus group involved the attention placed upon literacy and vocabulary. I, as a researcher, had not considered the importance of the student’s reading level and the amount of vocabulary necessary to be successful within a science classroom.
CHAPTER V: CONCLUSIONS AND RECOMMENDATIONS

The overall purpose of this study was to explore the experiences of male underachievement sixth through eighth grade middle school science teachers. The research questions that guided this study were “What are teachers’ experiences with male student underachievement in sixth through eighth grade science?” In the following are the conclusions from the researcher and the recommendations. The conclusions reached included more subject-targeted professional development, lack of evidence to support male underachievement, and the lack of literacy in students.

Professional Development

According to Michaels, Shouse, and Schweingruber (2008), “If teachers are to create rich science learning experiences for their students, they themselves need to be supported.” In order for the teachers to feel supported they need to be able to participate in professional development that is specifically targeted for their academic subject.” Professional development is the bridge between where an educator is now and where they will need to be in order to meet the challenges of guiding all students in achieving higher standards of science learning (United States Department of Education, 1995). Professional development is also seen a key factor in encouraging and supporting types of instructional practices (Louck-Horsley et al., 2003), and the focus group participants involved in this study also noted the importance of hands on professional learning within their specific discipline.

One member of the focus group stated and the other three members of the focus group agreed, “Well designed professional development is very important in helping us as teachers who
understand the scientific content as pedagogy required to transform our teaching with the sixth through eighth grade science classroom.” According to several scholars and reports (Darling-Hammond, 1997; Loucks-Horsley et al., 2003; National Staff Development Council, 2001; Department of Education, 2002), improving teaching and learning depends on high quality professional development. A high-quality program of professional development must involve teacher as learners and teachers (Darling-Hammond, 1997). Teachers should be engaged in a program designed to improve science literacy that includes a clear image of classroom learning and teaching (Loucks-Horsley et al., 2003), an attention to the content of science and the pedagogical knowledge of the classroom (Shulman, 1987), and a level of dissonance that disturbs the teachers beliefs, knowledge, and experiences (Thompson & Zeuli, 1999) causing them to leave behind their prior ways of teaching and move to a new pedagogy of science teaching (Willcuts, 2009).

At the beginning of each school year, teachers are presented with students they do not know and must learn about their student’s prior knowledge. The Weiss et al. study stated, “Teachers are unaware that research has identified teacher knowledge and skills that support the development and delivery of science lessons that foster student learning. Banilower et al. (2008) discussed a series of studies on science learning and suggest an instructional model based on research.

Research provides a template for instructional-based practices and should be the first logical step in improving students’ science learning. With the focus group’s ideas in mind, the participants examined effective instruction and what it should look like within their classrooms. As teacher participants in this study, all admitted they each had their own ideas of what teaching should look like within their classrooms. As part of our group discussion, it was clear that the
focus group members used a wide variety of strategies to meet their student’s needs and from experience select those strategies that work best for the individual teacher as well as the student.

This topic arose because of a discussion regarding student achievement as part of the teacher evaluation. Teacher Argo stated, “If student achievement within their class was used as part of their teacher evaluation and the growth was positive they had no problem with it.” Teacher Hayes stated and Teacher Matthews agreed “In order to be more effective we need to participate in professional development that increases our understanding and ability to present content to students.” According to Tweed (2009), there are five features of effective science instruction. First the students must be motivated, second, elicit student’s prior knowledge, third, engage students with the content, fourth, teach students to think like a scientist, and fifth, allow the students opportunities to compare their learning.

The focus group discussed the idea of how to motivate their students with the word wall concept. The word wall contains vocabulary the students are currently learning as part of their science studies. Teacher Heath stated and Teacher Eugene agreed,

The word wall motivated their students to learn their science vocabulary. As the students learned the vocabulary they were rewarded by illustrating the science vocabulary as a drawing that was meaningful to them. The students were encouraged to think about their prior learning and to draw upon that learning to be able to explain or define their science vocabulary. This could be accomplished by defining in their own words, demonstrating their knowledge, or working with a peer to demonstrate knowledge. The students were engaged with their peers in order to master the science content within the teacher’s class.

The focus group agreed that engaging their students with a peer as well as their teacher would lead to a more favorable learning outcome. The focus group wanted to work collaboratively together and with their students in order to give the students the best opportunity for mastery of a content standard.
Michaels, Shouse, and Schweingruber (2008) and members of the focus group stated that both children and adults, when faced with an unknown situation, try to determine what is happening and what will happen next. As human beings, we live in a world where we observe what is going on around us by gathering information to analyze what we think will happen next. In addition, research has shown that kindergarten through twelfth grade students do not necessarily develop scientific literacy through participation in a kindergarten through twelfth grade program of science (Lederman, 1992; Meichtry, 1992; NCISE, 1989).

Driver, Squires, Rushworth, and Wood-Robinson (2005) shared the view that a student should not be expected to memorize science from a textbook but should interact with science on a daily basis. For students to build a deeper knowledge of science, the classroom should not just be paper and pencil based but involve a hands-on understanding of the science topic. All participants agreed that the effective teaching of science requires a deep knowledge of the content to be taught along with knowledge of pedagogy on how to teach science, as noted by Shulman (1987).

According to Smart and Marshall (2013), teacher practices influence student learning in a variety of ways in all academic core subjects. The members of the focus group discussed the relationship they develop with their students and their parents. Two of the focus group members discussed the importance of the relationship to home and pointed out us as teachers do not often know of the environment our students go home to. The relationships that science teachers have with their students have the potential to shape the course of student learning (Van den Oord & Rossem, 2002). Another focus group member described the student-teacher relationship as an opportunity to share her knowledge with her students so they can see there are many opportunities rather than the immediate surroundings that they reside in. Even a teacher’s well-
meaning words of encouragement may not be enough to counteract the reality of a history of failure (Alloway et al., 2002; Cleveland, 2011; Martin, 2002; Younger & Warrington, 2005).

Even though all of the focus group members strive to build their students’ knowledge base, even the best of intentions may not be what the student needs at that moment. Building a classroom environment that is a learning laboratory is essential. In addition, the underachieving male, who is sensitized to failure, must feel safe enough in the classroom to willingly engage in learning (Alloway et al. 2002; Cleveland, 2011; Martin, 2002; Younger & Warrington, 2005).

According to Duit and Treagust (2003), the communication between the science teacher and the student guides the student in making meaning of science concepts. Within the elementary school, science is not emphasized but integrated into language arts and mathematics. It is only when a student reaches the sixth grade that science is its own academic course (Bransford, Brown, & Cocking, 1999; Ryder, Leach, & Driver, 1999; Driver, Guesne, & Tiberghien, 2000). The continuity of learning is not present in elementary to middle school. That is, science is integrated into the language arts and math in elementary school. When this occurs, the subject matter is not taught from a science perspective. So, when a student enters the middle school and science is a separate class, there are often feelings of anxiety. Because the former elementary student was accustomed to only two academic subjects, language arts and math. Now the former elementary school student is being exposed to four academic subjects of language arts, math, social studies, and science. According to the focus group participants, the middle school science teachers now have to focus on what their students know and the standards they are required to learn in middle school.

On the one hand, the science teachers have to look at the strengths and weaknesses of their students as well as promote learning through the use of best instructional practices. On the
other hand, those males who did not value themselves, lacked confidence in their academic abilities, and did not have the support at home, usually just did enough to get by or nothing at all, a response evident in the literature (Alloway et al. 2002; Cleveland, 2011; Martin, 2002; Younger & Warrington, 2005).

Science teachers have focused on the identification, documentation, and sharing of best practices (Oliveira, Wilcox, Angelis, Applebee, Amodeo, & Snyder, 2013). These best practices are instructional strategies conducive to higher student learning and/or performance in school science. Best practices in science education have been examined mostly at the school classroom level and do not consider practices located outside of the classroom (Oliveira, Wilcox, Angelis, Applebee, Amodeo, & Snyder, 2013). Best practices identified by the NSTA (National Science Teachers Association), include concise clear learning goals, use of content to apply to a performance standard, and student engagement does not reflect the learning. Science teachers, like any other teacher, begin the school year with high expectations of their students. According to Tweed (2009), even with the best laid plans not all students will be successful in science. According to NSTA, student performance on national assessments, especially that of science, are poor. That is why it is so important to delve into the research and implement strategies to help teachers, as well as students, to focus on success in the science classroom. Teaching cannot be effective if the classroom environment does not provide a safe place for children to learn even if the teacher has prepared an effective high-quality lesson (Marzano, 1997).

Lack of Evidence

Surprisingly, the researcher did not expect the answers she received from the research questions nor did the researcher expect for one potential individual not to want to participate. The explanation for the non-participation concerned issues outside of school involving the
teacher in other commitments that could not be rearranged to meet the interview schedule. The teacher and I tried to make the schedule work for both of our benefits, however, we were not successful and decided to exclude this individual from the study. The research questions used for this study were “What are teachers’ experiences with male student underachievement in sixth through eighth grade science?” The teacher’s experiences varied. The most popular answer received was it depends on the group from one year to the next (Teacher Heath, Teacher Eugene, Teacher Lyons, Teacher Parks, and Teacher Matthews). My research did not support the literature I reviewed. As a matter of fact, this research pointed to and provided other reasons for student’s underachievement in middle school science.

The researcher pulled the previous year’s data of students who did not meet the standards on the CRCT with the same standards as the first group examined of class room grades of a seventy-five or below, mandated testing scores of beginning learner or a score of 799 or lower. Out of 236 prior eighth graders, 41 students, or 17%, scored a 799 or lower on their 5th grade standardized testing. Looking at these same students in the 7th grade, 12%, or 29 of these 236 students did not meet the CRCT standard in science; that is, they scored a 799 or lower. Out of these students 33 are male. These data backed the focus group’s assertion that each year brings a different group with different levels of prior knowledge.

The teachers also reported they felt male underachievement was greatly exaggerated and the data collected from the mandated state testing were not one hundred percent valid. That is, a lot of students do not test well under pressure and time constraints. Many students suffer from anxiety, fear of failure, and the pressures placed upon students that eventually reflects on teacher evaluations is too much (Focus Group). The teachers all agreed that the particular data set we reviewed of class room grades, state testing data, and their interviews did not particularly point
to male underachievement in science, but to the ability of the particular group we looked at.

Even though male underachievement seemed to be a topic of concern beginning in the 2000s, since 2010 the topic has diminished in popularity. The literature points to teacher preparation, continued professional development of teachers, relationships in the class room. Also, according to Cleveland (2011), the ability to reach and teach underachieving males is not dependent in any way upon a teacher’s gender. The research, in fact, indicates that few boys believe that gender has any bearing on a teacher’s effectiveness (Alloway et al., 2002) nor is an excellent teaching style dictated by gender by a range of attitudes and abilities. While a teacher’s gender may not matter, many of the participant also introduced the idea of students’ non-academic factors that play a role in male underachievement in science. These include male maturity compared to female maturity, attitudes about learning, and parental support. Many the teachers interviewed relayed, in the words of one participant, that “males tend to struggle with immature behaviors which impact success in science.”

According to Weaver-Hightower (2005), understanding who underachieving boys are and how to help them lies in examining the context of the problem, that is, the way social and academic factors within the classroom affect an underachieving male’s ability to function as a learner within it. Schools are an important backdrop and the examination of boys as well as the current research regarding male underachievement in science relates to how one views males historically. Some conclusions are that the male students are not working to their full potential, do not make minimum goals set for students, have limited parent/guardian involvement in school, and the reading/comprehension level of male student is a problem (Cleveland, 2008; Weaver & Hightower, 2005). Teachers also indicated that the school experience is part of male underachievement. On the one hand, the teachers noted that males who eagerly wanted to learn
were successful and those who were not interested in science just did what they had to do to get by or nothing at all (Banilower, Cohen, Pasley, & Weiss, 2008; Cleveland, 2011).

Overall teacher experiences with male underachievement in science varied based upon the teacher’s experiences, exposure to research/data, and their perceptions of what underachievement is and is not. Some of the teachers interviewed agreed that curriculum was designed to be more inclusive and all students should have access to a science education (Teacher Heath, Teacher Eugene and Teacher Matthews), an idea also offered by some researchers (Michaels, Shouse, & Schweingruber, 2008; Willcuts, 2009).

This data analysis is not solely relying on the news media for reports on a boy crisis. According to the data collected there may be some male underachievement in science but not enough to call it a crisis. According to Cleveland (2011), the biggest difference between the United States and other countries’ educational systems are not related to the males, their schools, or their problems, but rather to the degree of governmental commitment to addressing the issue of underachievement. When one is looking at the historical perspective, one realizes the need for a scientific community and a stronger basis for science education within our schools. The stronger emphasis on the science curriculum encourages students to continue their science studies as related to their career pathway. That is after high school, encourage students to become part of the STEM (Science, Technology, Engineering, and Mathematics) programs in their colleges or universities. Even today males still dominate the sciences at the college and university level but in the elementary school the idea of STEM is not emphasized as much as language arts and mathematics.

Whether we agree or not, the United States is part of a global community in which the United States often competes for international standing. The United States also competes for a
share of the global market. With this in mind, it is imperative for there to be an emphasis on science related fields in order for our citizenry to be able to compete.

**Research Implications and Recommendations**

My research did not completely support the literature reviewed nor did it refute it. There are plenty of data base analyses in previous research regarding students and science achievement, so given the nature of this study, I recommend more qualitative research, and when appropriate, qualitative research as action research. Action research is conducted every day within classrooms without the teachers realizing they are actually participating in action research. It is important to encourage and motivate teachers to use action research within the class rooms to collect data about their students, student achievements, and student weaknesses. Textual inquiry—what Palincsar and Magnusson (2001) conceptualize as one form of secondhand inquiry—should be closely integrated with physical, or firsthand, inquiry. Research on these issues could also help to improve students’ achievement in science.

**Implications for Practice and Policy**

To be fair and consistent, it would only make sense for the elementary school to prepare the fifth-grade students to think of science in terms of a separate academic discipline rather than science being integrated into language arts and mathematics. This concept should be embedded in teachers’ and leaders’ conscious thoughts for success from one grade level to the next. What if we could reach into the elementary schools before the fifth graders came to the middle school and let them experience a class with a middle school science teacher?

The idea of a much more inclusive STEM program in the elementary school would also be beneficial to the student’s learning as they transition from one grade to the next and from one school level to the next. As a principal, the primary concern should be student learning and
achievement. The success of students in all academic areas is important but the emphasis needs to be spread across all disciplines and not just language arts and mathematics emphasized within the elementary school setting.

In addition, science could be more emphasized within the language arts and mathematics class rooms by the teacher pointing out the science concept that is integrated into the other academic subjects. Research on school systems that offer such programs could be useful in determining how to improve science achievement in general. In addition, during the last month or two of the fifth grade there are some interesting opportunities. Good practices would include the fifth-grade teachers and the middle school science teachers coming together to plan across grade levels the expectations of the science curriculum to be taught. Also, the eighth-grade middle school teachers could meet with the high school teachers to plan across grade level the expectations of the science curriculum. As the researcher, I would strongly urge those in leadership to talk with their science teachers and put themselves where the science teachers are, looking at the perception of the science teacher and the students they are working with and where the expectation lies in the form of student achievement. As an administrator, I would look at the teacher’s strengths and weaknesses and have them teach the subject they are most qualified to teach. I would encourage my teachers to look at their classrooms as laboratories of learning—even beyond science given the importance of literacy even in the middle school—to help our students become successful lifelong learners.

Sometimes professional development is just that simple. The teachers overall are not consulted but are presented with the next best and greatest idea in education at the moment. Some of these ideas may be good but do they actually provide what our teachers need? Teachers
need to be listened to and encouraged to share what their needs are in order to effectively teach science curriculum.

A major concern within the focus group was the students’ literacy ability and their understanding of how science relates to the world around them. The teachers are challenged by a lack of literacy shown by their students; especially, those who are new to the middle school setting. The connection between science and literacy is the subject of much attention in the science education and research community (National Science Teachers Association, 2006). This attention comes in large part from three sources:

1. growing body of research and practice in science teaching and learning that suggests that language is essential for effective science learning—for clarity of thought, description, discussion, and argument, as well as for recording and presentation of results. In addition to engaging in direct investigation of scientific phenomena, students make meaning by writing science, talking science, and reading science. At the root of deep understanding of science concepts and scientific processes is the ability to use language to form ideas, theorize, reflect, share and debate with others, and ultimately, communicate clearly to different audiences;

2. a related body of research and practice from the literacy community that suggests that students improve their skills in many areas of literacy when those skills are practiced in engaging contexts. One such context is inquiry-based science, where instruction includes direct experience, is explicit, focuses on substance rather than on form, and offers sufficient opportunity to engage in meaningful use of language. This context can be particularly important for second-language learners and students from diverse languages and cultures;

3. the attention to the science and literacy connection is also a result of the emphasis on literacy and mathematics in Federal and State legislation, with the resulting lack of focus on science instruction. While this may change somewhat when science becomes a tested subject area, the primacy of literacy and mathematics at the K–8 level is likely to remain, and thus this introduction requires a cautionary note. If we are not careful and clear, the current privileging of literacy instruction over all other areas of learning can lead to connections being forged between literacy and science in which reading and writing instruction substitute for, rather than add to, direct experience and scientific reasoning. (National Science Teachers Association, 2006)

So, what is literacy and what is its role in science? I would recommend all academic subjects not just science to actively look at their students learning and growth from one year to the next and think about where they want their students to be at the end of the school year. This
may include looking at and revising curriculum maps, doing research within their classrooms, and becoming more familiar with the dissemination of testing data.

All of the members of the focus group recognized that real-world scientists use print texts extensively in their own inquiries. The focus group members are now committed to working with the language arts teachers in engaging students in reading and writing texts in ways that support their science investigations. Textual inquiry—what Palincsar and Magnusson (2001) conceptualize as one form of secondhand inquiry—should be closely integrated with physical, or firsthand, inquiry.

Physical inquiry, for example, involves manipulating materials, theories, and ideas, whereas textual inquiry requires the decoding and negotiation of symbols, theories, and ideas. The fact that many of our students struggle either with basic reading and writing processes or with the technical and interpretive demands of science text in the inquiry process makes the integration of textual inquiry into the curriculum particularly challenging, however. In fact, many students require support in comprehension, composition, and meaning making or application of any content texts (Goldman, 1997; Ivey 1999; Lee & Fradd, 1998). Unfortunately, the constrained time periods for doing science during a typical school day make it challenging for teachers to teach students how to use print texts to engage in physical inquiry and build scientific literacy skills while also conducting the physical inquiry itself. Adjusting teaching schedules for more time in developing literacy as a foundation for scientific literacy in middle school could be helpful.

In conclusion, one clear implication of this dissertation study is that literacy teaching strategies not only provided teachers with tools for guiding students’ interactions with texts and with physical inquiry, but also motivated students to engage with the texts and provided a
window into student thinking. Investigating what methods of literacy teaching and learning have an impact on student achievement in science would be useful. There was no clear evidence to support the literature regarding male underachievement in science. According to my research, there was no strong evidence of male science underachievement, according to the science teachers, the test data studied was an anomaly.

**Summary**

The overall purpose of this collaborative action research study was to better understand the factors that are playing a role in the decline of male student science scores at Sherwood Forest Middle School. The factors explored and understood through teacher experiences of dropping science test scores at Sherwood Forest Middle School included class grades, and standardized test data. The data collected through the collaborative action research study may be used to inform further research on this topic such as teacher(s) strategies and in terms of practice, better address students’ needs.

This collaborative action research study focused on a problem observed by the researcher as a former science teacher and as a school counselor. The problem I studied is male student underachievement in science at Sherwood Forest Middle School. The trend of dropping science scores has also been noticed at the local school and at the district level. If we are serious about the teaching of science education within the school, we as citizens, professionals, and teachers need to be serious about more professional development that is centered around the specific academic subject. It is very important in order to produce a well-rounded citizen that we ensure the teachers receive the support they need to be successful as well as provide more opportunities for science learning within the classrooms. Practical implications include examining male and
female student achievement in the secondary setting and researching the differences between male and female students in order to determine if there is indeed a gender difference.
REFERENCES


APPENDIX A:
IRB APPROVAL

May 30, 2017

Marilyn Holbrook
ELPTS
College of Education
Box 870302

Re: IRB # 17-OR-185, “Understanding Male Underachievement in Middle School Science”

Dear Ms. Holbrook:

The University of Alabama Institutional Review Board has granted approval for your proposed research.

Your application has been given expedited approval according to 45 CFR part 46. Approval has been given under expedited review category 7 as outlined below:

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

Your application will expire on May 24, 2018. If your research will continue beyond this date, please complete the relevant portions of the IRB Renewal Application. If you wish to modify the application, please complete the Modification of an Approved Protocol Form. Changes in this study cannot be initiated without IRB approval, except when necessary to eliminate apparent immediate hazards to participants. When the study closes, please complete the Request for Study Closure Form.

Please use reproductions of the IRB approved stamped consent forms to obtain consent from your participants.

Should you need to submit any further correspondence regarding this proposal, please include the above application number.

Good luck with your research.

Sincerely,

[Redacted]

Garbafato T. Myles, MSM, CIP, CIP
Director & Research Compliance Officer
Office for Research Compliance
APPENDIX B:

INFORMED CONSENT

AAHRPP DOCUMENT #192
UNIVERSITY OF ALABAMA
HUMAN RESEARCH PROTECTION PROGRAM

Informed Consent for a Non-Medical Study

Study title: Understanding Male Underachievement in Middle School Science

Marilyn Jane Holbrooks-Hamlett, Ed.D Candidate, Educational Leadership, Policy, and Technology Studies

You are being asked to take part in a research study.

This study is called Understanding Male Underachievement in Middle School Science. The study is being done by Marilyn Jane Holbrooks-Hamlett, who is a graduate student at the University of Alabama. Ms. Holbrooks-Hamlett is being supervised by Professor Philo Hutcheson, PhD, who is a professor within the College of Education at the University of Alabama.

What is this study about? What is the investigator trying to learn?

This study is being done to better understand the factors that are playing a role in the decline of student science scores at Scoggin Middle School. The factors will be understood through teacher experiences of dropping science test scores at Scoggin Middle School, teacher observation of class grades as well as class standardized test scores. The data collected through the collaborative action research study may be used to inform further research on this topic such as teacher(s) strategies and in terms of practice, better address students’ needs.

Based upon teacher initial responses, the investigator will collaborate with teachers to develop a plan of action to implement to address concerns of underachievement in Science.

Why is this study important or useful?

The purpose of this study is to better understand the factors that are playing a role in the decline of male student science scores at Scoggin Middle School. The factors will be understood through teacher experiences of dropping science test scores at Scoggin Middle School, class grades, and standardized test data. The data collected through the collaborative action research study may be used to inform further research on this topic such as teacher(s) strategies and in terms of practice, better address students’ needs.

Why have I been asked to be in this study?

You have been asked to be in this study because you expressed interest in this study. You are a person over the age 19 who is employed as a certificated/licensed educator within Scoggin Middle School which is a part of the Paulding County School District.
How many people will be in this study?
There will be approximately 8 participants who are all highly qualified per the Georgia Professional Standards Commission.

What will I be asked to do in this study?
Participate in one 45 to 60-minute audio-taped individual interview with the investigator. Based upon interview responses, collaborate with teachers to develop an action plan to address the issue.

How much time will I spend being in this study?
Individual interviews should take approximately 60-90 minutes to complete.

Will being in this study cost me anything?
None.

Will I be compensated for being in this study?
None.

What are the risks (dangers or harms) to me if I am in this study?
There should be very little or no risk to you as a participant in this study, however potential risks have been identified. The main risk for you for being in this study is that you will be asked questions that could potentially be uncomfortable. You can control this potential by not being in the study, by not answering any questions that make you feel uncomfortable, or by stopping your participation in the study at any time. There is no penalty or consequence for choosing to stop your participation. Because agreeing to be audio-taped is necessary for participation in this study, your confidentiality may also be at an increased potential risk. To decrease this risk, you will be identified in this study by pseudonym, and the audio-tapes will be destroyed upon completion of this study.

What are the benefits (good things) that may happen if I am in this study?
There is an opportunity for you to collaborate with the researcher to develop an action plan to address concerns of underachievement in middle school Science. There are no direct benefits to participation in this study.

What are the benefits to science or society?
The specific goals of this research are to understand how educators perceive academic achievement in regards to student underachievement.

How will my privacy be protected?
Your privacy will be protected by conducting the interview in a reserved, private room. You have the right to refuse to answer any question(s) that you do not wish to answer. However, the investigator is required to report any signs of spousal, child, or elder abuse, or threats of harm to self or others, to the police and/or other protective services.
How will my confidentiality be protected?
Confidentiality refers to the data that you offer and how it will be safeguarded. Data from your interview will be transcribed by the investigator and kept in the sole possession of the investigator. No other person will have access to the recorded interview or transcription. Interviewees and/or their affiliated institutions will be de-identified through the use of chosen and/or assigned pseudonyms. Audio-recordings will be destroyed at the conclusion of the research project, and all hard-copy transcriptions will be shredded. Electronic copies of transcriptions will be kept as a password-protected document on the investigator’s personal computer for a period of seven years. Only the investigator will know the password.

What are the alternatives to being in this study? Do I have other choices?
The alternative to being in this study is not to participate.

What are my rights as a participant in this study?
Taking part in this study is voluntary. It is your free choice. You can refuse to be in it at all. If you start the study, you can stop at any time. There will be no effect on your relations with the University of Alabama.

The University of Alabama Institutional Review Board (“the IRB”) is the committee that protects the rights of people in research studies. The IRB may review study records from time to time to be sure that people in research studies are being treated fairly and that the study is being carried out as planned.

Who do I call if I have questions or problems?
If you have questions about the study right now, please ask them. If you have questions, concerns, or complaints about the study later on, please call the investigator, Marilyn Jane Holbrooks-Iamlett at 770-301-6988

If you have questions about your rights as a person in a research study, call Carpanato Myles, Director for Research Compliance at the University, at 205-348-846 or toll free at 1-877-820-3066. You may also contact Dr. Hutcheson my advisor over this study by e-mail at phutcheson@aa.edu.

You may also ask questions, make suggestions, or file complaints and concerns through the IRB Outreach website at http://osp.ua.edu/site/PRCO_Welcome.html or email us at participantoutreach@bama.ua.edu.

After you participate, you are encouraged to complete the survey for research participants that is online at the outreach website or you may ask the investigator for a copy of it and mail it to the University Office for Research Compliance, Box 870104, 152 Rose Administration Building, Tuscaloosa, AL 35487-0104.

I have read this consent form. I have had a chance to ask questions. I agree to take part in it. I will receive a copy of this consent form to keep.

__________________________
Signature of Research Participant

__________________________
Signature of Investigator

__________________________
Date

__________________________
Date

UNIVERSITY OF ALABAMA IRB
CONSENT FORM APPROVED: 5-25/17
EXPIRATION DATE: 5-24/18
APPENDIX C:

SCHOOL DISTRICT AND SUPERVISOR APPROVAL

District Employee Application to Conduct Research

Title of Research: Understanding Undergraduate Student Success

Researcher's Name: Marilyn Jane Holbrooks-Hamlett

Targeted Audience: Teachers

University/Sponsoring Agency: University of Alabama

Date of the Research: 3-1-17

By signing below, you agree that you have completed all items on the checklist, read and meet the guidelines as outlined in Policy KIB and Administrative Procedure KIB-R Special Interest Materials Distribution. You also agree to submit any significant changes to the Procedures of your project to the Superintendent's office for prior approval.

Marilyn J. Holbrooks-Hamlett

[Signature]

Date: 2-22-17

This research involving human participants, if approved, will be under the direct supervision of the following representative of sponsoring University/Agency.

Dr. John Hulmezacs

[Signature]

Date: 3-1-17

The attached request was reviewed by: Gina King

Recommendation: Approved

Signature: Director of Accountability

Date: 3-1-17

Your recommendation has been accepted. Please notify the requestor of the status of their request. A copy of their document was sent to them at the time of completion.
March 7, 2017

Marilyn Jane Holbrooks

Re: Understanding Male Underachievement in Middle School Science

Dear Ms. Holbrooks-Hamlett,

This is to advise you that your research packet has been approved. Please remember, you must submit your research findings to our office at the time of completion.

Sincerely,

[Signature]

Director of Accountability
May 11, 2017

RE: Understanding Male Underachievement in Middle School Science

Mrs. Hamlett,

This is to advise you your research proposal has been approved. Please remember all research activities must take place before and/or after school. In addition, I will provide you access to standardized test scores and school data.

As your immediate supervisor, please advise if I can be of any assistance and I would like to wish you well in the pursuit of this endeavor.

Sincerely,

Principal
APPENDIX D:
INTERVIEW GUIDE

Title: UNDERSTANDING MALE UNDERACHIEVEMENT IN MIDDLE SCHOOL SCIENCE

Method: Collaborative Action Research

Research Question: What are teachers’ experiences with male student underachievement in sixth through eighth grade science?

How do sixth through eighth grade science teachers understand male underachievement in science?

How do sixth through eighth grade science teachers respond to male underachievement in science at Sherwood Forest Middle School?

Participant:

Date:

Place: Sherwood Forest Middle School Conference Room

Researcher:

My name is Marilyn Jane Holbrooks-Hamlett. I am a doctoral student at the University of Alabama. The purpose of my research is to better understand the factors that are playing a role in the decline of student science scores at Sherwood Forest Middle School (a pseudonym). Before we begin, we will read and review the informed consent document together. You will need to sign the document, agreeing to participate in this research, before we begin the actual interview. Check "yes" or "no" giving your decision
regarding being audio taped. The audio taped interview will be transcribed for research purposes. If you have any questions, feel free to ask them at any point.

(Read Informed Consent aloud, offer time for individual review of the document, witness participant sign the document, provide a copy for participant to keep, allow participant to choose pseudonym, or assign a random one).

You are being asked to take part in a research study. This study is called Understanding Underachievement in Middle School Science. The study is being done by Marilyn Jane Holbrooks-Hamlett, who is a graduate student at the University of Alabama. Ms. Holbrooks-Hamlett is being supervised by Professor Philo Hutcheson, PhD, who is a professor within the College of Education at the University of Alabama.

What is this study about? What is the investigator trying to learn?

This study is being done to better understand the factors that are playing a role in the decline of student science scores at Sherwood Forest Middle School (a pseudonym). The factors will be understood through teacher experiences of dropping science test scores at Sherwood Forest Middle School, teacher observation of class grades as well as class standardized test scores. The data collected through the action research study may be used to inform further research on this topic such as teacher(s) strategies and in terms of practice, better address students’ needs. Based upon teacher initial responses, the investigator will collaborate with teachers to develop a plan of action to implement to address concerns of underachievement in Science.

Why is this study important or useful?

The purpose of this study is to better understand the factors that are playing a role in the
The decline of student science scores at Sherwood Forest Middle School (a pseudonym). The factors will be understood through teacher experiences of dropping science test scores at Sherwood Forest Middle School, class grades, and standardized test data. The data collected through the action research study may be used to inform further research on this topic such as teacher(s) strategies and in terms of practice, better address students’ needs.

**Why have I been asked to be in this study?**

You have been asked to be in this study because you expressed interest in this study. You are a person over the age 18 who is employed as a certificated/licensed educator within Sherwood Forest Middle School.

**How many people will be in this study?**

There will be approximately 8 participants who are all highly qualified per the Georgia Professional Standards Commission. The 8 participants consist of two science teachers per grade level and 2 teachers serving students with special needs.

**What will I be asked to do in this study?**

Participate in one 45 to 60-minute audio-taped individual interviews with the investigator. Based upon interview responses, collaborate with teachers to develop an action plan to address the issue.

_X YES ______NO Permission to audio tape_

**How much time will I spend being in this study?**

Individual interviews should take approximately 45-60 minutes to complete.

**Will being in this study cost me anything?**

*None*
Will I be compensated for being in this study?

None

What are the risks (dangers or harms) to me if I am in this study?

There should be very little or no risk to you as a participant in this study, however potential risks have been identified. The main risk for you for being in this study is that you will be asked questions that could potentially be uncomfortable. You can control this potential by not being in the study, by not answering any questions that make you feel uncomfortable, or by stopping your participation in the study at any time. There is no penalty or consequence for choosing to stop your participation. Because agreeing to be audio-taped is necessary for participation in this study, your confidentiality may also be at an increased potential risk. To decrease this risk, you will be identified in this study by pseudonym, and the audio-tapes will be destroyed upon completion of this study.

What are the benefits (good things) that may happen if I am in this study?

There is an opportunity for you to collaborate with the researcher to develop an action plan to address concerns of underachievement in middle school Science.

What are the benefits to science or society?

The specific goals of this research are to understand how educators perceive academic achievement in regards to student underachievement.

How will my privacy be protected?

Your privacy will be protected by conducting the interview in a reserved, private room. You have the right to refuse to answer any question(s) that you do not wish to answer.
However, the investigator is required to report any signs of spousal, child, or elder abuse, or threats of harm to self or others, to the police and/or other protective services.

**How will my confidentiality be protected?**

Confidentiality refers to the data that you offer and how it will be safeguarded. Data from your interview will be transcribed by the investigator and kept in the sole possession of the investigator. No other person will have access to the recorded interview or transcription. Interviewees and/or their affiliated institutions will be de-identified through the use of chosen and/or assigned pseudonyms. Audio-recordings will be destroyed at the conclusion of the research project, and all hard-copy transcriptions will be shredded.

Electronic copies of transcriptions will be kept as a password-protected document on the investigator’s personal computer for a period of seven years. Only the investigator will know the password.

**What are the alternatives to being in this study? Do I have other choices?**

The alternative to being in this study is not to participate.

**What are my rights as a participant in this study?**

Taking part in this study is voluntary. It is your free choice. You can refuse to be in it at all. If you start the study, you can stop at any time. There will be no effect on your relations with the University of Alabama. The University of Alabama Institutional Review Board (“the IRB”) is the committee that protects the rights of people in research studies. The IRB may review study records from time to time to be sure that people in research studies are being treated fairly and that the study is being carried out as planned.
Who do I call if I have questions or problems?

If you have questions about the study right now, please ask them. If you have questions, concerns, or complaints about the study later on, please call the investigator, Marilyn Jane Holbrooks-Hamlett at 770-301-6988. If you have questions about your rights as a person in a research study, call Carpanato Myles, Director for Research Compliance at the University, at 205-348-846 or toll free at 1-877-820-3066.

You may also ask questions, make suggestions, or file complaints and concerns through the IRB Outreach website at http://osp.ua.edu/site/PRCO_Welcome.html or email us at participantoutreach@bama.ua.edu. After you participate, you are encouraged to complete the survey for research participants that is online at the outreach website or you may ask the investigator for a copy of it and mail it to the University Office for Research Compliance, Box 870104, 152 Rose Administration Building, Tuscaloosa, AL 35487-0104.

I have read this consent form. I have had a chance to ask questions. I agree to take part in it. I will receive a copy of this consent form to keep.

_______________________________________________________  ___________
Signature of Research Participant       Date

_______________________________________________________  ___________
Signature of Researcher        Date
R: Now I will begin audio-taping our interview. I want to ask you to take just a moment to reflect on your experiences as a science teacher in the middle school setting. During this interview, we will discuss your thoughts on the factors that you feel are playing a role in the decline of student science scores.

<table>
<thead>
<tr>
<th>Interview Question</th>
<th>Notes</th>
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<tbody>
<tr>
<td>In your opinion, what is achievement?</td>
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<tr>
<td>In your opinion, within your classes and reflecting on your years as an educator of science, are there differences between males and females regarding achievement?</td>
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<tr>
<td>Describe underachievement.</td>
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<tr>
<td>What have you noticed determines success in science?</td>
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<tr>
<td>What are strategies do you use to respond to underachieving students? Are the majority of students male or female?</td>
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<tr>
<td>Why do you think underachievement occurs in science?</td>
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<tr>
<td>For the past 4 years, there has been a noticeable drop in science scores at Sherwood Forest Middle School. What are possible explanations?</td>
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</table>
R: Thank you for your time and participation in this interview. If you would like to receive an executive summary of the research findings of this study, you are welcome to leave contact information on a separate sheet of paper. Please note that this summary may not be available for several months. If you have questions, concerns, or complaints about this study later on, you may reach me using the information listed on your copy of the informed consent. If you have questions about your rights as a person in a research study, you may contact Carpanato Myles, the Research Compliance Officer of the University, whose information is also located on the informed consent.