THE IMPACT OF A MATH TUTORING PROGRAM ON URBAN HIGH SCHOOL TUTORS

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A Thesis

Submitted to the Graduate College of Bowling Green State University in partial fulfillment of the requirements for the degree of

MASTER OF EDUCATION

August 2011

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The purpose of this study was to investigate and examine the impacts a math tutoring program had on student tutors at an urban high school. The study was structured upon a mixed method design as both quantitative and qualitative data were gathered. Quantitative data were collected from tutors’ math scores from state tests, math class grades, attendance records, and behavior incident reports. The tutors were matched to a similar sample group of students who did not participate in the math tutoring program for a group comparison. Independent samples t-tests were computed to conclude if math tutors significantly differed in academic and nonacademic outcomes when compared to a matched sample. Results from the independent t-tests revealed that there were no statistical significances between tutors and non-tutors in terms of 8th Grade Ohio Achievement Assessment Math scores, 8th Grade math class grades, first semester math class grades, and attendance rates for the 2010-11 academic school year. However, five current tutors who also participated in the math tutoring program during the 10th Grade outperformed their matched non-tutor students on the 10th Grade Math Ohio Graduation Test. None of the students in this study possessed a single behavior incident for the first semester of the 2010-11 academic school year. Math tutors and the program advisor were interviewed to collect qualitative data regarding the impacts the math tutoring program had on tutors. Tutors believed that their participation in the program helped in their preparation for future endeavors, increased their confidence levels, and increased the tutees’ confidence levels. Tutors expressed their desire to be at tutoring to help peers, which allowed them to better
understand math material and learn new material too. The tutors recognized that the tutoring program was a social and academic program and that math can be difficult for all students, which is why certain modifications were recommended that could reduce some of the struggles students encounter in the classroom. Overall, it was concluded that the math tutoring program positively impacted tutors and that the program allowed the students to feel confident and able to make a difference in the lives of others.
ACKNOWLEDGMENTS

I would first like to acknowledge Dr. John Fischer, Dr. Toni Sondergeld, and Dr. Tracy Huziak-Clark for their guidance and support in writing this thesis. I would also like to acknowledge my family and friends who have offered support and encouragement. You all are greatly appreciated.
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Purpose of Study and Research Questions

Findings by Research Question

Research question one: Do math tutors differ in academic and nonacademic outcomes when compared to a matched sample?

8th grade OAA math scores

8th grade math class grades

10th grade math OGT scores

First semester math class grades

First semester attendance rates

First semester behavior incidents
Research question two: What impact does the math tutoring program have on tutors? 

- Interview participants
- River High School tutors
- Math tutor training
- Math tutoring sessions
- Summary of findings

Tutors believe that the math tutoring program helps prepare them for future schooling, occupations, and situations.

Tutors believe that the math tutoring program has increased their math confidence levels.

Tutors believe that they make tutees feel more confident in their math abilities.

Tutors have a desire to attend math tutoring and help their peers.

Tutors believe that they understand and remember material because of their involvement in the math tutoring program.

Tutors feel that the math tutoring program is a social and academic program.

Tutors are aware that math can be a difficult subject for students.

Tutors believe modifications could be made in order to reduce student struggles.

Tutors believe certain situations prevent students from attending the math tutoring program.
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CHAPTER I: INTRODUCTION

Mathematics is typically considered to be one of the core subject areas in United States schools (U.S. Department of Education, 2004). Even though math is a core subject, I have heard several students ask teachers, “Why do I need to know math? I’m never going to use this after I graduate”. While the real meaning of mathematics might seem hidden for students and many adults, mathematics is actually “the bedrock of our modern world” (Roman, 2004, p. 16). According to Roman (2010), mathematics is important because it can be related to the real world, used to represent information, and even help make new discoveries.

To further support the importance of mathematics, it is one of the two subject areas that must be tested in United States schools per the No Child Left Behind (NCLB) law. According to NCLB, states must test students in reading and mathematics in grades 3-8 annually and at least once during grades 10-12 (Education Week, 2004). For the state of Ohio, students must take the Ohio Graduation Test (OGT), which measures the level of reading, writing, mathematics, science, and social studies skills expected of students at the end of the 10th Grade. The OGT is used to establish an aligned system of standards, assessments, and accountability for Ohio schools, while meeting the NCLB requirements for high school testing (Ohio Department of Education, 2010). NCLB aimed to accomplish high academic standards for all students and close the achievement gaps through accountability. To hold schools accountable, schools must bring all students up to the proficient level on state tests by the 2013-2014 academic school year (U.S. Department of Education, 2004). If students test at a proficient level, then the school will meet Adequate Yearly Progress (AYP). However, if the students fail to test at a proficient level, then the schools are subject to sanctions, which could include labeling a school as “needing improvement,” restructuring the school and making staff changes, and/or offering supplemental
educational services, including tutoring (Education Week, 2004; Kruger, Wandle, & Struzziero, 2007). Thus, having students learn math at a level of proficiency has never been so important to public schools as it is in the age of NCLB accountability.

GEAR UP

The GEAR UP\(^1\) program, an acronym for Gaining Early Awareness and Readiness for Undergraduate Programs, is a federally funded grant program “designed to increase the number of low-income students who are prepared to enter and succeed in postsecondary education” (U.S. Department of Education, 2010). I am affiliated with this program through Bowling Green State University’s branch, where it has collaborated with River High School\(^2\). Bowling Green State University’s GEAR UP (2010) program “seeks to increase students’ achievement scores, on-time graduation rates, and the percentage of students attending and completing post secondary education” (p. 3). River High School, a large inner-city school in Northwest Ohio, has failed to meet AYP in mathematics and reading and is on its third year of state required improvement (Ohio Department of Education, 2010). In Ohio, high school students must take and pass the five sections of the OGT in order to graduate and receive a diploma (Ohio Department of Education, 2010). Mathematics and reading are two sections of the OGT and the scores from these two sections help to determine AYP for high schools. The other three sections of the OGT include writing, science, and social studies.

Through the GEAR UP program at River High School, a math tutoring program was implemented during the 2006-07 academic school year and has continued every academic year since its inception. The math tutoring program is an intervention to increase the passage rate for students who take Algebra 1 and Geometry during the 9\(^{th}\) and 10\(^{th}\) Grades, which should also

\(^1\) U.S. Department of Education Grant Award Number P334A050257
\(^2\) River High School indicates a pseudonym
assist students with the content covered on the 10th Grade mathematics portion of the OGT. During the 2010-11 academic year, the program began to make accommodations for students who needed assistance with Algebra 2.

**River High School’s Math Tutoring Program**

River High School’s math tutoring program meets in the school’s cafeteria immediately after school on Monday and Wednesday afternoons for one hour. A majority of the tutees are 9th and 10th Grade students, as the program is mainly marketed to these grade levels. However, with the addition of Algebra 2 assistance, there have been some 11th and 12th Grade students who also participate as tutees in the program. Most 9th Grade students receive assistance in Algebra 1, while many 10th Grade students receive assistance in Geometry, which is the traditional track for college preparatory coursework at River High School.

Tutees receive assistance from the peer tutors, who are current students at River High School in Grades 10-12. While there is not an application process that students must go through in order to be considered a tutor, there are a few guidelines that the advisor of the program (a current math teacher at River High School) considers when accepting students as tutors. First, the advisor considers students who have already passed an algebra course. She then takes into account the students’ “willingness to participate, assist fellow students, and gain extra instruction and training from math teachers” (Advisor, personal communication, December 1, 2010).

Students are permitted to tutor other students in subject areas that they have already completed and passed or are currently completing. Tutors also go through a month of training before they actually assist fellow students. After the training month, tutees are allowed to attend the tutoring sessions and each tutee is assigned to a tutor based on the subject area. A typical tutoring session usually consists of tutors gathering supplies for tutees, assisting the tutees with
assignments and questions, keeping the tutees on task, and returning any supplies to the math tutoring carts. Once all items are returned and chairs are pushed in, students are permitted to leave. A more thorough discussion regarding the tutors, math tutor training, and the math tutoring sessions will follow in chapter four.

**Significance of the Study**

I have enjoyed mathematics throughout my entire school career and have always wanted to obtain a career that allowed me to work with mathematics. During my high school years, I took all of the honors math courses offered. I usually understood the material quickly and was able to assist my peers with the understanding of the material by explaining how I went about solving certain problems. While assisting other students, I found that I really enjoyed helping others and seeing my peers succeed. Because of my interest in mathematics and assisting others, I decided to obtain my undergraduate degree in mathematics education for students in grades 7-12.

During my first year of college, I was having a difficult time adjusting to the workload and pace of the classes. Therefore, I found myself struggling with the mathematics courses I was in because they covered a great deal of material in such a short time period. I decided to go to the math tutoring center on campus and also attended Supplemental Instruction (SI) sessions that were offered. An SI Leader, who was an upperclassman and had previously taken the math course earning an A, led the SI sessions. The sessions were free and voluntary, meaning students did not have to attend the sessions. Because the sessions were voluntary, only a few students actually attended. I found that the individual attention really helped me because I was able to ask the questions that I did not think of in class, but only thought of after starting my homework. It was beneficial for other students to be with me in the SI sessions because we could help one
another with explaining material and answering questions. I ended up receiving an A in both of my math courses and I have the math tutoring center and the SI sessions to acknowledge for that accomplishment.

Based on my grades and participation in class, I was recommended by my professors to become an SI Leader. I interviewed for the position and ended up being an SI Leader for Precalculus for one semester and an SI Leader for Calculus for three semesters. During those four semesters, I was able to assist students with the math material and practice the skills myself in order to fully remember the material. I had to think of different ways to present and explain the material, so that students found the sessions helpful. Not only did the SI sessions help me practice my skills, but it also helped me with my upper-level math courses, where the instructors assumed that we all remembered how to do material we learned in previous math courses.

I am now in graduate school and have been assisting with River High School’s after school math tutoring program for most of the school year. Because of my different educational experiences, I am aware that all students think and process information in different ways (Gollnick, Cavaliere, & Chinn, 2008). I am also aware that math is not a well-liked subject among students because students claim that the material is very challenging and is not relevant to what the students want to do in the future when they have their own occupations (Roman, 2004). Thus, students lack the interest to learn the mathematics material and often struggle with the material.

However, there is often assistance offered to students who need or want the additional help. Many schools and teachers offer tutoring programs or individual tutoring hours before or after school, such as River High School’s after school math tutoring program (Britz, Dixon, & McLaughlin, 1989; Cohen, Kulik, & Kulik, 1982; Early, 1998; Karsenty, 2009; Robinson,
During the tutoring hours, teachers and/or fellow students are available to assist students who are struggling with the math material or who just need the reassurance that they are understanding the material. Many people, including myself, see and understand how the tutees are benefiting from the tutoring experience, as they receive individual assistance and can ask questions that they may be afraid to ask in a classroom (Allen, 1976; Gaustad, 1993; Karsenty, 2009; Roscoe & Chi, 2007). However, the tutors are often overlooked as having been impacted from the tutoring experience. I found being a tutor to be personally helpful when I was in college, but I want to know if being a tutor is beneficial and how it impacts the urban high school student tutors that I work with and observe at River High School.

**Statement of the Problem**

The students I work with, both the tutors and the tutees, are much more diverse than the students who attended my own rural high school, where almost all of the students in the school were white. According to River High School’s 2009-10 School Year Report Card, the average daily student enrollment was 1,031 students. Of the 1,031 students, the following demographics were reported: 25.1% Black, non-Hispanic, 17.4% Hispanic, 3.2% Multi-Racial, 54.0% White, non-Hispanic, 69.3% Economically Disadvantaged, 3.9% Limited English Proficient, and 20.7% Students with Disabilities (Ohio Department of Education, 2010). Unfortunately, according to the school’s 2009-10 local report card and math scores on the OGT, River High School’s overall population of students has not performed well in mathematics. The data show that only 70.2% of 10th Grade students passed the math portion of the OGT in 2010 and 84.8% of 11th Grade students passed the test, neither meeting the state requirements of 75% and 85% respectively for state proficiency.
In an effort to meet students’ needs to succeed in math, River High School, in conjunction with the GEAR UP program, implemented an after school math tutoring program. Math tutoring programs can serve as a great outlet for students who are struggling with math, especially minority students. This is evident through the National Assessment of Educational Progress (NAEP) statistics from 2009. These statistics show that even though the overall average mathematics score increased since 2005 for all racial/ethnic groups, score gaps persisted between White students and their Black and Hispanic peers, with White students outperforming these groups. In addition, the score gaps in 2009 were not significantly different from corresponding gaps in 2005, even though all three racial/ethnic groups made gains in 2009 (National Center for Education Statistics, 2010). As these minority groups are present at River High School, the school is trying to provide students with extra assistance through the math tutoring program in order for the students to better achieve. While math achievement can have an effect on a student’s grade point average, it can also have a large impact on one’s future, as “low levels of math achievement serve as a serious barrier for entry into a large number of well-paying scientific and technical occupations in which African American and Hispanic students are strikingly underrepresented” (Robinson et al., 2005, p. 329). Therefore, it is worth researching the impact that the math tutoring program has on students at River High School, as there is much at stake for all students, especially the minority students.

Rationale

Students have utilized River High School’s math tutoring program for five academic years, thanks in part to the funding provided by GEAR UP. However, GEAR UP is currently in its last year at River High School and the funding for this program and other programs will be terminated at the end of the school year. If the math tutoring program is going to continue after
GEAR UP funds are no longer available, then the school district needs a good reason to fund this program. Therefore, data needs to be gathered to provide evidence that the math tutoring program does have a positive impact on students, including test scores, grades, attendance, and discipline. There has already been some research compiled on the effectiveness of the program based on tutee data. However, tutors make up a large portion of individuals present at the tutoring sessions. Therefore, it is also important to provide evidence to the district of the impact the math tutoring program has on the tutors.

**Purpose and Research Questions**

The purpose of this study is to investigate and examine the impacts a math tutoring program at an urban high school has on the student tutors involved in the program. In order to determine the impacts, this study will use a mixed method design approach. Both quantitative and qualitative data will be gathered and analyzed to answer the research questions involved in the study. The research questions for this study include the following:

1. Do math tutors differ in academic (OGT math test scores and math grades) and nonacademic (attendance and discipline) outcomes when compared to a matched sample?

2. What impact does the math tutoring program have on tutors?

As an individual who was previously a math tutor, and as a mathematics educator and a participant in the program now, it has become my interest to analyze the impacts the math tutoring program has on tutors at River High School and results from these research questions will provide an overall perspective on the impact the math tutoring program has on tutors.
Variables Defined

- **Math Tutoring Program – Independent Variable.** The math tutoring program refers to the after school math tutoring program sponsored by GEAR UP. The program typically consists of 11th and 12th Grade students who serve as tutors to the 9th and 10th Grade tutees. Participants in this study were either Tutors in the program or Non-Tutors having never participated in the program.

- **OGT Math Test Scores – Dependent Variable.** The OGT Math Test Scores refer to the scaled score a student receives on the 10th Grade Math Ohio Graduation Test. A score of 400 or above is referred to as proficient or above, while a score of 399 or below is below proficient.

- **Math Grades – Dependent Variable.** The math grades refer to an average math grade point average calculated from letter grades. For this study, the end of the year math grade was calculated for 8th grade, while the first semester math grade was calculated for the 2010-11 school year.

- **Attendance – Dependent Variable.** The attendance involves the number of days a student attended school for the academic school year. The total number of days a student was present during the school year is divided by the total number of days school was in session for the year in order to calculate an attendance rate for an academic school year.

- **Discipline – Dependent Variable.** Discipline refers to the total number of in-school suspensions and expulsions students receive during an academic school year.

- **Impact – Qualitative Variable.** Impact indicates the effects or impressions the math tutoring program has on tutors.
Tutoring is a commonly used form of remediation in schools today (Britz et al., 1989; Cohen et al., 1982; Early, 1998; Greenwood & Terry, 1993; Robinson et al., 2005). While conducting research, it is important to take into account the different types of tutoring programs and the many people involved. Also, one should be aware of the results of tutoring programs affecting schools and different types of content areas, such as mathematics. Although there has been a significant amount of research done concerning tutoring programs, there has not been a large amount of published research that deals with underserved high school students (Cohen et al., 1982; Early, 1998; Robinson et al., 2005; Roscoe & Chi, 2007). In fact, “many of the programs that address the problem of Black and Latino/a underachievement in secondary mathematics are out-of-school, off-site, and/or summer programs” (Walker, 2007, p. 57). Though there are limited findings on the mentioned topics, the findings do provide one with a solid foundation illustrating the benefits of math tutoring programs related to minority math achievement and performance.

**Tutoring Programs Across Content Areas**

There have been two major groups of people who have participated in being a tutor: teachers and students. As teachers are masters of their content area, they know how to explain concepts and the material to students. However, teachers are not the only sources for tutoring support. While the practice of students teaching fellow students dates back to the ancient Greek time period, it is becoming more common for tutoring programs to have students as the tutors, as the schools are not required to pay students for their service (Robinson et al., 2005). However, it is advised that some teachers should be present at the tutoring program to assist with any questions that peer tutors may not be able to answer (Roscoe & Chi, 2007).
Student tutors are referred to as peer tutors, who can also be categorized into two different groups. One group is the same-age tutors, in which the tutors and tutees are of a similar age or grade level. The other group is the cross-age tutors, which refers to tutors who are clearly more advanced in their age and grade level when compared to the tutee (Roscoe & Chi, 2007). At River High School, same-age tutoring is the main practice that has been implemented in the math tutoring program. Peer tutors are usually placed with at least one tutee and some tutors may work with up to three tutees during a session. There are usually at least four math teachers in attendance during the math tutoring to provide any assistance that is needed.

In addition to serving as after school programs, tutoring programs may also serve as an intervention for schools that have not been meeting AYP. The NCLB law orders schools to ensure that 100% of students test at levels identified as proficient in reading and mathematics by the end of the 2013-2014 academic year (Darling-Hammond, 2007). Schools that do not continually meet AYP are subject to sanctions, which can range from labeling a school as “needing improvement” to restructuring the school and making staff changes. If a school performs poorly, then the school will be scrutinized from the mass media, which could increase the pressure and competition among schools (Kruger et al., 2007). Therefore, some schools not meeting AYP provide their students with additional methods, other than the traditional schooling, to try to improve academic achievement and meet AYP.

River High School has failed to meet AYP and is on its third year of state required improvement (Ohio Department of Education, 2010). Because math is one of the two subjects that is tested and helps to determine the school’s AYP, River High School introduced and now uses the math tutoring program as an intervention, which is a part of the school’s improvement plan to try to achieve AYP.
**Tutoring Benefits Across Content Areas**

**Academics related to tutoring.** When people think of a tutoring program, they generally think of the tutees being the ones who benefit from the tutoring. However, both the tutors and the tutees benefit from the experience. The tutee benefits because the tutor adapts to the tutee’s cognitive needs, meaning they adapt instruction to the tutee’s pace, learning style, and level of understanding. The tutor also provides immediate feedback, identifies and resolves basic misunderstandings, and provides practice that is customized to the tutee’s readiness (Karsenty, 2009). Cohen et al. (1982) completed a meta-analysis, in which they studied and evaluated 65 different tutoring programs across the nation. While the meta-analysis showed that the tutoring programs had positive effects on the academic performance and attitudes of the tutees, the study also showed that the tutoring programs had positive effects on those who served as tutors. Of the 65 studies, 38 examined achievement effects on tutors, 16 detected changes in self-concept of tutors, and 5 examined changes in tutor attitudes toward the subject matter being taught. In 33 of the 38 studies investigating achievement, tutors performed better than did control students on examinations in the subject being taught. By organizing material to teach, tutors facilitate long-term retention and aided in the “formation of a more comprehensive and integrated understanding” (Gaustad, 1993, p. 2).

Tutors learn and understand content better as a result of a number of processes. For instance, the tutor needs to review the material, organize, prepare, and illustrate the material to present it to the tutee, and the tutor may try to reshape or reformulate the material so as to enable the tutee to learn it, which allows the tutor to see the material in new ways (Roscoe & Chi, 2007). The tutors also have the opportunity to practice and improve communication skills and work habits.
Self-esteem related to tutoring. Reviewers and researchers have not been in agreement on the factor of tutoring participants’ self-esteem. While Allen (1976) reported increased self-esteem for both the tutor and the tutee, Cohen et al. (1982) did not record any change in either the tutor’s or the tutee’s self-esteem as a result of a tutoring program. However, more recent studies present a more positive outlook. For instance, Early (1998) found that peer tutoring enhanced academic self-concept, which is the degree to which students feel positively toward themselves as students. In addition, a study of sixth grade students at-risk of dropping out of school showed that academic efficacy increased among math tutees after they participated in a four-month tutoring program (Robinson et al., 2005).

None of the studies reviewed exhibited a decrease in self-esteem related to participation in a tutoring program. In fact, one study examining peer and cross-age tutoring in high and low-achieving second and fourth grade students showed that self-esteem varied as a result of the tutor and tutee pairings (DePaulo, Tang, Webb, Hoover, Marsh, & Litowitz, 1989). If students were in high-achieving tutor and low-achieving tutee pairs, then students seemed to have relatively higher levels of self-esteem. The tutor’s self-esteem would rise as the tutor saw his/her tutee improve because the tutor would know that he/she made a meaningful contribution. In order to measure self-esteem, the Student Self-Concept Scale was administered before and after participation in the tutoring program, which required students to evaluate their own confidence levels in different situations, such as completing homework assignments and speaking up in class (Early, 1998). Overall, research has established that a well-planned tutoring program can improve student achievement and self-esteem (Gaustad, 1993).

Tutoring in urban schools. While racial and ethnic gaps in mathematics performance are small in early grades, by high school the gap in performance between Blacks and Latino/as,
and Asian and White students, has widened (Walker, 2007). This performance gap is probably why Black and Latino/a students generally report greater test anxiety than White students (Hurley & Padró, 2006). Many students who attend urban schools are not well prepared to learn and are often affected by poverty, drugs, alcohol, and poor health. Because of the low level of student achievement, high rates of teenage pregnancy, high levels of student dropout rates, and incidents of violence, many teachers do not want to work in these urban school environments (Gimbert, Bol, & Wallace, 2007). Due to the challenging school environments, urban schools struggle with attracting and hiring highly qualified teachers. Many teachers who are hired by the urban schools mainly perform drill and practice in the classroom because of the school environment and the pressure to try to get the students in their classroom to meet AYP (Darling-Hammond, 2007). Because several urban schools have many low-performing students, additional support is sometimes provided before or after school to assist students and raise students’ achievement levels.

In some urban schools, tutoring has had a positive impact on students and their mathematics performance. One study focused on sixth grade minority students at-risk for dropping out of school who participated in a cross-age math tutoring program with eighth grade tutors. This study revealed that the tutored group’s math performance improved more than a control group’s math performance on a modified version of the Texas Assessment of Academic Skills (TAAS) (Robinson et al., 2005). In another study, first graders, a majority of whom were minority students participating in a peer tutoring program, improved their performance on the mathematics section of the Stanford Achievement Test, whereas similar first graders who did not participate in the program did not improve their performance. Furthermore, Greenwood and Terry (1993) found that urban school students who participated in a peer-tutoring program in
first through fourth grades continued to show higher math scores on the Comprehensive Test of Basic Skills when in the sixth grade.

   Even the tutors in urban school settings make academic gains. In fact, academic gains made by tutors are not limited to the material they teach. In a study of inner-city sixth graders who had participated in a peer-tutoring program as first through fourth graders, students showed gains not only in language, reading, and math, which were the subjects tutored, but also in science and social studies, subjects which were not tutored (Greenwood & Terry, 1993). In addition, expertise in doing, learning, and teaching mathematics can be developed in ways by high school students, including the students who have been labeled as underachieving and uninterested in mathematics (Walker, 2007). Furthermore, prior research involving minority students indicates that tutoring increases the tutors’ mathematics achievement (Robinson et al., 2005).

Math Tutoring

   Overall, research supports that math tutoring programs have benefits for all who are involved. For example, a study of cross-age tutoring with fourth and fifth grade female tutees tutored by eleventh grade tutors showed that tutored students had greater gains in math performance on the California Achievement Test than the students not tutored. Similarly, a study involving tenth grade students at risk for failing math demonstrated that peer tutoring led to higher scores on the TAAS mathematics examination than did the students who did not receive tutoring (Robinson et al., 2005). However, few studies examine the tutors’ academic outcomes on state tests. One two-week study of at-risk tenth grade tutors, who were mostly white, experienced a greater increase in their TAAS mathematics scores than did a control group
of students with a similar initial achievement level (Early, 1998). However, the tutoring lasted only two weeks and contained mostly white students.

**Summary**

The act of tutoring has been around for many years and both teachers and students can serve as tutors. Tutoring is available for many subject areas and has had positive effects on the academic performance of students. In particular, tutoring is valuable for math students and benefits both the tutees and the tutors. However, a great deal of research focuses on the tutees, rather than the tutors. Even in some urban schools, tutoring has had positive impacts on math performance for students. Yet, there is little research that examines the impacts of math tutoring programs in urban high schools, which is why it is significant to conduct a study involving the impact a math tutoring program has on urban high school tutors.
CHAPTER III: METHODS AND PROCEDURES

Purpose and Research Questions

The purpose of this study is to examine the impacts a math tutoring program at an urban high school has on the student tutors involved in the program. This is important because the results of the study can be used to evaluate the effects that this program may have on the tutors. Furthermore, the results may be used as evidence to support the implementation of other tutoring programs as a resource for student achievement in mathematics. In order to examine the impacts, the following research questions have been developed:

1. Do math tutors differ in academic (OGT math test scores and math grades) and nonacademic (attendance and discipline) outcomes when compared to a matched sample?

2. What impact does the math tutoring program have on tutors?

The remainder of this chapter will introduce readers to the research design, participants involved, research instrumentation, procedures, the data analysis, and limitations of the study.

Research Design

This study was structured upon a mixed method design, which allows the researcher to use both quantitative and qualitative data to “uncover some unique variance which otherwise may have been neglected by a single method” (Jick, 1979, p. 603). Using a mixed method design allows one to utilize the benefits of one research method in order to offset the flaws of another research method. More specifically, the concurrent triangulation mixed method design was used for research, in which the quantitative and qualitative data were collected and analyzed at the same time and both types of data carried equal weight in terms of importance (Hanson, Creswell, Plano Clark, Petska, & Creswell, 2005).
The quantitative research was represented by the numerical data that was collected from the tutors’ math scores from the 8th Grade Ohio Achievement Assessment (OAA) and the 10th Grade OGT, math grades from the students’ 8th Grade math courses and current math courses, and attendance and discipline records from the tutors’ current 2010-11 school year. The tutors were matched to a similar sample group of students from River High School who did not participate in the math tutoring program and the same quantitative data were collected.

The qualitative research was represented by the data that were collected from participant observation and interviews with the tutors and the math tutoring program advisor. Participant observation allowed the researcher to carefully observe, systematically experience, and consciously record in detail the many aspects of the math tutoring program, which ultimately helped the researcher understand the setting, its participants, and their behaviors (Glesne, 1999). Interviewing allowed the researcher to understand the experience of other people and the meaning they make of that experience (Seidman, 2006). This mixed method design was specifically useful for explaining relationships between the math tutoring program and the tutors.

This study was also structured upon a causal-comparative quantitative research design. A causal-comparative research design allows a researcher “to try to understand the relationship/association between group membership and the outcome variable(s)” (Mertler & Charles, 2008, p. 1). The researcher tried to understand the relationship between group membership in the math tutoring program and six different dependent variables. Membership in the math tutoring program served as the independent variable, which was not manipulated by the researcher. Group membership served as a naturally occurring variable because tutors self-selected to be in the program or not and thus there was no researcher manipulation of the
independent or grouping variable. Students who did not participate in the math tutoring program functioned as a comparison group to the tutors from the math tutoring program.

In addition to being a causal-comparative research design, this study was also considered a case study because the researcher was able to explore a phenomenon, the math tutoring program, through the use of different data sources (Baxter & Jack, 2008). Because of the different data sources, the researcher was able to ensure that the study was not explored through just one lens and was capable of understanding several components of the math tutoring program. More specifically, this study was an intrinsic, single case study because the researcher had a “genuine interest in the case” and wanted to “better understand the case” (Baxter & Jack, 2008, p. 548). The researcher closely collaborated with the math tutoring participants, while allowing the participants to describe their own views and stories of the math tutoring program.

Participants

Quantitative stage. The participants of this study consisted of students who were tutors for the 2010-11 academic school year. For the quantitative data, all junior and senior tutors who assisted for at least one tutoring session for the academic year and attended River Middle School\(^3\) were included. Tutors were all matched to a sample comparison group of students at River High School who also attended River Middle School, but did not participate in the math tutoring program at the high school. By using a matched sample of students with the tutors, the researcher was able to compare the two groups to see if there were any significant differences between these two groups.

There were sixteen tutors included in this study. The tutors were comprised of thirteen Caucasian students and three Hispanic students, which was all self-reported data provided by the

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\(^3\) River Middle School indicates a pseudonym
students to the school district. Included in this group, there were thirteen female students and three male students. Furthermore, six of the students were seniors and ten students were juniors. Socio-economic status was determined by the students’ affiliation with free/reduced lunches, in which eleven of the students received free/reduced lunches and five did not receive free/reduced lunches. None of the tutors were classified as special education students.

The comparison group of students, who were not tutors at River High School, had matching demographics as the tutors, with the exception of two students. The tutors were matched to a comparison group of non-tutors from River High School based on grade level, gender, ethnicity, socio-economic status, special education, and the 8th Grade OAA Math scores. There were two senior, female tutors who could not be matched to non-tutors according to the socio-economic status. The two female tutors received free/reduced lunches, but the matched non-tutor students did not receive free/reduced lunches. However, these students were similar in all other aspects, including 8th Grade OAA Math scores.

**Qualitative stage.** From the sixteen math tutors included in the study, eight of the tutors provided their assent with parent consent to be interviewed. Because of time constraints and schedule conflicts, only six of the eight eligible tutors were interviewed. The researcher interviewed three junior students and three senior students. Only one tutor was male and the other five tutors were female. All tutors interviewed were Caucasian, three tutors received free/reduced lunches, and the other three students did not receive free/reduced lunches. The math tutoring program advisor was also interviewed and she served as a Geometry teacher at River High School.
Instrumentation and Procedures

Quantitative stage. All of the quantitative data, except for the state test scores, had already been collected from the GEAR UP program before this study, meaning that the tutor sample just needed to be targeted in order to obtain the data. However, the tutor sample still needed to be matched with a group of students similar to the tutors, but not students who currently were or had previously been participants in the math tutoring program. Therefore, the researcher made a group comparison by matching the tutors to similar students who were not participants of the math tutoring program. Again, the tutors were matched to a comparison group of non-tutors from River High School based on grade level, gender, ethnicity, socio-economic status, special education, and the 8th Grade OAA Math scores. The OAA Math scores were included when matching students to make certain that students were statistically similar in their mathematical abilities before students entered high school and were allowed to participate in the math tutoring program. Other data that were included for the study and for further analysis included the students’ 8th Grade math classes, their final 8th Grade math class grade, their current math class for the 2010-11 academic year, their first semester final math class grade for the academic year, their math tutoring average program involvement duration, their school attendance rate for the first semester of this academic year, and their number of behavior incidents for the first semester of this academic year. The math grades, attendance rates, and behavior incidents were only reported using first semester data for the 2010-11 school year because these data were what the researcher had access to collect the time of data collection.

The researcher was given permission and obtained the state test scores for the tutors and the matched sample students from River High School’s principal. Both state math tests, the 8th Grade OAA and 10th Grade OGT, have a similar scoring system. Students receive a scaled
score, which is considered to be proficient or above or below proficient. If students score below proficient, then their scaled score is 399 or below, and is either considered to be at a limited or basic performance level. Students who receive a score of 400 or above are considered to be proficient or above, with a proficient, accelerated, or advanced performance level.

For matching purposes, the researcher matched a tutor’s 8th Grade OAA Math score with a sample student’s score as close as possible to the original scaled score and within the same performance level. The scaled score required to achieve a certain performance level in Math does not change from administration to administration (Ohio Department of Education, 2010). Therefore, a score of less than 379 was considered to be at the limited performance level, 379-399 was basic, 400-431 was proficient, 432-458 was accelerated, and a score above 459 was advanced (Refer to Table 1). The researcher also took into account the standard error of measurement for the scaled scores by ensuring that each tutor and their matched non-tutor were within one standard error of measurement of each other. For the May 2007 administration of the 8th Grade Math OAA, the standard error of measurement was 9.76. Likewise, the standard error of measurement for the May 2008 administration was 9.44. Thus, when matching the senior students, the standard error of measurement of 9.76 was used to match their 8th Grade test scores. The standard error of measurement of 9.44 was used in order to match the 8th Grade test scores of the junior students.
Table 1

8th Grade Math OAA Scaled Scores and Performance Levels

<table>
<thead>
<tr>
<th>Scaled Score</th>
<th>Performance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>459-550</td>
<td>Advanced</td>
</tr>
<tr>
<td>432-458</td>
<td>Accelerated</td>
</tr>
<tr>
<td>400-431</td>
<td>Proficient</td>
</tr>
<tr>
<td>379-399</td>
<td>Basic</td>
</tr>
<tr>
<td>278-379</td>
<td>Limited</td>
</tr>
</tbody>
</table>

Similar to the 8th Grade Math OAA, the 10th Grade Math OGT also had scaled scores that fell within performance levels that did not change from administration to administration yet were not identical to the 8th Grade Math OAAs (Refer to Table 2). A 10th Grade Math OGT scaled score of 252-383 was considered to be at the limited performance level, 384-399 was basic, 400-424 was proficient, 425-443 was accelerated, and 444-557 was advanced (Ohio Department of Education, 2010). The current senior students took the state test during the March 2009 administration, whereas the juniors were administered the state test in March 2010. Once all of the necessary data was gathered and after the tutors were matched up with similar students, the researcher analyzed all of the quantitative data.
Table 2

10th Grade Math OGT Scaled Scores and Performance Levels

<table>
<thead>
<tr>
<th>Scaled Score</th>
<th>Performance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>444-557</td>
<td>Advanced</td>
</tr>
<tr>
<td>425-443</td>
<td>Accelerated</td>
</tr>
<tr>
<td>400-424</td>
<td>Proficient</td>
</tr>
<tr>
<td>384-399</td>
<td>Basic</td>
</tr>
<tr>
<td>252-383</td>
<td>Limited</td>
</tr>
</tbody>
</table>

**Qualitative stage.** Qualitative data were gathered from participant observation and structured interviews (Glesne, 1999). For a majority of the school year, the researcher was a participant observer. After the first three months of math tutoring, the researcher created fourteen interview questions based on information that would not be attainable through quantitative designs. For example, the questions allowed the researcher to understand why the students decided to participate in the program and what the students felt they received because of their involvement in the program. The questions concentrated on the details of the tutors’ experiences that were of specific interest to the researcher (Refer to Appendix C). The tutors were interviewed separately during their lunch period or after school and each interview took around 20-30 minutes to complete. In addition, the math tutoring program advisor was also interviewed in order to receive more input about math tutors’ experiences and the impact the program might have on students. Because the advisor was also a teacher at River High School, the researcher thought that the advisor may be able to elaborate on her own thoughts and
observations from the program and her classroom. The advisor’s interview lasted about 40 minutes.

After the interviews were conducted, each interview was transcribed and a member check was performed. The member checks involved the sharing of interview transcripts, diagnostic thoughts, and drafts with the individuals involved in the study (Mertler, 2009). Member checks were completed with each tutor approximately two weeks after all interviews concluded. All six of the tutors felt that their thoughts were expressed appropriately and only a couple of comments were made regarding some of the wording that tutors used in their interview transcripts.

**Data Analysis**

**Quantitative stage.** The quantitative data were used to answer the following question: Do math tutors differ in academic (OGT math test scores and math grades) and nonacademic (attendance and discipline) outcomes when compared to a matched sample? To analyze these data, multiple independent samples t-tests were computed using the web-based data analysis system StatCrunch. For all of the tests, the independent variable remained the same, as it was program membership (tutor vs. non-tutor). However, there were different dependent variables for each test. The dependent variables consisted of the 8th Grade OAA Math scores, 8th Grade math class grades, the 10th Grade Math OGT scores, and first semester math class grades, attendance rates, and behavior incidents for this academic year.

All of the independent samples t-tests were computed to determine if a statistically significant difference existed in the dependent variables between the tutors from the math tutoring program and that of the matched group of students who did not participate in the program. The researcher did not want there to be a statistically significant difference between the 8th Grade OAA Math scores of the tutors and that of the matched sample in order to ensure
that the matched sample was indeed a proper match before any students were able to participate in the math tutoring program in high school. The t-value (t), mean (M), standard deviation (SD), p-value (p), and effect size ($r^2$) of each matched group were calculated and compared to determine if there were any statistically significant or practically significant differences. It was determined by the researcher that 0.05 would serve as the alpha level for the significance testing in order to decrease the chance of a Type I error. The assumptions about the t-test of independent samples were that each population was normally distributed and had equal variances.

**Qualitative stage.** The researcher served as a participant observer and interviewed six tutors and the math tutoring program advisor to gather qualitative data. Through participant observation, the researcher developed a sense of trust with the tutors, which allowed the tutors to share information with the researcher what otherwise they might not have shared (Glesne, 1999). After the tutors and advisor were interviewed, the researcher transcribed each interview and all transcripts were coded for assertions and warrants. Assertions are statements that the researcher believes to be true and can support with the interviewees’ data, while warrants are the statements that the interviewees make that support the assertion (Erickson, 1986). These data were then transformed into narratives in order to address the following research question: What impact does the math tutoring program have on tutors? Therefore, the researcher analyzed the interview transcripts, developed codes for assertions and warrants, and created narratives from the coded work. The codes were not pre-established, but rather they emerged as the researcher began sorting and defining the collected data. Codes were not pre-established because the researcher thought there might be a loss of important findings and themes that developed if a prior coding was used. Hence, coding was progressive, as the researcher first developed major code clumps
from the sorted data, then the major codes were broken down into subcodes, and then the data clumps were put into a meaningful sequence in order to piece together the assertions and warrants to create the narratives (Glesne, 1999).

**Limitations**

**Quantitative stage.** In regards to quantitative data, this study only examined the tutors from the 2010-11 academic year, meaning that it might not have included students who were tutors from the previous school year. Because the study only focused on one academic year, it could have excluded previous tutors who were still at River High School and may have excluded diverse students. In addition, this research narrowed in on a small population of students at one school, meaning that this study may not be comparable to other urban high school math tutoring programs. This showed a lack of external validity and ecological validity because the results from River High School may not be able to be generalized to another urban school that has more ethnic diversity or even to a suburban or rural school. However, to limit some of the external factors’ influence on the study, the researcher went through great lengths to match similar students based on many demographics that have been shown to influence academic and nonacademic outcomes. There was also a lack of internal validity, especially with the quantitative data, because there could have been other factors or variables that impacted the students’ outcomes rather than the math tutoring program.

Another limitation was the lack of differential selection, since there was not a random selection of tutors in the math tutoring program and students who were not in the program. For instance, it could be that the people who chose to be in the math tutoring program were qualitatively different than those students who did not choose to be in the program; this difference could be what really impacted the student outcomes more so than the participation in
the math tutoring program. One final and serious limitation for this study was the sample size. Having a small sample size makes it very difficult to find statistical significance because there is not enough power to do so. In addition, the researcher was only working with students who were at the proficient performance level in math in the 8th Grade, meaning that the researcher had a somewhat limited range for this dependent variable. Therefore, the researcher was most likely not going to find differences in academic findings because the study dealt with very few high performing students.

**Qualitative stage.** One of the limitations for qualitative research was the subjectivity of the researcher when interpreting the qualitative interviews, especially since the researcher was more of a participant than an observer in the math tutoring program. There are several ways a researcher may choose to interpret certain things that were said during an interview (Glesne, 1999). Therefore, in order to recognize the subjectivity, the researcher performed a member check for each interview in order for the interview participants to verify that their perspectives were reflected accurately (Glesne, 1999). The researcher took the transcriptions back to the tutors and the advisor who were interviewed in order for them to reaffirm what they said. This process, as well as the collection of data from multiple sources, added to the trustworthiness and credibility of the qualitative research.

Another limitation is that some tutors and/or the advisor may have been uncomfortable when they were tape recorded during the interview. To minimize this limitation, the tutors and advisor were informed of the tape recorder before the interview began and the tape recorder was placed to the side of the table, so that the participant was not constantly reminded of the device. Another limitation with the interviews could include the fear that tutors and/or the advisor may have developed based on their responses. The participants could have provided answers that
were considered socially desirable, instead of giving their honest thoughts or opinions because of fear that others might identify them and somehow reprimand or punish them because of their responses. To minimize this limitation, the researcher achieved trustworthiness by taking part in the math tutoring program and building rapport with the participants. Additionally, the tutors and math tutoring advisor were provided a copy of their consent form before the interview, which explained that their responses would not be used against them and that their name would be replaced with a pseudonym in order to conceal their identity.

Summary

A mixed method design was used to conduct the research. Quantitative data was collected to gain perspective on any relationships between the math tutoring program and the tutors’ scores on the Math OGT and tutors’ grades, attendance, and discipline in school. The researcher was a participant observer and six tutors and the math tutoring program advisor were asked to participate in interviews, which were designed to further investigate any impacts that the math tutoring program had on the tutors. After the completion of the interviews, each interview was analyzed and coded for pertinent evidence to answer and elaborate on the research questions. The results of the mixed method design are presented in the following chapter.
CHAPTER IV: RESULTS

Purpose of Study and Research Questions

The purpose of this study was to investigate the impacts a math tutoring program had on urban high school tutors. Previous research has shown that tutoring programs have had positive impacts on participants in urban schools (Greenwood & Terry, 1993, Robinson et al., 2005, Walker, 2007). However, little research existed regarding the impacts math tutoring programs had on tutors in urban high schools. Therefore, research was conducted on a math tutoring program at the urban River High School. The research questions that were the focus of this study were:

1. Do math tutors differ in academic (OGT math test scores and math grades) and nonacademic (attendance and discipline) outcomes when compared to a matched sample?
2. What impact does the math tutoring program have on tutors?

Findings by Research Question

The results of this research study are presented by research question for organization and simplicity. While there are two research questions, all data was collected simultaneously and helped the researcher further understand the impact the math tutoring program had on urban high school tutors.

Research question one: Do math tutors differ in academic and nonacademic outcomes when compared to a matched sample? The quantitative results that were found for this research question were computed using the web-based data analysis system StatCrunch. Independent samples t-tests were computed in which the independent variable remained the same for all tests. Program membership (tutor vs. non-tutor) was considered to be the independent
variable whereas there were six different dependent variables. The six dependent variables consisted of the 8th Grade OAA Math scores, 8th Grade math class grades, the 10th Grade Math OGT scores, first semester math class grades from this academic year, first semester attendance rates from this academic year, and first semester behavior incidents from this academic year. Each t-test was used to indicate if there was any significant difference between the tutors in the math tutoring program and the matched sample of non-tutors who have not participated in the math tutoring program.

8th grade OAA math scores. Tutors (M=409.5, SD=19.35) and non-tutors (M=408.44, SD=18.34) did not have significantly different 8th Grade OAA Math scores; t(30)=0.16, p=0.8744, two-tailed. The effect size was considered small ($r^2=0.00085$) with only 0.085% of the variance in OAA Math scores accounted for by group membership. This result is expected and desired since the researcher purposefully matched the tutors’ OAA scores with similar students’ scores who did not participate in the math tutoring program. Both tutors and non-tutors on average scored in the proficient performance level for the OAA Math section (400 – 431). By matching these students by their OAA Math scores and other data, such as gender, ethnicity, socio-economic status, and special education status, the researcher was assuring that the tutors and the non-tutors were indeed similar in River Middle School’s 8th Grade classes before any students entered River High School and were allowed to participate in the math tutoring program.

8th grade math class grades. Tutors (M=2.28, SD=0.93) and non-tutors (M=2.32, SD=1.27) did not have significantly different 8th Grade math class grades; t(30)=−0.11, p=0.9109, two-tailed. The effect size was considered small ($r^2=0.00040$) with merely 0.040% of the variance in math class grades accounted for by group membership. While the researcher did not
match students based on math class grades, the independent t-test still revealed that there was no statistical difference between the 8th Grade math grades for the students who became tutors in high school and the students who did not participate in the math tutoring program while in high school. Both tutors and non-tutors on average received final grades that were equivalent to a C+ for their 8th Grade math courses. Therefore, this is additional support that shows the students who became tutors and the students who did not participate in the math tutoring program while in high school were appropriately matched in that the tutors and non-tutors were similar in 8th Grade before students could take part in the math tutoring program.

10th grade math OGT scores. The state of Ohio only requires high school students to take a standardized test, the OGT, during their 10th Grade year. Most of the tutors at River High School are junior or senior students, similar to the students in this study. It is not as common for students to be tutors in the 10th grade, since many sophomore students are completing Geometry, which is one of the tutored subjects at math tutoring. However, five of the current tutors in this study were also math tutors during their 10th Grade year at River High School, which is why only these five tutors’ scores can be shared (See Table 3). Because of the small sample size of students who were actually tutors when they completed the OGT during their 10th Grade year, an independent samples t-test was not computed and statistical significance cannot be assessed. Nonetheless, there is still practical significance relevant to these Math OGT scores. The five tutors and the matched non-tutor students in this study were similar in the 8th Grade because they all scored on average in the proficient performance level. For the 10th Grade Math OGT, both tutors and non-tutors on average scored above proficient (400). However, the tutors on average scored in the advanced performance level (M=462), whereas the matched non-tutors on average scored in the accelerated performance level (M=439.6), which is one level below the tutors.
Therefore, both tutors and non-tutors scored well above proficient, but the tutors scored in the highest category while the non-tutors only scoring in the second highest category.

Table 3

*State Test Score Comparisons*

<table>
<thead>
<tr>
<th></th>
<th>8&lt;sup&gt;th&lt;/sup&gt; Grade</th>
<th>10&lt;sup&gt;th&lt;/sup&gt; Grade</th>
<th>Matched Non-Tutors</th>
<th>8&lt;sup&gt;th&lt;/sup&gt; Grade</th>
<th>10&lt;sup&gt;th&lt;/sup&gt; Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tutors</td>
<td>OAA Math Score</td>
<td>OGT Math Score</td>
<td>Non-Tutors</td>
<td>OAA Math Score</td>
<td>OGT Math Score</td>
</tr>
<tr>
<td>Tutor 1</td>
<td>436</td>
<td>474</td>
<td>Non-Tutor 1</td>
<td>432</td>
<td>464</td>
</tr>
<tr>
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<td>409</td>
<td>442</td>
<td>Non-Tutor 2</td>
<td>407</td>
<td>404</td>
</tr>
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<td>474</td>
<td>Non-Tutor 3</td>
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<td>478</td>
<td>Non-Tutor 4</td>
<td>428</td>
<td>446</td>
</tr>
<tr>
<td>Tutor 5</td>
<td>423</td>
<td>442</td>
<td>Non-Tutor 5</td>
<td>420</td>
<td>440</td>
</tr>
</tbody>
</table>

*First semester math class grades.* All of the tutors were enrolled in a math class at River High School this academic school year, except for one senior student. Therefore, first semester math class grades were collected for the tutors and their matched non-tutors, except for the senior student and her matched non-tutor. From the math class grades collected, tutors (M=2.55, SD=0.82) and non-tutors (M=2.04, SD=0.98) did not have significantly different first semester math class grades from this academic school year; t(28)=1.54, p=0.1353, two-tailed. The effect size was considered medium (r<sup>2</sup>=0.078) with 7.8% of the variance in math class grades accounted for by group membership. While there were not statistically significant differences found between tutors and non-tutors on their first semester math grades for this academic year, there is a practical significance to the findings. Both tutors and non-tutors on average did not
receive failing grades for their first semester math courses, yet the tutors on average received final semester grades equivalent to a C+ and the non-tutors on average only received final grades equivalent to a C for their first semester math class from this academic school year.

**First semester attendance rates.** Tutors (M=90.70, SD=5.03) and non-tutors (M=89.20, SD=6.78) did not have significantly different first semester attendance rates for this academic school year; t(30)=0.71, p=0.4848, two-tailed. The effect size was considered small ($r^2=0.017$) with 1.7% of the variance in attendance rates accounted for by group membership. Both tutors and non-tutors on average attended school around 90% of the time during their first semester of this academic year. In fact, out of the 88-day first semester for River High School, tutors on average attended school for 79.8 days and the non-tutors on average only attended school for 78.5 days for the first semester of this academic year. Therefore, tutors on average attended school 1.3 more days than students who did not participate in the math tutoring program for the first semester of this academic school year.

**First semester behavior incidents.** Both the tutors (M=0) and non-tutors (M=0) did not have a single behavior incident reported for their first semester of this academic school year. In fact, compared to the overall school average of behavior incidents of 0.708 incidents per student at River High School, both the tutors and their matched non-tutors were below the school average.

Table 4 shows a summary of results for the academic and nonacademic outcomes for this study. The table shows the comparison of the math tutors and students who did not participate in the math tutoring program during high school (non-tutors) on several different dependent variables.
Table 4

Results for the Academic and Nonacademic Outcomes for the Matched Sample on the Dependent Variables

<table>
<thead>
<tr>
<th></th>
<th>Tutors</th>
<th>Non-Tutors</th>
<th>t-value</th>
<th>df</th>
<th>p (two-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8th Grade OAA Math Scores</td>
<td>409.5</td>
<td>408.44</td>
<td>0.16</td>
<td>30</td>
<td>0.8744</td>
</tr>
<tr>
<td>8th Grade Math Class Grades</td>
<td>2.28</td>
<td>2.32</td>
<td>-0.11</td>
<td>30</td>
<td>0.9109</td>
</tr>
<tr>
<td>10th Grade OGT Math Scores</td>
<td>462</td>
<td>439.6</td>
<td>*</td>
<td>8</td>
<td>*</td>
</tr>
<tr>
<td>First Semester Math Class Grades</td>
<td>2.55</td>
<td>2.04</td>
<td>1.54</td>
<td>28</td>
<td>0.1353</td>
</tr>
<tr>
<td>First Semester Attendance Rates</td>
<td>90.70</td>
<td>89.20</td>
<td>0.71</td>
<td>30</td>
<td>0.4848</td>
</tr>
<tr>
<td>First Semester Behavior Incidents</td>
<td>0.00</td>
<td>0.00</td>
<td>*</td>
<td>30</td>
<td>*</td>
</tr>
</tbody>
</table>

Note. *Independent samples t-test not computed.

Research question two: What impact does the math tutoring program have on tutors?

Interview participants. The qualitative results that were found for this research question were coded from student interviews. I interviewed six tutors from the math tutoring program. Three of the students were juniors, while the other three were seniors. Susan, Jill, and Joe are all juniors at River High School. Susan is currently taking Algebra 2 and is an Algebra 1 tutor. Last year, she participated in the tutoring program as both a Geometry tutee and an Algebra 1 tutor. Jill is taking Algebra 2 and is also an Algebra 2 tutor. She was a tutor during her sophomore year for both Geometry and Algebra 1. Joe is an Algebra 1 tutor and is currently in an Honors Algebra 2 class. He was a tutee during his freshmen and sophomore years of high school. Ann, Brenda, and Pam are all seniors this academic year. Ann was a tutor last year and

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4 All students names have been replaced with pseudonyms
is a tutor again this year; depending on where extra help is needed, she tutors students in Geometry and Algebra 1. She is currently taking Precalculus. Brenda is a Geometry tutor and is currently in a Measurement and Analysis class. This is Brenda’s first year participating in the math tutoring program, but she has many friends in the program who were previous participants and have told her about the program. Finally, Pam is an Algebra 1 tutor and in not enrolled in a math course this year. She participated as a tutee during her freshmen, sophomore, and junior years of high school. (See Table 5 for specific information involving each tutor interviewed and the tutors’ tutoring experiences.)

River High School tutors. All of the tutors did not just voluntarily ask to be a tutor. While there is not an application process that students must go through in order to be considered a tutor, there are a few guidelines that the advisor of the program considers when accepting students as tutors. The advisor of the math tutoring program is a current math teacher at River High School. First, the advisor considers students who have already passed an algebra course. She then takes into account the students’ “willingness to participate, assist fellow students, and gain extra instruction and training from math teachers” (Advisor, personal communication, December 1, 2010). The advisor is aware that all students are not perfect in mathematics and will have some room to improve, but she wants to make certain that the tutors have a maturity level and personality that she considers appropriate for working with others. A current tutor even made a comment about how she could not think of any other students who should be a tutor because all of the students she could think of were already current tutors. Pam stated, “All of them I can think of were tutors that I really knew because the advisor made sure that if you were at that level, then she wanted you there to help out” (personal communication, March 15, 2011). Many tutors are currently enrolled in or have been in the advisor’s class, which means that the
Table 5

*Specific Information Regarding Tutors and Their Tutoring Experiences*

<table>
<thead>
<tr>
<th>Tutor Name</th>
<th>Grade</th>
<th>Tutoring Class Enrollment</th>
<th>Tutoring Subject</th>
<th>Previous Tutoring Experience</th>
<th>Previous Tutee Experience (Grade Level)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Susan</td>
<td>11</td>
<td>Algebra 2</td>
<td>-Algebra 1</td>
<td>-Algebra 1 (10)</td>
<td>-Geometry (10)</td>
</tr>
<tr>
<td>Jill</td>
<td>11</td>
<td>Algebra 2</td>
<td>-Algebra 2</td>
<td>-Geometry (10)</td>
<td>-None</td>
</tr>
<tr>
<td>Joe</td>
<td>11</td>
<td>Honors Algebra 2</td>
<td>-Algebra 1</td>
<td>-None</td>
<td>-Algebra 1 (9)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-Geometry (10)</td>
</tr>
<tr>
<td>Ann</td>
<td>12</td>
<td>Precalculus</td>
<td>-Geometry</td>
<td>-Geometry (11)</td>
<td>-None</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-Algebra 1</td>
<td>-Algebra 1 (11)</td>
<td></td>
</tr>
<tr>
<td>Brenda</td>
<td>12</td>
<td>Measurement &amp; Analysis</td>
<td>-Geometry</td>
<td>-None</td>
<td>-None</td>
</tr>
<tr>
<td>Pam</td>
<td>12</td>
<td>Not Enrolled in a Math Class</td>
<td>-Algebra 1</td>
<td>-None</td>
<td>-Algebra 1 (9)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-Algebra 1 (10)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-Geometry (11)</td>
</tr>
</tbody>
</table>
advisor is able to judge whether or not the student will make a suitable tutor. She even accepts students who receive C’s and D’s in their math classes because she believes that these students are sometimes better tutors than the tutors who receive A’s and B’s in their math classes. The advisor stated,

Actually, sometimes those students are more patient and willing to explain and take the time because they went through the struggles themselves versus someone, it’s so easy for them. So, they don’t give it a second thought and they have a hard time trying to explain because they say they did it in their head. (personal communication, April 27, 2011)

Thus, many students at River High School are permitted and encouraged to be tutors, including the students who do not receive high math grades because those students know how it feels to struggle with math material and they are willing to work with and not give up on other struggling math students.

The math tutoring program advisor is aware that a majority of the tutors are female and white students. She mentioned that when she recruits students, gender and race are not part of the criteria. However, she believes that females decide to be tutors because “they are more nurturing than males, which is one of the qualities of being a tutor” (Advisor, personal communication, April 27, 2011). In addition, the advisor thinks that sports are a factor that prevents some males from being a tutor, since there are seasonal sports throughout the majority of the school year. The advisor does not consider race/ethnicity as a criteria for being a tutor either as she is originally from a different country and culture. She mentioned that she is accepting to all students and believes that transportation and family life prevent students from being tutors and living in an urban environment may also have an impact on attendance.
**Math tutor training.** Students are permitted to tutor other students in subject areas that they have already completed and passed or are currently completing. Tutors also go through a training process before they actually assist fellow students. The math tutoring program does not officially start for tutors and tutees until the second whole month of the school year. The first whole month of school is devoted to training the student tutors. Tutor training takes place during the same days and times when the actual tutoring sessions would occur. Therefore, tutors receive around 8-9 hours of training in one month. During the training sessions, tutors are given worksheets in order to practice their algebra skills and their specific tutoring subject area skills, which include Algebra 1, Geometry, and Algebra 2. Students are encouraged to think about how they would explain certain material to other students who may be struggling with the content. Depending on the number of teachers present at the training sessions, the students can also be split up into their tutoring subjects and a teacher can assist each subject group with specific skills and ways to explain content to others. After the training month, tutees are allowed to attend the tutoring sessions and each tutee is assigned to a tutor based on the subject area. If potential tutors were not able to attend any of the training because of another after school activity, they still have to go through a training process when they begin to regularly attend the tutoring sessions. However, the training is not as extensive, as the tutor only has to complete practice worksheets for up to two weeks. Tutors are not paid for their service, but they are eligible to receive a convenience store gift card each school quarter if they attend at least 75% of the tutoring sessions (participant observation notes).

**Math tutoring sessions.** A typical afternoon of math tutoring consists of the tutees and the tutors gathering in the cafeteria. Math teachers are also present, as they provide any assistance to their students and any other participants who need help. At the beginning of the
session, four carts are rolled out of a locked storage space inside the cafeteria. Three carts are file carts, which contain Algebra 1, Geometry, and Algebra 2 content materials. The other cart is stocked with materials for the participants’ use, which includes pencils, scrap paper, calculators, individual-sized dry-erase boards, dry-erase markers, math course content books for each subject represented, and a file folder for each math teacher at the school. If students have additional time to complete the worksheets from the file carts after their homework is completed, then the tutors may select a worksheet for the student based on the pacing guide provided by the math teachers. The pacing guide is an outline of the curriculum covered week-by-week for all three designated math courses represented at the sessions. After all of the carts are rolled out and students sign in for the day, it usually takes around 5-10 minutes for the students to sit in their assigned areas and begin their homework or assigned worksheet from the file cart (participant observation notes).

Each tutee is assigned to a tutor, with some tutees assigned to the same tutor. The tutor is responsible for keeping the tutee or tutees on task. During the tutoring sessions, the school rules still apply, which means that students must follow the dress code and students are not allowed to use any technological devices, unless they ask for permission. The conversations between tutors and tutees should be kept at a minimum, unless it is math-related. However, there is always constant talking, as many tutors help explain concepts to tutees or tutees ask questions regarding the content and homework. When there are only five minutes remaining, tutors start gathering materials and returning them to the respective carts. If the tutees worked on any worksheets from the carts, the tutor can place the worksheet in the tutee’s respective teacher’s file folder, in which the teacher will collect any worksheets at the end of the quarter and may decide to count the completed worksheets as extra credit. Once the designated time arrives, all participants must
push in their chairs, clean up their areas, and are allowed to leave. Only the students who leave before the designated time are required to sign out on the appropriate sheet of paper (participant observation notes). Through their various tutoring experiences, tutors do feel that the math tutoring program has had some impact on their lives.

**Summary of findings.** Table 6 shows a summary of findings regarding the impacts the math tutoring program had on tutors for this study. These findings were gathered from interviews that were conducted with current math tutoring program tutors and the math tutoring program advisor. Each finding is further explained in the remainder of this chapter. (See Table 6 for a summary of findings.)

**Tutors believe that the math tutoring program helps prepare them for future schooling, occupations, and situations.** A majority of the tutors believe that their participation in the math tutoring program is helping prepare them for their future endeavors. For instance, all of the tutors I interviewed plan to attend an undergraduate program following high school. Four of the students plan to be admitted into a medical program, while the other two students aspire to attend school for the arts and architecture. Regardless of their plans, all of the tutors expressed that they will have to take math courses following high school and that they are not too concerned because of their experience in the math tutoring program. Ann mentioned that being a tutor will help her get into college, obtain scholarships, and “it looks good on an application” (personal communication, February 23, 2011). Susan also thinks that her tutoring experience will be a great asset on college applications, but she really believes that the experience will increase her problem solving skills. Because mathematics involves a great deal of problem solving, Susan hopes that she will be able to apply her skills to real world problems that she has not yet encountered during her final year of high school and beyond.
## Summary of Findings Regarding the Impacts the Math Tutoring Program has on Tutors

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Key Findings</th>
</tr>
</thead>
</table>
| **What impact does the math tutoring program have on tutors?** | • Tutors believe that the math tutoring program helps prepare them for future schooling, occupations, and situations.  
• Tutors believe that the math tutoring program has increased their math confidence levels.  
• Tutors believe that they make tutees feel more confident in their math abilities.  
• Tutors have a desire to attend math tutoring and help their peers.  
• Tutors believe that they understand and remember material because of their involvement in the math tutoring program.  
• Tutors feel that the math tutoring program is a social and academic program.  
• Tutors are aware that math can be a difficult subject for students.  
• Tutors believe modifications could be made in order to reduce student struggles.  
• Tutors believe certain situations prevent students from attending the math tutoring program. |

Not only do the students believe the math tutoring program helps prepare them for future careers, but Pam commented on how being a tutor has helped her realize that she may not always agree with others and their opinions. Therefore, her experiences have helped her to become more patient and courteous. For instance, Pam stated, “You do tend to get a person [tutee] that you do not like because they’ll complain the whole time and it is not fun for either of us” (personal communication, March 15, 2011). She realizes that when she leaves high school and obtains a job, she will have to try her best to be a team player, even if others are not as complacent as she is. Therefore, the students believe that their experiences as a tutor will be beneficial and help them prepare for their future schooling, occupations, and situations.

**Tutors believe that the math tutoring program has increased their math confidence levels.** The tutors also believe that the math tutoring program has increased their math confidence levels. Jill mentioned, “it gives me better understanding of what I’ve learned. Like, I might get something, but I get it even more when I come here because I go through it a couple of times” (personal communication, March 21, 2011). Because Jill gets to practice with the math material more than once at the tutoring sessions, she feel more confident with the material when answering questions and completing homework for her Algebra 2 class. All of the other tutors also expressed their confidence in their math classes, except for Ann. Ann does not feel as confident as she has in her previous math classes because she is currently in Precalculus and finds the content very difficult. However, she does feel confident when tutoring a student at the math tutoring program because she is confident in her algebra and geometry abilities. The other tutors interviewed also feel confident when tutoring a student, except Pam conveyed some hesitation. Pam communicated, “There are times when you are a little on the edge because you never learned material, so you had to teach yourself really quick” (personal communication,
March 15, 2011). She explained that she is usually confident when tutoring a student, until the
tutee asks her a question and he/she wants immediate feedback. Nonetheless, Pam realizes that
she should still feel confident during those situations because she is the tutor and is “more
knowledgeable of the math” content (personal communication, March 15, 2011).

One tutor shared that he was confident when tutoring students and more confident in his
math abilities and classes because he loves math. Joe stated, “Math has always been my favorite
subject” (personal communication, March 14, 2011). In fact, several of the tutors expressed their
favorable interests of mathematics and how their interest in the subject helped contribute to their
confidence levels. One student, Brenda, mentioned that she somewhat enjoyed math before
participating in the math tutoring program. However, now that she has been a tutor, she enjoys
math a lot more and feels more confident in her math class. The students seem to really enjoy
mathematics, which helps contribute to their confidence in their math classes and when tutoring
fellow students.

Tutors strongly believe that they make a difference and are able to make the tutees feel more confident
in their mathematical abilities. A few tutors expressed that their tutees learn from them because
they are similar in age and are able to explain the math material in a different way than the
tutee’s teacher. Brenda suggested that because her tutee gets the help he needs from her during
math tutoring, “he does a lot better in his math class” (personal communication, February 23,
2011). Ann added to Brenda’s comment when she stated, “I think they get more knowledge
about what they’re doing and confidence in what they’re doing because they know that if they
don’t do it right, then they have someone there to help them” (personal communication, February
23, 2011). Students are sometimes too afraid to speak up and ask questions in class, which is
why the tutor encourages the tutee to ask questions and try difficult problems when they are working together. Because the tutors are confident in their math abilities, they are able to assist the tutees and make the tutees feel more confident in their own math abilities by answering questions and correcting any misconceptions.

**Tutors have a desire to attend math tutoring and help their peers.** Not only do the tutors feel confident and able to assist the tutees, but the tutors actually want to be at math tutoring and help their peers. The tutors are willing to give up their time to attend math tutoring because they enjoy helping other students at a one-on-one level. Tutors seem to find enjoyment in helping others and even receive an increase in self-esteem because they are aware that they are trying to make a difference and help another student with the understanding of a difficult subject. Pam shared her positive feedback when she stated, “It’s a fun experience to show another student how to do a math problem if they don’t understand it. They might also learn more with a student, rather than a teacher” (personal communication, March 15, 2011). Pam really enjoys attending the math tutoring program because of the variety of people and she is able to show other students that math does not have to be stressful and confusing, but it can be fun. Jill reiterates the comments that Pam made because she admitted, “If I understand it, then I want other people to understand it too, so I don’t have to feel bad that I get something and they don’t” (personal communication, March 21, 2011). These tutors all expressed their desire and willingness to help other students because they feel better about themselves and feel that they made a difference by attending the tutoring sessions.

**Tutors believe that they understand and remember material because of their involvement in the math tutoring program.** Tutors believe that by assisting other students, they understand and remember material better and actually learn new material too. Ann articulated
that it is normal to forget certain math terms and formulas. However, because of her regular attendance at the math tutoring program, she remembers a lot more material now when compared to when she first began her tutoring experience. Ann stated, “I remember formulas I never thought I would be able to remember because I see them more often at math tutoring” (personal communication, February 23, 2011). Joe, Brenda, Susan, and Jill also commented on how their participation in the program increased their math knowledge and they now have a better understanding of material they learned in previous years of high school. Brenda even said, “I now show my work more and my grades have gone up because I am a tutor” (personal communication, February 23, 2011). The tutors also made it clear that they even received help from other tutors and teachers whenever they had questions regarding their own math homework. By receiving the assistance at the math tutoring program, the students did not have to worry about getting home and not knowing how to do their homework for the evening. The experience allows them to help other students, ask their own questions, and increase their math skills because of the exposure and practice they are experiencing with the math material.

Pam also mentioned that her math skills got better with time, but what surprised her the most was her social status. The math tutoring program made Pam feel important because she felt like she was looked up to and she was no longer treated as “an equal in class” (personal communication, March 15, 2011). Jill also noticed that other students looked up to her because she was a tutor and it made her act more responsible. As a tutor, the students get to assist tutees, but they feel that they also benefit from the experience because they understand material better, learn new material, increase their math grades, and feel like a role model to other students.

*Tutors feel that the math tutoring program is a social and academic program.* While the tutors and tutees work hard during the tutoring sessions, the math tutoring program advisor
sometimes enjoys rewarding the students for their drive and determination. Over the 2010-11 academic year, there has been at least one event each month where tutoring is not taking place. For example, the tutors and tutees were able to travel to a nearby university and receive a tour, watch a football game, and eat a nice meal at a sports restaurant in October. The students also participated in a Thanksgiving potluck. Tutors had a winter gift exchange and pizza party. In January, all students were invited to go to a science center for an afternoon of exploration. The students hosted their own Math Family Fun Night during the month of February, in which the students had several student-run stations and invited the community to come and learn about math in fun and interactive ways. Students attended a pizza and Nintendo Wii games party in March. In the remaining months, there are plans for baseball games and hosting a car wash fundraiser (participant observation notes).

Because of all of the extra events that the math tutoring program advisor plans and coordinates, many of the tutors feel that the program is a social program, as well as an academic program. Ann even commented, “It’s more of like a social club because we get to have a bunch of fun activities along with the actual tutoring” (personal communication, February 23, 2011). Joe’s favorite part about math tutoring is that he gets to help students with math and spend time with friends. However, he also appreciates the extra group outings, such as the visitation to the nearby university because it helps him to see how university classes are different from high school classes and how college is not as easy as he was originally thinking. Joe believes that the non-tutoring activities are an “initiative to keep going and helping people…like a prize for helping” (personal communication, March 14, 2011). Brenda and Pam also enjoy the extra activities and the social aspects of math tutoring. Both tutors mentioned that the math tutoring program and the additional activities have helped them develop better communication skills and
become more outgoing and comfortable talking with other people. Brenda revealed, “I used to be really shy and the tutoring program is getting me out of my comfort bubble” (personal communication, February 23, 2011). Hence, the math tutoring program and the extra activities associated with the program allow the tutors to feel like they are a part of a social group and improve their communication skills.

**Tutors are aware that math can be a difficult subject for students.** While the tutors are very knowledgeable of their math material, they also realize that math can be difficult for some students, including themselves. Most of the tutors stated that they were nervous or scared about future math courses they might have to take, especially Calculus. Susan said that she was scared of Calculus because other students told her it was really hard and she saw some of the Calculus homework. Jill also commented, “Calculus sounds scary because everyone else has made it sound scary” (personal communication, March 21, 2011). Pam is worried about future math classes, especially college math courses, because she does not know if she will be able to keep up with the pace of the course or if she will understand how the professor teaches. Even though the students are worried about future math courses, they believe that they will still be able to pass their math courses because they know there is extra assistance available. Ann stated, “I know that even if I do struggle, there’s always people that will be able to help me. There’s always math tutoring programs out there in college too” (personal communication, February 23, 2011). Therefore, because of their commitment to their own math tutoring program, the students are aware that there will still be assistance in college if they struggle with coursework.

**Tutors believe modifications could be made in order to reduce student struggles.** The tutors believe that certain modifications could be made in math classrooms in order to reduce some of the struggles students encounter. Similar to the math tutoring program and the one-on-
one assistance, the tutors think that teachers should provide more one-on-one time with students in order for students to learn more. For instance, Brenda mentioned, “More one-on-one time in the classroom would help me learn more” (personal communication, February 23, 2011). Susan also commented that she struggled with a past math class because the teacher was going too fast and she could not get the one-on-one help that she needed. Brenda mentioned that sometimes she did not pay attention in class because it was not interesting. Therefore, she recommended that teachers get more involved and “instead of just writing notes on the board, teachers should explain the material through games or other activities” (personal communication, February 23, 2011). Jill also recommended that math teachers provide students with more activities in the classroom and to give more than one explanation in class, since not all students understand certain material by just hearing it said one time.

Additionally, Jill noted that teachers should recognize students more often when they improve or solve complicated problems. Pam agreed with Jill and stated, “Positive feedback will help build a student’s confidence” (personal communication, March 21, 2011). These tutors are willing to share their opinions about changes that need to be made in the math classroom because they encounter the student tutees that struggle and come to the math tutoring program to receive assistance because the students struggled with the math material in the classroom. Consequently, the tutors believe that there should be more one-on-one time between the teacher and students, more interactive activities, group work, more than one explanation, and positive affirmations in the classroom.

_Tutors believe certain situations prevent students from attending the math tutoring program._ In addition to some struggles students face in the classroom, tutors commented on situations that impact attendance at the math tutoring program. Some students have issues with
transportation after school. Only a few of the math tutoring participants can legally drive, which means students have to rely on parents, friends, or the city bus system. For some students, it is very difficult for their parents to pick them up an hour after school. Therefore, a few students choose to walk home. However, some tutors do not feel safe walking home because it requires them to walk long distances and through neighborhoods that are unsafe. Joe commented, “I do not like walking home because I don’t feel safe. I will sometimes skip math tutoring if I know that someone can’t pick me up and I will have to walk home” (personal communication, March 14, 2011). Hence, some students find a ride home or walk with a group immediately after school in order to arrive home safely. Therefore, parents, transportation, and the neighborhood have some impact on whether or not students stay after school to attend math tutoring.

Because of the inconsistency of tutees that attend math tutoring, some math tutors have been mentally impacted and decide to stop coming to the program too. When the tutors go to the math tutoring program, they feel like they have a job to do, since they are in charge of helping others students who struggle with math. The tutors get some satisfaction from helping other students. Therefore, when tutees do not show up, “tutors do take it personal and they feel like they are not accomplishing anything” (Pam, personal communication, March 15, 2011). The students do not feel like wasting an hour of their time after school if nobody is going to show up, which is why they also stop attending.

Some tutors think that more students would participate in the math tutoring program if the program was more relaxed. Because the program is an extension of the school day, students must follow the school dress code. The school day is roughly seven hours long and students must wear a collared shirt, which must be tucked into their solid-colored pants. Pam mentioned, “You have to be in straight uniform and sometimes I just want to crack and take off my collared
shirt and relax for a moment or so, but you have to set an example to the underclassmen”
(personal communication, March 15, 2011). Some students decide to just leave and go home
immediately after school in order to relax and change clothes. Other students decide that they
would rather attend other after school activities, such as sport teams.

While the math tutoring program advisor understands that some of the sports prevent
students from participating in the math tutoring program, she recognizes that some of the student
athletes could use assistance with their math work and should put more emphasis on academics,
instead of sports. She strongly believes that the math tutoring program is beneficial for many
students, since it allows students to work in a quiet environment and gives them the opportunity
to get questions answered and finish homework before they go home to different situations that
may prevent them from working on homework.

Summary

The results presented in this chapter outline the research questions posed in this study.
For the first research question, the data results showed that there were not significant statistical
differences when comparing tutors and the non-tutor matched sample students. However, there
were practical significances when comparing 10th Grade Math OGT scores and first semester
math class grades, attendance rates, and discipline incidents from this academic school year.

The second research question involved qualitative data from participant observation and
interviews. Tutors and the math tutoring program advisor agreed that the tutors’ participation in
the program helped prepare them for future success and increased their math confidence levels
and self-esteem by helping others. Material was remembered and understood more through the
tutors’ participation in the program and students recognized that math is sometimes difficult,
which is why certain modifications could be made to math classrooms. In addition, tutors
expressed their thoughts on the program being social and academic and situations that impacted attendance at the math tutoring program.
CHAPTER V: CONCLUSIONS

Summary of the Study

Mathematics is one of the core subject areas in schools and can be related to the real world and used to represent information (Roman, 2010). In fact, mathematics is one of the two subjects areas that is tested in United States schools as a way to hold schools accountable. One method used to help sustain accountability and improve math achievement among students is the use of math tutoring programs. Previous research supports that tutoring programs, similar to the one at River High School, have resulted in more positive effects on the academic performance and attitudes of students who participated in these types of programs (Cohen et al., 1982). However, little research existed regarding the impacts a math tutoring program had on urban high school tutors. Therefore, this study was designed to research any impacts River High School’s math tutoring program had on the urban high school tutors. The research conducted in this study was done through mixed methods to answer two essential research questions.

Quantitative data, which included students’ state test scores, math grades, attendance rates, and discipline records, were gathered for sixteen tutors from the math tutoring program and a matched sample of students who did not participate in the program. This data were analyzed to gauge whether tutors differed in academic and nonacademic outcomes when compared to a matched sample. To further the study, the researcher was a participant observer and six tutors and the math tutoring program advisor were asked to participate in interviews in order to gather qualitative data. The interview questions allowed the individuals to express the different experiences tutors had and the impact the math tutoring program might have had on the tutors’ lives. Upon analyzing the quantitative and qualitative data, there were some positive findings related to tutors for each research question involved.
Discussion of Findings

Research question one: Do math tutors differ in academic and nonacademic outcomes when compared to a matched sample?

Academic outcomes. Overall, there were not any significant statistical differences between the tutors in the math tutoring program and the matched sample of students who did not participate in the program. Even though there were not any statistical differences, there was still practical significance to the findings. For instance, while there were only five tutors from this academic school year who were also tutors during their 10th Grade year when they completed the Math OGT, the tutors on average scored in the advanced performance level and their matched non-tutors on average only scored in the accelerated performance level for the OGT Math section. While in the 8th Grade, the tutors and non-tutors on average all scored in the proficient performance level for the OAA Math section. Therefore, both groups of students seemed to perform better on the standardized test in the 10th Grade, but the tutors outperformed their matched non-tutors after they began participating in the math tutoring program. The literature also supports this idea as Cohen et al. (1982) found that tutors performed better than did control students on examinations in the subject being taught. More specifically, at-risk tenth grade tutors, who were mostly white, experienced a greater increase in their TAAS mathematics scores than did a control group of students with a similar initial achievement level in a two-week study (Early, 1998). Early’s study is similar to this study because most of the tutors were white and they all attended an urban high school. However, this study lasted for most of the academic school year, instead of only two weeks. One reason that the difference was not statistically significant is due to the small sample size. If the sample were larger, the findings may have been different.
Tutors and non-tutors did not have significantly different first semester math class grades from this academic school year, but a practical significance still existed. While in 8th Grade, the tutors and non-tutors on average all received final grades that were equivalent to a C+. However, for their first semester math courses for this academic year, the tutors on average received final grades equivalent to a C+ and the non-tutors on average only received final grades equivalent to a C. Even though there was not a statistical difference, the tutors seemed to receive better grades than the students who did not participate in the math tutoring program. In fact, the tutors on average maintained their passing math grades for this academic year and some even improved from their 8th Grade year to obtain an average math grade of a B-, while the non-tutors on average received lower math grades than the C+ grade they received during 8th Grade. This supports past research, which found that tutoring increased the tutors’ mathematics achievement, especially in minority students (Cohen et al., 1982; Robinson et al., 2005). Even though the tutors’ math grades may seem somewhat low to some readers, the math tutoring program advisor mentioned that she accepted students as tutors who received lower math grades because those students are sometimes better tutors than the tutors who receive higher grades in their math classes. While the tutors on average received a first semester grade equivalent to a C+ for their math class this year, they still managed to receive on average a higher final first semester grade than the non-tutors.

**Nonacademic outcomes.** There was not a significant difference between tutors and non-tutors regarding their first semester attendance rates for this academic school year. Out of the 88-day first semester for River High School, tutors on average attended school for 79.8 days (90.7% of the time) and the non-tutors on average attended school for 78.5 days (89.2% of the time) for the school year. Therefore, tutors on average missed 8.2 school days while the non-
tutors on average missed 9.5 school days. Per the NCLB law, schools must meet AYP goals set for reading and mathematics proficiency, attendance rate, and graduation rate. If student groups do not meet AYP in reading and/or mathematics proficiency, attendance rate, or graduation rate, then the school does not meet AYP (Ohio Department of Education, 2010). For the 2010-11 school year, the AYP attendance rate goal is 93.0%, which means that a school can meet AYP if they achieve an attendance rate that is at or above the AYP goal. While neither the tutors nor the non-tutors would have met the AYP goal if the goal was based off of the first semester, the tutors involved in the math tutoring program on average had better attendance records than the non-tutoring students. Therefore, it seems that the school and teachers should be supporting the math tutoring program and attempting to get more students to participate in order to try to increase attendance rates, meet AYP, and avoid being subjected to sanctions (Darling-Hammond, 2007).

Tutors and non-tutors did not have significantly different first semester behavior incident reports for this academic school year because both groups of students did not receive a single behavior incident. In fact, compared to the overall school average of behavior incidents of 0.708 incidents per student at River High School, both the tutors and their matched non-tutors were below the school average. One reason for the lack of behavior incidents is because these students are 11th and 12th Grade students and the vast majority of behavior issues occur with younger students. Because the students are still enrolled and attending River High School in 11th and 12th Grade, these students tend to not cause trouble (Barton, Coley, & Wenglinsky, 1998). This is positive news for River High School because it shows that teachers might be able to focus more on teaching, instead of disciplining students when they are in the presence of the students involved in this study. Many highly qualified teachers do not want to work in urban school environments because of low student achievement levels, high levels of student dropout rates,
and behavior incidents (Gimbert et al., 2007). Therefore, if more students were involved in the math tutoring program, there might not be on average as many behavior incidents and students might attend school more often. With these positive results from the tutors involved in the math tutoring program, more highly qualified teachers might be willing to work in urban school environments, such as River High School.

**Research question two: What impact does the math tutoring program have on tutors?** The interviews with the tutors and math tutoring program advisor provided positive data regarding the math tutoring program. A majority of the tutors believe that their participation in the math tutoring program is helping prepare them for their future endeavors, such as college and future math classes that they may be required to take. Because students feel that being a tutor is preparing them for their futures, they might be more encouraged to attend school regularly in order to be as prepared as possible. This information could contribute to why tutors on average attended school more often during the first semester of the academic year when compared to their matched non-tutor students. Tutors think that they will have to take future math classes in college, which is why they might want to work hard right now and try to achieve acceptable grades in high school, such as a B- or C+. Robinson et al. (2005) support this in their research, which found that tutoring increases the tutors’ mathematics achievement. Additionally, tutors mentioned that they have become more patient and courteous because of working with tutees with differing achievement levels. Therefore, the tutors might be less likely to cause behavioral problems because they are becoming more patient and courteous of others.

Tutors also expressed that the math tutoring program has increased their own confidence levels in their math classes and when tutoring a tutee. Because the students are consistently working with math material, they better understand the material and seem to enjoy math more.
In addition to their own confidence levels, the tutors believe that they do make a difference and are able to make the tutees feel more confident in their math abilities. Both the tutors and tutees feel more confident because they are working one-on-one, tutors are able to answer any questions the tutees have, and tutors are able to explain the material in different ways until the tutee understands. The tutors actually want to be at math tutoring to help their peers because they feel that they make a difference in the lives of their peers and they feel an increase in their own self-esteem from helping others. Allen (1976) also reported increased self-esteem for both the tutor and the tutee in his own research. DePaulo et al. (1989) even commented that the tutor’s self-esteem rises as a tutor sees his/her tutee improve because the tutor knows that he/she made a meaningful contribution. It is possible that the five tutors scored on average in the advanced performance level on the OGT Math section because they felt more confident in their mathematical abilities when compared to when they took their last standardized test in the 8th Grade. Another reason for the higher first semester attendance rates for the academic year may be because tutors feel like they make a difference in the lives of their tutees, which may cause the tutors to attend school more often in order to help others and increase their own self-esteem.

Gaustad (1993) found in her research that tutors retain and understand material more because they have to organize the material first in order to assist tutees. The tutors from River High School also expressed that they understand and remember material better and actually learn new material because of assisting other students in the math tutoring program. Because the students are constantly working with math material in their own math classroom and at math tutoring, they are able to show their work more often. They are even able to assist other tutors with their own math coursework. The tutors may have scored on average in the advanced performance level for the OGT Math section and received on average first semester grades
equivalent to a C+ because they are constantly practicing and working with math material. In addition, tutors believed that they were looked up to as role models, especially by the tutees. Because they feel like their peers are looking up to them, the tutors mentioned that they try to act more responsible. Therefore, the lack of behavior incidents for tutors during the first semester of the school year may be contributed to the fact that tutors are more mature because they are upperclassmen and try to act responsible in order to set a positive example and serve as role models for other students.

Tutors may also attend school more frequently because they get to spend time with friends during math tutoring. Many of the tutors expressed that they felt math tutoring was both a social and academic program, meaning that they get to spend time with friends and help others at the same time. Some tutors commented that being a math tutor has really helped them develop better communication skills and allowed them to become more outgoing because they have to build rapport with tutees and other participants in the program. Roscoe and Chi (2007) also support this as they found that tutors have the opportunity to practice and improve communication skills and work habits. While tutors enjoy their time at math tutoring, they do realize that math can be difficult for some students, including themselves sometimes. However, because of their own experience in the program, tutors are aware that they will still be able to receive assistance from others while in college, which could help them achieve higher math grades.

Tutors also made some recommendations for what could be altered in math classrooms in order to reduce some of the struggles students and tutees encounter. The recommendations the tutors made could also assist in improving OGT Math scores, math grades, and even attendance rates and behavior incidents. Tutors suggested that teachers should provide more one-on-one
assistance in the classroom, have students participate in classroom activities and group work instead of always having the students take notes at their seats, and provide positive feedback when appropriate. Students feel that if these changes were made, students would not struggle as much with math material and they would be more excited about attending their math class, since there would be some variety in the classroom and they would not know what to expect. Instead of the traditional note taking, tutors feel that they would be more engaged and there would be less behavioral disruptions if the suggested changes were implemented into the math classrooms.

Overall, the study conducted at River High School was different from other studies in the field because it involved the tutors, instead of the tutees. While there were many studies involving the tutees, there were few studies that focused on the tutors of a math tutoring program. In addition, the few studies that did involve tutors were not set in an urban environment. There was one two-week study of at-risk tenth grade tutors, who were mostly white, who experienced a greater increase in their TAAS mathematics scores than did a control group of students with a similar initial achievement level (Early, 1998). However, the tutoring only lasted two weeks, whereas River High School’s math tutoring program lasts for the entire school year with the exception of the tutor training month. Although there was limited research regarding urban tutors in a math tutoring program, the findings from the River High School tutors were similar to other tutor findings from studies in the field.

Conclusions and Implications

The findings of this study have revealed a number of meaningful positive results and impacts that support tutors and tutoring programs. Both the quantitative and qualitative data collected serve as crucial supporting evidence of the positive impacts on tutors. These results can especially be used as evidence for other urban schools to begin the implementation of a math
tutoring program. Walker (2007) mentioned that expertise in doing, learning, and teaching mathematics can be developed in ways by high school students, including the students who have been labeled as underachieving and uninterested in mathematics, similar to students in urban high schools. This is important because it reveals that even underachieving students can benefit from being a tutor. Being a tutor allows a student to feel more confident because of all the exposure to math material and the assistance the tutor provides to tutees. In addition, tutors feel that they are able to make a difference in the lives of others because they are assisting and teaching their peers about math. Because tutors feel more confident and consider themselves as role models to others, they want to continue to attend the math tutoring program regularly.

Findings from this study will benefit students, teachers, parents, administrators, and other schools thinking about implementing a tutoring program, especially a math tutoring program. Students should find this study beneficial because it reveals that even if a student does not receive straight A’s, he/she can still be a tutor and be positively impacted. Because tutors are seeing and working with math material in their own math class and during math tutoring, the tutors are constantly practicing their skills, they are able to remember and understand material better, and they become more confident in their math abilities (Roscoe & Chi, 2007). Even if students are not interested in becoming a tutor, this study should help convince students to participate in a tutoring program as a tutee if they are struggling with material because peer-tutors are able to explain material in different ways and answer any questions that a tutee may have (Gaustad, 1993).

This study is important for math instructors, especially the math teachers at River High School, because tutors provided some recommendations that could help reduce students’ struggles in the math classroom. Math teachers at River High School should use the information
from this study as evidence to support the fact that the math tutoring program can be and was beneficial to many students who served as tutors. In particular, this study revealed that on average tutors tested at the advanced performance level of the OGT Math section, which is above proficient. Additionally, tutors on average attended school during the first semester of the academic year more often than students who did not participate in the math tutoring program. As math proficiency and attendance are both factors that help determine AYP, these results should allow teachers and school administrators to see that the math tutoring program can be used as an intervention to help the school try to achieve AYP, especially since students earn more “points” by performing at the advanced and accelerated performance levels than the lower performance levels on the state test (Ohio Department of Education, 2010). Therefore, teachers should encourage more students to attend the math tutoring program and recruit more students to become tutors. Other research reinforces the success of peer tutoring, especially for inner-city students (Robinson et al., 2005).

The findings from this study can also be used by parents of students who attend River High School to demonstrate the positive impacts the math tutoring program has on tutors. Parents should realize the benefits of being a tutor or a participant in the math tutoring program and figure out a way to encourage their students to attend the program and a way for the students to arrive home safely when the tutoring hour concludes. In addition, administrators and other members of the school district should process this information and understand the impacts the math tutoring program has on tutors. This study should provide enough evidence that the math tutoring program does in fact have positive impacts on students, which is why this program should continue to be funded when GEAR UP funds are no longer available. Finally, other school districts can use the findings from this study to assist in the implementation of a math
tutoring program. The same principles of this research can even be generalized to implement tutoring programs for other subject areas.

River High School’s math tutoring program is a well-established program and runs with very few problems. The tutor training month is very useful and necessary for students, especially for new tutors. While the training is beneficial for students, training could be even more enhanced if additional math teachers were involved in the training. If several math teachers contributed their time, then tutors would be able to ask more questions involving certain math material and ask questions about different scenarios that could occur during tutoring. This training would allow tutors to feel more prepared for when tutoring begins with the tutees. The actual tutoring sessions with tutors and tutees operate smoothly. One reason the sessions run smoothly is because students must follow the school dress code and technological devices are not allowed, such as cell phones and music players. Without these rules in place, students could become distracted and the tutoring session could get out of hand. The math tutoring program is a place where students are able to work quietly with other students in order to get questions answered and try to complete homework before they go home to different situations that may prevent students from looking at the math material until the following day in school. Therefore, these rules should continue to be enforced in order to maintain order and ensure that the math tutoring program is a place for students to receive assistance.

This study raises new questions about the diversity of students who agree or volunteer to tutor. The math tutoring program advisor does not consider gender or race/ethnicity as criteria when asking students to be a tutor. It is interesting and raises a concern that the majority of the tutors are Caucasian, female students. Therefore, one question raised is what should be done in the future to get more diverse students involved in the tutoring program as tutors?
Even with this lack of diversity, this study added new insight to the research already available. Many of the tutors mentioned that while they may be a little worried about future math courses they may have to take in college, they believe that they will still be able to pass their math courses because they know there is extra assistance available. Students who have never participated in a tutoring program sometimes are unaware of assistance opportunities in college or are too uncomfortable about receiving assistance, which forces the students to struggle with material, instead of receiving help (Petress, 1999). Because of their tutoring experiences in high school, the tutors know that there are also tutoring programs in college or other assistance programs that are available, which can help them if they ever struggle with any material.

**Recommendations for Improvement**

There are a couple issues that should be addressed in order to improve the impact of the math tutoring program in the future. One issue that impacts the attendance of tutors and tutees is transportation after the tutoring sessions conclude. This issue should be addressed and different ideas should be discussed to try to improve the transportation problem. One idea may be to have a meeting with the math tutoring program participants’ parents/guardians in order to discuss the benefits of math tutoring and why parents should encourage their students to attend the program. In addition, the parents could discuss amongst themselves different carpool situations or other scenarios that would allow their children to leave the math tutoring program and arrive home safely. Another idea may be to have the math tutoring program take place before school begins. Instead of the hour after school, students could arrive to school an hour early and attend math tutoring. Many students already get to school early and sit in the cafeteria while they wait for the first bell to ring to signal them to go to their first hour class. Therefore, these students could be asking questions and receiving assistance with their math material, instead of just sitting and
talking with friends. It could be beneficial to have the tutoring program in the morning because
students would have had the previous night to look at their math material and figure out what
questions they have regarding the material. Even if the students were not able to look at the
math material the previous night, the students could still go to the math tutoring program and
work on their homework and ask questions as they arise. The school’s administration would
need to grant permission and math teachers and student tutors would need to be available to
assist for an hour before school, but this is another idea that could help improve the attendance
issue. In addition, students who usually participate in after school sports could participate in the
math tutoring program, if it were to take place before school.

One additional issue that should be addressed in the future is the lack of representation of
all math teachers at the tutoring program. While several math teachers contribute their time quite
often to the program, other math teachers have never assisted with the math tutoring program. In
fact, there are four female teachers who consistently attend the program and a couple of teachers
who attend inconsistently. Therefore, the researcher is recommending that there should be at
least one male math teacher who could serve as a role model and try to encourage male students
to be math tutors. All of the math teachers at River High School need to show that the math
tutoring program is important by actually attending the program and showing students that they
are able to help after school. A majority of the tutors and tutees that attend the program currently
have or have had the program advisor as a math teacher. Therefore, if other math teachers
became actively involved in the program, more students may be willing to serve as tutors or
attend the program in order to get questions answered and feel like their respective teacher is
proud of them. The math tutoring program advisor commented, “Tutors enjoy being discovered
and feeling like their teacher is proud of them” (personal communication, April 27, 2011).
Hence, more math teachers should be involved in the math tutoring program in order to show students that they are available to help and to attempt to get more student tutors involved in the program.

**Recommendations for Future Research**

Based upon the research completed in this study, further research is suggested in several areas. For instance, Greenwood and Terry (1993) completed research and revealed that students showed gains not only in language, reading, and math, which were the subjects tutored, but also in science and social studies, subjects which were not tutored. Similar to Greenwood and Terry’s (1993) research, future research could be conducted to see if math tutors from River High School were impacted in other subject areas as well. In addition to other subject areas, once the current school year concludes, further research could be conducted and quantitative data could be collected and analyzed for the tutors’ and the matched sample non-tutors’ entire school year in order to see if there were any significant differences that were not revealed during this study, which only involved quantitative data from the first semester.

Additional research that could be conducted includes gathering more qualitative data. More interviews could be conducted for further research involving this study, and the interviews could be directed towards the non-tutor matched sample students, meaning the students who did not participate in the math tutoring program while in high school. The data collected from the non-tutors could uncover why students choose not to participate in the math tutoring program and what could be done differently in order to get more students involved in the program. In addition, the non-tutors could share any thoughts they might have regarding what they believe they would or would not achieve by being a tutor. Interviews could also be conducted with other math teachers, including teachers who are and who are not involved in the math tutoring
program. The teachers who are involved with the math tutoring program may have different perspectives than the program advisor’s perspectives. Also, the math teachers who are not involved with the program could share why they choose not to participate and if they notice any impacts the program may have on tutors. All teachers could provide information on whether they notice a difference in tutors’ confidence levels when they are in the math classroom.

Finally, further research could also be conducted by observing a few tutors throughout the entire school year in different classrooms and during math tutoring. The observations could allow the researcher to notice any changes in behavior the student could experience in the classrooms because of their experiences in the math tutoring program. Further research would be helpful in adding to the impacts that were already discovered from this study at River High School.

**Summary**

As an individual who was previously a math tutor, and as a mathematics educator and participant in the math tutoring program, it was the researcher’s goal to analyze the impacts the math tutoring program had on tutors at River High School. There were positive results for both research questions involved in this study. In fact, the positive findings will be beneficial to several individuals, including students, teachers, parents, administrators, and other schools thinking about implementing a tutoring program. Additional research can be conducted in the future to further analyze the impacts that the math tutoring program has on urban high school tutors. Overall, this study allowed the researcher to understand the positive impacts math tutoring programs have on its participants and helped shape the way the researcher will teach mathematics in the classroom.
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APPENDIX A

PARENT CONSENT
Informed parent consent for participation in a research study on the impact the math tutoring program has on tutors at High School

As a graduate student at Bowling Green State University, in affiliation with the Gaining Early Awareness and Readiness for Undergraduate Programs (GEAR UP) program in the School of Teaching and Learning, I am conducting a study that involves your child. My advisor Dr. John Fischer, the director of the BGSU GEAR UP program, myself, one other GEAR UP affiliated committee member, and my graduate advisor for the School of Teaching and Learning are conducting research on the impact the math tutoring program has on tutors at High School. If you consent, your child will be asked to participate in this data collection because of their participation in the math tutoring program at High School at some point during this school year. He or she will be asked to take part in a 5-minute survey about their attitude towards mathematics and a 25-minute interview where they will be asked questions concerning how they got involved in the math tutoring program, how their participation has impacted their experiences in math classes and school, and if their future plans involve mathematics. As a graduate assistant for the GEAR UP program, a considerable amount of my work hours are spent at High School in service to students. I have access to each student’s school schedule, and have contacted your child face-to-face during their lunch period and have informed them about their selection to participate in the survey and interviews for this study. I have given your child an informational handout outlining the duties and timeline of their potential participation in the study. I have also provided a handout for you, attached to this consent form.

In an effort to keep the program running after GEAR UP leaves the building, High School would like to know how the math tutoring program impacts the tutors. Therefore, the purpose of this study is to examine if math tutors differ in academic and nonacademic outcomes when compared to students not involved in the program, as well as to learn if and how the tutors believe they are impacted because of the math tutoring program. There are no direct benefits to the students as a result of participating in this study, except the idea of assisting in providing data for the purpose of detailed evaluation of the program. However, the general benefits include the administration and teachers’ awareness of the impact of the math tutoring program through this study.

Upon receipt of the information sheet and the consent form, your child will be given one week to think about whether they want to participate in the study. If both you and your child consent, your child may turn in their parent-signed consent form within that week. Students cannot participate if their written consent form is not signed and returned to me, because they are minors (under the age of 18). After that week has expired, those students who have turned in the consent forms will be contacted again, via face-to-face and will be assigned a day during their lunch period to complete the survey and be interviewed. If parent consent is granted, signed consent forms are asked to be returned to Kyle Zwayer by Wednesday, February 9, 2011 in the GEAR UP office at High School. During the interview, your child will be asked several questions about how they got involved in the math tutoring program, how their participation has impacted their experiences in math classes and school, and if their future plans involve mathematics. The one-on-one interview with each individual student will take place in a private location in the GEAR UP office at High School. Your child’s interview would take approximately 25 minutes. Once each student is interviewed, he/she may be contacted again in order to check over his/her interview transcript for accurateness. After this member check, the student’s participation in the study is finished. The risks of participation are no greater than that experienced in daily life.
Your child’s participation is completely voluntary. Also, if you feel the need to do so, you may withdraw your child at any time. He or she is free to withdraw at any time as well. They may decide to skip questions (or not do a particular task) or discontinue participation at any time without penalty. Deciding to participate or not will not affect your child’s math grade or their relationship with myself, GEAR UP, or High School. Due to the fact that this study is taking place at High School, I have obtained permission to complete the research from Principal.

The survey results and original audio-recorded data collected from your child’s interview will be stored in a locked office. This data will be typed out and saved on my personal flash drive and on my password-protected computer located in the GEAR UP office. I will be the only person who has access to the data. Your child’s personal identity will not be revealed in any way, other than through the consent forms. In addition, your child’s name will not be used during any formal presentation of the study.

If you would like more specified information concerning this study and your child, you may contact me at krwver@bgsu.edu or 419-372-9491 (BGSU GEAR UP office). If you would like to contact my advisor as well for this purpose, you may contact Dr. John Fischer at jfisch@bgsu.edu or 419-372-5152. In addition, you may also notify the Chair, Human Subjects Review Board at 419-372-7716 or hrbb@bgsu.edu, if you have any questions about your child’s rights as a participant in this research. Thank you so much for your time and I look forward to working with your child in the future if you see fit to do so.

I have been informed of the purposes, procedures, risks and benefits of this study. I have had the opportunity to have all my questions answered and I have been informed that my child’s participation is completely voluntary. I agree to allow my child to participate in this research.

______________________________________________________________
Parent/Guardian Name (Print)

______________________________________________________________
Parent/Guardian Signature
APPENDIX B

STUDENT ASSENT
Informed student assent for participation in a research study on the impact the math tutoring program has on tutors at High School

As a graduate student at Bowling Green State University, in affiliation with the Gaining Early Awareness and Readiness for Undergraduate Programs (GEAR UP) program in the School of Teaching and Learning, I am conducting a study that involves you. My advisor Dr. John Fischer, the director of the BGSU GEAR UP program, myself, one other GEAR UP affiliated committee member, and my graduate advisor for the School of Teaching and Learning are conducting research on the impact the math tutoring program has on tutors at High School. If you and your parent give permission, you have the opportunity to take part in this data collection because of your participation as a tutor in the math tutoring program at High School at some point during this school year. If your parent agrees, you will be asked to complete a 5 minute survey about your attitude towards mathematics and take part in a 25-minute interview where you will be asked questions concerning how you got involved in the math tutoring program, how your participation has impacted your experiences in math classes and school, and if your future plans involve mathematics. As a graduate assistant for the GEAR UP program, a considerable amount of my work hours are spent at High School in service to students. I have access to each of your school schedules and consider this my time to inform you about your selection to participate in the survey and interviews for this study. You are receiving an informational handout outlining the duties and timeline of your potential participation in the study. I am also providing a consent form for your parent, which, if consent is granted, can be signed and returned to me in the GEAR UP office by Wednesday, February 9, 2011.

In an effort to keep the math tutoring program running, High School would like to know how the math tutoring program impacts the tutors. Therefore, the purpose of this study is to examine if math tutors differ in academic and nonacademic outcomes when compared to students not involved in the program, as well as to learn if and how the tutors believe they are impacted because of the math tutoring program. There are no direct benefits to you as the student as a result of participating in this study, except the idea of assisting in providing data for the purpose of detailed evaluation of the program. However, the general benefits include the administration and teachers’ awareness of the impact of the math tutoring program through this study.

Upon receipt of the information sheet and the parent consent form, you will have a week to think about whether you want to participate in the study. If your parent consents and you give permission, please turn in your parent-signed consent form by Wednesday, February 9, 2011. You will not be able to participate if your written consent form is not signed by your parent/guardian and returned to me, because you are a minor (under the age of 18). After the week has expired, those students who have turned in the consent forms will be contacted again, via face-to-face and will be assigned a day during their lunch period to complete the survey and be interviewed. If permission is granted, consent forms are asked to be returned to Kyle Zwayer by Wednesday, February 9, 2011 in the GEAR UP office at High School. During the interview, you will be asked several questions about how you got involved in the math tutoring program, how your participation has impacted your experiences in math classes and school, and if your future plans involve mathematics. After you are interviewed, you may be contacted again in order to check over your interview transcript for accuracy. After this member check, your participation in the study is finished. The risks of participation are no greater than that experienced in daily life.
Your participation is completely voluntary. You are free to withdraw at any time and your parent has the right to withdraw you from this study at any time as well. You may decide to skip questions (or not do a particular task) or discontinue participation at any time without penalty. Deciding to participate or not will not affect your math grade or your relationship with myself, GEAR UP, or High School. Due to the fact that this study is taking place at High School, I have obtained permission to complete the research from Principal .

The survey results and original audio-recorded data collected from your interview will be stored in a locked office. This data will be typed out and saved on my personal flash drive and on my password-protected computer located in the GEAR UP office. I will be the only person who has access to the data. Your personal identity will not be revealed in any way, other than through the consent forms. In addition, your name will not be used during any formal presentation of the study.

If you would like more specified information concerning this study, you may contact me at kwyer@bgsu.edu or 419-372-9491 (BGSU GEAR UP office). If you would like to contact my advisor as well for this purpose, you may contact Dr. John Fischer at ifisch@bgsu.edu or 419-372-6152. In addition, you may also notify the Chair, Human Subjects Review Board at 419-372-7716 or hsrb@bgsu.edu, if you have any questions about your rights as a participant in this research. Thank you so much for your time and I look forward to working with you in the future if you see fit to do so.

I have been informed of the purposes, procedures, risks and benefits of this study. I have had the opportunity to have all my questions answered and I have been informed that my participation is completely voluntary. I agree to participate in this research.

______________________________
Participating Student’s Name (Print)

______________________________
Participating Student’s Signature
APPENDIX C

INTERVIEW QUESTIONS
APPENDIX C

Interview Questions for Tutors in the Math Tutoring Program

1. Why did you start participating in the math tutoring program? Have your reasons changed since you started participating?

2. What drives you to be in the math tutoring program?

3. How do you feel your math skills/knowledge has changed since participating in the math tutoring program?

4. What do you do if you do not know something that a tutee is working on or asks you a question about?

5. Did you enjoy math before participating in the math tutoring program? Why or why not? Now that you are a participant in the program, do you enjoy math? Why or why not?

6. Do you feel that your math grades reflect your understanding of math?

7. Do you feel confident in your math class? When tutoring a student? Has your participation in the math tutoring program helped you feel more confident?

8. What could be better or different about your math class/tutoring program to make it more enjoyable? Learn more? Help you feel more confident?

9. How does the math tutoring program help you? What do you get from it?

10. What do you think the tutees get out of the tutoring?

11. Are you scared of future math classes that you may be required to take?

12. Do you think you will use math when you graduate high school or in a career?

13. Where do you think you are headed after you graduate? Has your math tutoring experience helped you prepare for your future?

14. Is there someone in your math class who you think should be a math tutor, but is not one?