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Spoerk, Tammy K. ***The Value of a Summer STEM Camp DVD for Promoting Engineering and Technology Careers in Milwaukee Public School District***

Abstract

This study is to determine if a summer Science, Technology, Engineering, and Mathematics (STEM) camp DVD included in a multimedia presentation given to students in Grades 6-8 from a Milwaukee Public School (MPS) contributed to student enrollment in a STEM camp and to identify barriers affecting such enrollment.

Technological changes in a global society are generating a greater demand on America's youth to become innovative problem-solvers interested in science, technology, engineering, and mathematics. To increase awareness of these fields, MPS has implemented Summer STEM camps available to all MPS students Grades 6-8.

At a STEM camp, students are able to explore STEM education and STEM career opportunities in an exciting, hands-on way. In other words, STEM camp participants are given the opportunity to broaden and enrich their education, their lives, and their prospects for success in the 21st century.

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Chapter I: Introduction

Background

Technological changes are global and are imposing a greater demand on our youth today (Torinus, 2008). The United States workforce needs a highly skilled science, technology, engineering, and math (STEM)-educated workforce of problem-solvers and innovators in order to maintain its prosperity (Froschauer, 2006), its competitiveness, and its leadership in the global economy of the 21st century (Society of Manufacturing Engineering [SME], 2007). Unfortunately, the United States educational system is not preparing adequate numbers of underrepresented students who have an interest in STEM fields (Dickman, Henken, Schmidt, & Schwabe, 2009).

According to a press release from the Tapping America's Potential (TAP) coalition, (Tapping America's Potential, 2008), 16 top industry leaders from the United States gathered to discuss the shortages of STEM graduates. Their goal is to double the number of graduates to 400,000 with STEM-related degrees by 2015. A recent study by TAP reports that the number of STEM degrees increased by 24,000 in three years, totaling 225,000, suggesting that United States is off track for fulfilling the 2015 goal.

To help meet this goal, the coalition considered the demographics and the needs of the upcoming underrepresented populations. A study by Business-Higher Education Forum on diversity in both education and the workforce shows that the college-age underrepresented population will grow by 16% between the years 2000 and 2015. Predictions from the United States Census Bureau state that 80% of potential college-bound students will be non-White (Business-Higher Education Forum, 2002).

The Milwaukee, Wisconsin, Public School District (MPS) faces the same needs. A report completed by the NEA Foundation (2012b) found MPS in need of support to ensure effective STEM education growth. The NEA Foundation is supporting STEM growth in MPS by investing more than $6 million in a pilot program called Closing the Achievement Gaps. Milwaukee was one of three school districts selected for the pilot program because it has a high number of underachieving, low-income, and minority students (NEA Foundation, 2012a).

To assist the MPS underrepresented youth with STEM education, the demographics of the region must be understood. According to the Milwaukee Public School District (Milwaukee Public Schools, Office of Communications and Public Affairs, 2012) website, its student body is made up of 56.2% African Americans, 23.5% Hispanics, 14.4% Whites, 5.2% Asians, and 0.8% Native Americans. In 2009, an urban initiative effort was created in Milwaukee to help underrepresented students develop skills and knowledge in STEM fields. According to a report completed by the National Action Council for Minorities in Engineering, Inc. (NACME), MPS has partnered up with a national company called Project Lead the Way (PLTW®) that offers MPS middle and high school students a STEM curriculum (National Action Council for Minorities in Engineering, Inc., 2009). In this NACME press release, Dr. Irving Pressley McPhail, NACME President and CEO, said, "This initiative ensures the growth and development of a stronger pathway from middle school through higher education into the STEM workforce for African American, Latino and American Indian women and men." In addition, the 2009 NACME press release reports that 3,400 middle and high schools enrolled more than 300,000 students in 50 states and the District of Columbia in the PLTW program (NACME, 2009).

Lauren Baker, coordinator, of MPS Career and Technical Education, said, "More than 3,700 students are currently enrolled in the PLTW program—more than any other school district

in the nation." Baker added, "We are proud to boast that over 88 percent of the participants in our PLTW courses are students of color and almost 47 percent are female" (NACME, 2009).

Can the American educational system motivate more underrepresented students to focus on STEM fields? With this goal in mind, in 1997, the University of Wisconsin-Stout developed its first overnight weeklong STEM camp (University of Wisconsin-Stout [UW-Stout], 2012). The Society of Manufacturing Engineering Education Foundation (SME–EF) began funding weeklong Science Technology Engineering Preview Summer (STEPS) Camps in 1997 in response to the ever-growing shortage of skilled workers in America's engineering workforce. By the year 2004, at the University of Wisconsin-Stout, nearly 3,600 underrepresented youth had participated in a weeklong STEPS Camp; 30% of the participating student allocations were reserved for minority students (Society of Manufacturing Engineering, 2004). The STEPS Camps introduce STEM activities to female youth. The goal of the camps is to increase STEM awareness with hands-on activities and team building (UW-Stout, 2012). From the first camp conducted by the University of Wisconsin-Stout, STEPS Camps have grown to expand nine other universities by 2006. This was due in part by reaching out to communities and from the sponsorship of the Society of Manufacturing Engineering (2007). Over $1.3 million invested in STEPS Camps has helped to inspire young people to explore careers in STEM (Society of Manufacturing Engineering, 2008).

In the summer of 2008, SME-EF sponsored a STEM Gateway Academy Day Camp at the Lynde and Harry Bradley Technology and Trade School (Bradley Tech)(Society of Manufacturing Engineering, 2007) located in Milwaukee. Bradley Tech is one of 40 high schools in the Milwaukee Public School District. Initially this camp was scheduled to start in the summer of 2007. The experience of this author as a co-director of the summer STEM camps

revealed that there are many barriers that affect student interest in not enrolling. These barriers led the author to postpone the summer STEM camps until the summer of 2008. In 2008, even after many new recruiting efforts took place, enrollment continued to be low. The camp was designed for 40 eligible participating students in grades 6 through 8; however, only 21 students were eligible to participate and attended. There are many barriers to increasing student interest to enroll in summer STEM camps within MPS. This paper seeks to identify those barriers and to review the value of a summer STEM camp DVD included in a multimedia presentation for recruiting camp participants.

Statement of the Problem

Technological changes in a global society are generating a greater demand on America's youth to become innovative problem-solvers for the 21st century workforce (Torinus, 2008). To better prepare students for today's workforce demands, Wisconsin has implemented STEM summer programs to increase awareness and to better prepare MPS students for these changes. Students can explore career opportunities in STEM fields by participating in STEM summer programs (Hetzner, 2009). Opportunities to motivate MPS students to consider STEM education exist through participation in these summer camps. However, since 2007, the student enrollment in MPS summer STEM camps has been low. Therefore, a study reviewing the current recruitment strategy and factors that potentially limit recruitment will assist other summer STEM camp recruiters to increase enrollment and student eligibility within MPS.

Purpose of the Study

There are three goals to this study. The first is to determine if a DVD used as a recruiting tool impacts summer STEM camp enrollment for MPS students in grades 6 through 8. The

second measures the impact of familial encouragement on camp enrollment. The third examines how transportation issues impact MPS student participation in summer camps.

The study questions asked include the following:

1. Does a summer STEM camp DVD multimedia presentation viewed by MPS students in grades 6 through 8 increase camp enrollment?
2. Do parental encouragement and family obligations affect students' ability to enroll in a summer STEM camp?
3. Do transportation issues impact student enrollment in a summer STEM camp?

The results of this study will assist other summer STEM camp recruiters to increase enrollment and student participation within MPS. The data gathered will assist MPS grades 6 through 8 educators and recruiters in the development of promotional efforts and camp design. Research findings may assist educators and camp planners with identifying steps needed to overcome student barriers, thus preventing enrolled students from becoming ineligible for summer camp.

Assumptions of the Study

There are several assumptions to this study. These are, but are not limited to:

1. IRB Forms and summer STEM camp informational papers are given to students/parents by the due date.
2. Parents/guardians sign required forms and students returned them to school.
3. Student participation in summer camp was impacted by the Statements measured in the survey questions.
4. The participants in this study accurately reflect the larger school population where the study was conducted.

5. Participants and parents record honest answers to survey questions.

Definition of Terms

Provided below are the definitions of terms used in this study:

Barriers: Factors beyond participants' control that inhibit students from participating in an MPS Summer STEM camp. Barriers could include, but are not limited to, transportation, health, family responsibilities, and parental perspectives.

Day Camp: A summer camp between the hours of 1:00 – 4:00 p.m. for 10 week days, July 12-23, 2010. It is hosted at a high school less than one mile from the elementary school in the study. Students learn STEM education while performing hands-on project activities.

Engineering: Both a body of knowledge—about the design and creation of human-made products—and a process for solving problems. This process is design under constraint (Feder, Katehi, & Pearson, 2009, p. 17).

Immunization: The State of Wisconsin law states all students must have updated health records for each student on file where they are currently enrolled for school. These files show proof of vaccine shots students received from a physician to prevent transfer of diseases. This record must be presented when students are participating in a summer camp. Students must show this evidence while registering for the Summer STEM camp registration.

Mathematics: The study of patterns and relationships among quantities, numbers, and shapes. Specific branches of mathematics include arithmetic, geometry, algebra, trigonometry, and calculus (Feder, Katehi, & Pearson, 2009, p. 17).

Middle school: Students enrolled in Milwaukee Public School District, Grades 6-8.

MPS: Milwaukee Public School District.

Science: The study of the natural world, including the laws of nature associated with physics, chemistry, and biology, and the treatment or application of facts, principles, concepts, or conventions associated with these disciplines (Feder, Katehi, & Pearson, 2009, p. 17).

SME-EF: Society of Manufacturing Engineering-Education Foundation. Sponsors who provide funding for middle school STEM summer day and night camps.

STEM: The field of study representing four areas in education: Science, Technology, Engineering, and Mathematics.

STEM DVD: Consists of video clips and photos, and includes enhanced music, all compiled from the directors of a 2008 STEM middle school summer camp. The DVD was used in this study to determine its value as a motivational recruiting tool for summer STEM camps MPS students grades 6 through 8.

Technology: Compromises the entire system of people and organizations, knowledge, processes, and devices that go into creating and operating technological artifacts, as well as the artifacts themselves (Feder, Katehi, & Pearson, 2009, p. 17).

Technology Education: In this study, it is described as gaining knowledge and skills through processes that can assist people to utilize the tools, resources, and systems needed for advancements with human conditions and the made environment.

Underrepresented: Any demographic group that has a significantly lower representation, based on percentage, in STEM education and careers than the percentage of that group in the general population. For the purposes of this study, that is all females and non-White males.

Chapter II: Literature Review

This chapter combines two years of the author's past experiences for 2007 and 2008 as the co-director for summer STEM camps and a literature review. Both the author's experiences and the literature review examine the role that multimedia plays in increasing students' interest in enrolling in a summer STEM camp. Barriers for low socioeconomic students that prevent them from participating in summer STEM camp enrollment, including parental encouragement, family responsibilities, and transportation issues are examined.

Multimedia Motivation

Student enrollment has been low in MPS summer STEM camps since 2007. One purpose of this study is to determine if a summer STEM camp DVD included in a multimedia presentation shown to students in grades 6 through 8 in MPS will increase students' interest in enrolling in summer STEM programs.

What are the theoretical perspectives for motivating MPS students in grades 6 through 8 to enroll in a summer STEM camp? Alyson Paige, a well-known writer specializing in culture and business since 1998, states: "Motivational theories are psychological ways of understanding what inspires human beings to extend their abilities and perform according to expectations" (Paige, n.d., para. 1). Viewing a multimedia presentation is an efficient way for some students to learn new personal goals, new information, and new tasks to achieve the goals (Clark, 1994). Can a DVD be used as a motivational tool to recruit students? According to Oak, it might be possible: "Different things motivate different people. There is nothing right or wrong in that, it is just that each person has his/her own conative style" (Oak, 2011, para. 2).

At the Center for Media Literacy Francis Davis, an adult educator and media education specialist, was on the staff from 1989 to 1992 (Davis, n.d.). Davis describes how the history of

human social interchange has evolved through three distinct phases: oral, text-based, and image-centered communication. In his article he discussed how communication through media plays a role in human reaction to images. "Images. They are so compelling that we cannot not watch them. They are so seductive that they have revolutionized human social communication. Oral and written communication are in decline because a new form of communication, communication by image, has emerged" (p. 1). Davis describes six examples of how images used in media can change or control our perceptions of common myths, which are cultural ideas and stories that motivate daily behavior. He explains how images used in media, including advertising, entertainment, and news, control these daily behaviors through the emotional level and "basic ideas are obscured by the powerful stories and emotional connections" (p. 2).

By learning what form of media students use daily by choice, we can learn what form of media could be used as a recruiting tool to help motivate students learn more about STEM camps. This in return will motivate students to register and become eligible participants in summer STEM camps. A series of studies was conducted by the Kaiser Family Foundation about media use among 8-to-18-year-olds supports this idea (Foehr, Rideout, & Roberts, 2010). The studies were conducted at 5-year intervals in 1999, 2004, and 2009.

The Foehr et al. (2005) study revealed that 694 young people spend an average of three hours a day watching television (TV) and about 1¾ hours a day listening to the radio, CDs, tapes, or MP3 players. Young people average about one hour a day on the computer and about 50 minutes a day playing video games (Foehr et al., 2005).

The third phase of the Kaiser Family Foundation (Foehr, et al., 2010) studies examined media usage among 8 to 18 year-olds. This report in a surveyed a sample of 2,002 3rd through 12th grade students (Foehr et al., 2010).

This study showed that TV consumption among participants showed viewing TV content increased 38 minutes daily. This includes watching TV or movies on the Internet, or on cell phones and iPods. Television viewing continued to dominate media consumption in young people's lives (Foehr et al., 2010).

The Kaiser Family Foundation study reported that the highest rating in TV consumption are students in the same demographics as in the MPS study. In the Foehr et al. study, two groups of young people had high levels of media consumption. This included 11- to-14-year-olds and Blacks and Hispanics. Total media use in this group increased to more than 3 hours a day. Foehr et al. state, "Eleven-to-fourteen-year-olds average just under nine hours of media use a day . . . to pack in nearly 12 hours of media exposure" (p. 5). Video game use and TV and movie content showed the biggest increases (Foehr et al., 2010).

The largest demographic differences in television consumption occurred along racial and ethnic lines. Black and Hispanic youth reported watching far more TV than White youth. Black children reported an average of 5:54 hours a day of viewing across all platforms, compared to 3½ hours for White youth. These differences based on race held even when controlling for such other demographic factors as age, gender, parent education, family composition, personal contentedness, and media environment (Foehr et al., 2010).

The author's experiences include teaching STEM education, summer STEM camps, and after-school programs with students 5 through 12 grade in the Milwaukee Public School District, which has the same demographics as this study and literature reviewed. Participating students in this study are from low socioeconomic status attending an urban Milwaukee Public School middle school and are African-American, 2 female and 3 male, grades 6 through 7.

The results of this study will help determine if a summer STEM camp DVD included in a multimedia presentation shown to students in grades 6 through 8 from MPS would increase students' motivation to enroll in such programs. According to Sasso (2008), African American students excel nationally in STEM fields when they learn in the right environment and in the same racial demographic climate. The DVD used in this study was recorded in 2008, at a previous summer camp located in MPS. Participating students in study, and students prerecorded on the DVD, are from the same demographics as those within MPS. Thus, by using this multimedia presentation, student interest in a summer STEM camp may increase and enrollment may increase.

Past Experience Guiding Literature Review

The author of this study is guided by past experience related to recruiting students for summer STEM camps. In 2007 and 2008, the author co-directed a five-day overnight summer STEM camp and another four-day summer STEM camp. Both camps were designed to accept 40 registered Milwaukee Public Schools (MPS) students grades 6 through 8. The camps were sponsored by the Society of Manufacturing Engineers Education Foundation (SME-EF).

Presentations were given to students and their teachers in grades 6 through 8 at five MPS middle schools to help promote both of the summer camps. These presentations included demonstrations and an overview of final projects camp participants would complete during their experience. After each presentation, informational packets and camp enrollment forms were given to participating teachers to hand out to their students. Camp enrollment forms were collected 4 to 8 weeks after each presentation. The author reviewed all collected forms and found that many were not filled out properly and were missing information—for example, missing parent/guardian signatures and contact information or missing health and/or

immunization records—thus preventing enrolled students from becoming eligible for summer camp.

In 2007, student enrollment was remarkably low; only 11 students were eligible to participate, forcing both camps to cancel due to unforeseen barriers such as transportation, parental encouragement, and family responsibilities. In 2008, 21 students enrolled and were eligible to participate, enabling the summer STEM camp to be held.

The author's experiences in STEM education have assisted her with identifying literature about barriers, such as incomplete parental permission forms and missing health records. These barriers affect enrollment for MPS underrepresented middle school students. After collecting camp enrollment forms, for example, the author found documentation to be a key problem. For example, some student immunization records were not on file with the school district. Health records not up-to-date resulted in 50% of applicants being ineligible to participate in camp. To help update students' health records, free physicals were offered to participating MPS students, thanks to Aurora Health Clinic. However, transportation to and from the location for a free physical resulted in another barrier.

The author's experiences are reflected in the literature. A study completed by University of Massachusetts Donahue Institute (UMDI) Research and Evaluation Group (University of Massachusetts Donahue Institute, 2011) included research on various issues for two summer STEM camps for high-need middle school districts. The report authors found barriers with collecting and distributing paperwork for participating students. A similar study completed by Alexander et al. (2011) reports that urban minority populations in general, and adolescents in particular, can be difficult to engage in health research, often because they do not receive parental consent. In that study, participating students were from six high schools; 98% of the

students were African-American and 74% qualified for free/reduced-price lunch. During the initial recruitment period, there were 422 students who enrolled out of 1668 and who met eligibility criteria, but did not enroll (nonparticipants).

This study completed by Alexander et al. discussed the same barriers, that is, parental permission forms incomplete or not returned. The authors report that "recruitment can also be influenced by issues of mistrust, differential access to resources (e.g., health care, Internet), and a lack of cultural awareness on the part of investigators" (Alexander et al., 2011, p. 2).

In addition, a previous study by Carter et al. (2009) includes a pilot where the authors focused on middle school-based students' recruitment and retention to reduce modifiable risk factors for type 2 diabetes in youth and other medical problems. Student populations were predominately minority and/or of lower socioeconomic status. The parents' (largely female) annual household income was less than $30,000, and most had no more than a high school education. Forty interviews were conducted with parents of participating students, and 19 interviews were conducted with parents of nonparticipating students.

In the Carter study, parents of nonparticipating students reported the reasons why they did not give their child permission to participate. These were: they did not understand the informed consent form (37%), excessive paperwork (32%), and the child's refusal to participate (32%). Another 32% reported running out of time to complete the enrollment paperwork, forgetting to sign the consent forms, or giving the forms to their child to turn in and the child forgetting. Parents also reported confusion related to receiving multiple copies of the consent materials (one copy was provided to send back and one to keep), language or communication difficulties (all materials were provided in English and Spanish), and poor comprehension (Carter et al., 2009).

Experiences with barriers to participation, combined with a desire to get more underserved youth involved in summer STEM camps, led the author to examine the literature regarding summer learning, transportation, parental encouragement, and family responsibilities.

The Importance of Summer Learning

After-school and summer learning are vital to expanding STEM learning for our nation's students. According to Southwest Academy for 21st Century Excellence (2012), an initiative to help students develop skills and knowledge in 21st century STEM fields, Project Lead the Way (PLTW) offers a 4-H Gateway Academy summer STEM camp in Milwaukee, Wisconsin (Southwest Academy for 21st Century Excellence, 2012). A report completed by the Afterschool Alliance (AA), National Afterschool Association (NAA), and National Summer Learning Association (NSLA) (Afterschool Alliance, National After-school Association, and National Summer Learning Association, 2010) stated that nearly 80% of future careers in our nation will require STEM skills. They reported that if our nation does not focus on developing after-school and summer learning STEM programs, students will not have basic analytical, problem-solving, and critical-thinking STEM skills to fill these careers. This study shows that these organizations are committed to leveraging our organizational resources to expand after-school and summer learning programs that support STEM education (Afterschool Alliance et al., 2010). Organizations are needed to support our students' STEM skills—the skills of our future workforce—to achieve success academically while preparing them for the 21st century workforce.

For example, according to a recent Afterschool Alliance report, 8.4 million children are enrolled in after-school programs, and the parents of another 18.5 million children would sign up if a program were available. An estimated 14.3 million American schoolchildren currently

participate in summer learning programs, while parent interest indicates that 24 million more would enroll if programs were available (Afterschool Alliance, et al., 2010).

Having knowledge of the high potential for STEM education, the Afterschool Alliance, National After-school Association, and National Summer Learning Association continue to collaborate with federal agencies and policy-makers nationwide to develop policies and initiatives to increase STEM learning in after-school and summer programs. The article "Afterschool and summer programs: Committed partners in STEM education" (Afterschool Alliance et al., 2010) reported that through partnerships, expand STEM resources can be expanded by hosting conferences and professional development workshops, thus giving students exposure to instructors and mentors with STEM backgrounds from within their communities. Without after-school and summer STEM activities, children would be deprived of time to develop an interest in STEM education, which is key to learning skills in STEM careers (Afterschool Alliance et al., 2010).

Research on summer learning for children of low socioeconomic status has proven to be rewarding for all stakeholders. A study by authors Gamble, Harper, and Phillips (2007) reports that low-income students have unique challenges when participating in summer programs. After review of 30 studies, they found issues for low-income students when compared to middle-income students. Low socioeconomic students showed a greater loss in achievement scores and suffer nutritionally because parents cannot provide additional summer meals. In addition:

> Child and youth development activities are limited, and rural youth have fewer safe places with caring adults and constructive activities. Child care is almost nonexistent, and many children are left home alone, in the care of older siblings, or in caregiver roles themselves. Low-income communities have fewer playgrounds and other places for

children to play. Children spend their days in sedentary activities. (Gamble et al., 2007, p. 66)

From 2005 through 2008, the author's STEM experiences at Bradley Tech High School in MPS included teaching grades 9 through 12 PLTW STEM curricula and mentoring students in an after-school STEM program called FIRST Robotics. These STEM experiences inspired the author to develop STEM recruitment presentations to educate parents and students grades 6-12, to help grow MPS STEM programs. To encourage parents and give students hands-on STEM experiences, a coworker of the author suggested developing two summer STEM camps. One camp was an overnight summer STEM camp called STEPS, and the other a day summer STEM camp called Gateway Academy. Both camps were sponsored by Society of Manufacturing-Education Foundation (SME-EF). Both camps offered parents a safe atmosphere for their children to learn STEM education and for participating students to gain STEM skills with experienced instructors, mentors, and camp counselors with STEM backgrounds.

To avoid human capital issues with hiring knowledgeable and experienced staff in STEM education, the author and coworker camp director were the main camp instructors. The author and director were experienced STEM educators, having previously instructed in the PLTW STEM curriculum and as FIRST Robotics STEM mentors. In addition, the author and two camp counselors had additional five days of training as camp counselors during the 2006 summer STEPS camp at the University of Wisconsin-Stout. The author and director trained the other camp instructors and counselors to assist camp participants. The SME-EF sponsorship for both camps included all camp participant fees, which included room and board and transportation costs for the overnight camp. Day camp meals were provided at no charge, assisting MPS low socioeconomic families with summer meals. In addition to SME-EF sponsorship, Rockwell

Automation Corporation, located within walking distance from Bradley Tech, gave participating students a tour of the Corporate Building, including Engineering Departments and hands-on team-building activity.

After the summer STEM camp recruitment presentations in 2006 and 2007, which were held at five MPS middle schools students for grades 6 to 8, the author's experiences were disappointing. They included a lack of eligible participants. The camp was designed to accept 40 students, and only 21 students participated. Additional author experiences included lack of camp participants who were eligible, transportation problems for health or immunization updates, incomplete or not-submitted health forms, incomplete or not-submitted parental permission forms. These statements show a lack of parental encouragement and/or lack of student interest in summer STEM camps by MPS students. These experiences led the author to search for literature describing barriers for participants in low socioeconomic summer STEM camps.

General Challenges to Participation in Summer Learning

In their research, Gamble et al. focused on three major challenges that low-income communities face. These are lack of community resources, human capital, and program accessibility. Following are brief examples of these challenges. In terms of community resources, most funding addresses immediate needs, not the need to continue building infrastructure for long-term existence. In terms of human capital, it is difficult to retain people with skills or college education to become mentors because they leave low-income communities for higher paying jobs. In terms of program accessibility, transportation is an issue for low-income residents because, to name a few reasons, they do not know how to drive, lack a driver's license, or lack funding for gas or to own and maintain a vehicle (Gamble et al., 2007). To assist

with a possible solution, a report completed by the Afterschool Alliance et al. (2010) states that these three organizations are committed to leveraging our organizational resources to expand after-school and summer learning programs that support STEM education (Afterschool Alliance et al., 2010). Summer STEM camps can address some or all of these issues.

A study by Sasso (2008) reports that a lack of education in STEM disciplines for minority youth is the main problem with the K-12 system. Not having K-12 support for STEM education holds minority groups back, making it difficult to attain the skills and knowledge to be prepared for higher education in STEM. To excite minority students, teachers and parents need to encourage and support STEM education suggests Art Hicks, director of the Louis Strokes Alliances for Minority Participation program at the National Science Foundation (Sasso, 2008). Hicks also reports that minority students catch the excitement of learning science and understand how it's related to the real world through STEM role models, teachers with STEM backgrounds, and after-school and summer programs relating to STEM fields (Sasso, 2008).

To support the need for summer STEM programs for minority students, a 2011 study completed by University of Massachusetts Donahue Institute's (UMDI) Research and Evaluation Group gathered data to help increase student interest in K-16 STEM programs. This study included research on various issues for two summer STEM camps for high-need middle school districts. Two camps were hosted each year in 2008 and 2009. "The camps were designed to engage students in fun, hands-on, content-based inquiry science that would develop their subject knowledge and awareness of careers in STEM fields" (University of Massachusetts Donahue Institute, 2011, p. v). This study reports that approximately only 40 students attended each summer STEM camp in 2008 and 2009 because of recruitment challenges: "The program intended to enroll 60 middle school students from high-need districts in each camp. Due in part

to challenges with recruitment, this initial target—both in number and composition—wasn't fully realized" (University of Massachusetts Donahue Institute, 2011, p. 20). This study suggests that to increase student interest in participating in STEM programs, applicants should concentrate on both STEM awareness and STEM learning. It suggests that programs should "address misconceptions about STEM careers, and promote STEM career opportunities through guest speakers, field trips to STEM businesses, student internships, and other activities" (University of Massachusetts Donahue Institute, 2011, p. 1).

The report also describes issues with recruitment, attendance, and transportation support for the same summer STEM camps. UMDI indicated that:

> During the second year, the program prioritized enrollment from high-need school districts, and focused outreach efforts to publicize the camps in them. However, despite distributing flyers about the camps to schools, the flyers did not always reach the students. Furthermore, some students who registered did not attend. Other methods of program recruitment, such as distributing information earlier in the school year, possibly directly to science teachers or parent groups (such as the PTO), as well as using more electronic methods (school website, e-mail, or social networking sites), could provide students with additional avenues to learn about the camps. Asking students and/or parents about the best way to publicize these camps may also yield some useful suggestions. (University of Massachusetts Donahue Institute, 2011, p. 21)

To enhance summer program recruitment strategies, this study suggested developing STEM awareness not only in students but in parents, teachers, and administrators and by using

electronic technology to promote summer learning in STEM camps (University of Massachusetts Donahue Institute, 2011).

Summer learning programs can offer many benefits for all stakeholders. For example, Summer Food Service Programs (SFSPs) are offered by state administrators, their local sponsors, nonprofit organizations, summer camps, and local government agencies to eligible rural and urban students. Yet even when SFSPs are developed by the USDA to assist families from urban and rural communities with free meals, transportation issues and other barriers continue for low-income families. "These programs feed about 31 million students annually" (Stracuzzi & Wachope, 2010, p. 1).

Carsey Institute researchers interviewed a small group of eight SFSP state administrators and 23 sponsors in January of 2010. These interviews gathered data to help reveal barriers at rural SFSP sites and help support the children in need. The study reports the need for summer meal programs where students from rural low-income families who are eligible for free or reduced-priced meals during the school year can continue receiving free meals (Stracuzzi & Wachope, 2010).

Similar issues impact MPS students, according to Peacock (2012). The 2010 Census recorded that MPS children living in poverty is just as common as rural areas. Statistics show that free or reduced-price meal eligibility is 83.4% in MPS. The State Superintendent of Public Instruction, Tony Evers, said, "Poverty and hunger are cruel facts of our difficult economy and can have a harsh impact on student learning" (Peacock, 2012, para. 3). The author's experiences include working with MPS students in summer STEM camps and afterschool programs.

The author's experiences include working with community and corporate sponsors in summer and after-school programs, which included meals and transportation for MPS

participants. For example, prior to the summer STEM camps offered to MPS students, in 2006 SME-EF interviewed the author and director to reveal the needs of the participants and provided funding to avoid such barriers like transportation and meals.

Even when summer meal programs are available and offered to communities with low-income families, transportation barriers continue to hinder the ability of low-income children to participate in summer programs, creating issues for implementing SFSPs. Transportation barriers affect rural children, who participate less in after-school and summer programs than children in urban areas. For example, "Study participants rated transportation issues such as long travel distances, lack of options for transporting meals or children, or high costs of gas and maintenance as large or moderate barriers to both program implementation and to children's participation in SFSPs" (Stracuzzi & Wachope, 2010, p. 2). The transportation issue is discussed in greater detail in the following section.

Although located in an urban area, there are some parallels between rural districts and MPS. Some afterschool and summer programs do not offer transportation for participating MPS students. The author's observations with middle and high school students are that if programs are located on a bus line, students can use their public transportation bus passes. During the school year, qualified MPS middle and high school students who live more than two miles away from their school receive paid public transportation passes from the district. Other after-school and summer programs have limited funding for transportation, and free public transportation is not included for MPS students during the summer. This continues to be a barrier to student participation in summer programs.

Stracuzzi and Wachope (2010) revealed other barriers to children's participation in SFSP sites. Sponsors and state administrators record barriers as "children's lack of interest in leaving

home to attend the program and parents' desire or need for children to stay at home" (p. 3). They conclude that family perceptions of the SFSPs could be as important to children's participation as transportation. Knowing that family perceptions are important to having a successful SFSP site, state administrators report that lack of family awareness and activities at sites creates barriers. In addition, several sponsors report that some SFSP sites do not offer enough staff to supervise more than a few children during the walk or drive to the site, creating another barrier to children's participation in the program (Stracuzzi & Wachope, 2010).

Another barrier for many students is lack of immunizations or of immunization records. Milwaukee Public School students who enroll in a summer STEM overnight camp are required to show evidence of immunization records to become eligible to participate. Immunization records are necessary to protect all camp participants' health. According to a report by the American Journal of Preventative Medicine, children, adolescents, and adults who are in the low socioeconomic sector, as are many MPS students, are vulnerable to transmitting diseases through person-to-person contact because they have not been vaccinated (American Journal of Preventative Medicine, 2000).

To support the need for immunizations, a nationwide study of trends in vaccination coverage, completed between 1995 and 2001, listed the 50 top counties in our nation in terms of lack of vaccinations. The study sampled 151,720 children between the ages of 19 to 35 months. This study ranked Milwaukee, Wisconsin, as the 33rd highest unvaccinated county based on the estimated number of unvaccinated children recorded (Barker, Chu, & Smith, 2004). According to Barker et al., Wisconsin is one of 18 states that allows philosophical exemptions, meaning students can be accepted into school without immunization because of, for example, religious beliefs. Barker et al.'s study presented two groups, under-vaccinated and un-vaccinated:

"Under-vaccinated children tended to be black, to have a younger mother who was not married and did not have a college degree, to live in a household near the poverty level, and to live in a central city" (p. 187). "Unvaccinated children have characteristics that are distinctly different from those of under-vaccinated children. Unvaccinated children are clustered geographically, increasing the risk of transmitting vaccine-preventable diseases to both un-vaccinated and under-vaccinated" (Barker et al., p. 187).

According to the study's data, Milwaukee Public School District is both unvaccinated and under-vaccinated. The MPS student body consists of 56.2% African Americans, most of whom live in low socioeconomic neighborhoods (MPS, 2012). These unvaccinated children are at greater risk of both acquiring and transmitting VPDs (vaccine-preventable diseases). Because of the lack of immunizations, interventions need to be specifically designed and targeted toward parents who choose for their children not to receive any vaccinations (Barker et al., 2004).

Health and immunization issues are barriers for students considering enrollment in a summer camp. To support the need for MPS summer camp immunization, Wisconsin Department of Health Services (State of Wisconsin Department of Health Services, 2012), in a press release, urged parents to get summer campers' immunizations updated and to vaccinated against pertussis due to an outbreak.

This study continued to collect data that will be used to determine if other barriers exist and to what extent the barriers contribute to students' successful enrollment in the camp.

Targeted Barriers to Participation in Summer Learning

Students who enroll in a summer STEM overnight camp are now required to show evidence of immunization records to become eligible to participate. A report of the Boy Scouts of America, National Health and Safety Support Subcommittee (Boy Scouts of America, 2008)

indicates that they require persons engaged in Boy Scout activities receive age-appropriate immunizations and an annual health and medical record or specialty physical exam and are required to have current tetanus immunization. Individuals not receiving immunization must provide a medical alert to event sponsors while allowing exceptions to tetanus immunization for medical, religious, or philosophical reasons (Boy Scouts of America, 2008).

Immunization records are necessary to protect all camp participants' health. According to a report by the American Journal of Preventative Medicine (2000), children, adolescents, and adults who are in the low socioeconomic sector and without any vaccines, such as many students in MPS, are vulnerable to transmitting diseases through person-to-person contact.

Although research shows, especially for families of low socioeconomic status, that the lack of student immunizations can be a deterrent to enrolling in a summer STEM camp enrollment, this may not be a specific barrier leading to low enrollment. Experiences with barriers to participation, combined with a desire to get more underserved youth involved in summer STEM camps, led the author to continue examining the literature regarding such barriers.

The author's past experiences helped to find literature that focused on two barriers that might hinder enrollment in a MPS summer STEM camp. The second and third goals of this study help identify specific barriers for low socioeconomic students that prevent them from participating in summer STEM camp enrollment. They include the issues of parental encouragement/family responsibility and transportation. A summary of the literature on these issues follows.

Parental encouragement and family responsibility. Schools in low SES neighborhoods suffer from the lack of support in the students' homes. It has been established in

the literature that the home environment contributes substantially to the development of academic skills (Dion, Kovac, Markesich, & Pavetti, 2002). Family plays an important and continuing role in the lives of youth, and the route to educate youth is through their parents (Sasso, 2008).

Thus, parental encouragement, may contribute to low enrollment in a summer STEM camp. To help enrollment efforts, it is important to understand how parental encouragement impacts student enrollment.

For some students, the lack of family support is a barrier. Several studies, such as *African Americans Studying STEM: Parsing the Numbers* (Sasso, 2008); *Family Barriers* (Dion et al., 2002); and *Latinos and Science, Technology, Engineering, and Mathematics (STEM) in Illinois* (Latino Technology Alliance, 2009), show that parents of low socioeconomic status (SES) whose children attend an urban middle school were not well informed of STEM education. This led to the youth of low SES families being underrepresented in STEM education. This is primarily due to the parents' lack of education and knowledge about the value of STEM education. *Latinos and science, technology, engineering, and mathematics (STEM) in Illinois, a* study of family priorities by the Latino Technology Alliance (2009), shows that families of low SES status may expect less time for education and require students to contribute to family income, males through a job and females by providing home-related services, such as babysitting for a sibling or other family members. Females may even be required to stay home as a family-care resource.

Transportation. Transportation issues may contribute to low enrollment in a summer STEM camp. After review of 30 studies related to summer programming in poor rural communities, Gamble et al. (Gamble et al., 2007) report, "Poor rural communities face three

major challenges in implementing summer programming" (p. 66) one being program accessibility. They briefly describe transportation issues such as little or no public transportation, not knowing how to drive, a lack of driver's license, or lack of access to a vehicle. Long distances and rising gasoline prices are also issues (Gamble et al., 2007).

In low-income urban communities, there are numerous means of transportation for middle-school-aged students. Unfortunately, these remain inaccessible to students due to a variety of complex issues, including safety, awareness, access to a vehicle, social barriers, and funding.

Students who are within a one-mile radius of a local summer program could walk as their form of transportation. In many urban communities, parents' concerns with their children's safety when walking are an issue. Studies (Kong et al., 2009) have shown the key concerns about safety when walking are unsafe pedestrian crossings, stray dogs, and students playing during their walks. Parents have reported nonfunctioning pedestrian signals at busy intersections, stray dogs approaching students, adults approaching students, and students not paying attention while walking because of excessive electronic game playing (Kong et al., 2009). Ongoing parent perceptions about transportation are key elements for low summer STEM camp enrollment.

A study by Kerr, Rosenberg, and Sallis (2006) found American students are five times more likely to commute to a summer program if parents feel their student will be safe in their physical environment for walking or biking. This report found 11 main parental concerns with physical environment for students with a mean age of 11.3 years without a disability. These concerns are: crime, stranger danger, gangs, bullying, too much traffic in neighborhood, too much traffic at school, cars driven too fast through their neighborhood, no sidewalks or bikeways

on the route to school, school too far away, not enough time, child's after-school schedule, easier to drop off child on the way to work, child would be walking or biking alone to school, child does not want to, or like to, walk or bike to school (Kerr et al., 2006).

A study by Aalborg and McDonald (2009) shows that 40% of students in kindergarten through eighth grade who live within a 2-mile radius of school will be driven by private car, with parents giving reasons such as their time is too valuable, convenience, and safety for students. The sample size for this report was 403 parents, with one-quarter earning under $40,000 per year and a racially and ethnically diverse sample, with over 78% of respondents being people of color. Aalborg and McDonald provided test results that focused on one-fifth of their test sample and equally divided the students by sex and by age (10-14) and by who lived within two miles of school. To gather data, parents of the studied children completed surveys and lived in the San Francisco Bay Area. Previous research found that children around age 10 are more independent and could have parental permission to walk or bike to school (Matthews, 1992; Aalborg & McDonald, 2009).

The Aalborg and McDonald (2009) study found that 10% of the students take public transportation and half were unaccompanied. The remainder traveled with their parents, friends, or siblings. The study took into consideration that lower income families are more likely to live within two miles of the school where the students are enrolled. This leads to findings that lower income families have fewer vehicles per driver (Babey, Brown, Hastert, & Huang, 2009).

To support parental concerns listed above about safety and walking, a study by Safe Kids Worldwide ranked Milwaukee and Racine, Wisconsin, in the top third, the 10th highest out of 47 metropolitan areas, with the worst pedestrian safety. Statistics in this study came from a population of 371,315 children ages 14 and under (Cody, Donahue, & Quraishi, 2005).

A study completed by University of Massachusetts Donahue Institute (UMDI) (2011) reports that transportation funding issues affect attendance goals for summer camps. They describe how corporate funding could assist with funding by offsetting camp fees and supporting the transportation costs. The report states that corporate sponsorship paid for many participants' fees to attend summer camp; this could be used for promoting future summer camps to support attendance (University of Massachusetts Donahue Institute, 2011).

The author's experiences in the 2008 summer STEM camps included corporate sponsorship that paid the fees for all participants, including transportation, during the campers' stay. Students needed to provide their own transportation to arrive and be picked up after five days at the camp site located in MPS Bradley Tech High School. The author greeted parents and participants outside during pick-up and drop-off at the camp site. There were 21 out of a possible 40 participants; 20 arrived by vehicle, one took the bus public transportation and was unaccompanied, and no students walked as a form of transportation.

The literature review included the same age group and demographics as the current study. Transportation could be a possible barrier for recruiting camp participants and is intended to be explored in the author's study.

Conclusion

The author's past experiences include teaching, summer camps, and after-school programs with students in the Milwaukee Public School District. It is her observation that many students in middle and high school needed to stay at home to watch younger siblings and some to care for elderly family members living in the same household while parents work.

During recruitment presentations for summer STEM camps and after-school programs, the author observed a lack of STEM education knowledge on the part of parents and students,

both middle and high school. The author witnessed more students than parents during the recruitment presentations.

The literature review for this study included the same age group and demographics as the study to be undertaken. The literature recognizes parental and student lack of knowledge about STEM education, which may create barriers because of lack of parental encouragement and family responsibilities. These barriers may contribute to low enrollment in a summer STEM camp; they are the same barriers the author witnessed and are statements intended to be explored in this study.

Chapter III: Methodology

The three goals of the study were to: 1) measure the effectiveness of a DVD included in a multimedia presentation on summer STEM camp enrollment, 2) determine if parental encouragement, plus family responsibilities, is a barrier for students to enroll in a summer STEM camp, and 3) examine transportation issues that might influence student enrollment in a summer STEM camp.

In addition, this study collected data through follow-up telephone contact, with available participants who did enroll in the Milwaukee Public School summer STEM camp. Health records were reviewed at the participating school to verify student eligibility for students who did register for the 2010 MPS summer STEM camp.

Subject Selection and Description

This study was designed as a quantitative study focusing on gathering students enrolled in a Milwaukee Public School, grades 6 through 8. A non-random selection was used and consisted of 57 MPS students grades 6 through 8 (55 African American students, one biracial student, and one Caucasian student).

An introductory letter written by the author was given to the principal of the school in the study prior to the recruiting sessions. Prior to distributing the introductory letter, it was submitted to the University of Wisconsin-Stout Institutional Review Board (IRB) for approval. This letter contained background information about the MPS summer STEM camp, the camp's objectives, which students were eligible to participate in the study, a description of the room needed to successfully administer the presentation, and a description of how long each session would take to administer. The letter continued to explain in detail how control group and experimental group recruiting sessions were different (See Appendix A).

Research Design

For the first goal of the study, the author examined the effectiveness of a prerecorded summer STEM camp DVD included in the multimedia recruiting session. A pre- and postsurvey were designed to gather measurable data to identify barriers that affect student enrollment in a summer STEM camp.

To generate measurable data and determine the effectiveness of the DVD, this study gathered data in two parts. Part one included a total count of all completed and returned enrollment forms to the author, one week after the recruiting session. The forms showed student interest in enrolling. Part two included a total count of students who actually participated in the camp and determined the potential effect the DVD had on student interest.

The non-random selection of students was completed by participating teachers the morning of the multimedia recruiting session. Students were divided into, a control group and an experimental group. The control group did not view the STEM camp DVD included in the presentation; the experimental group did see the STEM camp DVD in the presentation. The control group consisted of 32 sample students, 17 female and 15 male; the experimental group consisted of 25 sample students, 12 female and 13 male.

All participants in both groups, control and experimental, completed pre- and postsurveys, reviewed a brochure describing the 2010 summer STEM camp, saw a YouTube video called *Shift Happens*, participated in a PowerPoint presentation that described STEM education and careers, and were given summer STEM camp enrollment forms. The control group did not have the STEM camp DVD included in the presentation; the experimental group did see the STEM camp DVD in the presentation.

To gather additional data on the multimedia recruiting session for both the control and experimental groups, the postsurvey included an additional set of questions and space where participants could write comments or suggestions on the a YouTube video and PowerPoint presentations. One additional summer STEM camp DVD was added to the experimental group presentation.

Both recruiting sessions were held in the library, located on the first floor of the participating school. Both the control and experimental groups participated in a recruiting session on a Tuesday morning, the control group at 10:30 and the experimental group at 8:30. All participants were given summer STEM camp enrollment forms after the recruiting sessions. Participants had opportunities for questions and answers during, before, and after both recruiting sessions.

To complete the final analysis of eligibility for the summer STEM camp, updated health records of students were verified at school. Front office school employees collected students' health records to verify that all registered students' immunizations were current. The author did not have access to any student health records due to confidentiality.

Participating teachers were invited to attend, but they chose not to be present during either recruiting session. The librarian and a front office school employee were present during both recruiting sessions. All parents/guardians were invited to participate in the presentation given to students, but no parents were present.

After the 2010 MPS summer STEM camp, the author completed a follow-up phone interview with the parents/guardians of the three of the four students who enrolled but did not participate in MPS summer STEM camp 2010.

To measure the second and third goals regarding barriers, a pre- and postsurvey was used to gather measurable data. One week after the presentations, the author compiled a final count of students who enrolled in an MPS summer STEM camp by collecting enrollment forms.

Instrumentation

A prerecorded DVD was prepared by the author from a 2008 summer STEM camp to be used as a motivational tool. In order to choose an appropriate appraisal instrument for this study, the author reviewed several surveys and found no existing research instrument that met the specific needs of this study. To ensure that the critical appraisal instrument was appropriate to use for the sample population in study, the author designed an instrument. A pre- and postsurvey were designed to gather measurable data to identify barriers that affect student enrollment in a summer STEM camp. Postsurveys included rating scales for the DVD, video, and PowerPoint presentation. The pre- and postsurveys, as shown in Appendices B through E, used a three-point Likert design, which included a graphic picture and text to help "all students" in grade 6 through 8 understand and answer questions on the survey: "yes" ☺, "agree" ☺, "would like to" ☺, "not sure" 😐, "no" ☹ or "disagree" ☹ (See appendices B - E).

Prior to distribution, the pre- and postsurveys and the parent consent forms were submitted to the University of Wisconsin-Stout IRB office for approval. To collect data from all completed surveys, parent consent forms were given to the school principal four weeks prior to the recruiting sessions. These IRB parent consent forms were to be distributed to parents for signatures giving consent for their student to participate in study. Once the consent forms were signed, they were to be returned to participating teachers for the author to collect. These consent forms were needed to generate and collect data for use in the study.

Data Collection

Prior to the recruiting session, copies of the IRB parent consent forms were distributed to participating students that included details on the summer STEM camp presentation. Students were instructed to return forms back to school with parents' signatures giving consent for students to participate in study. At the beginning of the recruiting sessions, the subjects were given a presurvey. All participants were instructed to write their names on the surveys. They were also informed that their participation in the pre- and postsurveys was voluntary, that their answers would be confidential, and that their identity would not be associated with the data in any way. The author explained to participants that they needed to raise their hand when their survey was complete, and it would be collected from them at that time. After the multimedia presentation, subjects were given a postsurvey. Again, subjects were instructed to add their names and when completed, the presenter would collect the completed survey.

Following the postsurvey, the researcher gave subjects a camp enrollment form and a brochure, both related to a summer STEM camp in MPS. Students who did not have participating parents at the presentation were told that they had one week to return completed enrollment forms to their teacher. One week after presentation, the researcher collected all completed enrollment forms and then compiled a final count of students who enrolled in an MPS summer STEM camp and used that information for analysis.

Limitations

This study was designed for MPS grades 6 through 8 students and parents. However, flaws were found in the process of distributing parent/guardian permission slips that included details of the summer STEM camp presentation. Permission slips were given to an MPS

administrator. These permission slips were not distributed to teachers and students by the administrator.

The administrator had initially agreed to explain what the summer STEM camp presentation is and give all participating MPS grade 6 through 8 teachers the permission slips to distribute to students. Teachers then would collect the parental/guardian signed permission slips from students. After several disappointing attempts to collect signed permission slips from teachers, the researcher found that teachers were not given the permission slips.

To solve this problem, the author distributed copies of the parent permission forms to participating MPS grade 6 through 8 teachers and gave details on the summer STEM camp presentation. One week later the author returned to the participating school to again find that the participating teachers had not distributed the parent permission slips to students.

The author then received permission from participating teachers to give a 10-minute, informational presentation to all students who were present in their classroom that day on the summer STEM camp presentation and to hand out permission slips to their students. However, the eighth grade teacher was not willing to participate in this informational presentation.

Data Analysis

The study used two surveys pre- and post-designed by the author and informed by observations, literature reviews, and phone interviews. After the recruiting presentation, the author reviewed and compared data from both groups pre- and postsurveys for participants who had returned signed permission to participate. The author compared changes in answers from the pre-presentation to the post-presentation to gather data on the multimedia presentation. Participants were asked to answer questions relating to the barriers in study on the pre- and postsurvey and to write comments describing the multimedia presentation on the postsurvey. In

addition, the experimental group wrote comments on the summer STEM camp DVD. These comments were then transcribed into a Microsoft Word document. Entries into the Microsoft Word document were reviewed to make sure they were entered accurately.

The author also utilized qualitative data captured by external sources, in particular follow-up phone dialogue with parents/guardians to gather data pertaining to students' participation in camp and the DVD in the study. The author asked the same four questions of all the parents/guardians. The first question was, "Why did your son/daughter NOT participate?" The second question was, "Were you aware of the summer STEM camp?" The third question was, "If you received a DVD showing prerecorded students activities at the STEM camp, would you reinforce student participation?" The fourth question was, "If you received a summer STEM camp DVD to use as a reminder of the camp, would this help to reinforce participation with your son/daughter?" The author also recorded observations of teachers, administration, paraprofessionals, parents, and students during the process of the study. This data was collected by the author then transcribed into a Microsoft Word document. Entries onto the Microsoft Word document were checked to make sure they were entered accurately.

The recorded data was reviewed to compare key points between the answers on the pre- and postsurveys for both groups. When respondents were asked to answer questions, the answers varied. To accurately capture the responses from both groups, the researcher developed an Excel spread sheet to categorize responses into common themes about whether participants shifted their answers between the pre- and postsurveys. These common themes were analyzed side by side to, compare what changed positively or negatively or stayed the same between the pre- and postsurveys response. After analyzing each theme, the themes were then summed into one statement. That statement was then used to support or discount the findings between the

control group and the experimental group as well as for individual participants. Completed survey results were tabulated, and the researcher used a qualitative analysis to draw conclusions. Results from the pre-and postsurveys were then used to compare both the author's experiences and the literature review to draw final conclusions about the results, which are discussed in Chapter Four.

Chapter IV: Results

The three goals of the study were to measure the effectiveness of a multimedia presentation on summer STEM camp enrollment, to determine if parental encouragement/family responsibilities is a barrier for students to enroll in a summer STEM camp, and to examine transportation issues that might influence student enrollment in a summer STEM camp. Due to a low number, five, of returned signed IRB parent consent forms, this study used a qualitative research study design.

Effectiveness of a Multimedia Presentation on Summer STEM Camp Enrollment

The first goal of this study examined the effectiveness of using a multimedia presentation for recruiting students to a summer STEM camp. The participants in this study were students enrolled in the Milwaukee Public School District, grades 6 through 8. A total of five students out of the original 57 participants returned parental consent forms. All five participants were African American, and they were divided into two groups, a control group and an experimental group. The control group did not see the STEM camp DVD; the group consisted of three students, two males, one grade 6 and the other grade 7, and one female, grade 7. The experimental group, which saw the STEM camp DVD, consisted of two students, one male, grade 7, and one female, grade 6.

Table 1

Study Sample Demographics

Group	# Subject	DVD	Gender		Ethnicity	Grade		Parents at Presentation
			Male	Female		6	7	
Control	3	No	2	1	African-American	1	2	0
Experimental	2	Yes	1	1	African-American	1	1	0

One way to determine the effectiveness of a recruiting DVD is to analyze how participants' attitudes changed between the pre-recruiting presentations and the post-recruiting presentation. Participants were asked to rank their interest on 11 statements before a recruiting presentation was given (Appendix B). The same 11 statements were presented immediately after the recruiting presentation (Appendix D). These questions targeting on interest in STEM careers include:

a) I would like to be a scientist.

b) I would like to be an engineer.

c) I would like a job where I invent things.

d) I would like to design machines that help people walk.

e) I would like a job helping to make new medicines.

f) I would like a job that lets me design cars.

g) I would like a job helping to protect the environment.

h) Scientists help make people's lives better.

i) Engineers help make people's lives better.

j) Scientists can have many different kinds of jobs.

k) Engineers can do many different kinds of jobs.

The author compared changes in answers from the pre-presentation to the post-presentation to determine what direct impact a multimedia presentation may have had on STEM education interest and what possible impact the DVD may have had on students' interest in attending a summer STEM camp. The results from the 11 statements are shown below (Figures 1 through 11).

Statement 1 indicated, "I would like to be a scientist." There was no change in the control group or the experimental group from the pre-recruiting presentation to the post-recruiting presentation (Figure 1). In the control group, one participant indicated "Yes," one indicated "Maybe," and one indicated "No." Each response remained the same on both pre- and post-recruiting surveys. In the experimental group, both participants indicated "Maybe." Each response remained the same on both pre and post-recruiting surveys.

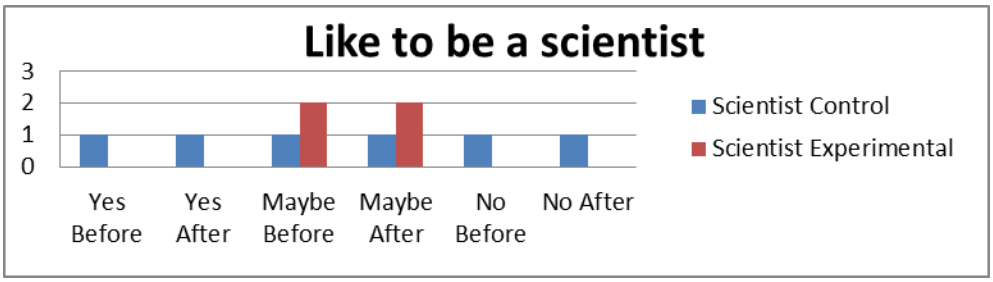

Figure 1. I would like to be a scientist.

Statement 2 indicated, "I would like to be an engineer." There was no change in the control group from the pre-recruiting presentation to the post-recruiting presentation. One participant indicated "Yes," one indicated "Maybe," and one indicated "No." Each response remained the same on both pre and post-recruiting surveys. A positive change occurred in the experimental group. One participant indicated "Maybe" and one indicated "No" in the pre-

recruiting survey. One participant changed his response from "No" to "Maybe," and one participant response remained the same in the post-recruiting survey (Figure 2).

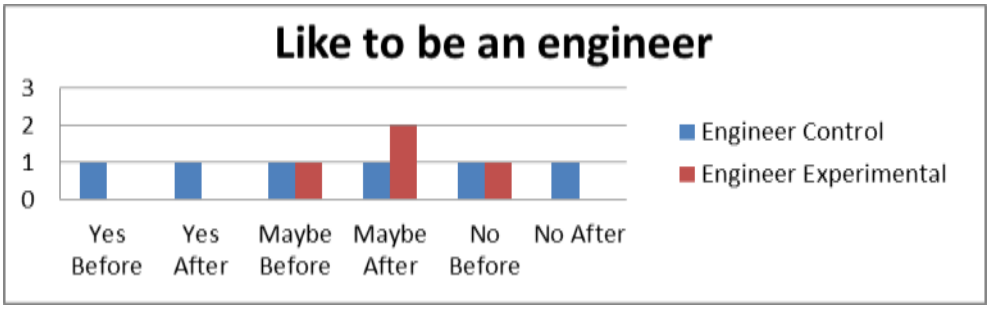

Figure 2. I would like to be an engineer.

Statement 3 indicated, "I would like a job where I invent things." There was no change in the control group from the pre-recruiting presentation to the post-recruiting presentation. One participant indicated "Yes" and two indicated "Maybe." Each response remained the same on both pre- and post-recruiting surveys. A positive change occurred in the experimental group. Two participants indicated that they would "Maybe" like to invent things in the pre-recruiting survey. One participant changed his response from "Maybe" to "Yes," and one participant response remained the same in the post-recruiting survey (Figure 3).

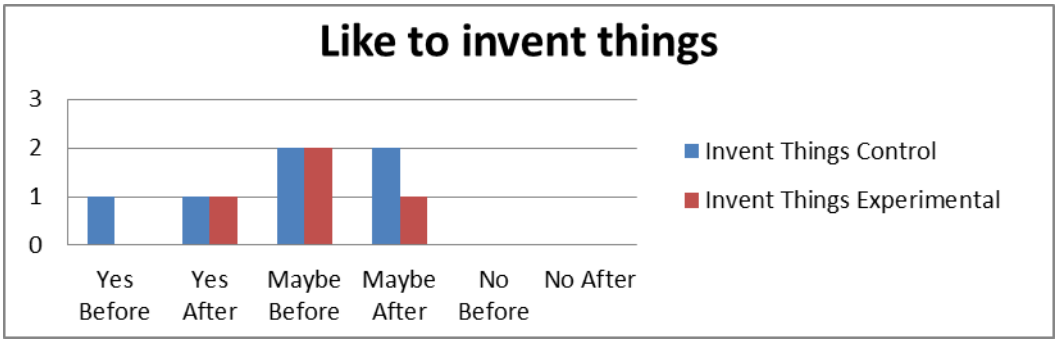

Figure 3. Engineers invent things.

Statement 4 indicated, "I would like to design machines that help people walk." A positive change occurred in the in the control group. One participant indicated "No," one

indicated “Maybe,” and one indicated “Yes” in the pre-recruiting surveys. One participant changed her response from “No” to “Maybe,” and two participants remained the same in the post-recruiting survey. A negative change occurred in the experimental group. One participant indicated “Yes” and one indicated “Maybe” in the pre-recruiting surveys. One participant changed his response from “Yes” to “Maybe,” and one participant remained the same in the post-recruiting survey (Figure 4).

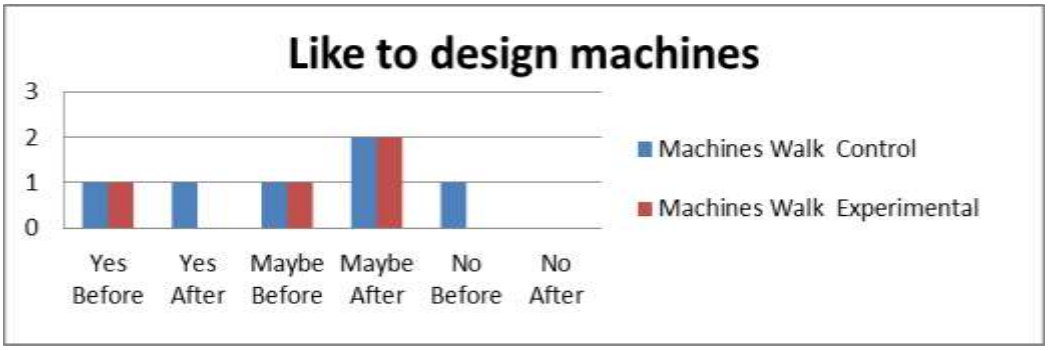

Figure 4. Engineers design machines.

Statement 5 indicated, “I would like a job helping to make new medicines.” There was no change in the control group from the pre-recruiting presentation to the post-recruiting presentation. One participant indicated “Yes,” one indicated “Maybe,” and one indicated “No.” Each response remained the same on both pre- and post-recruiting surveys. A negative change occurred in the experimental group. One participant indicated “Maybe” and one indicated “No” in the pre-recruiting survey. One participant changed her response from “Maybe” to “No,” and one participant response remained the same in the post-recruiting survey (Figure 5).

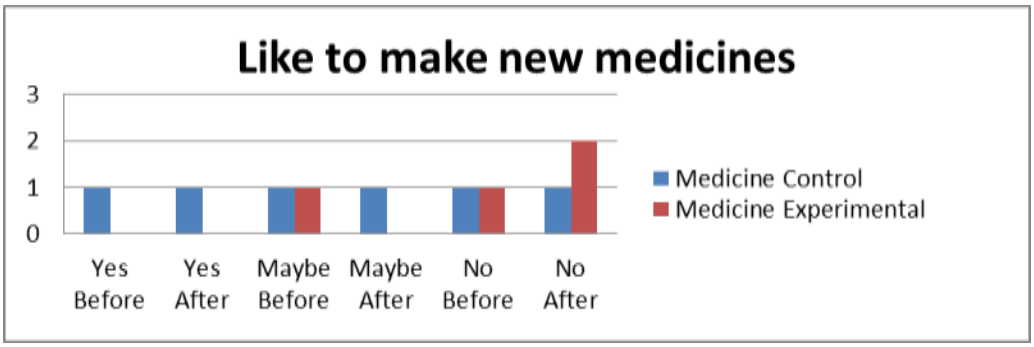

Figure 5. Scientists make new medicines.

Statement 6 indicated, "I would like a job that lets me design cars." A negative change occurred in the control group from the pre-recruiting presentation to the post-recruiting presentation. In the control group, two participants indicated "Yes" and one indicated "Maybe" in the pre-recruiting survey. One participant changed his answer from "Yes" to "Maybe," and two participants' responses remained the same in the post-recruiting survey. A positive change occurred in the experimental group. One participant indicated "Yes" and one indicated "No" in the pre-recruiting survey. One participant changed her response from "No" to "Maybe," and one participant response remained the same in the post-recruiting survey (Figure 6).

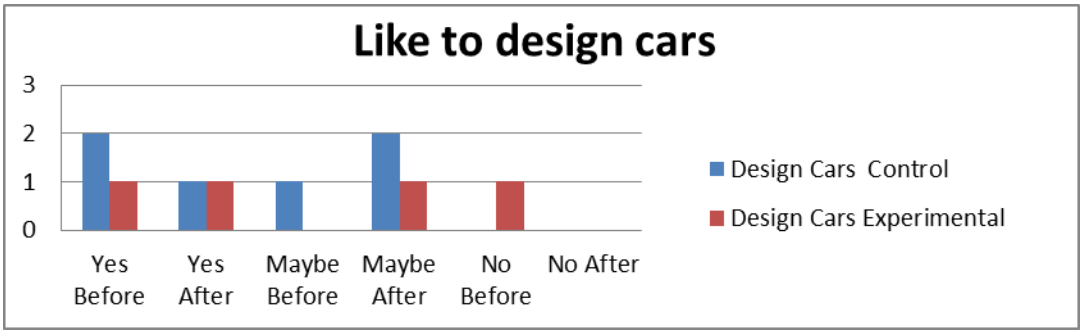

Figure 6. Engineers design cars.

Statement 7 indicated, "I would like a job helping to protect the environment." There was no change in the control group from the pre-recruiting to the post-recruiting presentation. One participant indicated "Yes," and two indicated "Maybe." Each response remained the same

on both pre- and post-recruiting surveys. A positive change occurred in the experimental group. In the pre-recruiting survey, one participant indicated "No," and one did not record an answer. One participant changed his response from "No" to "Maybe," and one participant, who did not record an answer in the pre-recruiting survey, indicated "Maybe" in the post-recruiting survey (Figure 7).

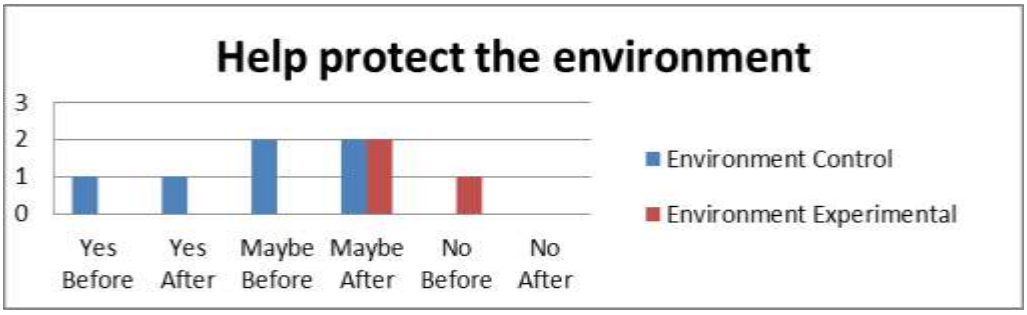

Figure 7. Scientists protect the environment.

Statement 8 indicated, "Scientists help make people's lives better." A negative change occurred in the control group from the pre-recruiting presentation to the post-recruiting presentation. In the control group, three participants indicated "Yes" in the pre-recruiting survey. One participant changed his response from "Yes" to "Maybe" in the post-recruiting survey, and two participant responses remained the same in the post-recruiting survey. There was no change in the experimental group from the pre-recruiting to the post-recruiting presentation. One participant indicated "Yes" and one indicated "Maybe." The responses remained the same on both pre and post-recruiting surveys (Figure 8).

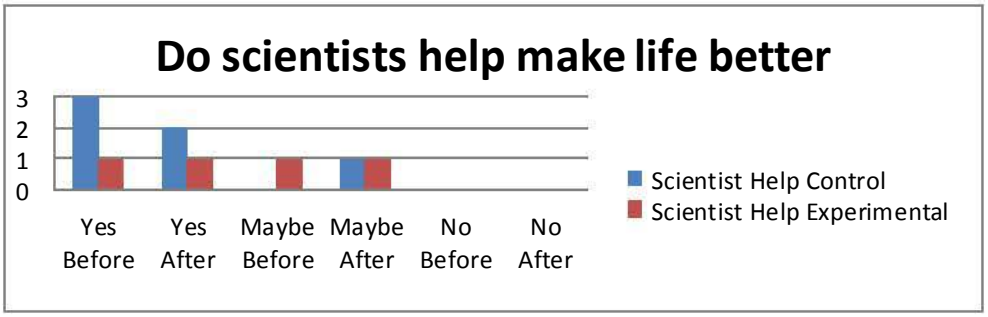

Figure 8. Scientists help make life better.

Statement 9 indicated, "Engineers help make people's lives better." A negative change occurred in the control group from the pre-recruiting presentation to the post-recruiting presentation. In the control group, three participants indicated "Yes" in the pre-recruiting survey. Two participants changed their responses from "Yes" to "Maybe," and one participant response remained the same in the post-recruiting survey. There was no change in the experimental group from the pre-recruiting presentation to the post-recruiting presentation. One participant indicated "Yes" and one indicated "Maybe." Each response remained the same on the pre- and post-recruiting surveys (Figure 9).

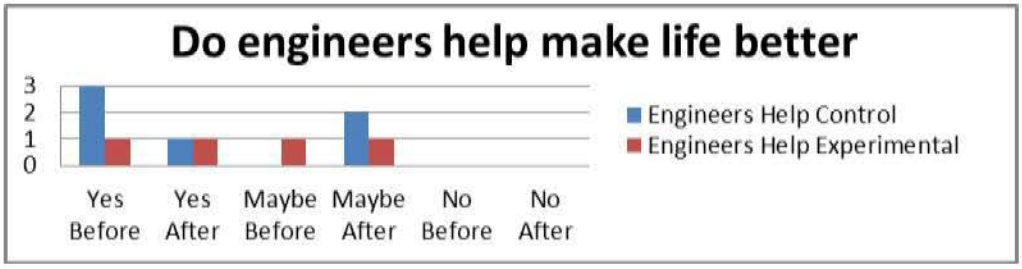

Figure 9. Engineers make life better.

Statement 10 indicated, "Scientists can do many different kinds of jobs." A negative change occurred in the control group from the pre-recruiting presentation to the post-recruiting presentation. In the control group, three participants indicated "Yes" in the pre-recruiting survey. One participant changed his response from "Yes" to "Maybe," and two participants

responses remained the same in the post-recruiting survey. There was no change in the experimental group from the pre-recruiting presentation to the post-recruiting presentation. One participant indicated "Yes" and one indicated "Maybe." Each response remained the same on the pre and post-recruiting surveys (Figure 10).

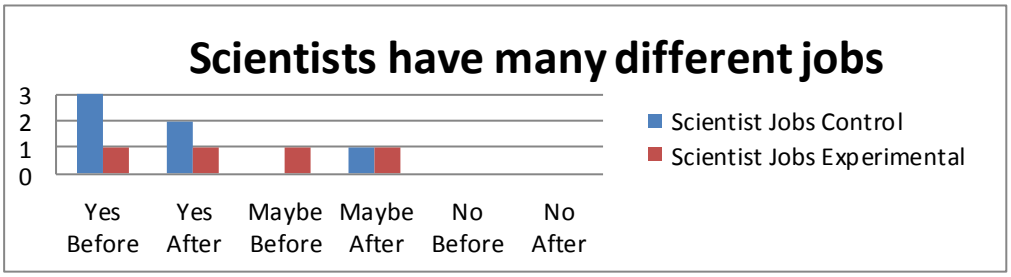

Figure 10. Scientists do different jobs.

Statement 11 indicated, "Engineers can have many different jobs." There was no change in the control group from the pre-recruiting presentation to the post-recruiting presentation. One participant indicated "Yes" and two indicated "Maybe." Each response remained the same on the pre and post-recruiting surveys. A positive change occurred in the experimental group. One participant indicated "Yes" and one indicated "Maybe" in the pre-recruiting survey. One participant changed his response from "Maybe" to "Yes," and one participant response remained the same in the post-recruiting presentation (Figure 11).

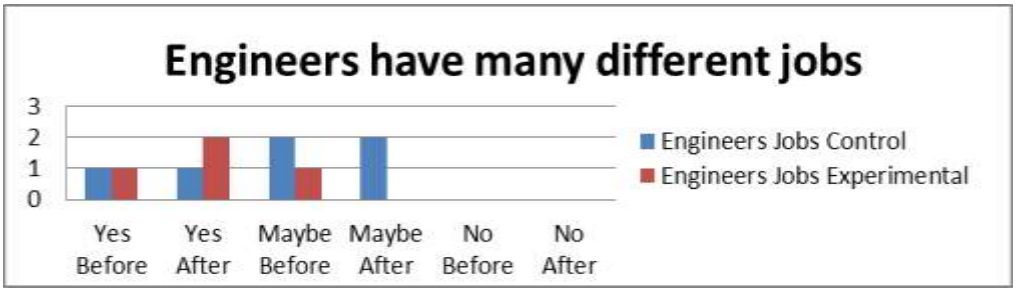

Figure 11. Engineers have different jobs.

A summary of the differences between pre- and postsurveys for the control and experimental groups relative to the DVD presentation follows. The control and experimental groups were examined, and patterns in responses and differences between the control and experimental groups may have had on the STEM education interest were noted.

There was no change from pre- to postsurvey condition on Statement 1 for either the control or the experimental group. A total of six Statements remained unchanged for the control group (Statements 1, 2, 3, 5, 7, and 11). A total of three statements remained unchanged for the experimental group (Statements 1, 9, and 10). It should be noted that one respondent in the experimental group did not record an answer in the pre-survey (Statement 7). Responses that were positive from both the control and experimental groups were examined between the pre- and postsurveys. The control group participants shifted from less to more positive responses in one instance (Statement 4). The experimental group participants shifted from less positive to more positive responses in six instances (Statements 2, 3, 6, 7, and 11). Two positive shifts occurred for Statement 7, "I would enjoy a job helping to protect the environment". Responses that were negative from both the control and experimental groups were examined between the pre- and postsurveys. The control group participants shifted from more to less positive response in five instances (Statements 6, 8, 9, and 10). Two negative shifts occurred for Statement 9, "Engineers help make people's lives better". The experimental group participants shifted from more positive to less positive responses in two instances (Statements 4 and 5).

Response patterns relative to gender were reviewed for both the control and experimental groups. Patterns shifting in responses from positive to negative and vice versa were examined between the pre- and postsurveys. In the control group, a single female participant had one negative and one positive shift in her response. One male in the control group shifted four times

toward the negative and zero times toward the positive end of the scale. The responses of the other male in the control group stayed the same. The experimental group had one female; her responses shifted two times toward the positive end of the scale and two times toward negative end of the scale. The one male in experimental group had shifted his responses five times toward the positive end of the scale and one time toward the negative end of the scale.

Both females in the study seemed to have an equal balance between responses shifting toward the negative and positive end of the scale. The three males in study seemed to have a little more drastic comparison in shifting toward the negative and positive ends of the scale. In the control group, one male did not shift negative or positive; all responses stayed the same, and the other male responses shifted four times to the negative and one response toward the positive end of the scale. In the experimental group, the only male shifted five times positive and shifted one time negative toward the end of the scale. Both males who shifted had a similar pattern, only in the opposite direction. The two females seemed to balance out. One from the control group shifted once positive and once negative, and from the experimental group, one female shifted two times positive and two times negative.

Positive and negative shifts in responses were compared by grade level for both the control and the experimental groups from the pre- and postsurveys. The control group consisted of two seventh grade and one sixth grade participants. The experimental group consisted of one seventh grade and one sixth grade participant. The pattern for shifting of responses was similar, but opposite, between the sixth and seventh grade participants. The sixth graders' responses shifted toward the negative in six instances and toward the positive in two instances. The seventh graders' responses shifted toward the negative in two instances and toward the positive in six instances.

In conclusion, the first goal of this study examined the effectiveness of using a DVD in a multimedia presentation for recruiting students to a summer STEM camp. Data collected and reviewed above came from a small convenience sample of five participants who completed pre- and postsurveys. The two participants in the experimental group exposed to the DVD included in the multimedia presentation and the seventh grade students in the control group accounted for shifts toward positive responses. One individual, a seventh grade boy from the experimental group, reporting the most positive change in responses, did not participate in the 2010 summer STEM camp. One individual, a sixth grade boy in the control group, reporting the most negative responses, did participate in the 2010 summer STEM camp. The one individual, a seventh grade boy in the control group, reporting all positive responses in both pre- and postsurveys, responses did not change. The next section investigates other barriers that might prevent participants from attending in summer STEM camps.

Parental Encouragement

The second goal of this study was to determine how parental encouragement impacted students' enrollment in a summer STEM camp. Study participants were asked to rank their opinion regarding parental encouragement according to whether they "Have," "Don't wish to do this," or "Would like to" participate in extracurricular programs. Participation in extracurricular activities indicates some level of parental encouragement and the willingness of parents to encourage their children. The results from the seven ranked questions are shown below in Table 2.

Question 1 asked students to indicate their level of participation in an after-school program at a school, community center, or church. Three participants indicated they have participated in after-school programs, and two participants indicated they would like to.

Question 2 asked students to indicate their level of participation in an after-school program where they were able to do science/engineering projects. Three participants indicated they have participated in science/engineering projects, and two participants indicated they would like to.

Question 3 asked students to indicate their level of participation in an after-school program where they were able to participate in projects where they design or build things. Two participants indicated they have participated in after-school programs, and three participants indicated they would like to.

Question 4 asked students to indicate their level of participation in a community club. Three participants indicated they have participated in a community club, and two participants indicated they would like to.

Question 5 asked students to indicate their level of participation in summer camps. Two participants indicated they had been involved in summer camps related to science, computers, or engineering. Three participants indicated an interest in these types of summer camps.

Table 2

Results to Questions 1 through 5 Show Interest in Participating in After-school Activity

Question	Have	Would Like to	Don't Wish to
After-school program at a school, community center, or church.	3	2	
Club or group where they do science/engineering projects.	3	2	
Club or group where they design and/or build things.	2	3	
In a community club like the Boys/Girls Scouts, YMCA, Girls Inc., 4-H, etc.	3	2	
Summer Camps about science, computers, or engineering.	2	3	

Questions 1 through 5 (above) were used to determine all five students' current level of interest or involvement in after-school activities. They were also used as indicators of parental encouragement. To gain a clearer distinction between students' perception of parental encouragement and students' interest in participation in extracurricular activities, questions 6 and 7 results were added to the survey. Results from the additional questions follow.

Questions 6 and 7 listed were used to determine if study participants have parental encouragement to participate in after-school activities and if parental encouragement impacted students' enrollment in a summer STEM camp.

Question 6 asked students to rank their response to "My parents encourage me to participate in these activities." Results listed below show that five out of five participants were encouraged by their parents to participate in these activities.

Question 7 asked students to indicate "Yes" or "No" to the question "I have parents/guardian that will want me to attend (July STEM camp)." Four out of five participants recorded "Yes," they are encouraged by their parents to attend the STEM camp in July; one out of five recorded "No," their parents did not encourage them to attend in the July summer STEM camp. No additional data was collected to support understanding the "No" parental encouragement.

Collected data show there is student interest and parental encouragement in after-school activities and to attend the July summer STEM camp. As recorded by student participants in question 6, all respondents indicated that there is parental encouragement to participate in after-school activities. As recorded by student participants in question 7, the results show four out of five participants have parental encouragement to attend the July STEM camp. Of all the study

participants, only one student registered for the summer camp and participated. This participant was a sixth grade male exposed to the control treatment of this study.

The next section investigates other barriers that might prevent participants from attending in summer STEM camps.

Barriers

The third goal of this study was to determine what potential barriers might impact students' ability to enroll in a summer STEM camp. Two sets of rating scales were used to indicate students' beliefs regarding possible barriers because of family obligations and transportation issues.

Family obligations. The final set of survey rankings was designed to gather data related to the barrier of family obligations potentially affecting student enrollment in a summer STEM camp (Appendix B). The following statements pertaining to family obligations include:

1) I need to babysit during time of camp (1-4 p.m.).
2) I cannot attend summer camp because of family responsibilities.
3) I will be at another camp and cannot come to this camp.

Participants ranked each statement with the results from these three questions shown in Table 3.

Table 3

Family Obligations Preventing Participation

Statement	Yes	No
Need to babysit		5
Family Responsibilities	1	4
Attending another camp	1	4

Participants indicated that they do not have family obligations, such as babysitting a family member, during the time of camp. The need to babysit does not appear to be a factor in participants enrollment in the summer STEM camp. Results reveal that one participant indicated "Yes" she would have other family responsibilities that would keep her from participating in camp, whereas four reported they would not. The author had follow-up phone dialogue with the parent of the participant who indicated "I cannot attend summer camp, because of family responsibilities." The parental response indicated that the student did not have other family responsibilities.

Four participants indicated that there would not be a conflict with other camps. Conflicting dates with other summer camps did not appear to be a barrier for four out of five participants attending a summer camp. Three out of five participants did not have family or other obligations preventing them from enrolling in a summer STEM camp. One participant indicated that she would have family responsibilities, and one participant indicated that he would have another camp to attend. Final data show that both participants would have barriers preventing them from registering and participating in the summer STEM camp.

The second sets of six ranked items were designed to gather data relative to possible barriers with transportation that could affect student enrollment in a summer STEM camp (Appendix B).

Transportation issues. The following is a list of six statements pertaining to transportation options that were rated by student participants. Statements rated on a "yes," "maybe," or "no" scale included:

1) I will walk to camp.
2) I will be driven to camp.
3) I will take public transportation, if needed.
4) Does parent/guardian own or have access to a car?
5) Transportation problems will keep me from camp.
6) How far is camp from home, if I participate?

Results for statements one through five related to transportation barriers are indicated below in Table 4. Reviewing the results from six statements listed below was used to determine which barriers impacted all five participating students and prevented participants from enrolling for a summer STEM camp.

All participants report there is some form of transportation available to attend the July summer STEM camp. But will the parents see these as reliable solutions? Responses to the survey statements indicate that transportation may be an issue for participation. For the "I will walk to camp" statement, the results show that three participants indicated "Yes" and two indicated "Maybe" they would walk to camp. For the "I will be driven to camp" statement, the results show that four participants indicated "Maybe" and one indicated that "No" he would not be driven to camp. Two of the five participants indicated that their parents did not have access to

a car, with three of the five participants indicating they would take public transportation. Three of the five participants indicated that transportation would, or might be, a factor in camp participation.

Table 4

Individual Participant Response to Transportation Barriers by Group

Statement	Yes	Maybe	No
Walk to camp	3	2	
Driven to camp		4	1
Parent/guardian owns car	3		2
Take public transportation	3	2	
Transportation problems	1	2	2

The total individual responses shown in Table 4 indicate the overall impact of transportation barriers. After review of the data gathered from the first set of possible barriers, the results indicate that for three participants, being driven to camp is a tentative option because the parent/guardian owns a car, where two participants said "No". Another tentative option for attending camp was that the results indicated that three participants could walk or could take public transportation. However, the results of four participants indicating maybe they would be driven and one reporting no, he would not be driven to camp, shows uncertainty about transportation.

The final statement related to transportation barrier asked, "If I participate, how far is camp from home (how many blocks)?" One participant indicated that he "lives more than 30 blocks," one participant indicated that he "lives 10 blocks," two participants did not record any

information, and one participant listed her address, making the calculated distance 0.89 miles away from the summer STEM camp. After results for transportation problems were reviewed, this still shows uncertainty with transportation.

Of the five students who participated in the study, only four were eligible to participate in the summer STEM camp and enrolled in the camp. Out of the four, three did not attend the camp. Only one student out of four eligible students participated in the 2010 summer STEM camp.

The author made follow-up phone contact to parents after the camp and found that did not reinforce support for student participation in the summer STEM camp. The three parents of students who did not attend the summer STEM camp were asked why their student did not participate. They responded that they cannot force their student to participate in something that the student didn't want do. In the interview, when asked "if they knew of the STEM camp," the parents' response was "yes." When asked, "If you were given a DVD that explained and showed prerecorded students activities of the summer STEM camp, would you reinforce student participation?" the parents' response was, "Maybe." When asked "If you were given a DVD to use as a reminder of the camp, would this help to reinforce your student's participation?" their response was, "Yes." Parents of students in each study group were invited to participate in both presentations; however, no parents were present.

Chapter V: Discussion

Introduction

There are many barriers to increasing student interest in enrolling in an MPS summer STEM camp. This chapter discusses the findings from the literature review, author observation, and research conducted. The thesis presents recommendations to other summer STEM camp recruiters that could potentially increase enrollment and student eligibility for summer STEM camps within Milwaukee Public School District (MPS). Research findings may assist educators and recruiters in the development of promotional efforts for their training and recruiting process relative to summer camps.

Technological changes in a global society are generating a greater demand on America's youth to become innovative problem-solvers for the 21st century workforce (Torinus, 2008). To better prepare students for today's workforce demands, Wisconsin has implemented Science, Technology, Engineering and Mathematics (STEM) summer programs to increase awareness and to better prepare Milwaukee Public School (MPS) students for these changes. Students can explore career opportunities in STEM fields by participating in STEM summer programs (Milwaukee Journal Sentinel Online, 2009, June 27). Opportunities to motivate MPS students to consider STEM education exist through participation in these summer camps. However, since 2007, the student enrollment in MPS summer STEM camps has been low. Therefore, the purpose of this study was to review the current recruitment strategies and barriers that limit enrollment.

There are three goals to this study. The first goal investigates the effectiveness of a summer STEM camp DVD used as a recruiting tool to increase camp enrollment with MPS students in grades 6 through 8. The second goal examines parental encouragement and how it

impacts students' camp enrollment. The third goal looks at transportation barriers impacting summer camp enrollment.

Limitations

As discussed in chapter three, this study was limited to low socioeconomic status (SES) students enrolled at one Milwaukee Public Schools middle school.

Flaws were found in the process of distributing parent/guardian IRB consent forms that included details of the summer STEM camp presentation. These consent forms were needed to generate and collect data for use in the study. Permission slips given first to an MPS administrator, then to the teachers, were not distributed appropriately. Scheduled meetings between the researchers and the administrator were cancelled and rescheduled several times without any notice from the school administrator. The literature shows that other researchers have encountered similar problems (University of Massachusetts Donahue Institute, 2011; Sasso, 2008; Dion et al., 2002).

Consequently, the results of this study are limited due to the low number of participants. Only five students participated in the study, four enrolled for the summer STEM camp, but only one participated. The majority of students eligible for the study (57) received the forms but did not return them, indicating lack of parental interest or oversight. This may have impacted not only the study itself but ultimately the participation in the summer STEM camp.

Discussion

Multimedia. Was the DVD an effective recruiting tool? Can a multimedia presentation that includes a DVD increase student interest in enrolling in and participating in a Milwaukee Public Schools summer STEM camp?

The DVD had no significant impact on recruiting students to participate in a summer STEM camp, as evidenced by the following. Only one out of five of the individuals (20%) who participated in the study went on to enroll in a STEM camp. That person was in the control group that did not see the DVD. This participation rate for the STEM camp in this study is less than the rate shown in other studies (University of Massachusetts Donahue Institute, 2011). This discrepancy is noteworthy, given that most students came to the study with a high level of interest in summer STEM camps and also came to the study with a high degree of perceived parental encouragement.

Survey data indicated that the control group multimedia STEM presentations had a negative impact on student interest in STEM-related activities, with five negative changes and one positive change. In the experimental group, the multimedia presentations, including the DVD, seemed to have a positive impact on students interested in STEM-related activities, with six positive changes and two negative changes.

Survey data indicated that changes occurred by gender. In the control group, a male shifted toward the negative side of the scale, and in the experimental group, a male shifted toward the positive side of the scale. In the control group and experimental group, there was no change in two females. Because of the small sample size, it is difficult to speculate on the reasons for the gender differences. Survey data indicated that changes also occurred by grade level and thus age. Sixth graders indicated a shift toward the negative end of the scale and seventh graders indicated a shift toward the positive end of the scale. One possible explanation for these shifts is that the seventh graders are more mature and open to considering STEM camp.

Upon reflection, the study showed that while the DVD did not have an impact on camp participation, the data collected does show that the DVD did help students clarify their

understanding of STEM careers, as evidenced by the following. Even though they were well informed, they had no interest in STEM careers. Other students' attitudes changed from positive to negative. This was not gender based, as the data indicates male gender participants switched equally in opposite directions, nor was it based on grade level, because both grade levels changed. It could be argued that the DVD may have provided a better understanding for students, leading them to make more informed choices.

Another factor has to do with the environment in which information about STEM careers is presented. The DVD shown in this study included students with a similar demographic background as the study population. Thus, students were able to relate to those shown in the DVD and make better-informed decisions, either gravitating toward STEM careers or away from them. While a larger sample and further studies in this area would have to be completed, these results are consistent with the research. For example, according to Sasso (2008), African American students excel nationally in STEM fields when they are in the right environment, that is, with others who have the same demographic characteristics, to learn STEM. The 2008, MPS summer STEM camp participating students with the same demographics as the students in this study are shown on the DVD conducting hands-on, project-based STEM activities as well as demonstrating leadership skills.

Although multimedia presentations may not have increased STEM camp enrollment, they may have been a beneficial factor in helping students clarify where their interests lie. Participants in both groups liked the multimedia aspects of the presentation. In addition to observations of the control and experimental groups, postsurveys relating to the multimedia STEM camp presentation were reviewed. All participants indicated that the multimedia presentations helped them learn more about STEM education. Four students (80%) indicated

that the presentation increased their interest in STEM activities and helped them see that they were good at STEM activities. Four participants (80%) reported they had fun learning about STEM and the presentation increased their interest in STEM educational activities. Three participants (60%) would include the PowerPoint presentation describing the summer STEM camp and stem careers. One respondent (20%) indicated the PowerPoint should be improved, as should the YouTube video *Shift Happens*. Three participants (60%) would include the YouTube video, while one (20%) participant did not comment.

As technology changes in the 21st century, so will media viewing. Multimedia usage in presentations should continually change as technology changes to keep participants' interest. The participants in this study were a multimedia-savvy audience, which is typical of this age group. According to Foehr et al. (2010), this age group is watching more electronic media, so it appears that the multimedia presentations were appropriate for this audience. In fact, the feedback in the surveys was that the participants liked the quality of the PowerPoint and the DVD. One participant (20%) indicated, "The DVD was great." Another felt that the quality of the DVD needed to be better ("great but a little blurry"). Yet the majority of this multimedia-savvy population was not influenced to attend the summer camp, and the participation rate of this study was below that experienced by other studies.

There is no evidence showing that the DVD made an impact on students' decision to enroll or participate in the summer camp. Participants indicated that they learned more about STEM education and included DVD-specific recommendations for improving the presentations. Participants were asked if they would recommend that the summer camp DVD be included in the recruiting sessions. Both participants who saw the DVD would include it in promotional presentations. In addition to feedback from participants, postsurveys relating to

recommendations for the summer STEM camp were reviewed. Both groups indicated that they would recommend their friends to participate and were positive about the summer camp.

It could be that other methods for recruiting might work better than the DVD/PowerPoint combination used in this study. Foehr et al. (2010) discussed using technologies such as iPods, cell phones, Facebook, Twitter, and the school website for recruiting. Clearly these are the recruiting tools of the future, and STEM camp administrators would do well to strategize about how to best use them.

The data in this study indicate that students are interested in attending summer STEM camps. Presentations about the summer camp resulted in four out of the five participants enrolling in an MPS summer STEM camp. Students were interested, but still did not attend the summer STEM camp. This suggests there are other possible barriers to camp enrollment, such as parental encouragement and transportation.

Impact of parental encouragement. Do parental encouragement and family obligations affect students' ability to enroll and participate in a summer STEM camp?

A total of five students returned parental consent IRB forms, giving them permission to participate in the study, but not necessarily indicating parental encouragement to attend a summer camp. All students who returned the paperwork were eligible, with their immunization records at school up-to-date.

The data gathered show that four out of the five students in this survey had parental encouragement for summer and community activities. The parents of all five study participants signed the IRB consent forms for their student to take part in this study and also submitted a summer enrollment form. The data indicated that four out of five participants would not have conflicts with other camps.

Examining the impact of parental support was important for this study, because a review of the research about community sponsors and state administrators indicate there are barriers for students' participation in summer programs. These barriers include students not having any interest in participating and parents wanting or needing them to stay home (Stracuzzi & Wauchope, 2010). Continued research on schools in low socioeconomic status neighborhoods reveals that students suffer from the lack of parental support in their homes, and yet the home environment contributes substantially to the development of academic skills (Dion et al., 2002). Family plays an important and continuing role in the lives of youth, and the route to educating youth is through their parents (Sasso, 2008). Two of the five participants (40%) indicated they would have barriers preventing them from enrolling and could not participate in a summer STEM camp. These included family responsibilities and attendance at another camp.

Student participation in the MPS summer STEM camp is consistent with research found in literature review chapter of this thesis. For example, to get minority students excited about STEM education, students need encouragement and support from teachers and parents if they are to participate in summer programs. Minority students catch the excitement of learning STEM education through role models with real-world backgrounds and in after-school and summer programs (Sasso, 2008).

To further understand the dynamics at work with the students in this study, the author made follow-up phone contact with available parents and interviewed the MPS summer STEM camp coordinator to verify the names of participating students at the MPS summer STEM camp in 2010. The author also used information from the study and literature review to create a profile of students who did and did not participate in the summer camp. For the purpose of this discussion we will call the first student, who did not attend the summer camp, Jamie (not her real

name). Jamie is a female, African American, middle school student living within a 1-mile radius of the camp. Walking to and from the summer STEM camp is an option for Jamie, as well as being driven by her parents, so transportation would not be a problem. Jamie comes from a family of between five and ten members and had parental support to attend the summer STEM camp. All her necessary paperwork, including immunization records, was complete, returned by the due date, and included a parental signature.

The author made a phone call to Jamie's parents and found that Jamie was not interested in participating in the STEM camp. This was evidenced by the fact that this student "forgot" about the STEM summer camp. Further, Jamie's parents indicated they were aware of the summer STEM camp but said they "cannot force Jamie to participate in something if she did not want to." This ties in with Stracuzzi and Wauchope's (2010) findings that students simply may not have an interest in participating in these types of camps and/or that parents may subtly discourage them from attending camp because the parents may want or need their student to stay home.

Casey (not his real name), who did attend the summer STEM camp, is a male, African American, middle school student living between three and five miles from the STEM camp. Casey comes from a smaller family than Jamie, five or fewer family members, and had parental support to attend the summer STEM camp. All of Casey's necessary paperwork, including parental signatures and up-to-date immunization records, was complete and returned by the due date, making Casey eligible to participate in the summer STEM camp. Casey indicated that transportation to and from the summer STEM camp would not be an issue, although the specific form of transportation to be used was not indicated.

Casey had previously indicated that he would tell his friends about the summer camp because "it looks fun and interesting." This comment ties into Davis' (n.d.) and Clark's (1994) findings that images in the media generate intrinsic factors that motivate behavior and are an efficient way to achieve an intellectual challenge. This study, however, looks at motivation. The biggest difference between Casey and Jamie was that Casey showed a willingness to participate. This again ties into Stracuzzi and Wauchope's (2010) findings that students simply may not have an interest in participating in these types of camps and/or that parents subtly influence them to stay home. Casey participated in the summer camp even though distance was more likely to have been a barrier.

Transportation barriers. Did transportation issues impact Jamie's or Casey's enrollment in a summer STEM camp?

Jamie, who did not participate in the summer STEM camp, lived within walking distance of the camp, and Casey, who did participate, did not live within walking distance. Jamie indicated that transportation would not be a barrier, that her parents owned a vehicle, and that she "might" take public transportation if necessary. Casey indicated that transportation "might" be a problem, that his parents did own a vehicle, but that he "might" walk or take public transportation, if needed.

So it appears that transportation did not seem to be a deciding factor for camp participation for either Jamie or Casey. However, the research discussed in chapter two (Babey et al., 2009; Kong et al., 2009; Kerr, et al., 2006) and the data collected by this author show that transportation factors may have contributed overall to the low enrollment in the summer STEM camp, because three of five participants (60%) indicated they would have some transportation problems. This included all participants in study who came from the same surrounding location,

near the school where the survey was given. Three of the participants (60%) indicated they would walk to camp, and two participants (40%) indicated they might walk to the summer camp.

Issues with transportation are consistent with research included in the literature review in chapter two. For example, safety, cost of gas, access to a vehicle, and cost of public transportation were possible concerns for the parents of participants in both groups (Babey et al., 2009; Kong et al., 2009; Kerr, et al., 2006). It should be taken into consideration that the participant might not have parent/guardian permission to walk to and from the summer STEM camp. Out of five participants, only two could report that they would not have any transportation problems.

Conclusions

Because this study had low student/parent participation, the author found it difficult to develop firm conclusions from only five participants. Based on the author's observations and the results of the study, the following conclusions are drawn:

- New multimedia technology should be used to enhance enrollment for future summer STEM camps and to distribute camp information. For example the participating school website, email, Facebook, or Twitter could be used.
- To promote summer learning to students, administrators and teachers should consider scheduling future guest speakers, field trips to STEM businesses, or possible student internships.
- To help recruit or increase parental involvement, communication barriers should be addressed. For example, English as a second language or bilingual communication are possibilities in low socioeconomic status communities and should be considered when communicating among the recruiter, researcher, school, and families.

- Possible parental difficulties in comprehending marketing materials, parental informational packets, permission forms, and phone dialog should be addressed. There were no parents present during the presentations, so other methods of disseminating critical information to parents need to be considered.
- Transportation issues are barriers that could affect student participation in camp. Adequately addressing transportation barriers should be considered for future camps, and the past experience of the author of this study confirms such barriers.
- In this study, family responsibilities were not shown to affect most students' ability to enroll, and thus were not a barrier. Four out of five participants would not have family responsibilities preventing them from enrolling and could have participated in a summer STEM camp.
- While health records in this study were not a barrier, this is likely due to the low number of students participating in this study. All students who enrolled were eligible and their immunization records at school were up-to-date. Based on the author's past observations with a larger number of study participants, health records would certainly be an issue in recruiting students in the future.
- Social environment factors include the people surrounding the students. Important people such as parents, teachers, and administrators constitute a significant influence on low socioeconomic status students as they decide to pursue STEM education. These factors should be taken into account in interesting students in STEM careers.
- The complex issue of motivation needs to be studied in greater depth. In this study, the one student who did attend camp didn't "forget" and was motivated to go. It

seems that increasing motivation for students to actually attend is the big hurdle to overcome.

Recommendations

Despite the significant limitations of this study, the research findings and the results of this study may assist other summer STEM camp recruiters to increase enrollment, promotional efforts, and student participation in a summer STEM camp within MPS.

Based on the research findings and observations of this study, the following recommendations are made:

1. Conduct further studies to see which information dissemination platforms provide the greatest response rate in potential summer camp participants. Future studies should include strategies to overcome barriers and possible roadblocks found in schools and classrooms.
2. Conduct focus groups and research to identify best practices that encourage parental participation in students' lives, particularly related to enrolling in extracurricular activities.
3. Utilize new multimedia technologies for communication, for example, school website, emails, YouTube videos, Facebook, iPods, cell phones and Twitter.
4. Contact community health clinics to discuss the availability of sponsorships for updating student immunization records. To increase student eligibility in summer camp participation, when needed, contact participating students' parents to have health records updated prior to camp.
5. Develop marketing items, recruiting presentations, or any form of communication in multiple languages and in easy-to-understand formats. This will help alleviate

parental difficulties with the summer camp paperwork and assist parental comprehension for successfully completing the paperwork.

6. Involve corporations to help increase STEM education awareness in low socioeconomic status student communities.
7. Overcome circumstantial factors such as the financial barriers of transportation costs through awareness of and availability of corporate sponsorship.
8. Include marketing and recruitment efforts at low socioeconomic status elementary and middle schools regarding the availability of summer STEM camps and the economic benefits of STEM education.

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Appendix A: Administration Intro Letter

Introductory letter given to the administration located at the Elementary school in study.

Presenter Talking Points

Gateway Academy Day Camp

- The Gateway Academy is a co-ed, summer day camp that provides students in grades 6, 7 & 8 with a new awareness of the principles of science, technology, engineering and math in a learning lab environment.
- Includes fun, confidence-building activities designed to inspire and influence youth students to pursue math and science courses in high school in preparation for technical careers.
- After a pilot program with five camps in 2006, 2007 more than 1,000 students participated in Gateway Academies, 2008 about 180 academies 3,600 students estimated total, 2010, SME-EF's goal add an additional 50 academies per year through 2010.
- Milwaukee is home base for Gateway Academy Camp located at:
    - Washington High School.
    - 2525 North Sherman Boulevard
    - Milwaukee, WI 53210
- Date: July 12 – July 23, 2010 Time: 1 p.m. – 4 p.m.
- Academy instructors are certified by Project Lead the Way® (PLTW).
- Academies prepare students for the PLTW Gateway to Technology pre-engineering curriculum during the school year.

Workforce Issues

- Fewer young people are pursuing engineering-related careers and more engineers are retiring. The result: manufacturers, who are already suffering from a lack of qualified employees, will experience a growing need for skilled workers.
- The Bureau of Labor Statistics projects the demand for engineers to increase by 160,000, or 11 percent, from 2006 to 2016.

The SME Education Foundation

- The foundation addresses the need for skilled workers in the manufacturing sector with a three-fold approach designed to:
    - Inspire youth interested in science, technology, engineering and math (STEM).
    - Support students studying for a career in an engineering-related field.
    - Prepare these students with the necessary skills for success.

To collect students and parent interests, I will use:

- Pre-Survey given to students and parents before presentation.
- Post-Survey given to students and parents after presentation.

Presentation is approximately one hour:

- PowerPoint
- DVD
- You Tube 6 minute video "Shift Happens"

Presentation participants:

- Grade 6-8 students and parents.
- Split each class into 2 groups. Call them Group "A" and Group "B."
- Teachers and administration are welcome.

Parents and Students, divide into two groups, and are given different presentations.

- Group "A" consists of half of Grade 6-8 students and parents. (one hour)
    - Pre-Survey give to students before presentation.
    - PowerPoint.
    - You tube 6 minute video "Shift Happens."
    - DVD of STEM camp.
    - Post-Survey to students and parents.
    - Camp brochure and registration form.

- Group "B" consist of half of Grade 6-8 students and parents. (one hour)
    - Pre-Survey give to students before presentation.
    - PowerPoint.
    - You tube 6 minute video "Shift Happens."
    - NO DVD of STEM camp.
    - Post-Survey to students and parents.
    - Camp brochure and registration form.

Supplies needed:

- Internet Access
- Electrical power supply (outlet) for: (I will supply the following four Statements)
    - Projector
    - Speakers
    - Laptop
    - A surge protector
- Table for all of the above.
- Projector screen. If you do not have one I will bring one, please let me know.

Possible room:

- Classroom.
- Conference room.
- Any room large enough for all of the above with capabilities to receive internet access, and power.

Thank you for working with me. Please let me know, if you have any questions.

Appendix B: Group "A" Pre Survey

My name:_____ Date:_____

Group A – with DVD
Gateway Academy Camp
PRE Survey

Thank you for taking the time to fill out this survey, which will take about 10 minutes to complete. Raise your hand if you have questions while you are taking the survey.

a. I am a: ☐ Girl ☐ Boy
b. I have a parent/guardian present with me today: ☐yes ☐no
c. I am "☐" years old:☐ 9 ☐ 10 ☐11 ☐ 12 ☐ 13 ☐ 14☐15
d. I am in grade: ☐6 ☐7 ☐8

I. Demographics

Participants
Indicate the number of participants from your family. Include yourself to total count.

	Female	**Male**	**Total**
Participants			
Ethnicity: **Hispanic__ African American__ Caucasian__ Asian__ Native American__ Bi-Racial__**			

II. Rating Scales for Sense of Participation

The following is a list of activities. For each activity, check one box to answer your participation.

Have☺ or Don't wish to do this ☹. (😐Means I would like to)	**HAVE**	**HAVE NOT DONE**	
	☺	😐 **But Would Like To**	☹ **Don't Wish To do This**
a. After-school Program at a school, community center or church	☐	☐	☐
b. Clubs or groups where I get to do science/engineering projects	☐	☐	☐
c. Clubs or groups where I can design and/or build things	☐	☐	☐
d. Community Groups (Scouts, YMCA, Girls Inc. 4H, etc.)	☐	☐	☐
e. Summer camp about science, computers or engineering	☐	☐	☐
f. My parents encourage me to participate in these activities.	☐	☐	☐

III. Rating Scales for Transportation

The following is a list of transportation options. Please check one box .

Please mark YES ☺ or NO ☹ (😐 Maybe)	☺	😐	☹
a. I will walk to camp – Washington High School	☐	☐	☐
b. I will be driven to camp – Washington High School	☐	☐	☐
c. Does parent/guardian own or have access to a car?	☐	☐	☐
d. I will take public transportation, if needed?	☐	☐	☐
e. Transportation problems will keep me from camp?	☐	☐	☐
f. How far is camp from home, if I participate?			

IV. Rating Scales for a STEM Career

Please mark one box: YES☺ or NO ☹ (MAYBE 😐)		☺	😐	☹
a.	**I would like to be a scientist.**	☐	☐	☐
b.	**I would like to be an engineer.**	☐	☐	☐
c.	**I would like a job where I invent things.**	☐	☐	☐
d.	**I would like to design machines that help people walk.**	☐	☐	☐
e.	**I would like a job helping to make new medicines.**	☐	☐	☐
f.	**I would like a job that lets me design cars.**	☐	☐	☐
g.	**I would like a job helping to protect the environment.**	☐	☐	☐
h.	**Scientists help make people's lives better.**	☐	☐	☐
i.	**Engineers help make people's lives better.**	☐	☐	☐
j.	**Scientists can do many different kinds of jobs.**	☐	☐	☐
k.	**Engineers can do many different kinds of jobs.**	☐	☐	☐

V. Rating Scales for Sense of Family Obligations

Check one box. yes ☺ or no ☹ **Camp date and time: July 12 – July 23, 2010 --- 1 p.m. – 4 p.m.**	☺	☹
a. I need to baby-sit during time of camp (1-4 pm)	☐	☐
b. I cannot attend summer camp, because of family responsibilities.	☐	☐
c. I will be at another camp, cannot come to this camp	☐	☐
d. I have parents/guardian that will want me to attend	☐	☐

Appendix C: Group "B" Pre Survey

My name:_____ Date:_____

Group B – without DVD
Gateway Academy Camp
PRE Survey

Thank you for taking the time to fill out this survey, which will take about 10 minutes to complete. Raise your hand if you have questions while you are taking the survey.

a. I am a: ☐ Girl ☐ Boy
b. I have a parent/guardian present with me today: ☐yes ☐no
c. I am "☐" years old:☐ 9 ☐ 10 ☐11 ☐ 12 ☐ 13 ☐ 14☐15
d. I am in grade: ☐6 ☐7 ☐8

I. Demographics

Participants
Indicate the number of participants from your family. Include yourself to total count.

	Female	Male	Total
Participants			

Ethnicity:
Hispanic__ African American__ Caucasian__ Asian__ Native American__ Bi-Racial__

II. Rating Scales for Sense of Participation

The following is a list of activities. For each activity, check the box to answer your participation.

Have ☺ or Don't wish to do this ☹. (😐Means I would like to)	HAVE	HAVE NOT DONE	
	☺	😐 But Would Like To	☹ Don't Wish To do This
a. After-school Program at a school, community center or church	☐	☐	☐
b. Clubs or groups where I get to do science/engineering projects	☐	☐	☐
c. Clubs or groups where I can design and/or build things	☐	☐	☐
d. Community Groups (Scouts, YMCA, Girls Inc. 4H, etc.)	☐	☐	☐
e. Summer camp about science, computers or engineering	☐	☐	☐
f. My parents encourage me to participate in these activities.	☐	☐	☐

III. Rating Scales for Transportation

The following is a list of transportation options. Please check one box telling me how you will get to and from camp.

Please mark YES ☺ or NO ☹ (😐 Maybe)	☺	😐	☹
a. I will walk to camp – Washington High School	☐	☐	☐
b. I will be driven to camp – Washington High School	☐	☐	☐
c. Does parent/guardian own or have access to a car?	☐	☐	☐
d. I will take public transportation, if needed?	☐	☐	☐
e. Transportation problems will keep me from camp?	☐	☐	☐
f. How far is camp from home, if I participate?			

IV. Rating Scales for a STEM Career

Please mark YES☺ or NO ☹ (MAYBE 😐)	☺	😐	☹
a. I would like to be a scientist.	☐	☐	☐
b. I would like to be an engineer.	☐	☐	☐
c. I would like a job where I invent things.	☐	☐	☐
d. I would like to design machines that help people walk.	☐	☐	☐
e. I would enjoy a job helping to make new medicines.	☐	☐	☐
f. I would like a job that lets me design cars.	☐	☐	☐
g. I would enjoy a job helping to protect the environment.	☐	☐	☐
h. Scientists help make people's lives better.	☐	☐	☐
i. Engineers help make people's lives better.	☐	☐	☐
j. Scientists can do many different kinds of jobs.	☐	☐	☐
k. Engineers can do many different kinds of jobs.	☐	☐	☐

V. Rating Scales for Sense of Family Obligations

Check one box. yes ☺ or no ☹ **Camp date and time: July 12 – July 23, 2010 --- 1 p.m. – 4 p.m.**	☺	☹
a. I need to baby-sit during time of camp (1-4 pm)	☐	☐
b. I cannot attend summer camp, because of family responsibilities.	☐	☐
c. I will be at another camp, cannot come to this camp	☐	☐
d. I have parents/guardian that will want me to attend	☐	☐

Appendix D: Group "A" Post Survey

My name:_____ Date:_____

Group A – with DVD
Gateway Academy Camp
Immediate Post Survey

Thank you for taking the time to fill out this survey, which will take about 10 minutes to complete. Raise your hand if you have questions while you are taking the survey.

I. Rating Scales for Sense of Participation

The following is a list of activities. For each activity, check the box to answer your participation.

Have☺ or Don't wish to do this ☹. (😐Means I would like to)	HAVE	HAVE NOT DONE	
	☺	😐 But Would Like To	☹ Don't Wish To do This
g. After-school Program at a school, community center or church	☐	☐	☐
h. Clubs or groups where I get to do science/engineering projects	☐	☐	☐
i. Clubs or groups where I can design and/or build things	☐	☐	☐
j. Community Groups (Scouts, YMCA, Girls Inc. 4H, etc.)	☐	☐	☐
k. Summer camp about science, computers or engineering	☐	☐	☐
l. My parents encourage me to participate in these activities.	☐	☐	☐

II. Rating Scales for Transportation

The following is a list of transportation options. Please check one box telling me how you will get to and from camp.

Please mark YES ☺ or NO ☹ (😐 Maybe)	☺	😐	☹
g. I will walk to camp – Washington High School	☐	☐	☐
h. I will be driven to camp – Washington High School	☐	☐	☐
i. Does parent/guardian own or have access to a car?	☐	☐	☐
j. I will take public transportation, if needed?	☐	☐	☐
k. Transportation problems will keep them from camp?	☐	☐	☐
l. How far is camp from home?			

III. Rating Scales for a STEM Career			
Please mark how much you agree ☺ or disagree☹. (😐Means that you are not sure)	☺	😐	☹
l. I would like to be a scientist.	☐	☐	☐
m. I would like to be an engineer.	☐	☐	☐
n. I would like a job where I invent things.	☐	☐	☐
o. I would like to design machines that help people walk.	☐	☐	☐
p. I would like a job helping to make new medicines.	☐	☐	☐
q. I would like a job that lets me design cars.	☐	☐	☐
r. I would like a job helping to protect the environment.	☐	☐	☐
s. Scientists help make people's lives better.	☐	☐	☐
t. Engineers help make people's lives better.	☐	☐	☐
u. Scientists can do many different kinds of jobs.	☐	☐	☐
v. Engineers can do many different kinds of jobs.	☐	☐	☐

IV. Rating Scales for Sense of Family Obligations		
Check one box. yes ☺ or no ☹ **Camp date and time: July 12 – July 23, 2010 --- 1 p.m. – 4 p.m.**	☺	☹
e. I need to baby-sit during time of camp (1-4 pm)	☐	☐
f. I cannot attend summer camp, because of family responsibilities.	☐	☐
g. I will be at another camp, cannot come to this camp	☐	☐
h. I have parents/guardian that will want me to attend	☐	☐

V. Rating Scales for Presentations			
Please mark how much you agree ☺ or disagree☹. (😐Means that you are not sure)	☺	😐	☹
a. Helped me learn more about STEM education.	☐	☐	☐
b. Increased my interest in doing more science, technology and engineering projects and activities.	☐	☐	☐
c. Helped me see I was good at engineering and science.	☐	☐	☐
d. Was fun.	☐	☐	☐

- Tell me if you liked the media and what changes might be needed.

Changes if needed to improve are (please write your thoughts):	☺ **Include Next Time**	😐 **Include, But Improve**	☹ **Don't Include Next**

			Time
a. Name of Power Point: Gateway Academy STEM camp	**1**	**2**	**3**
b. Name of Video: Shift Happens / Did you Know	**1**	**2**	**3**
c. Name of DVD: Gateway Academy STEM camp (video)	**1**	**2**	**3**

d. What did you like best about the MEDIA Presentation?

DVD:
VIDEO:
POWERPOINT:

e. Will you tell your friends about this STEM Gateway Academy Camp?

☐ Yes ☐No ……Please explain why or why not.

Thank You!

Appendix E: Group "B" Post Survey

My name:_____ Date:_____

Group B – without DVD
Gateway Academy Camp
Immediate Post Survey

Thank you for taking the time to fill out this survey, which will take about 10 minutes to complete.
Raise your hand if you have questions while you are taking the survey.

I. Rating Scales for Sense of Participation

The following is a list of activities. For each activity, check the box to answer your participation.

Have☺ or Don't wish to do this ☹. (😐Means I would like to)	HAVE	HAVE NOT DONE	
	☺	😐 But Would Like To	☹ Don't Wish To do This
a. After-school Program at a school, community center or church	☐	☐	☐
b. Clubs or groups where I get to do science/engineering projects	☐	☐	☐
c. Clubs or groups where I can design and/or build things	☐	☐	☐
d. Community Groups (Scouts, YMCA, Girls Inc. 4H, etc.)	☐	☐	☐
e. Summer camp about science, computers or engineering	☐	☐	☐
f. My parents encourage me to participate in these activities.	☐	☐	☐

II. Rating Scales for Transportation

The following is a list of transportation options. Please check one box telling me how you will get to and from camp.

Please mark YES ☺ or NO ☹ (😐 Maybe)	☺	😐	☹
a. will walk to camp – Washington High School	☐	☐	☐
b. will be driven to camp – Washington High School	☐	☐	☐
c. Does parent/guardian own or have access to a car?	☐	☐	☐
d. will take public transportation, if needed?	☐	☐	☐
e. Transportation problems will keep them from camp?	☐	☐	☐
f. How far is camp from home?			

III. Rating Scales for a STEM Career			
Please mark how much you agree ☺ or disagree☹. (😐Means that you are not sure)	☺	😐	☹
a. I would like to be a scientist.	☐	☐	☐
b. I would like to be an engineer.	☐	☐	☐
c. I would like a job where I invent things.	☐	☐	☐
d. I would like to design machines that help people walk.	☐	☐	☐
e. I would enjoy a job helping to make new medicines.	☐	☐	☐
f. I would like a job that lets me design cars.	☐	☐	☐
g. I would enjoy a job helping to protect the environment.	☐	☐	☐
h. Scientists help make people's lives better.	☐	☐	☐
i. Engineers help make people's lives better.	☐	☐	☐
j. Scientists can do many different kinds of jobs.	☐	☐	☐
k. Engineers can do many different kinds of jobs.	☐	☐	☐

IV. Rating Scales for Sense of Family Obligations		
Check one box. yes ☺ or no ☹ **Camp date and time: July 12 – July 23, 2010 --- 1 p.m. – 4 p.m.**	☺	☹
a. I need to baby-sit during time of camp (1-4 pm)	☐	☐
b. I cannot attend summer camp, because of family responsibilities.	☐	☐
c. I will be at another camp, cannot come to this camp	☐	☐
d. I have parents/guardian that will want me to attend	☐	☐

V. Rating Scales for Presentations			
Please mark how much you agree ☺ or disagree☹. (😐Means that you are not sure)	☺	😐	☹
a. Helped me learn more about STEM education.	☐	☐	☐
b. Increased my interest in doing more science, technologyand engineering projects and activities.	☐	☐	☐
c. Helped me see I was good at engineering and science.	☐	☐	☐
d. Was fun.	☐	☐	☐

- Tell me if you liked the media and what changes might be needed.

Changes if needed to improve are (please write your thoughts):	☺ **Include Next Time**	😐 **Include, But Improve**	☹ **Don't Include Next Time**
a. Name of Power Point: Gateway Academy STEM camp	**1**	**2**	**3**
b. Name of Video: Shift Happens / Did you Know	**1**	**2**	**3**

c. What did you like best about the MEDIA Presentation?

VIDEO: POWERPOINT:

d. Will you tell your friends about this STEM Gateway Academy Camp?

☐ Yes ☐ No ……Please explain why or why not.
