EFFECTS OF PEER LABELING ON MIDDLE SCHOOL STUDENT ENGAGEMENT IN STEM SUBJECTS

by

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ABSTRACT

Much attention has been given to the shortage of STEM professionals entering the workforce in the United States. Reasons for the disinterest in pursuing STEM degrees are many. Some argue students are disinterested with STEM content during early adolescence as a result of negative peer labeling, such as “brain” or “nerd,” towards individuals who demonstrate aptitude in STEM content. The purpose of my study was to investigate whether peer labeling in middle school is directed towards students who show an aptitude for STEM content, and further, to determine whether peer labeling impacts motivation and engagement in STEM content. There are two research questions in my study: 1) Do students label or stereotype peers who show an aptitude for STEM learning? 2) What are the levels of enjoyment and interest in STEM content areas? Fifty-three middle school students volunteered to participate in my study. I administered a 12-question survey to each participant to determine the presence of name-calling and teasing; attitudes towards STEM content; and whether or not peer pressure is used to direct negative attitudes towards students who show aptitude in STEM content. Results show that name-calling and teasing in middle school for aptitude in a particular subject area is most likely to be directed towards students who show aptitude in mathematics, but it is unclear whether name-calling reduces interest in studying mathematics. Additionally, students find both science and mathematics to be valuable, but they are least interested in learning math. More research is needed to understand why students are maintaining interest in science, yet losing interest in mathematics.

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STEM	Science, Technology, Engineering, and Math
OECD	Organization for Economic Co-operative Development
PISA	Programme for International Student Assessment

CHAPTER ONE: INTRODUCTION

A Shortage in STEM Professionals

There has been some concern over the need for more students to graduate with science, technology, engineering, and mathematics (STEM) degrees. Casey (2012) argues that the United States will lose it prowess as a leading technologically innovative country. Some research has shown a decline in the number of students pursuing STEM degrees (Casey, 2012; Maloney, 2007). Reasons for the decline in STEM degrees are debatable, but it can be argued that the K-12 curriculum needs to focus on improving mathematics and science education. A number of legislation efforts have been passed to help improve STEM education in primary and secondary schooling, including: *Innovative America Act* (S. 239), *Effective STEM Teaching and Learning Act of 2011* (S. 463), *STEM 2 Act* (S. 619), *STEM Master Teacher Corps Act of 2011* (S. 758), *National STEM Education Tax Incentive for Teachers Act of 2011* (S. 1055), *Computer Science Education Act of 2011* (S. 1614), and *Preparing Students for Success in the Global Economy Act of 2011* (S. 1675). Yet, other factors that legislation cannot address may be influencing student engagement and pursuit of STEM.

Hagedorn and Purnamasari (2012) argue there may not be a shortage of STEM professionals, but rather the demands for STEM professionals fall within fields that do not require a bachelor's degree. Instead, many of the job openings projected are for two-year trained STEM professionals, yet many students are being drawn to other, more lucrative careers that require a four-year degree (Hagedorn and Purnamasari, 2012). Regardless of the number of STEM graduates and the type of STEM degrees earned, STEM industries are declaring a significant need for more qualified STEM workers. Even during the recession, many companies reported a shortage of STEM-qualified workers (Casey, 2012). The STEM shortage, whether real or perceived, has heightened United States government officials' concerns in education and encouraged many researchers to learn why there are fewer students completing STEM degrees than industry demands (Casey, 2012; Hagedorn and Purnamasari, 2012).

Some researchers suggest that many students lack the appropriate foundation in math and science to be able to successfully complete a STEM program (Casey, 2012; Hagedorn and Purnamasari, 2012). A poor foundation in math and science could put an emphasis on the quality of education offered by the United States public K-12 system and bring awareness to the mathematical and scientific abilities of American students compared with other countries. According to the Organization for Economic Co-operative Development (OECD), United States 15 year-olds ranked 25th in math and 17th in science in the 2009 Programme for International Student Assessment (PISA) test among OECD nations (OECD, 2014). The PISA test is an international testing system used to compare scores of 15 year-old students from one country with other countries around the world (OECD, 2014). Based on the OECD ranking, it comes as no surprise that many United States officials and policymakers are concerned with the future of American innovative and technological abilities compared with other OECD countries.

It is also possible to argue there is a lack of student interest in STEM subjects. One possible reason for the lack of interest in STEM careers arises from the social media's perception of those who pursue these degrees. Wilson and Litterell (2001) found that in social media and literature, mathematicians, in particular, are portrayed negatively, usually lacking social skills and often classified as mentally ill. Negative stereotyping could be a deterrent for students who have an interest in STEM content, and it could be significant enough to turn these students away from the STEM content all together. It is this fear of labeling and potential negative attitudes towards STEM content that led me to wonder whether peer labeling is occurring at a content area specific level here in the United States. I am particularly interested in finding out what attitudes students have towards STEM content and what opinions they have of their peers who do well in STEM subjects.

Mathematics is not the only STEM subject to suffer from negative social stereotyping. Some studies have been conducted to determine student perceptions of scientists. One such study was conducted by Wyss, Heulskamp, and Siebert (2012), which asked students to provide essays describing scientists, and their results concluded that many students "perceived scientists as old, white males working in a laboratory performing dangerous experiments" (Wyss et al., 2012, p. 503). In another study, DeWitt, Archer, and Osborne (2012) confirmed that students often picture scientists as 'geeky' and in a career path that is limited to a select few. Further, DeWitt et al. (2012) found that having a limited perception of scientists decreased student engagement in science courses. Negative perceptions of mathematicians, scientists, and engineers could potentially have a significant effect on student interest and engagement in STEM subjects. This led me to wonder about how much students are teased or marginalized for doing well in mathematics and science courses. Of particular interest to me was to investigate the perceptions of middle school students, as middle school is perceived to be a critical juncture in students' academic and professional career path (Spielhagen, 2010).

The Role of Middle School Education

Middle school is an important time for students regarding math and science. For example, Spielhagen (2010) reports that students who do not complete algebra in eighth grade are unable to study calculus in high school without doubling-up on math courses. As a result, some schools are moving their Algebra I curriculum from a ninth grade course to an eighth grade course (Spielhagen, 2010). If students are not ready for Algebra I but are forced to take it, they may lose self-confidence in their abilities to do math. According to Rowan-Kenyon, Swan, and Creager (2012), self-confidence is vital for maintaining interest and reducing chances of students giving up on material when it becomes more difficult. Students who aren't ready for Algebra I in eighth grade risk losing interest in mathematics as a result of feeling insecure and unconfident. Of interest to me is whether or not students hold high regard towards their mathematical studies, and if their opinions are correlated to their perceptions of their peers who do well in math.

In addition to academic importance, middle school is a fundamental time during which students begin to develop strong opinions about the school subjects they are studying. As Wyss et al. (2012) concluded, unlike high school students, middle school students have not fully formed their opinions towards the subjects they study in school. Bouchey and Harder (2005) found there is a strong correlation between a students' perception of doing well in a particular subject, such as math and science, and their peers caring about being successful in that subject. The emphasis of student opinion towards a subject is important, as it acts as a motivating factor in student success, as indicated by

Bouchey and Harder (2005) and students are more likely to put effort into subjects they care about than subjects that disinterest them. Bouchey and Harder (2005) also stated that in addition to caring about a subject, students who felt more competent in the content were more likely to work harder in that class. Not only is it important for the student to hold value in the subject, but they must also perceive value from their peers, parents, and teachers (Rice et al., 2013). Seventh and eighth grade student opinions towards math and science are of particular interest to me in my current study because these opinions are important to student motivation and success with STEM content.

The Role of Peers

In K-12 education, students often place significant emphasis on how their peers perceive them (e.g., Aasebø, 2011; Bishop et al., 2004). Many of these students fear exclusion and aspire to be a part of a particular social group. As a result, much research has been conducted about the role peers play in academic achievement. Bishop et al. (2004) concluded school culture, which is often set by a particular group of students, plays an important role in academic achievement. In particular, Bishop et al. (2004) analyzed the role of social “cliques” and “crowds,” specifying that the popular cliques were the ones who set the academic standard for all students, as these are the students who determine what is “cool” and “uncool.” Aasebø (2011) confirmed the role of school culture when he analyzed a ‘rule-breaking’ popular school culture in a Norwegian high school and investigated its connection to student academic achievement. Aasebø (2011) found that many students are likely to reduce their academic performance to avoid being labeled as an outcast by their peers. Many researchers (Aasebø, 2011; Bishop et al., 2004; Lynch, Lerner, &Leventhal, 2013; Rentzsch, Schutz, & Schroeder-Abe, 2011) agree that peer labeling plays an important role in student academic success, as many students fear being labeled in a negative way by their peers. Of particular interest to me is whether or not the results found by Aasebø (2011) could be replicated in the United States, specifically whether or not students are being labeled by their peers for showing aptitude in STEM content and if peer labeling impacts student opinions towards STEM content.

Peer labeling, as noted by Kinney (1993), is a normal part of personal identity development amongst teenagers. Students can receive a label by their peers for a variety of reasons, and these labels can be both positive and negative. Positive labels are those that heighten social status for the student, and are generally affiliated with athletics, physical appearance (i.e., whether or not an individual is considered attractive, wearing stylish clothing, etc.), and possessing an outgoing and confident personality (Bishop et al., 2004). Peer labels are often set early in middle school or junior high, and many students aspire to obtain positive peer labels (Bishop et al., 2004). According to Bishop et al. (2004), students will often act in ways they think their peers would associate with positive stereotypes in order to prove their affiliation to that group. Sometimes, students are given a negative label, which is generally associated with a student trying hard to get good grades and asking a lot of questions in class (Bishop et al., 2004; Rentzsch et al., 2011). For most students, being labeled as an academic, or more popularly referenced, a "nerd," is their biggest fear, as Bishop et al. (2004) stated, "Being labeled a nerd is like having a communicable disease" (p. 237) and as Rentzsch et al. (2011) indicated, the "label nerd refers to one of the least liked crowds at school" (p. 144). In addition to being tied to academic excellence, nerds are often thought to have poor social skills, nonfashionable style, and look weird (Bishop et al., 2004). Once labeled, it can be extremely difficult for students to break their association with that label (Bishop et al., 2004).

It is important to note that most students do not necessarily equate being intelligent with being a nerd, but rather they associate certain academic tendencies with that label (Bishop et al., 2004; Rentzsch et al., 2011). For example, a number of studies have found that students who try hard to get good grades are at risk of being labeled a nerd, whereas students who don't try, or appear not to try hard yet still receive good grades are considered to be lucky, or gifted, by their peers (Bishop et al., 2004; Rentzsch et al., 2011). Part of receiving the "nerd" label stems from the association of trying hard at school to having little or no social life, which was often viewed as more undesirable than simply earning good grades. As a result, some students may reduce their efforts in school to avoid being labeled a nerd (Rentzsch et al., 2011; Kinney, 1993). Reducing effort in school can have severe consequences in student academic performance and may limit their future aspirations. It is particularly of concern for students in middle school, as it is such a pivotal time for students to build an educational foundation for success in high school, college, and/or the work place. As such, my study will focus on middle school student attitudes towards STEM content and opinions of peers who show aptitude in STEM content.

Middle school students are particularly susceptible to peer influence, as they are at an age where students begin to shift from family to peer interactions for social purposes (Lynch et al., 2013). Kinney (1993) notes that middle school students have a heightened sense of self-reflection and are more inclined to view others' perceptions as their own, which can lead students to be more heavily influenced by their peers and be more inclined to conform to social norms. In his study, Kinney (1993) found that middle school tended to have two crowds, those who were ‘popular’ and those who were ‘nerds.’ Kinney (1993) interviewed several high school students about their experience in middle school, and one of the girls indicated in middle school people were more inclined to judge and stereotype than in high school. Part of peer judging stems from an increased self-consciousness that many middle school students develop (Kinney, 1993). Students are so focused on what others think of them that they become afraid to socialize with others, which makes them susceptible to negative peer labeling (Kinney, 1993). The drive to be accepted by peers to avoid negative labeling can lead students to accept what their peers think is “cool,” which often times is not academic excellence in math and science courses. It is therefore important to understand whether or not students perceive STEM subjects as “cool” to do well in, and whether that perception is correlated with a presence of peer labeling. As such, a major focus of my study is to understand how middle school students view STEM content and how they view their peers who demonstrate aptitude in that content. The results could provide additional insight into middle school student motivation to do well in STEM classes.

Bishop et al. (2004) concluded that labels are placed on students within the first few weeks of middle school, and that students are generally aware of their labeling within a month of starting middle school. Bishop et al. (2004) also found that many students found their label dissatisfying and hoped to change their social status by convincing their peers they do not fit into that stereotype. Negative attitudes can be detrimental for students academically, as they may try to disassociate themselves from academics and working hard in school, which can lead to a decline in their academic performance.

STEM subjects are most often linked to the nerd persona and other negative labeling, and as such are susceptible to decreasing student interest and motivation to avoid receiving negative peer labels. Landsheer, Massen, Bisscop, and Adema (1998) conducted a study in primary age students in the Netherlands, which resulted in a negative correlation between popularity and performance in academics, namely performance in math and physics. Lack of popularity as a result of academic excellence suggests that aptitude in math and physics is not viewed highly by peers, and according to Rentzsch et al. (2011), eighth grade students in Germany tend to have lower achievement in mathematics as a result of fear of being labeled a nerd. Since the study conducted by Rentzsch et al. (2011) was conducted in Germany, I became curious as to whether I would find similar results in middle school students in the United States.

Interest in STEM Content

Rice et al. (2013) suggested that a student's desire to pursue a STEM career is largely based on his or her interest in math and science. If a student has limited interest in math and science during adolescence, it may be unlikely that he or she pursues a STEM career (Bouchey and Harder, 2005; Rice et al., 2013). Additionally, students who enjoy mathematics are more likely to persevere when encountering challenging problems, which leads to greater success in the classroom and improved self-efficacy (Adelson & McCoach, 2011). Research at Boise State University shows that the grade earned in the first mathematics course taken at the university level plays a more predictive role in retaining students in STEM than the level of mathematics the student begins with (Belcheir, 2014).

Maintaining student interest in mathematics in K-12 education is essential for increasing the number of students who pursue and complete STEM programs. Students who see a value and purpose for mathematics are more likely to develop interest and a drive to be successful at it (Adelson and McCoach, 2011). While there are factors that contribute to interest in mathematics and other STEM course areas, of particular concern to me are the factors that decrease student interest and engagement. These factors stem largely from support and perceived social implications for doing well and being interested in STEM content. It is important to understand why students are disinterested in mathematics, because mathematics is a key component for success in higher education (Adelman, 2006). Adelman (2006) studied the correlation between the level of math completed in high school and the percentage of students who earned a bachelor's degree, and found that students who take higher-level math courses in high school are more likely to complete a college degree program. By understanding why students become disinterested in mathematics, and other STEM content, we can begin to implement changes that will maintain student interest, and hopefully see the number of college graduates increase, particularly in STEM content areas.

Previous research suggests that fear of stereotyping is a contributing factor to declining interest in STEM subjects, specifically math and science (Rentzsh et al., 2011), but it is not the only factor (Rice et al., 2013). Interest in math and science comes from an individual's support system, which may include parents, teachers, and peers (Rice et al., 2013). In their study, Rice et al. (2013) concluded that if there is no support, individuals are likely to lose interest in math and science as they progress through middle school and high school; but if there is a social support system in place, an individual is likely to have a more positive opinion towards these subjects. One aspect I am curious about in my study is whether there is a peer support system that encourages or discourages students to do well in STEM content.

Need of the Study

There is much concern over the shortage of STEM professionals in the United States, as much of the stability of the nation rests on its ability to develop technological innovations to remain competitive with other developed countries (Hagedorn and Purnamasari, 2012). Success in a STEM career is highly dependent on a strong math and science foundation that is often built during middle school and high school, a time during which students are most concerned with what their peers think is “cool” or “un-cool” (Kinney, 1993; Lynch et al., 2013). Social media often portrays STEM professionals as unpopular, awkward, and undesirable, which can adversely affect an individual’s desire to pursue a STEM profession (Wilson and Latterell, 2001). Middle school, in particular, is a critical time for students to be successful in math and science, but it is also a time when students highly value the opinions of their peers and social norms (Lynch et al., 2013).

While numerous studies (Aasebø, 2011; Bishop et al., 2004; Kinney, 1993; Rentzsch et al., 2011) have been conducted to determine the impact of school culture and negative peer labeling on academic achievement, few have researched the specific effects on academic achievement in STEM subjects. Landsheer et al. (1998) investigated the effects of time spent on homework for various subjects and its relationship to popularity. Landsheer et al. (1998) found a negative correlation between popularity and abstract subjects, such as math and physics, suggesting that high performance in these subjects as a result of high effort leads to reduced social acceptance by peers. Landsheer et al. (1998) conducted their study in the Netherlands, and it has not been replicated in the United States. Therefore, my study aims to fill that need by investigating the relationship between subjects, such as math and science, and popularity in the United States. Specifically, my study will look at whether negative peer labeling is targeted towards students who show an aptitude in STEM subjects, and if so, what effect does labeling have on a student's motivation, desire, and engagement to pursue STEM subjects.

Purpose

The purpose of my study is to investigate peer labeling in middle school as it pertains to STEM subjects, particularly math and science. I have two research questions for my study: 1) Do students label or stereotype peers who show an aptitude for STEM learning? 2) What are the levels of enjoyment and interest in STEM content areas?

Hypotheses

I tested three hypotheses in my study. First, if middle school students show an aptitude in STEM content areas, then their peers will negatively label them. Second, if students receive a negative label from their peers for doing well in STEM content, then they will have a negative perception towards these subjects. Lastly, if students have a negative perception towards a STEM content area, then they are less likely to work hard and complete assignments in STEM content areas.

Operational Definitions

For the purposes of my study, negative peer labeling refers to students assigning a peer a label with a negative connotation, such as "nerd," "geek," "brain," etc. These labels carry a negative stigma and can affect a person's self-esteem. Any label that results in reduced self-esteem of a student was considered a negative peer label.

I defined student motivation, engagement, and desire to pursue STEM content through academic involvement in those subjects. For example, I used a survey to gather information about student completion of homework, effort on assignments, enjoyment in learning, and overall interest in specific course areas. I considered students who indicated they enjoyed learning, were interested in learning, or that they put forth effort to complete all assignments as being engaged and highly motivated. I considered students who indicated lack of enjoyment or interest, or who put forth little effort towards completing assignments to have little interest, motivation, and desire towards that content.

Limitations and Delimitations

One limitation of my study was its non-longitudinal design. Student engagement and motivation may change over time, and students in early middle school years may place significant emphasis on peer opinions in grade six, but have little regard for them in 7^{th} and 8^{th} grade. As stated earlier, grade eight algebra is pivotal for completion of advanced math and science course in high school. If a student becomes more academically inclined in 7^{th} or 8^{th} grade than he/she was in 6^{th} grade, he or she may still be on track to complete algebra in 8^{th} grade. I collected data for my study during the spring semester, which is a potential limitation, as many students have found their "niche" and may not be as influenced by peers outside of their close network of friends. Administering the survey at the beginning of year, particularly to 6^{th} graders who are new to the school, may have yielded different results. Another limitation is that my study only focused on the effects of peer opinion. Other opinions could have impacted a student's level of engagement, including parents, teachers, and other role models in the student's life (e.g., Bouchey & Harter, 2005).

Students who elected to participate in my study were required to sign an assent form indicating they were interested in participating, as well as bring home a consent form to be signed by a parent or guardian. I only allowed students who brought back both forms to participate, limiting the population of students to those who are more responsible, which may have impacted my study results. There were many other students who wished to participate in my study, but could not because they did not remember to have the consent form signed.

Additionally, my study only examined student perceptions in their motivation and engagement in academia. I did not directly tie their perceptions to academic achievement through analysis of overall GPA or standardized test scores. Only perceived grades in math, science, and English were recorded, and I was only able to record these grades if participants knew what their grade was likely to be. Additionally, gender differences may have impacted the results of my study due to gender roles and the differences males and females place on peer acceptance.

A delimitation of my study is the age group selected to participate. Since middle school students are more susceptible to peer pressure and place higher value on peer acceptance, only middle school students participated in the survey.

Significance of the Study

There is much concern in the United States as to why there are not enough students pursuing STEM degrees to meet the job demands (Casey, 2012). Previous studies have been conducted to analyze secondary education and its role in preparing students to be successful in STEM majors, yet much of this research has focused on instructional methods and emphasizing the importance of competent K-12 math and science teachers (Hagedorn and Purnamasari, 2012). Some research (Bishop et al., 2004) has been conducted to analyze the role peer labeling plays in overall academic performance, yet few studies (Aasebø, 2011; Landsheer et al., 1998) exist that examine the role of peer labeling on academic performance in math and science. Of major significance in my study is whether peer labeling in middle school directly correlates to a disinterest in STEM content, which can provide researchers with a better understanding of the role peers play in student engagement and academic performance in STEM subjects in middle school.

CHAPTER TWO: LITERATURE REVIEW

Need for More STEM Professionals

In the United States, there is a national interest for increasing the number of degrees awarded in STEM subjects. Some businesses feel there is a shortage of qualified personnel to fill vacant positions, and that the shortage of STEM qualified personnel is expected to increase with time (Casey, 2012; Maloney, 2007).

> The President's Council of Advisors on Science and Technology states: Economic projections point to a need for approximately 1 million more STEM professionals than the U.S. will produce at the current rate over the next decade if the country is to retain its historical preeminence in science and technology. To meet this goal, the United States will need to increase the number of students who receive undergraduate STEM degrees by about 34% annually over current rates. (p. 9)

The foundation for success in STEM careers is built during early adolescence, when students are beginning to learn math and science content needed to pursue a career in STEM. It is also during adolescence that peer pressure and concern for what others think become most prevalent in adolescent development (Brown, 1990a). In my study, I investigated the presence of peer labeling in middle school, and whether or not it affects students who show an aptitude for STEM content. There are two research questions for my study, which are: 1) Do students label or stereotype students who show an aptitude for STEM learning? 2) What are the levels of enjoyment and interest in STEM content areas?

Parameters and Organization of Literature Review

The literature I included in my review was written in the last 30 years, with the exception of any work considered to be seminal. I excluded studies focusing on gifted and talented students for the purposes of my study. Additionally, I excluded studies focusing on race and minority groups from my review, with the exception of the seminal study conducted by Fordham and Ogbu (1986). My literature review is organized according to central themes in adolescent development and the influence of peer groups on academic motivation and engagement.

Classic Cognitive and Social Development Theory

Cognitive development of adolescents has been a popular topic in education research. Coleman (1962) was one of the first to study adolescent culture in public and private high schools. He concluded that a subculture exists in which adult values are belittled and emphasis is placed on popularity over academic achievement. Within the peer subculture exists a hierarchical system for social status. Coleman (1962) emphasizes that the most academically inclined students are the least likely to be accepted by peers, "the students most involved in the school and most identified with it – those for whom school means most – are the ones upon whom exclusion from the leading crowd has its greatest impact" (p. 228). Other research confirmed the existence of an adolescent subculture. Erickson (1968) hypothesized the adolescent subculture exists as a means for adolescents to navigate the social climate of middle school and high school. He noted that many adolescents conform to the ideals of their subculture out of desire to be accepted by their peers (Erickson, 1968), which led me to wonder how the adolescent subculture in the United States views STEM content areas and whether its views impacts student motivation and engagement in STEM content.

The need for adolescents to conform to the subculture ideals is alarming to many educators, because, as Coleman (1962) found, adolescence is a time marked by focus on peer opinion and popularity and not scholastic achievement. If the adolescent subculture devalues academic achievement, it is possible for students to conform to these values and decrease their performance in school. Fordham and Ogbu (1986) found that black students reduced their effort in class in order to lower their academic achievement, because they feared being accused as “acting white,” implying that only white students are academically successful (Fordham and Ogbu, 1986). Fordham and Ogbu (1986) provide insight into peer labeling and ridicule experienced by those black students who had high scholastic achievement. The impact of peer labeling, largely due to peer culture, on academic motivation has profound implications for education, and as such is a major focus of my study. In order to fully understand its effect, I designed my study to investigate the presence of peer labeling for academic achievement in specific subject areas to see whether certain subjects are at risk for students lowering academic achievement to avoid negative labels.

The Need for Peer Acceptance in Early Adolescence

Peer acceptance in early adolescence is “essential for maintaining a positive self-concept” (Brown and Lohr, 1987, p. 48). Rejection by one’s peers can lead to increased depression and loneliness, decreased self-esteem, and minor increases in social anxiety during adolescence (Prinstein& La Greca, 2002). Rejection can also lead to reduce academic effort. Research shows that students with friends tend to perform better in school and have better self-esteem than peers rejected as loners (Kindermann, 2007; Nichols & White, 2001). Nichols and White (2001) investigated peer friendships within an algebra class to assess whether having friends in the classroom impacted academic performance. Students in both low-track and regular-track algebra classes were given surveys to assess who they would likely hang out with in the classroom (Nichols and White, 2001). Teachers were also asked to categorize students within groups; seven student groups were identified: student clique affiliation, dyad groups containing only 2 students, floaters who moved from group to group, loners, invisibles, ignored, and overlooked (Nichols and White, 2001). The last four groups represented all of the students who had few, or no friends in the classroom and the results show that students in these four groups demonstrated lower academic achievement in the classroom (Nichols and White, 2001). The study conducted by Nichols and White, (2001) did not include across-school friendships, but rather focused on in-class friendship groupings. It is possible that some students identified as loners, invisibles, ignored, and overlooked by Nichols and White (2001) had friends outside of the classroom. As students search for acceptance from their peers, they are likely to adapt the behaviors and traits valued by their peers to avoid rejection. In my study, I aim to investigate the role students play in encouraging their peers to do well in specific content areas. Specifically, I am looking at whether students feel peer pressure to label students who show aptitude for certain content areas.

According to Brown (1990a), four major shifts in peer associations occur in early adolescence around sixth grade. First, students become less interested in the opinions of adults, and begin to rely more heavily on the opinions of their peers. Additionally, Wentzel and Caldwell (1997) and Sallee and Tierney (2007) both indicated adolescents depend heavily on their peer groups (i.e., friendships) for support. The second shift occurs when peer groups begin to function with less adult supervision. The decline in adult supervision is due in part because of the atmosphere of middle school (Brown, 1990a). Students are no longer confined to one classroom with one set of peers and a single teacher. Instead, they have entered an environment with new peers, more classrooms, multiple teachers, and multiple sets of “classmates” found within each of their selected courses (Brown, 1990a). As a result, peer groups have less adult supervision than when students were previously in elementary school. The third shift occurs when students begin to develop closer relationships with the opposite sex (Brown, 1990a). Peer groups, which have traditionally been single-sex, begin to include members of the opposite sex. Lastly, peers begin to acknowledge a larger, social presence, defined by Brown (1990a) as a peer crowd, which are typically individual peer groups classified together according to stereotypical traits. These peer crowds are assigned a label that encompasses these stereotypical traits (Brown & Lohr, 1987). My study will focus primarily on the fourth shift in peer association as outlined by Brown (1990a).

Peer Labeling in Adolescence

Peer crowds commonly identified in secondary education include: jocks, brains/nerds, druggies, preps/populars, and alternatives (Goth/punk) (Bishop et al., 2004; Brown, 1990a; Daddis, 2010; Prinstein& La Greca, 2002). The formation of these peer crowds is often based on stereotypical behaviors and appearance that fit with these crowds (Brown, 1990a; Daddis, 2010; Nichols and White, 2001). According to Bishop et al. (2004), students are aware of the peer crowd assignment within the first few weeks of middle school. Some students do not fit with or agree with the values of their assigned peer crowd, and hence peer label, because these assignments are based on perceptions of an individual's appearance and behavior, since most students will not know every single one of their classmates (Brown, 1990a). Additionally, Brown (1990a) acknowledged that some students will be unhappy with their peer crowd assignment, especially those assigned to undesirable labels, such as a nerd.

Brown (1990b) investigated social acceptance of high-achieving high school students. He distributed a survey to 8,000 students in grades 9-12 from California and Wisconsin. Major findings include: noting high schools have many different types of peer groups; students associate 'brains' with 'nerd'; there is a possibility for high-achievers to avoid the nerd or brain label; and students have several strategies to use to avoid receiving the "nerd" label. The avoidance of the nerd label was a significant finding by Brown (1990b) who also found students could avoid being labeled as a nerd by implementing one of four strategies to employ. First, students can deny association with nerds (Brown, 1990b). While disassociation may not prevent the label from being applied by peers, the student does not associate himself/herself with the label and thus may reduce some of the negative effects associated with it (Brown, 1990b). I will analyze some of these negative effects later in my review. Second, students can distract their peers by being highly involved with sports or clubs at the school (Brown, 1990b). Kinney (1993) arrived at a similar conclusion when he interviewed high school students about their experiences in middle school. Students indicated that peer labeling was more prominent in middle school than in high school, and receiving the nerd label was devastating to some individuals (Kinney, 1993). Some students in the study conducted by

Kinney (1993) worked hard to dispel the nerd label, whereas others accepted their fate and anxiously awaited life beyond middle school. According to Kinney (1993), many students were able to shed their nerd label in high school through involvement with school affiliated clubs and leadership opportunities. One of the key traits of a nerd is being anti-social, and thus students who became more involved in clubs and school leadership demonstrated more sociable traits, which allowed them to lose their affiliation with the nerd label (Kinney, 1993). The goal is for students to divert attention away from academics and other stereotypical traits associated with nerds and brains. Third, Brown (1990b) said students might display deviance by acting up in class, which may reduce their peers' perceptions of high-effort and achievement. Lastly, Brown (1990b) said students can choose to underachieve in their classes. Brown (1990b) indicates underachievement is the most promising of the four strategies to avoid the nerd or brain label. The latter strategy, which was also confirmed by Bishop et al. (2004), can have dire consequences on academic engagement and motivation.

Peer crowds are often responsible for defining academic norms, which are enforced through rejection, harassment, and bullying (Aasebø, 2011; Lynch et al., 2013). In a study conducted by Aasebø (2011), the peer culture of the school investigated was one that placed very little value on engagement and academic success. Aasebø (2011) concludes that many students are afraid of being labeled as a nerd, and thus supported the "rule-breaking," anti-academic culture initiated by the popular crowd. The study conducted by Aasebø (2011) illustrates the influence peer crowds have over individuals and their academic behaviors. Some studies have indicated that high-achieving peers are often rejected because they bring down the curve and set the bar too high for others to achieve (Coleman, 1962; Juvonen & Murdock, 1995). When the performance bar is set too high for other students to achieve, hostility can be directed towards those who choose to do more than what is acceptable by the popular crowd leading many high-achieving students to reduce their efforts and engagement in academics or face being labeled as a nerd. Of particular interest to me in my study is how students treat their peers who show excellence in STEM content areas, specifically whether students who show aptitude are teased, made fun of, or called mean names.

The Nerd Label

Rentzsch et al. (2011) specify the following characteristics of the nerd stereotype: “being ambitious, intelligent, having good grades, studying a lot, displaying success publically, being shy, having few friends, not wearing fashionable clothing, not being athletic, and not being physically attractive” (p. 144). For many, the nerd label is one of the least desirable (Bishop et al., 2004; Rentzsch et al., 2011). Bishop et al. (2004) identify the “nerd” population as being frequently rejected by peers, which limits their opportunities for social interaction and thereby increases the difficulty for those individuals to develop necessary social skills and self-confidence to overcome their stereotype. Rejection by peers can have adverse psychological and academic effects. Prinstein and La Greca (2002) investigated the psychological effects associated with peer rejection of high school students in grades 10-12 through use of the Peer Crowd Questionnaire to determine student peer crowd associations. Prinstein and La Greca (2012) used additional surveys to investigate depression, social anxiety, self-esteem and self-concept, and loneliness. Prinstein and La Greca (2002) concluded that members associated with the Populars/Jocks group demonstrated the highest level of self-esteem, and the lowest levels of depression, social anxiety, and loneliness. In contrast, the students in the Brains group were the only peer crowd to demonstrate a decrease in self-esteem and an increase in loneliness from childhood to adolescence. Additionally, they were the only peer crowd who did not exhibit a decrease in social anxiety with age. The effects of social anxiety can be detrimental to an individual's sense of self-worth and may lead to a decline in academic engagement and motivation.

Many students fear receiving the nerd or brain label and may alter their behavior to reduce association with the stereotype (Brown, 1990a). Rentzsch et al. (2011) investigated acceptance of high-achieving students by their peers, specifically analyzing whether there are certain factors that influence acceptance and rejection. Using a series of vignettes describing hypothetical average and high-achieving students, 125 eighth grade students were asked to assess how well they liked or disliked the student described in the vignette. Factors analyzed in the vignettes included: effort, modesty, sports, and sociability. Rentzsch et al. (2011) concluded that students, including students who had previously been labeled as a nerd, who were modest about their achievements, participated in sports, and demonstrated factors of sociability were more likely to be liked by their peers. In terms of effort, there was some variance depending on the student's academic success. Students previously labeled as nerds were viewed negatively for displaying effort in their studies. Average students, on the other hand, were not viewed as negatively as high-achieving students for displaying effort; however, males were more likely than females to be disliked by their peers for showing effort. Due to peer rejection, and risk of receiving a nerd label, many students choose to reduce their effort in academic pursuits, which can lead to lower academic achievement. As such, a major component of my study is to investigate how much effort students put into their STEM content classes to see if there is a correlation with how students are treated who show aptitude in STEM content.

Adolescent Academic Achievement and Engagement

In general, academic performance and engagement tend to decrease as students enter middle school (Kindermann, 2007; Ryan, 2001). Reduction in performance could be due to increased difficulty of coursework, increased autonomy in the school environment, and negative peer influence (Brown, 1996). A decline in engagement may also be a result of decreased interest in academics. Rice et al. (2013) studied student interest in academics and the effects social support have on maintaining that interest, and found that support from parents, teachers, and peers, as well as self-perceived abilities in math and science significantly impact interest in academics. Students with more support had more positive attitudes; these positive attitudes attributed to prolong interest and pursuit of study in math and science (Rice et al., 2013). Students with less support showed a decrease in interest and pursuit of study in math and science (Rice et al., 2013). While all of these factors are important, my study will only focus on the role peers play in academic motivation and interest.

The decline of academic engagement is considered to be a result of the shift of adolescent values away from those of adults and towards those of their peers (Brown, 1990a). Bishop et al. (2004) suggest that high-achieving students are viewed as students that trust their teachers, which is a viewpoint common in elementary school, and thought of as “baby stuff” by most adolescents (Bishop et al., 2004, p. 249). Daddis (2010) confirmed that high-achieving students typically place more value in adult beliefs and authority than other adolescents. Different viewpoints towards adult beliefs contribute to the separation of students into similar peer groups (Daddis, 2010).

Prior to middle school, most friendship groups were established by adult figures, either through structured play or assignment to a particular classroom in elementary school. When students enter middle school, there is less adult supervision and influence on which peers students can choose as friends, which creates an assortment of peer groups that typically exhibit similar traits, values and behaviors (Brown, 1990a; Ryan, 2001). It is important to note that peer groups are different from peer crowds. Students get to pick their own peer groups, but they are generally assigned to a peer crowd based on stereotypical traits the student appears to possess (Bishop et al., 2004). Usually peer groups are assigned to the same peer crowd, as members of the same peer group exhibit similar traits (Bishop et al., 2004). There is some controversy over the process by which these peer groups are formed and much research has investigated the homogeneity of peer groups; specifically some argue that homogeneity arises because students seek others who have similar values and beliefs (Brown, 1990a; Kindermann, 2007; Lynch et al., 2013;Wentzel et al., 1997), while others argue homogeneity arises due to the pressures applied by the group to conform to its values (Brown, Clasen, & Eicher, 1986; Kindermann, 2007). Kindermann (2007) also concluded there is an influence from other associates outside of the group who exhibit similar values.

Of particular interest to my study is the impact of peer-pressure to enforce group conformity, as peer-pressure can impact student behavior, including behaviors associated with academic involvement. Several studies (Kindermann, 2007; Riegle-Crumb, Farkas, & Muller, 2006; Ryan, 2001) have been conducted to analyze the influence peer groups have on academic engagement, which is an important factor in academic achievement. Ryan (2001) analyzed how different peer groups of 331 seventh grade students impacted motivation and academic achievement through use of surveys and analysis of student grades for English, math, science, and social studies. Major findings suggest that overall, motivation and grade point average (GPA) declined from fall to spring semester of seventh grade, and that different peer groups held different values towards engagement and motivation in academics (Ryan, 2001). Peer groups that place a high value on academic engagement demonstrated less of a decline compared with other peer groups who devalued engagement (Ryan, 2001).

Ryan (2001) also found that students who associated with peers that dislike school demonstrated a greater decline in achievement over the course of the year, illustrating how the beliefs and values of a peer group can influence student academic performance. One unexpected finding from Ryan (2001) is that despite peer group influence on academic motivation and achievement, peer groups had little influence on a student's personal views towards the utility and importance of education, which suggests that students still refer to adults for influence on future educational and vocational planning. Regardless of opinion towards the value of education, Ryan (2001) concluded that student engagement is influenced by peer attitudes, which can impact academic achievement. In my study, I will look at the role peers play in encouraging or discouraging academic performance in STEM content areas to see whether peer groups influence student interest and motivation. I will also look at individual attitudes towards learning STEM content and compare them to peer influence on motivation.

Kindermann (2007) analyzed the influence of peer groups on 366 sixth grade students using socio-cognitive mapping and surveys. Students were given surveys to assess their engagement in school, teacher involvement, and parent involvement. Additionally, students were asked to identify their peer groups and other members of their groups, which were used to generate a socio-cognitive map (Kindermann, 2007). To assess academic achievement, Kindermann (2007) looked at student GPA. Kindermann (2007) concluded that peer groups that value engagement in academics were likely to influence their members to perform better. Riegle-Crumb et al. (2006) found similar results when investigating the role of peer groups on encouraging or discouraging advanced course taking. Riegle-Crumb et al. (2006) showed students who associated with peer groups that valued academic engagement and achievement were more likely to enroll in advanced courses, which was particularly true for female students. Kindermann (2007) also found that students who were part of a peer group that devalued academic engagement were likely to perform worse. Kindermann (2007) argued, “Peer groups who believe that enthusiasm about learning is not ‘cool’ may undercut children’s willingness to demonstrate their interest and commitment to classroom activities” (p. 1199). Similarly, Sallee and Tierney (2007) concluded that “cool” is not typically a word associated with academic success. In early adolescence, acting “cool” can be priority for many students, which may cause some to devalue education and reduce engagement (Sallee & Tierney, 2007). In my study, I aim to investigate the role peers play on pursuing academic achievement in STEM subjects, which historically are considered “un-cool” (Rentzsch et al., 2011).

Peer Influence on Effort, Engagement, and Motivation

Juvonen and Murdock (1995) researched peer influence on effort, engagement, and motivation in 4th, 6th, and 8th grade students, who were asked to complete a series of surveys for the study. The surveys contained hypothetical situations designed to investigate student self-presentation strategies when a high or low grade was received on an exam. Juvonen and Murdock (1995) concluded 4th grade students were most likely to value effort and achievement of a student, which is consistent with the findings of Bishop et al. (2004), who highlighted the shift from pleasing adults in elementary school to devaluing adult opinions in middle school values. Eighth graders, on the other hand, were more likely to downplay their effort, indicating that effort is associated as a negative trait by many adolescents (Juvonen and Murdock, 1995), which aligns with finding from Brown (1990a) and Rentzsch et al. (2011), who both concluded students can reduce the risk of receiving a nerd label by downplaying their effort. It is important to understand whether the overall decline in motivation in middle school, as found by Ryan (2001), is a result of peer influence or if there are other factors involved. In my study, I aim to look for a connection between peer influence and student opinion of engagement and motivation.

Implications for STEM Subjects

Limited research exists that analyzes the connection between STEM subjects and student motivation as a result of peer labeling (DeWitt et al., 2012; Taconis & Kessels, 2009). DeWitt et al. (2012) investigated student and parent perceptions of scientists, and while some viewed scientists as exhibiting traits similar to nerds, many participants tried to dispel negative perceptions of scientists by focusing on one’s ability to be successful in science. The participants in the study conducted by DeWitt et al. (2012) noted that certain people are capable of doing well in science, and others are not, suggesting it is not a skill achievable with effort. It is also important to note that DeWitt et al. (2012) found that a majority of the students who participated in the study indicated it is possible for students who do well in science to be popular, but popularity depends on physical attractiveness and having good social skills. DeWitt et al. (2012) further stated that participant upbringing and school culture largely influenced whether students believed it is possible to be both popular and high achieving in science.

Conversely, Taconis and Kessels (2009) concluded that Dutch adolescents tend to view science more negatively than positively, which led to reduced effort in science courses. Taconis and Kessels (2009) indicated reduced effort in science courses could be a contributing factor to the limited number of Dutch students pursuing scientific careers. While the study conducted by Taconis and Kessels (2009) specifically analyzed how students view peers who show an aptitude for science, it does not cover all STEM course areas. My study aims to expand the research of Taconis and Kessels (2009) to analyze student motivation and engagement in both math and science.

Landsheer et al. (1998) investigated the effects of academic performance in math and physics on social status for 157 3rd-grade students, and determined that students who showed an aptitude in math and physics were less likely to be accepted by their peers. Even though the sample population for the Landsheer et al. (1998) study was elementary aged students, it is an important study because it is one of few that specifically looked at STEM subjects and student popularity. Landsheer et al. (1998) conducted their study in the Netherlands, and it has not been replicated in the United States. More studies are needed to conclude whether or not academic performance in STEM subjects is correlated with popularity. My study aims at better understanding peer labeling towards students who show aptitude in particular course areas, specifically those related to STEM content. Having knowledge in peer labeling will help educators better understand student motivation in these course areas.

Limitations of Previous Research

The above studies all utilized qualitative analysis, either through interview or through a questionnaire or survey. As such, each of these studies has a limitation due to the subjective nature of such analysis. Both interviews and surveys require students to provide honest answers; however, there is no way to be certain that students answered honestly. For example, the study conducted by Juvonen and Murdock (1995) asked students to honestly decide which self-presentation scenario they would likely utilize, which requires an honest answer from the student, but as with any survey, there is no way to determine whether or not the student answered honestly. The students may have chosen their answer based on what they thought the investigators wanted to hear, and thus may not have selected the actual strategy they would utilize. Additionally, few studies looked at the implications of academic motivation and involvement in STEM subjects. Landsheer et al. (1998) confirmed that students who excelled in math and physics were part of a less popular crowd, and suggested this association could lead to students choosing to reduce performance in these subject areas. More studies are needed to confirm whether a similar trend exists in the United States between academic achievement in STEM content and reduced popularity. Additionally, more studies are need to understand whether or not students are de-motivated to pursue STEM subjects out of fear of rejection by their peers. The goal of my study is to confirm whether or not peers are more likely to be negatively labeled for showing aptitude in STEM course areas, and whether negative labeling affects student interest and motivation in those subjects.

Summary of Literature Review

Research has shown that early adolescence is a critical time in social development. Most adolescents begin to rely on peers for support and shift away from their dependence on adults to help them make life decisions (Brown, 1990a; Bishop et al., 2004; Daddis, 2010; Wentzel and Caldwell, 1997; Sallee and Tierney, 2007). Peers are highly influential throughout middle school and high school, with middle school being the most vulnerable time for adolescents to focus on peer opinions and values (Brown, 1990a). It is also during middle school that students experience a heavy influx of peer labeling, which assigns students to a particular peer crowd based on perceived behaviors and traits (Bishop et al., 2004; Brown, 1990a). Many students are fearful of rejection and thus adapt their behavior to align with the norms set by their desired peer crowd (Bishop et al., 2004; Brown, 1990a; Daddis, 2010). Peer crowd norms can be detrimental for high-achieving students who are at risk for being labeled a nerd, as one of the most effective strategies to avoid peer rejection associated with the nerd label is lowering academic engagement and reducing motivation for academic achievement (Brown, 1990a). Reduced effort in school is of concern for many educators who see a decline in student engagement and performance throughout adolescence. The United States is concerned with the decline in student engagement and performance, as fewer students are equipped with the skills and knowledge needed to pursue STEM careers (Casey, 2012).

Based on literature findings regarding peer acceptance in adolescence, I hypothesized that if students show aptitude in STEM content areas, then they are likely to be rejected by their peers and labeled as a nerd, or brain. My hypothesis stems from literature findings that highlight student perceptions of STEM professionals, often describing them as unsocial, awkward, and highly intelligent, descriptions commonly found in the peer defined nerd label (DeWitt et al., 2012; Wilson & Latterell, 2001).

CHAPTER THREE: METHODS

Research Questions

I used two research questions for to guide my study: 1) Do students label or stereotype students who show an aptitude for STEM learning? 2) What are the levels of enjoyment and interest in STEM content areas?

Participants

All participants in my study are in 7^{th} or 8^{th} grade at in a middle school in suburban community in the Pacific Northwest. There are five math teachers and six science teachers at this middle school. Most students who attend this middle school will move to the same high school in ninth grade. Enrollment in a four-year college program after graduating from this high school is approximately 20%, and enrollment in a two-year degree program after graduating high school is approximately 40%.

I recruited participants by first asking classroom teachers if their students can participate in the study, and then asking students if they would like to volunteer to take the survey. Two teachers, a 7^{th} grade science teacher and an 8^{th} grade math teacher, agreed to let their students participate. I visited each classroom to inform students about the survey and ask for volunteers. Participation was entirely voluntary, and no restrictions will be placed on student performance. There was no consequence for not participating in the study, and I asked students to obtain parental permission before participating. Fifty-three students volunteered to participate in my study and brought back signed assent and parental consent forms.

Students in middle school experience the highest level of peer-pressure and desire for peer acceptance (Brown et al., 1986; Kinney, 1993; Wentzel and Caldwell, 1997). As such, I selected these students for my study, I did not focus on academic achievement, and thus I did not select participants based on current academic performance. Rather, I selected students based on willingness to participate, and collaboration from their teacher. I placed no other restrictions on participation for my study.

Participation in my study was completely voluntary and all results will remain anonymous. I gave students who were willing to participate a parental consent form to be signed by a parent or guardian. The consent form provided details of my study, including the types of questions to be answered and the emphasis on results remaining anonymous. Parents who agreed to have their child participate signed the consent form and their child returned the form to his or her teacher. I allowed one week for participants to bring the signed consent forms back to their teacher. I excluded from my study any students who did not receive permission from their parents.

Instruments

For my study, I created a survey and administered the survey to each of my participants. A full copy of my survey can be found in Appendix A. My survey included a number of Likert-scale items for which students selected the extent to which they agreed or disagreed with each statement. To assess the validity of the survey, I conducted a pilot study with six freshman students at a high school in the Pacific Northwest. I asked these six students to interpret the questions and provide feedback regarding the meaning of the questions. Based on their responses, I determined the questions did accurately assess student feelings towards STEM subjects and their relationships with their peers. I based the answers to the survey on a 5-point Likert-scale, which is typically used to measure participant attitudes towards an event. Likert-scales are commonly used in qualitative research studies regarding student motivation towards academics (Brown et al., 1986; Juvonen & Murdock, 1995; Lynch et al., 2013; Rentzsch et al., 2011; Ryan, 2001). The Likert-scale I used in my study presents participants with a series of statements pertaining to peer labeling and motivation in middle school. I coded the answers to the Likert questions from 1.00 = strongly disagree to 5.00 = strongly agree.

I assessed the presence of peer labeling by using eight statements about peer interactions. I wrote each statement so that students assessed the question for five different content areas: English, social science, science, math, and music, art, and theatre. In creating my survey, I was cautious of introducing peer labeling and stereotyping by content area. If these negative attitudes were not occurring, I did not want my participants to start stereotyping and labeling. As such, I included as many positive attitude statements as I did negative attitudes, hoping students would see I am investigating the culture of their school, but not looking for a specific attitude to be present. Additionally, I did not want my participants to feel as if it is common for stereotyping and labeling to occur for students with an aptitude in STEM content, so I included other core content areas students are likely to be studying. Art, music, and theatre were combined in hopes that students will have taken at least one of these subjects so they would not have to leave a content area blank on their survey. An example statement from my survey includes: “Students who do well in the following course areas are called names: English, social science, science, math, and art, music, and theatre.” I assessed interest and engagement using 4 statements, an example statement from my survey includes: “I think it is cool to do well in the following course areas: English, social science, science, math, and art, music, and theatre.”

An additional section of my survey asks students to indicate whether they feel pressure from their peers to do well in any of the course areas. Specifically, I asked participants to circle their answer to: “Do you feel peer pressure to do well in any of the following subjects: English, math, science, social studies, and art, music, and theatre, Yes or No.” If participants circle yes, I asked, “If you answered yes, which subjects do you feel the most peer pressure to do well in? Circle one or more: English, Math, Science, Social Studies, and art, music, and theatre.” To investigate whether participants are pressured to call their peers names, I asked: “Do you ever feel peer pressure to call names to students who do well in any of these subjects: English, math, science, social studies, and art, music, and theatre, Yes or No?” I then asked participants, “If you answered yes, are there any specific subject area that students who do well get teased in? Circle one or more: English, math, science, social studies, and art, music, and theatre.” I designed these questions to measure the peer influence. Following these two questions are a series of demographic questions I designed to assess participant gender, grade, plans after high school, education of parents, and ethnicity. Example questions from my demographic section include: “What is your gender? Male or Female” and “What are your plans after you graduate high school?”

Procedure

I administered surveys during participating teachers' 50-minute class period in the spring semester towards the end of the third quarter. Students were allowed the entire 50-minute period to answer the survey. I collected data over a two-week timeframe based on teacher availability and classroom schedules.

Students who did not wish to participate in the study, or who did not return signed parental consent forms, remained in the classroom and worked on an assignment provided by the teacher. All cooperating teachers remained in the classroom to supervise students who did not participate in the survey. Students completed the survey at their own pace, and brought all completed surveys to me, not their teacher. After turning in their survey, students joined their classmates not participating in the study and completed the alternate assignment.

Participant Sample

Fifty-three students volunteered to participate in my study and brought back signed assent and parental consent forms. I removed four participants from the study due to lack of survey completion. Of my resulting 49 participants, 20% were students in the 7^{th} grade (10 participants), and 80% were in the 8^{th} grade (39 participants). There were 9 students (18%) who were in an advanced 8^{th} grade mathematics class. In terms of gender, 59% of my participants are female (29 participants) and 41% are male (20 participants). The ethnicity make-up of my sample is: 42% White/Caucasian, 27% Hispanic/Latino, 13% other (mixed ethnicity), 10% unknown, 4% American Indian/Native American, and 4% Black/African American. The average academic grades reported by students participating in my study were a B in math, an A in science, and a B in English. I did not ask for any other grades from students.

Data Analysis

I focused the data analysis on my two research questions: 1) Do students label or stereotype students who show an aptitude for STEM learning? 2) What are the levels of enjoyment and interest in STEM content areas? I used SPSS Standard Version 21.0 for all statistical analyses performed for my study. Descriptive statistics for the participants include gender, age, ethnicity, and grade. I used a paired t-test to determine whether or not there were differences among the positive and negative attitudes towards English, math, and science. Additionally, I ran an ANOVA to determine whether there were significant differences between academic performance and attitudes towards English, math, and science. I also used ANOVA to determine whether there were significant differences between peer pressure to do well or call other students names and attitudes towards English, math, science, social science, and art, music, and theatre.

CHAPTER FOUR: RESULTS

Negative and Positive Attitudes Towards Certain Course Areas

My first three questions on the survey asked students whether they felt in general that students were called names, nice to one another, or mean to one another at their school. Results from these three questions are depicted in Table 5.1, which shows the average Likert value for each question.

Table 5.1
Peer Interactions in Middle School

Statement	Average Score
Students call each other mean names	4.10
Nice to other students	2.44
Mean to other students	3.64

Participants agreed that students called each other mean names, as indicated by the average score of 4.10. A score of 4.00 indicates participants agreed with the statement asked, and a score of 5.00 indicates strong agreement with the statement. With an average score of 4.10, some participants did strongly agree with the statement that students call each other mean names, which indicates peer labeling is occurring in the middle school.

My next statement on the survey asked whether students are nice to one another. It received a score of 2.44, which is between disagree (2.00) and neutral (3.00), suggesting that participants leaned somewhat toward disagreeing with the statement that students are nice to each other.

When I asked whether students are mean to one another, participants indicated an average value of 3.64, which lies between neutral (3.00) and agreement (4.00). A value of 3.64 is slightly closer to agreement than neutral, indicating more participants felt that students are mean to one another at their school. From the results of my first three statements, I would say that the culture at this middle school is more negative than positive. Students are likely to be mean to one another, and highly likely to call each other names. On the remainder of my survey, I ask participants to assess how these positive and negative attitudes are directed towards certain areas of study, such as: English, social science, science, math, and art, music, and theatre.

The next nine statements ask participants to agree or disagree with the statement as it applies to each of the following course areas: English, social science, science, math and art, music, and theatre. Participants indicated their agreement or disagreement using the same 5-point Likert-scale as the first three questions on the survey. Average scores for each of the 12 statements are displayed in Tables 5.2 – 5.10 below. I calculated the composite score by averaging each participant's Likert values for each course area as a single composite score.

Table 5.2
Students Who Do Well in the Following Course Areas, Are Teased by Some Students

Content Area	Average Score
English	2.82
Social Science	2.63
Science	2.84
Math	3.04
Art, music, and theatre	2.88
Composite	2.84

Table 5.3
Students Who Do Well in the Following Course Areas, Are Admired by Other Students

Content Area	Average Score
English	2.98
Social Science	3.04
Science	3.00
Math	3.08
Art, music, and theatre	3.02
Composite	3.02

Table 5.4
Students Are Mean to Other Students Who Do Well in the Following Course Areas

Content Area	Average Score
English	2.90
Social Science	2.59
Science	2.69
Math	2.92
Art, music, and theatre	2.98
Composite	2.82

Table 5.5
Students Who Do Well in the Following Course Areas Are Respected by Other Students

Content Area	Average Score
English	3.00
Social Science	3.04
Science	3.08
Math	3.06
Art, music, and theatre	3.17
Composite	3.07

Table 5.6
Students Who Do Well in the Following Course Areas Are Called Names

Content Area	Average Score
English	2.96
Social Science	2.84
Science	2.88
Math	3.18
Art, music, and theatre	3.06
Composite	2.98

From the tables above, I found that the average scores for both the positive and negative attitudes tend to be fairly neutral, ranging between 2.59 and 3.18. In comparing these values between content areas, I found that any negative attitudes that are expressed towards students with an aptitude for a specific content area more likely to be directed towards students who do well in math, art, music, theatre, and English. Math had the highest score for both name-calling and teasing, followed by art, music, and theatre (see Tables 5.2 and 5.6). In terms of teasing, math is the only content area to receive a score above 3.00, indicating there are some participants who agree that teasing is directed towards peers who show aptitude in mathematics, even though the average score is close to neutral. Math and art, music, and theatre, were the only two content areas with a score above 3.0 for name-calling, with math having the highest average score of 3.18, which leads me to believe that more participants agree name-calling is present over teasing. Science lies in the middle, with a score of 2.84 (teasing) and 2.88 (name calling).

A slightly different trend can be seen for students being mean to their peers for showing aptitude in certain course areas. These results are found in Table 5.4. All scores were less than 3.0, meaning students were more likely to disagree with the statement that students are mean to one another for showing aptitude in a specific content area. The subjects with the highest scores are art, music, and theatre (2.98), and math (2.92). Both of the scores are very close to 3.0, which indicate neutral feelings towards the statement. Again, science is in the middle, suggesting in general that students are not likely to be mean to their peers who show aptitude in science.

Tables 5.3 and 5.5 display results for the positive attitudes towards students who do well in certain subjects. Students are most likely to admire their peers who show aptitude in mathematics, and least likely to admire peers who do well in English. These results can be seen in Table 5.3. Admiration is not as likely to be directed towards peers who do well in science, which received a score of 3.00, the second lowest score. Math received a score of 3.08, which suggests students are slightly more likely to agree that they admire their peers who do well in math. Table 5.5 displays the results for respect for showing aptitude in certain course areas. Students with an aptitude in art, music, and theatre (3.17) are most likely to be respected by their peers, followed by science (3.08), and math (3.06). Students are least likely to be respected by their peers for doing well in English (3.00). These results show that despite increased teasing for doing well in math and art, music, and theatre, students who show aptitude in these subjects are still likely to be admired and/or respected by their peers.

Participant Attitudes Towards Certain Course Areas

Tables 5.7-5.9 present the results for questions that asked participants for their opinion on learning and doing well in certain course areas. Table 5.7 displays results for the statement: “I think it is cool to do well in the following course areas.” The composite score is a 4.16, which means overall participants feel that learning is cool, regardless of the subject. Science has the highest average value for this statement, 4.35, and English has the lowest, 4.04. The average for math is the same as the composite average, 4.16, which shows that students think that doing well in science is the coolest, and doing well in English is the least cool. The score for English is still above a 4.00, which does indicate that despite its lack of popularity, students do still think it is cool to do well in English, but not as cool as the other subjects.

Table 5.7
I Think it is Cool To Do Well in the Following Course Areas

Content Area	Average Score
English	4.04
Social Science	4.06
Science	4.35
Math	4.16
Art, music, and theatre	4.16
Composite	4.16

Table 5.8 displays results for the statement: “I enjoy learning about the following course areas.” The composite average is a 3.71 with art, music, and theatre having the

highest average, 4.02, and English having the lowest, 3.25. These results are consistent with which course areas students felt it is “cool” to do well in. English is least enjoyable and art, music, and theatre and science are most enjoyable. Again, math is in the middle with a score of 3.51. Table 5.9 displays results for the statement: “I try hardest to complete assignments and earn good grades in the following course areas.” The composite average is a 4.16, indicating in general the participants in my study are motivated students who try hard to do well in all of these course areas. Participants indicated they try hardest in social science (4.27) and science (4.20) and try the least in English (3.98) and math (4.08), which is consistent with where their interests and disinterests lie, suggesting students try harder in classes they are more interested in learning.

Table 5.8
I Enjoy Learning about the Following Course Areas

Content Area	Average Score
English	3.25
Social Science	3.80
Science	3.98
Math	3.51
Art, music, and theatre	4.02
Composite	3.71

Table 5.9
I Try Hardest to Complete My Assignments and Earn Good Grades in the Following Course Areas

Content Area	Average Score
English	3.98
Social Science	4.27
Science	4.20
Math	4.08
Art, music, and theatre	4.12
Composite	4.16

Table 5.10 below displays the averages for student disinterest in learning certain course areas, specifically the statement says: “I am least interested in learning about the following course areas.” Higher scores indicate less interest in content. The composite score for this statement is a 2.98, suggesting most participants were neutral in learning all of the course areas. English and math have the highest averages, both with a value of 3.22, meaning participants are least interested in learning math and English, which is expected as participants indicated they least enjoy these classes, but put forth the least effort in these classes. Art, music, and theatre has the lowest average, with a score of 2.76, suggesting students are most interested in learning art, music, and theatre content, which is also consistent with my other findings. Students indicated they most enjoy learning art, music, and theatre. Science is in the middle with a value of 2.88, which is somewhat surprising since previously the participants ranked science as being the coolest

content area to do well in, and the second highest content area they tried their hardest to do well in.

Table 5.10
I Am Least Interested in Learning About the Following Course Areas

Content Area	Average Score
English	3.22
Social Science	2.82
Science	2.88
Math	3.22
Art, music, and theatre	2.76
Composite	2.98

Results from my study show that middle school students do experience name-calling and feel their peers are mean to one another. Though minimal, there is some evidence that students who show an aptitude in mathematics experience the majority of subject-specific teasing and name-calling that occurs in middle school. The majority of participants were neutral when asked about name-calling and teasing for each of the five subject areas studied, yet for each of the negative statements, math always had the highest score indicating a higher percentage of participants agreed that these events are taking place more prevalently in math compared with the other course areas. Additionally, participants of my study indicated that students who do well in art, music, and theatre are just as likely to be called names, teased, and experience peers who are mean to them as students who show an aptitude for mathematics. Students with an aptitude for science were not as likely to be teased, called-names, or experience peers being mean to them as students with an aptitude for math. In fact, science was the 2nd least-likely content area to experience these negative attitudes, with social studies be the least likely area of study for which students will be made fun of.

In terms of motivation to do well and complete assignments, the participants indicated they try to complete all of their assignments for all of their subjects, but math and English received the two lowest scores. The low scores in English and math suggests that, though these participants are motivated to do well in general, they are least motivated to do well in math and English. Similarly, participants listed English and math as the two course areas they are least interested in studying. Lack of interest in English and math could be the reason for lower motivation to complete assignments in these course areas.

Peer Pressure

In the second section of my survey, I asked participants whether or not they felt peer pressure to do well in certain subject areas. The results show that 51% of the participants do not feel peer pressure. I asked the remaining 49% of the participants that do feel peer pressure to identify which course areas they felt pressured to do well in. The results by content area are displayed in Table 5.11 below. One participant stated she was pressured to do well in “math – because that's the subject I struggle with the most.” Participants were not asked to identify why they felt pressure in these course areas, but simply to identify which course areas they experienced pressure to do well. Overall, participants felt most pressured to do well in math and science, and least pressured to do well in art, music, and theatre, which suggests a peer social support system is in place for these students with regards to math and science.

Table 5.11
Peer Pressure by Content Area

Content Area	Pressure to do Well	Pressure to do Call Peers Names
Math	28%	27%
Science	25%	27%
Social Science	17%	0%
English	19%	27%
Art, music, and theatre	9%	18%

In order to investigate whether there is a difference in positive and negative attitudes towards each content area for participants who are pressured by peers to do well versus participants who are not pressured by peers, I ran a one-way ANOVA between each attitude and whether or not participants felt peer pressure to do well. Results are displayed in Appendix B. Peer pressure to do well does have a significant effect on negative attitudes associated with English [$F(1,47) = 4.18$, $p<.05$] and science [$F(1,47) = 3.70$, $p<.05$]. There does not appear to be a significant difference for the other course areas. Average values composite negative attitudes for English and science are displayed in Table 5.12 and 5.13 respectively.

Table 5.12
Mean Values for Negative Attitudes towards Students Who Do Well in English for Participants Who Experience Peer Pressure To Do Well.

Peer-Pressure	Teasing	Mean	Name-Calling	Composite
Yes	3.08	2.96	3.33	3.20
No	2.56	2.84	2.60	2.76

Table 5.13
Mean Values for Negative Attitudes towards Students Who Do Well in Science for Participants Who Experience Peer Pressure To Do Well.

Peer-Pressure	Teasing	Mean	Name-Calling	Composite
Yes	3.21	2.63	3.21	3.04
No	2.48	2.76	2.56	2.61

Overall, participants that experienced peer pressure to do well were more likely to admit that negative attitudes exist towards students who do well in English and science. Interestingly, participants also indicated that these are two of the top three course areas they feel pressured to do well in by their peers (English: 19%; science: 25%). Surprisingly, attitudes towards math, which the majority of participants (28%) indicated their peers pressure them to do well in, do not appear to be affected by peer pressure to do well. These results mean that negative and positive attitudes for math come from a source other than peers.

I also asked participants if they felt pressured to call other students who do well in specific course areas names. Only 8 (16%) of the participants indicated they feel peer pressure to call other students names for doing well in specific course areas; the remaining 41 (84%) indicated they did not feel pressured to call students names. I then asked participants to identify the course areas student who show aptitude are teased in. There is an even split between math, science, and English, although students also feel pressured for art, music, and theatre. Social science is the only subject where participants are not called names for showing an aptitude in that content.

I ran a one-way ANOVA between each attitude and whether or not participants felt peer pressure to call other students names. I used the ANOVA results to investigate whether there is a difference in positive and negative attitudes towards each content area for participants who experience peer pressure to call students who do well names versus participants who are not pressured to call their peers names. Results are displayed in Appendix C. Peer pressure to call students who show an aptitude in school does have an effect on negative attitudes towards English [$F(1, 47) = 2.96$, $p<.05$], social science [$F(1,47) = 3.02$, $p<.05$], and art, music, and theatre [$F(1, 47) = 6.13$, $p<.05$], but not on math and science. Mean values for each negative attitude are displayed in Tables 5.14 – 5.16 below for English, social science, art, music, and theatre.

Table 5.14
Mean Values for Negative Attitudes towards Students Who Do Well in English for Participants Pressured to Call Their Peers Names for Showing Aptitude in These Subjects

Peer-Pressure	Teasing	Mean	Name-Calling	Composite
Yes	3.50	3.63	3.63	3.53
No	2.68	2.76	2.83	2.87

Table 5.15
Mean Values for Negative Attitudes towards Students Who Do Well in Social Science for Participants Pressured to Call Their Peers Names for Showing Aptitude in These Subjects

Peer-Pressure	Teasing	Mean	Name-Calling	Composite
Yes	3.25	3.13	3.25	3.28
No	2.51	2.49	2.76	2.61

Table 5.16
Mean Values for Negative Attitudes towards Students Who Do Well in Art, Music, and Theatre for Participants Pressured To Call Their Peers Names for Showing Aptitude In These Subjects

Peer-Pressure	Composite	Teasing	Mean	Name-Calling	Composite
Yes	3.28	3.75	4.13	4.00	3.72
No	2.61	2.71	2.76	2.88	2.76

Participants who felt pressured by their peers to call other students who show aptitude in school names indicated that negative attitudes were most prevalent towards students with an aptitude for art, music, and theatre. Of the participants who felt pressured to call other students names, 18% of them indicated they were pressured to call students with an aptitude in art, music, and theatre names. I find it interesting that there is a significant difference for social studies, as none of the participants said they were pressured to call students with an aptitude for social studies names. Of the three course areas where there was a significant difference, social studies does have the lowest mean values for each negative attitude, which suggests the majority of students do not feel that these negative attitudes are directed at social studies. Most participants indicated students are mean to their peers who do well in English and they call them names, as opposed to teasing. Participants of my study indicated they felt most students are called names for doing well in math, science, and English, yet these participants only exhibited different answers from the participants who are not pressured to call their peers names when it comes to English. In other words, peer pressure does not have a significant effect on name-calling for math and science, but rather there are other factors at play.

Relationships between Positive and Negative Attitudes

Relationships in Negative Attitude by Course Area

To further investigate the relationships between the positive and negative attitudes, I ran a series of Pearson bivariate correlations to determine whether any relationships exist. The results of these tests are displayed in Appendix D. For each course area I investigated in my study, there is a positive relationship between being teased and students being mean; being teased and being called names; and being called names and students being mean for showing aptitude in course content. Results are displayed in Tables 5.17 – 5.19 below. These results show that as teasing increases towards students who show aptitude in studies, so too does name-calling and the presence of students being mean towards their peers who are doing well. In other words, if one negative attitude is present, the other two are also being directed towards students with an aptitude in course content, regardless of what course area it is. Science, math, and art, music, and theatre have positive correlations with significance below .01, which indicates these subjects have the most positive correlation between all three negative attitudes.

Table 5.17
Significant Correlations Between Negative Attitudes towards Students for English and Social Science

	English		Social Science	
Attitudes	Correlation	Significance	Correlation	Significance
Teasing & Mean	.49 **	< .01	.48**	<.01
Teasing & Name Calling	.55 **	<.01	.35*	.01
Teasing & Name Calling	.29*	.05	.45**	<.01

** Correlation is significant at the .01 level (2-tailed)

* Correlation is significant at the .05 level (2-tailed)

Table 5.18
Significant Correlations between Negative Attitudes towards Students for Science and Math

	Science		Math	
Attitudes	Correlation	Significance	Correlation	Significance
Teasing & Mean	.38**	.01	.67**	<.01
Teasing & Name Calling	.53**	<.01	.59**	<.01
Teasing & Name Calling	.45**	<.01	.51**	<.01

** Correlation is significant at the .01 level (2-tailed)

* Correlation is significant at the .05 level (2-tailed)

Table 5.19
Significant Correlations between Negative Attitudes towards Students for Art, Music, and Theatre

	Art, Music, and Theatre	
Attitudes	Correlation	Significance
Teasing & Mean	.69**	<.01
Teasing & Name Calling	.42**	<.01
Teasing & Name Calling	.57**	<.01

** Correlation is significant at the .01 level (2-tailed)
* Correlation is significant at the .05 level (2-tailed)

I also noticed two unique trends for attitudes towards students who did well in math. My results show an inverse relationship between students who are teased and students who are respected for doing well in math (r = -0.33, n = 49, p<.05). As teasing increases for showing an aptitude in math, respect of peers decreases. Additionally, there is an inverse relationship between students whose peers are mean to them and students who are respected for showing aptitude in math (r = -0.32, n = 49, p<.05). Like teasing, respect for peers with an aptitude in math decreases as the presence of students being mean increases. Math was the only subject to show a significant relationship between teasing and respect and students being mean and being called names.

In addition to looking at negative attitudes directed towards students who do well in school, I also looked at the relationships between negative and positive attitudes. Significant relationships are displayed in Table 5.20. English had the most significant relationships between negative attitudes directed towards students who do well and positive participant attitudes. Specifically, there is a positive relationship between participants thinking it is cool to do well in English and being teased for doing well in

English (*r* = .31, *n* = 49, *p*< .05). The same is true for name-calling and thinking it is cool to do well in English (*r* = .31, *n* = 49, *p*< .05), as well as name-calling and enjoying learning English (*r* = .32, *n* = 49, *p*< .05). These results show that negative peer attitudes do not prevent students from thinking it is cool to do well in English.

Science was the only other subject to show a positive relationship between negative peer attitudes and participant attitudes towards a specific content area. There is a positive relationship between being teased and thinking it is cool to do well in science (r = .31, n = 49, p< .05), which means the more students believe it is cool to do well in science, the more they are teased for doing well in science. Students still view doing well in science positively, despite an increase in teasing from their peers. Social science, math, and art, music, and theatre did not have any significant relationships between negative peer attitudes and positive participant attitudes, which leads me to believe that peers have more influence over personal viewpoints for these content areas.

Table 5.20
Negative Peer Attitudes and Positive Participant Attitudes towards Specific Content Areas

	English		Science	
Attitudes	Correlation	Significance	Correlation	Significance
Teasing & Cool	.31 *	.03	.31*	.03
Name-Calling & Cool	.31*	.03		
Mean & Enjoying Learning	.32*	.03		

** Correlation is significant at the .01 level (2-tailed)

* Correlation is significant at the .05 level (2-tailed)

Relationships Between Positive Attitudes by Course Area

To investigate the relationships between the positive and negative attitudes, I ran a series of Pearson bivariate correlations to determine whether any relationships exist between the two positive attitudes directed towards peers who do well: being admired and respected. The Pearson bivariate SPSS results are displayed for each subject in Appendix E. Table 5.21 and Table 5.22 below display only the significant relationships between being admired and being respected for showing aptitude in specific course areas. Social science, science, and art, music, and theatre all showed positive relationships between admiration and respect, which means as admiration increased for students showing aptitude, so did respect. Art, music, and theatre had the most significant relationship (r = .52, n = 49, p< .01), followed by science (r = .39, n = 49, p< .01). Art, music, and theatre also had a significant positive relationship between respect for doing well and being disinterested in the content (r = .32, n =49, p< .05). As respect for peers who do well in art, music, and theatre increases, so does disinterest in learning the content, which leads me to believe that earning the respect of their peers can also lead to disinterest in pursuing art, music, and/or theatre.

Table 5.21
Significant Correlations between Positive Attitudes and Participant Attitudes towards Social Science and Science

	Social Science		Science	
Attitudes	Correlation	Significance	Correlation	Significance
Admired & Respected	.33	.02*	.39	.01

Table 5.22
Significant Correlations between Positive Attitudes and Participant Attitudes towards Art, Music, and Theatre

	Art, Music, and Theatre	
Attitudes	Correlation	Significance
Admired & Respected	.52	<.01

English and math however, did not have a significant relationship between students being admired and respected. English did have a significant positive relationship between being admired for doing well in English and working hard on assignments in English class (r = .33, n = 49, p< .05). I believe these results show that the harder students work to do well in English, the more they are admired for doing well, as opposed to doing well without putting forth effort in the class. Additionally, there is a negative relationship between students who are admired for doing well in mathematics and students being disinterested in mathematics ($r = -.31$, $n = 49$, $p < .05$). A negative relationship shows that as students receive more admiration for doing well in mathematics, their disinterest in learning mathematics decreases, meaning they become more interested in learning mathematics when they are admired by their peers.

Table 5.23 and Table 5.24 show significant relationships between participants' attitudes towards each content area. These attitudes include thinking it is cool to do well, enjoying learning, and working hard in specific content areas. I did not include English in the table, because there is only one significant relationship, which is between thinking it is cool to do well in English and enjoying learning English ($r = .36$, $n = 49$, $p < .05$). In other words, the more students enjoy learning English, the more they think it is cool to do well in English, which means the student's attitude towards English impacts their enjoyment in learning the content. Social science and art, music, and theatre have a positive relationship for all three positive attitudes towards learning that content: thinking it is cool to do well and enjoying learning; thinking it is cool to do well and working hard; and enjoying learning and working hard. I believe these results mean that student attitude towards the subject impacts how hard they will work and whether they will enjoy learning the content.

Math and science have positive relationships between working hard and thinking it is cool to do well and working hard and enjoying learning. I believe these positive relationships mean students are more likely to put more effort in to learn math and science if they have positive views towards that content. Additionally, there is a negative relationship between enjoying learning social science and being disinterested in learning social science (r = -.42, n = 49, p< .01), which means students generally enjoy learning social science. As enjoyment in learning social science increases, disinterest in the content decreases. Overall, the results displayed in Table 5.23 and Table 5.24 show that personal opinions and attitudes toward the subject directly influence whether or not the student is respected.

Table 5.23
Significant Relationships between Participants' Attitudes towards Learning Each Subject Area

	Social Science		Science	
Attitude	Correlation	Significance	Correlation	Significance
Cool & Enjoy Learning	.33*	.02		

Cool & Working Hard	.43**	<.01	.30*	.04
Enjoy Learning & Work Hard	.39**	.01	.39*	.01

** Correlation is significant at the .01 level (2-tailed)

* Correlation is significant at the .05 level (2-tailed)

Table 5.24
Significant Relationships between Participants' Attitudes towards Learning Each Subject Area

	Math		Art, Music, and Theatre	
Attitude	Correlation	Significance	Correlation	Significance
Cool & Enjoy Learning			.64**	<.01
Cool & Working Hard	.33*	.02	.68**	<.01
Enjoy Learning & Work Hard	.43*	<.01	.73**	<.01

** Correlation is significant at the .01 level (2-tailed)

* Correlation is significant at the .05 level (2-tailed)

Attitudes Towards English, Math, and Science

Positive Attitudes

I conducted a series of paired-samples t-tests to compare positive feelings towards students who do well in English, math, and science. Results for these tests can be found in Appendix F. There was not a significant difference in the scores for positive attitudes toward students who do well in English (*M* = 3.45, *SD* =.63) and students who do well in math (*M* = 3.56, *SD* = .60), *t*(48) = -1.34, *p*>.05. These results suggest that in general students have positive attitudes towards students who do well in both math and English. In other words, students are not likely to favor peers who show aptitude in English over peers who show aptitude in math, and vice versa.

There was, however, a significant difference in the scores for positive attitudes toward students who do well in English (*M* = 3.45, *SD* = .63) and students who do well in science (*M* = 3.76, *SD* = .50),*t*(48) = -3.83, *p*<.05, which suggests that students are more likely to look favorably toward students who show aptitude in science over students who show aptitude in English. There was also a significant difference in the scores for positive attitudes toward students who do well in math (*M* = 3.45, *SD* = .63) and students who do well in science (*M* = 3.76, *SD* = .50), *t*(48) = -3.00, *p*< .05, which suggests that students are more likely to look favorably toward students who show aptitude in science over students who show aptitude in math. Overall, students are most likely to look favorably toward peers who show an aptitude in science than with English or math.

Negative Attitudes

Additionally, I conducted a paired-samples t-test to compare negative feelings towards students who do well in English, math, and science. There was not a significant difference in the scores for negative attitudes toward students who do well in English (M = 2.97, SD = .77) and students who do well in math (*M* = 3.09, *SD* = .75), *t*(48) = -1.07, *p*>.05, which suggests that students in general do not harbor negative attitudes towards students who do well in English and math. Also, I did not see a significant difference in the scores for negative attitudes toward students who do well in English (*M* = 2.97, *SD* =

.77) and students who do well in science (*M* = 2.82, *SD* = .74), $t(48) = 1.75$, $p > .05$). Although the mean values indicate participants are slightly more likely to view English more negatively compared with science, there is a not significant enough difference to conclude that students have more negative attitudes towards students with an aptitude for English than an aptitude for science.

There was, however, a significant difference in the scores for negative attitudes toward students who do well in math (*M* = 3.09, *SD* = .75) and student who do well in science (*M* = 2.82, *SD* = .74); $t(48) = 2.96$, $p < .05$. These results suggest that students have more negative attitudes towards students who show an aptitude in math than students who show an aptitude in science. In other words, students are more likely to look favorably toward students who show aptitude for science than students who show aptitude for math. Math also had the highest mean score, 3.09, suggesting participants were more likely to harbor negative attitudes towards math and students who show an aptitude in math than the other two subjects I analyzed in my study – English and science.

Academic Performance and Attitudes Towards English, Math and Science

Attitude Towards Math

To compare the effect of academic performance in math with positive and negative perceptions towards students who do well in math, I conducted a one-way ANOVA analysis (see Appendix F). My results show a significant effect of academic performance on positive perceptions towards students who do well in math at the $p < .05$ level for the two conditions [$F(3, 37) = 6.00$, $p < .01$]. Next, I ran a post hoc analysis to determine which groups were significantly different. The Bonferroni post hoc test (see Appendix F) determined that students who received A's in mathematics held different attitudes than students with D's(*p*< .01). Additionally, I found a significant difference between students who received B's and the students who received D's in math(p =.02). Table 5.25 below shows the average score for positive composite and negative composite attitudes according to the participant's grade in math. Students who earned an A have a higher average score for positive attitudes towards math compared to students with a lower grade, such as a D, which means students who do well in math are more likely to harbor the positive attitudes I analyzed in my study when compared with students with a lower academic performance. None of the participants indicated their grade in math is an F.

Table 5.25
Average Composite Scores for Positive and Negative Attitudes by Participants' Grade in Math

Grade in Math	A	B	C	D	F
Positive Attitude Towards Math	3.96	3.62	3.39	2.83	N/A
Negative Attitude Towards Math	2.91	3.30	3.15	3.13	N/A

s

Academic performance in mathematics can impact whether students have positive attitudes towards their peers who do well in math; however, academic performance does not impact negative attitudes towards peers who do well in mathematics. I did not see a significant effect of academic performance on negative attitudes towards students who do well in math at the $p < 0.05$ level for the three conditions [$F(3, 37) = 6.60$, $p = 0.58$].

From my results, I concluded that students with higher academic performance have more positive opinions towards their peers who also show aptitude for mathematics; whereas, students with lower academic performance have less positive opinions towards their peers who show aptitude for mathematics. Negative attitudes are not developed as a result of academic performance, but rather these attitudes stem from somewhere else.

Attitude Towards Science

I also conducted a one-way ANOVA analysis to compare the effect of academic performance in science to positive and negative perceptions towards students who do well in science. I did not see a significant effect for academic performance on positive attitudes towards students who do well in science at the $p < 0.05$ level for the two conditions [$F(3, 38) = 1.86$, $p = .15$]. Additionally, I did not see that academic performance significantly affected negative perceptions towards students who do well in science at the.05 level for the two conditions [$F(3, 38) = .75$, $p = .53$]. To me, the lack of significance suggests that academic performance in science has little to no effect on attitudes towards students who show aptitude in science.

Attitude Towards English

The third ANOVA test I completed was a one-way ANOVA analysis to compare the effect of academic performance in English on positive and negative perceptions towards students who do well in English. There was not a significant effect of academic performance on positive perceptions towards students who do well in English at the $p < 0.05$ level for the two conditions [$F(4, 37) = 2.01$, $p = .11$], nor on negative perceptions towards students who do well in English at the $p<.05$ level for the three conditions [F(4,

37) = .63, p = .64]. Similarly to science, my results suggest academic performance in English has little to no effect on attitudes towards students who show aptitude in English.

CHAPTER FIVE: CONCLUSION

The purpose of my study was to investigate peer labeling in middle school as it pertains to STEM subjects, particularly math and science. I used two research questions to guide my study: 1) Do students label or stereotype students who show an aptitude for STEM learning? 2) What are the levels of enjoyment and interest in STEM content areas? Using a 12-question survey based on a 5-point Likert scale, I collected data to answer both of my research questions for my study. Based on previous research, I expected to see teasing and name-calling occurring for students who show an aptitude in mathematics and science. I also expected there would be less enjoyment and engagement towards STEM course areas.

Impact of Balancing Survey

When I developed my survey, I took caution to avoid introducing the idea of negatively labeling peers for showing aptitude in STEM subjects. As such, I included statements that were both positive and negative, and I investigated subjects other than math and science. Previous research has mainly focused on negative labeling and its effects on motivation, and did not include statements that aim at understanding positive peer attitudes towards academic excellence. It is possible that some of my findings may be influenced by both the positive questions that were asked in my survey and the inclusion of subjects outside of STEM.

Peer Labeling in STEM Course Areas

Overall, participants were neutral with regards to teasing and peer labeling, but math did receive the highest scores for both of these negative attitudes. The high scores in mathematics indicate that some participants did agree that teasing and name-calling are directed towards students with an aptitude in mathematics. More research is needed to understand exactly what labels are being used and the frequency at which these labels are being directed towards students with aptitude in mathematics. It is unclear at this time how significant of a role these negative attitudes play in student interest and motivation to learn mathematics. It is possible that other factors are contributing to these attitudes.

It is surprising that participants indicated it is coolest to do well in science, followed by math and art, music, and theatre. Reasons for this could be that students understand the significance and importance of these course areas, and thus feel it is cool to do well in them. American society has placed high importance on STEM education, and now, people are pushing for the acronym to be STEAM to incorporate art, as much of engineering is the creative design process. Students may be well aware of the emphasis on STEAM from the media and from emphasis on these subjects in school. Rowan-Kenyon et al. (2012) found that few students are intrinsically motivated to study math, but many students see its value in life and its need for specific careers they find interesting. It could be that the participants of my study have similar attitudes towards math – they recognize its importance, but they don't see it as fun and interesting. Rather students may see it as something they need to get where they want to go in life, which would also explain that despite thinking it is cool to do well in math, students were least interested in learning math.

It is also possible that some of the teasing and name-calling directed towards students with an aptitude in mathematics could result from frustration experienced by those who do not understand the content. Other research has found that when students feel their intelligent peers set the bar too high, the rest of the population cannot reach it, and thus feel frustrated and may begin calling their more high-performing peers names in effort to lower their performance (Coleman, 1962; Juvonen & Murdock, 1995). The teasing and name-calling directed at students with an aptitude in math may be a means by which students attempt to lower the performance expectations set by these higher achieving students in an attempt to make the performance bar more achievable. Further research is needed in order to understand the reasons for teasing and labeling directed towards students with an aptitude for certain course areas.

Level of Interest and Engagement in STEM Course Areas

My results do show that students are least interested in English and mathematics, and they put forth the least amount of effort into coursework assigned in English and mathematics. Finding that students are disinterested in learning math is not surprising. Rice et al. (2013) concluded that middle school and high school students are the least likely age group to display interest in math and science. Rice et al. (2013) said disinterest in math and science at the middle school and high school level is largely due to the perceived social support students have in place for math and science. It is possible that the participants in my study did not have a strong social support system that encouraged them to study and do well in math. Participants of my study did indicate they felt the most pressure from their peers to do well in mathematics, but it is unclear how this pressure is being presented to the participants. It is possible that the pressure is more negative than positive, so rather than having a nurturing support system form their peers, it could be more competitive. If it is more negative, then students may not be receiving the type of support they need from their peers to maintain interest in mathematics (Rice et al., 2013). Future research is needed to better understand how students are being pressured by their peers to do well in mathematics.

It is also possible that students are frustrated with their peers who earn higher grades (Coleman, 1962; Juvonen & Murdock., 1995). My results showed that students who believed their current grade in mathematics is a B were the most likely group of students to agree that negative attitudes were directed towards students with an aptitude in mathematics. It could be that these students are feeling frustrated by their peers who are earning higher grades, which is consistent with findings by Juvonen & Murdock (1995) and Coleman (1962). It is also possible that these students are feeling some peer pressure to keep up with their peers who are earning higher marks. Additional research is needed to better understand how students feel pressure to do well by their peers and whether or not this pressure differs depending on content area.

It is surprising to me that participants showed the most interest in science and art, music, and theatre, as this interest contradicts findings by Rice et al. (2013), who stated that students in middle school tend to lose interest in math and science. It is also interesting that despite being teased, students still felt it was cool to do well in science. This was not the case for mathematics. Students still felt it was cool to do well in math, but it did on have a statistically significant correlation with being teased, as science did. A possible explanation for the positive feelings towards science could be that there is a stronger social support for science than for math. According to Rice et al. (2013), students are more likely to sustain interest in math and science if they have a strong social support system that encourages them to do well in that content. Participants indicated that they are pressured by their peers to do well in science, just as they are pressured to do well in math, but it might be possible that participants are receiving a more nurturing support system from their peers in science in comparison to math. Additional research is needed to better understand how students are pressured and whether it creates a nurturing environment, or a detrimental environment. Other factors that may contribute to student interest in science include the culture of the school and support participants are receiving from their teachers, as well as the support they receive at home from their parents. These factors were excluded from my study, but could still influence interest and engagement in certain course areas. If students receive more support for science than math, it is expected that students would have more interest in science than math (Rice et al., 2013).

Another possible explanation for science and art, music, and theatre being the top two classes participants are most interested in learning could be the ways in which these classes are taught. Science classes tend to be very hands on, offering students labs and projects to help them visualize the content. Art, music, and theatre are also hands-on, as students must create something with their hands in an art class, or sing/act in music and theatre classes. Students have active involvement in these subjects. Math and English, although they can be taught with hands-on projects, are often perceived as being more notes driven. Rowan-Kenyon et al. (2012) found that middle school students responded more positively towards math when they were allowed to work with groups and when asked to complete hands-on activities that utilized concepts being taught in class. Future studies could incorporate teaching strategies in order to better understand whether these strategies impact student interest and engagement.

Middle school is also the first time most students in the school district I studied are placed in a separate science class that they have on a daily basis. During elementary school, students participated in science lessons, but they did not have a dedicated science class every day, as they did for English and mathematics. It is possible that students are still feeling the excitement of this new class, and that may be sustaining their interest in the content. It would be interesting to see if other middle schools in the district show similar results for student interest in science, or if there is something specific to middle school that participated in my study.

Another possible explanation for the difference between interest in math and science could be state standardized assessments. Students have had more emphasis placed on math and English during their academic careers than other content areas as a result of math and English standardized state assessments. It is possible that students are losing interest in math as a result of this emphasis on standardized assessments. Additional research is needed to better understand what influences student interest in mathematics and science.

Future Research

My study focused on attitudes towards peers who do well in certain course areas. A limitation of my study was the number of participants who completed the survey. Participants had to obtain parental permissions in order to complete the survey, which excluded students who wanted to participate, but forgot to get their permission slips signed. Future studies should aim at recruiting a larger population to participate, and should consider participants from more than one school. It is also important to include students in the sixth grade, as that is the first year of middle school for most school districts, and a time where students experience significant changes in attitudes towards peers and academics. Additionally, my survey could be modified to ask students what labels are being used when addressing students who do well in specific course areas, as well as whether their friends encourage or discourage academic behaviors. These modifications would provide more insight behind the participants and could help identify other factors that contribute to their answers.

Another focus of my study was to investigate student interest and engagement in STEM subjects. I found that students think it is cool to do well in math and science, but have little interest in studying mathematics. Future studies should investigate the reasons for why students think it is cool to do well in math and science, as well as investigate how math and science are being taught in the classroom. Understanding both the reasons for why students think it is cool to do well in math and science and how these subjects are taught could help researchers pinpoint whether the method of instruction is influencing perceptions and attitudes; if attitudes are more cultural; or if there is a combination of both for the population being studied. It is important to have a better understanding for why students lose interest in math and science so as to implement strategies to improve and maintain interest in these course areas. Increasing interest in STEM course areas in secondary education could help motivate more students to pursue higher education that requires an understanding of mathematics, which could help reduce the shortage of STEM professionals. Additionally, increased interest in STEM content could also help prepare students to successfully complete a higher education program (Adelman, 2006), and therefore maintain retention of students pursuing a STEM degree.

REFERENCES

Aasebø, T. S. (2011). Anti-schoolness in context: the tension between the youth project and the qualifications project. *Social Psychology of Education, 14*. 503-518.

Adelman, C. (2006). *The toolbox revisited: Paths to degree completion from high school through college*. Washington, D.C.: U.S. Department of Education.

Adelson, J.L. & McCoach, D.B. (2011). Development and psychometric properties of the Math and Me survey: Measuring third through sixth graders' attitudes toward mathematics. *Measurement and Evaluation in Counseling and Development*.*44*(4), 225-247.

Belcheir, M. (2014). *What is related to student retention in STEM for STEM majors?* Unpublished manuscript, Office of Institutional Research, Boise State University, Boise, Idaho.

Bishop, J. H, Bishop, M., Bishop, M., Gelbwasser, L., Green, S, Peterson, E., Rubinsztaj, A., &Zuckerman, A. (2004). Why we harass nerds and freaks: A formal theory of student culture and norms. *Journal of School Health*, ***74****(*7), 235-251.

Bouchey, H. A., &Harter, A. (2005) Reflected appraisals, academic self-perceptions, and math/science performance during early adolescence. *Journal of Educational Psychology 97*(4), 673-686.

Brown, B.B., Clasen, D.R.,& Eicher, S.A. (1986). Perceptions of peer pressure, peer conformity dispositions, and self-reported behavior among adolescents. *Developmental Psychology*, *27*(4), 521-530.

Brown, B.B. &Lohr, M.J. (1987). Peer-group and adolescent self-esteem: An integration of ego-identity and symbolic-interaction theories. *Journal of Personality and Social Psychology*, *52*(1), 47-55.

Brown, B.B. (1990a). Peer groups and peer cultures. In Feldman, S.S. and Elliot G.R. (Eds.). *At the Threshold: The developing adolescent* (pp. 171-196). Cambridge, MA: Harvard University Press.

Brown, B.B. (1990b). Academic achievement and social acceptance. *The Education Digest*, **BI**(7), 57-60.

Brown, B.B. (1996). Visibility, vulnerability, development, and context: Ingredients for a fuller understanding of peer rejection in adolescence. *Journal of Early Adolescence*, *16*(1), 27-36.

Casey, B.U.S. Congress Joint Economic Committee. (2012). STEM education: Preparing for the jobs of the future. Retrieved from http://www.jec.senate.gov/public//index.cfm?a=Files.Serve&File_id=6aaa7e1f-9586-47be-82e7-326f47658320

Coleman, J.S. (1962). *The adolescent society*. New York: Free Press.

Daddis, C. (2010). Adolescent peer crowds and patterns of belief in the boundaries of personal authority. *Journal of Adolescence*, *33*, 699-708.

DeWitt, J., Archer, L., &Osborne, J. (2012). Nerdy, brainy and normal: Children’s and parent’s constructions of those who are highly engaged with science. *Research in Science Education*, *43*(4), 1455-1476.

Erickson, E.H. (1968). *Identity, youth, and crisis.* New York: Norton.

Fordham, S. &Ogbu, J.U. (1986). Black students’ school success: Coping with the “Burdon of ‘acting white’”. *The Urban Review*, *18*(3), 176-206).

Hagedorn, L. S., &Purnamasari, A. V. (2012).A realistic look at STEM and the role of community colleges. *Community College Review 40*(2), 145-164.

Juvonen, J. &Murdock, T.B. (1995). Grade-level differences in the social value of effort: Implications for self-presentation tactics of early adolescence. *Child Development*, *66*, 1694-1705.

Kinney, D. A. (1993). Form nerds to normals: The recovery of identity among adolescents from middle school to high school. *Society of Education*, *66*(1), 21-40.

Kindermann, T.A. (2007). Effects of naturally existing peer groups on changes in academic engagement in a cohort of sixth graders. *Child Development*, *78*(4), 1186-1203.

Landsheer, H. A., Massen, G. H., Bisschop, P., &Adema, L. (1998). Can higher grades result in fewer friends? A reexamination of the relation between academic and social competence. *Adolescence, 33*, 185-191.

Lynch, A. D., Lerner, R. M. &Leventhal, T. (2013). Adolescent academic achievement and school engagement: An examination of the role of school-wide peer culture. *Journal of Youth Adolescence, 42*(1). 6-19.

Maloney, P. A. (2007). Partnerships, policy, and educational change: The role of mathematics and science in K-16 reform. *Florida Journal of Educational Administration & Policy, 1*(1), 1-10.

Nichols, J.D. &White, J. (2001). Impact of peer networks on achievement of high school algebra students. *The Journal of Educational Research*, *94*(5), 267-273.

OECD (2014), PISA 2012 Results: Creative Problem Solving: Students' Skills in Tackling Real-Life Problems (Volume V), PISA, OECD publishing. http://dx.doi.org/10.1787/9789264208070-en

President's Council of Advisors on Science and Technology (2012). Report to the President: Engage to excel: Producing one million additional college graduates with degrees in science, technology, engineering, and mathematics. Retrieved from: http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast-engage-to-excel-final_feb.pdf.

Prinstein, M. J., &La Greca, A.M. (2002). Peer crowd affiliation and internalization distress in childhood and adolescence: a longitudinal follow-back study. *Journal of Research on Adolescence*, *12*(3), 325-351.

Rentzsch, K., Schutz, A., &Schroder-Abe, M. (2011). Being labeled nerd: Factors that influence the social acceptance of high-achieving students. *The Journal of Experimental Education, 79*(2), 143-168.

Rice, L., Barth, J.M., Guadagno, R.E., Smith, G.P.A., McCallum, D.M., &ASERT. (2013). The role of social support in students' perceived abilities and attitudes toward math and science. *Journal of Youth Adolescence*.*42*(7), 1028-1040.

Riegle-Crumb, C., Farkas, G., &Muller, C. (2006). The role of gender and friendship in advanced course taking. *Sociology of Education*, *79*(3), 206-228.

Rowan-Kenyon, H.T., Swan, A.K., &Creager, M.F. (2012). Social cognitive factors, support, and engagement: Early adolescents' math interests as precursors to choice of career. *The Career Development Quarterly*,*60*(1), 2-15.

Ryan, A.M. (2001). The peer group as a context for the development of young adolescent motivation and achievement. *Child Development*, *72*(4), 1135-1150.

Sallee, M.W., & Tierney, W.G. (2007). The influence of peer groups on academic success. *College and University*, *82*(2), 7-14.

Spielhagen, F. R. (2010). Algebra for everyone? Student perceptions of tracking in mathematics. *Middle Grades Research Journal, 5*(4). 213-223.

Taconis, R., &Kessels, U. (2009). How choosing science depends on students' individual fit to 'science culture'. *International Journal of Science Education, 31*(8), 1115-1132.

Wentzel, K.R., &Caldwell, K. (1997). Friendships, peer acceptance, and group membership: Relations to academic achievement in middle school. *Child Development*, *68*, 1198-1209.

Wilson, J. L., &Latterell, C. M. (2001). Nerds? Or nuts? Pop culture portrayals of mathematicians. *ETC.: A Review of General Semantics, 58*(2), 172-178.

Wyss, V. L., Heulskamp, D., &Siebert, C. J. (2012). Increasing middle school student interest in STEM careers with videos of scientists. *International Journal of Environmental & ScienceEducation,**7**(4)*, 501-522.

APPENDIX A

Survey Administered to Participants

Survey of Student Civility

Purpose of Survey: To find out how students treat each other in your school, and learn more about the culture at your school.

Background Information: Please circle the best answer to each question.

1. My grade in mathematics at end of quarter is likely to be (circle one): A, B, C, D, F
2. My grade in science at end of quarter is likely to be (circle one): A, B, C, D, F
3. My grade in English at end of quarter is likely to be (circle one): A, B, C, D, F

Instructions: Read each statement and put an "x" in the box that best answers each statement. There can only be one "x" per statement.

Student Culture at Your School: (check all that apply by indicating strongly disagree, disagree, neutral, agree, or strongly agree on the right).	Strongly	Disagree	Neutral	Agree	Strongly
1. Some students frequently call each other mean names at my school.					
2. Students are nice to all the other students in my school.					
3. Students are mean to other students at my school.					
4. Students who do well in the following course areas, are teased by some students:					
a. English					
b. Social studies					
c. Science					
d. Math					

e. Art/Music/Theatre					
5. Students who do well in the following course areas, are admired by other students:					
a. English					
b. Social studies					
c. Science					
d. Math					
e. Art/Music/Theatre					
6. Students are mean to other students who do well in the following course areas:					
a. English					
b. Social studies					
c. Science					
d. Math					
e. Art/Music/Theatre					
7. Students are who do well in the following course areas are respected by other students:					
a. English					
b. Social studies					
c. Science					
d. Math					

e. Art/Music/Theatre					
8. Students who do well in the following course areas are called names:					
a. English					
b. Social studies					
c. Science					
d. Math					
e. Art/Music/Theatre					
9. I think it is cool to do well in the following course areas:					
a. English					
b. Social studies					
c. Science					
d. Math					
e. Art/Music/Theatre					
10. I enjoy learning about the following course areas:					
a. English					
b. Social studies					
c. Science					
d. Math					

e. Art/Music/Theatre					
11. I try hardest to complete my assignments and earn good grades in the following course areas:					
a. English					
b. Social studies					
c. Science					
d. Math					
e. Art/Music/Theatre					
12. I am least interested in learning about the following course areas:					
a. English					
b. Social studies					
c. Science					
d. Math					
e. Art/Music/Theatre					

Extension Questions: Please circle the best answer for each question.

1. Do you feel peer pressure to do well in any of the following subjects: English, Math, Science, Social Studies, Art/Music/Theatre, Yes or No?

    a. If you answered yes, which subjects do you feel the most peer pressure to do well in? Circle one or more: English, Math, Science, Social Studies, Art/Music/Theatre.

2. Do you ever feel peer pressure to call names to students who do well in any of these subjects: English, Math, Science, Social Studies, Art/Music/Theatre, Yes or No?

    a. If you answered yes, are there any specific subject areas that students who do well get teased in? Circle one or more: English, Math, Science, Social Studies, Art/Music/Theatre.

Demographics: Please circle the best answer for each question, or handwrite your response in the space provided.

1. What is your gender? Male or Female
2. What grade are you in (circle one)? 6, 7, 8
3. What are your plans after you graduate high school?
4. Have either of your parents graduated from high school? Yes / No
5. Have either of your parents graduated with a college degree? Yes / No
6. Would you describe yourself as:
    a. American Indian/Native American
    b. Asian
    c. Black/African American
    d. Hispanic/Latino
    e. White/Caucasian
    f. Pacific Islander
    g. Other

APPENDIX B

Peer pressure to do well ANOVA

Positive Attitudes by Content Area

		Sum of Squares	df	Mean Square	F	Sig.
Positive_ English	Between Groups	1.073	1	1.073	2.800	101
	Within Groups	18.010	47	.383		
	Total	19.082	48			
Positive_ Social Science	Between Groups	.052	1	.052	.143	707
	Within Groups	17.098	47	.364		
	Total	17.150	48			
Positive_ Science	Between Groups	.320	1	.320	1.271	265
	Within Groups	11.838	47	.252		
	Total	12.158	48			
Positive_ Math	Between Groups	.975	1	.975	2.776	102
	Within Groups	16.517	47	.351		
	Total	17.493	48			
Postive_ AMT	Between Groups	.788	1	.788	1.175	284
	Within Groups	31.525	47	.671		
	Total	32.313	48			

Negative Attitudes by Content Area

		Sum of Squares	df	Mean Square	F	Sig.
Negative_English	Between Groups	2.348	1	2.348	4.175	.047
	Within Groups	26.432	47	.562		
	Total	28.781	48			
Negative_Social Science	Between Groups	2.029	1	2.029	3.697	.061
	Within Groups	25.800	47	.549		
	Total	27.829	48			
Negative_Science	Between Groups	2.282	1	2.282	4.498	.039
	Within Groups	23.843	47	.507		
	Total	26.125	48			
Negative_Math	Between Groups	.052	1	.052	.090	.766
	Within Groups	27.035	47	.575		
	Total	27.087	48			
Negative_AMT	Between Groups	2.900	1	2.900	3.633	.063
	Within Groups	37.523	47	.798		
	Total	40.423	48			

APPENDIX C

Peer Pressure to Call Students Who Do Well Names ANOVA

Positive Attitudes by Content Area

		Sum of Squares	df	Mean Square	F	Sig.
Positive_ English	Between Groups	.006	1	.006	.016	.900
	Within Groups	19.076	47	.406		
	Total	19.082	48			
Positive_ Social Science	Between Groups	.022	1	.022	.060	.807
	Within Groups	17.128	47	.364		
	Total	17.150	48			
Positive_ Science	Between Groups	.068	1	.068	.263	.610
	Within Groups	12.091	47	.257		
	Total	12.158	48			
Positive_ Math	Between Groups	.073	1	.073	.196	.660
	Within Groups	17.420	47	.371		
	Total	17.493	48			
Postive_ AMT	Between Groups	.001	1	.001	.002	.964
	Within Groups	32.311	47	.687		
	Total	32.313	48			

Negative Attitudes by Content Area

		Sum of Squares	df	Mean Square	F	Sig.
Negative_ English	Between Groups	2.964	1	2.964	5.396	.025
	Within Groups	25.817	47	.549		
	Total	28.781	48			
Negative_ Social Science	Between Groups	3.018	1	3.018	5.718	.021
	Within Groups	24.811	47	.528		
	Total	27.829	48			
Negative_ Science	Between Groups	1.756	1	1.756	3.387	.072
	Within Groups	24.369	47	.518		
	Total	26.125	48			
Negative_ Math	Between Groups	.343	1	.343	.603	.441
	Within Groups	26.744	47	.569		
	Total	27.087	48			
Negative_ AMT	Between Groups	6.125	1	6.125	8.393	.006
	Within Groups	34.299	47	.730		
	Total	40.423	48			

APPENDIX D

Pearson Bivariate Relationships Between Positive and Negative Attitudes

Attitudes towards English

Correlations

		Teased	Admired	Students Mean	Respected	Called Names	Cool to do Well	Enjoy Learning	Try Hard on Assignments	Disinterested in Learning
Teased	Pearson Correlation	1	-.003	.494**	-.056	.545**	.308*	.153	.130	.013
	Sig. (2-tailed)		.983	.000	.700	.000	.031	.300	.374	.931
	N	49	49	49	49	49	49	48	49	49
Admired	Pearson Correlation	-.003	1	-.167	.196	.097	.099	.090	.327*	-.088
	Sig. (2-tailed)	.983		.252	.179	.506	.501	.542	.022	.549
	N	49	49	49	49	49	49	48	49	49
Students are Mean	Pearson Correlation	.494**	-.167	1	-.037	.288*	.114	.318*	-.018	-.096
	Sig. (2-tailed)	.000	.252		.802	.045	.435	.027	.903	.512
	N	49	49	49	49	49	49	48	49	49
Respected	Pearson Correlation	-.056	.196	-.037	1	-.182	.044	.239	-.134	-.014
	Sig. (2-tailed)	.700	.179	.802		.212	.767	.102	.357	.922
	N	49	49	49	49	49	49	48	49	49
Called Names	Pearson Correlation	.545**	.097	.288*	-.182	1	.310*	-.007	.176	.054
	Sig. (2-tailed)	.000	.506	.045	.212		.030	.963	.227	.715
	N	49	49	49	49	49	49	48	49	49
Cool to do Well	Pearson Correlation	.308*	.099	.114	.044	.310*	1	.357*	.174	.123
	Sig. (2-tailed)	.031	.501	.435	.767	.030		.013	.233	.398
	N	49	49	49	49	49	49	48	49	49
Enjoy Learning	Pearson Correlation	.153	.090	.318*	.239	-.007	.357*	1	.222	-.217
	Sig. (2-tailed)	.300	.542	.027	.102	.963	.013		.130	.138
	N	48	48	48	48	48	48	48	48	48
Try Hard on Assignments	Pearson Correlation	.130	.327*	-.018	-.134	.176	.174	.222	1	-.048
	Sig. (2-tailed)	.374	.022	.903	.357	.227	.233	.130		.743
	N	49	49	49	49	49	49	48	49	49
Disinterested in Learning	Pearson Correlation	.013	-.088	-.096	-.014	.054	.123	-.217	-.048	1
	Sig. (2-tailed)	.931	.549	.512	.922	.715	.398	.138	.743	
	N	49	49	49	49	49	49	48	49	49

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Attitudes Towards Social Studies

Correlations

		Teased	Admired	Students Mean	Respected	Called Names	Cool to do Well	Enjoy Learning	Try Hard on Assignments	Disinterested in Learning
Teased	Pearson Correlation	1	.114	.479**	.080	.352*	.168	-.060	.141	.009
	Sig. (2-tailed)		.437	.000	.590	.013	.248	.683	.339	.952
	N	49	49	49	48	49	49	49	48	49
Admired	Pearson Correlation	.114	1	.060	.325*	-.071	.282*	-.011	.130	-.135
	Sig. (2-tailed)	.437		.682	.024	.629	.050	.942	.380	.356
	N	49	49	49	48	49	49	49	48	49
Students are Mean	Pearson Correlation	.479**	.060	1	-.051	.448**	.064	.051	-.003	-.078
	Sig. (2-tailed)	.000	.682		.731	.001	.661	.727	.983	.595
	N	49	49	49	48	49	49	49	48	49
Respected	Pearson Correlation	.080	.325*	-.051	1	-.185	-.046	.008	.028	.201
	Sig. (2-tailed)	.590	.024	.731		.208	.755	.957	.852	.172
	N	48	48	48	48	48	48	48	47	48
Called Names	Pearson Correlation	.352*	-.071	.448**	-.185	1	.009	-.279	-.167	.279
	Sig. (2-tailed)	.013	.629	.001	.208		.952	.052	.258	.052
	N	49	49	49	48	49	49	49	48	49
Cool to do Well	Pearson Correlation	.168	.282*	.064	-.046	.009	1	.327*	.430**	-.110
	Sig. (2-tailed)	.248	.050	.661	.755	.952		.022	.002	.451
	N	49	49	49	48	49	49	49	48	49
Enjoy Learning	Pearson Correlation	-.060	-.011	.051	.008	-.279	.327*	1	.391**	-.423**
	Sig. (2-tailed)	.683	.942	.727	.957	.052	.022		.006	.002
	N	49	49	49	48	49	49	49	48	49
Try Hard on Assignments	Pearson Correlation	.141	.130	-.003	.028	-.167	.430**	.391**	1	-.115
	Sig. (2-tailed)	.339	.380	.983	.852	.258	.002	.006		.437
	N	48	48	48	47	48	48	48	48	48
Disinterested in Learning	Pearson Correlation	.009	-.135	-.078	.201	.279	-.110	-.423**	-.115	1
	Sig. (2-tailed)	.952	.356	.595	.172	.052	.451	.002	.437	
	N	49	49	49	48	49	49	49	48	49

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Attitudes Towards Science

Correlations

		Teased	Admired	Students Mean	Respected	Called Names	Cool to do Well	Enjoy Learning	Try Hard on Assignments	Disinterested in Learning
Teased	Pearson Correlation	1	.113	.375**	.034	.534**	.313*	-.023	.250	.025
	Sig. (2-tailed)		.439	.008	.815	.000	.029	.877	.086	.865
	N	49	49	49	49	49	49	48	48	49
Admired	Pearson Correlation	.113	1	.000	.390**	.000	.125	-.127	.203	-.082
	Sig. (2-tailed)	.439		1.000	.006	1.000	.390	.389	.166	.575
	N	49	49	49	49	49	49	48	48	49
Students are Mean	Pearson Correlation	.375**	.000	1	-.158	.453**	.107	-.029	-.116	-.179
	Sig. (2-tailed)	.008	1.000		.279	.001	.463	.844	.433	.219
	N	49	49	49	49	49	49	48	48	49
Respected	Pearson Correlation	.034	.390**	-.158	1	.071	-.066	.001	-.026	.158
	Sig. (2-tailed)	.815	.006	.279		.629	.653	.992	.860	.279
	N	49	49	49	49	49	49	48	48	49
Called Names	Pearson Correlation	.534**	.000	.453**	.071	1	.202	.148	.224	.064
	Sig. (2-tailed)	.000	1.000	.001	.629		.165	.316	.126	.663
	N	49	49	49	49	49	49	48	48	49
Cool to do Well	Pearson Correlation	.313*	.125	.107	-.066	.202	1	.192	.300*	.067
	Sig. (2-tailed)	.029	.390	.463	.653	.165		.190	.038	.646
	N	49	49	49	49	49	49	48	48	49
Enjoy Learning	Pearson Correlation	-.023	-.127	-.029	.001	.148	.192	1	.391**	-.071
	Sig. (2-tailed)	.877	.389	.844	.992	.316	.190		.007	.632
	N	48	48	48	48	48	48	48	47	48
Try Hard on Assignments	Pearson Correlation	.250	.203	-.116	-.026	.224	.300*	.391**	1	.022
	Sig. (2-tailed)	.086	.166	.433	.860	.126	.038	.007		.880
	N	48	48	48	48	48	48	47	48	48
Disinterested in Learning	Pearson Correlation	.025	-.082	-.179	.158	.064	.067	-.071	.022	1
	Sig. (2-tailed)	.865	.575	.219	.279	.663	.646	.632	.880	
	N	49	49	49	49	49	49	48	48	49

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Attitudes Towards Math

Correlations

		Teased	Admired	Students Mean	Respected	Called Names	Cool to do Well	Enjoy Learning	Try Hard on Assignments	Disinterested in Learning
Teased	Pearson Correlation	1	.084	.673**	-.327*	.585**	.097	-.087	-.051	-.067
	Sig. (2-tailed)		.568	.000	.022	.000	.510	.561	.727	.646
	N	49	49	49	49	49	49	47	49	49
Admired	Pearson Correlation	.084	1	.164	.164	.152	.197	-.061	.103	-.309*
	Sig. (2-tailed)	.568		.260	.261	.298	.175	.684	.480	.031
	N	49	49	49	49	49	49	47	49	49
Students are Mean	Pearson Correlation	.673**	.164	1	-.323*	.509**	-.052	-.171	-.203	-.279
	Sig. (2-tailed)	.000	.260		.024	.000	.723	.252	.163	.052
	N	49	49	49	49	49	49	47	49	49
Respected	Pearson Correlation	-.327*	.164	-.323*	1	-.206	-.012	.205	.134	-.040
	Sig. (2-tailed)	.022	.261	.024		.156	.933	.166	.360	.783
	N	49	49	49	49	49	49	47	49	49
Called Names	Pearson Correlation	.585**	.152	.509**	-.206	1	.074	.088	.004	-.063
	Sig. (2-tailed)	.000	.298	.000	.156		.611	.557	.976	.666
	N	49	49	49	49	49	49	47	49	49
Cool to do Well	Pearson Correlation	.097	.197	-.052	-.012	.074	1	.191	.328*	-.274
	Sig. (2-tailed)	.510	.175	.723	.933	.611		.197	.021	.057
	N	49	49	49	49	49	49	47	49	49
Enjoy Learning	Pearson Correlation	-.087	-.061	-.171	.205	.088	.191	1	.434**	-.276
	Sig. (2-tailed)	.561	.684	.252	.166	.557	.197		.002	.061
	N	47	47	47	47	47	47	47	47	47
Try Hard on Assignments	Pearson Correlation	-.051	.103	-.203	.134	.004	.328*	.434**	1	-.229
	Sig. (2-tailed)	.727	.480	.163	.360	.976	.021	.002		.114
	N	49	49	49	49	49	49	47	49	49
Disinterested in Learning	Pearson Correlation	-.067	-.309*	-.279	-.040	-.063	-.274	-.276	-.229	1
	Sig. (2-tailed)	.646	.031	.052	.783	.666	.057	.061	.114	
	N	49	49	49	49	49	49	47	49	49

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Attitudes towards Art, Music, and Theatre

Correlations

		Teased	Admired	Students Mean	Respected	Called Names	Cool to do Well	Enjoy Learning	Try Hard on Assignments	Disinterested in Learning
Teased	Pearson Correlation	1	-.109	.689**	-.214	.415**	.151	-.073	.152	.094
	Sig. (2-tailed)		.455	.000	.140	.003	.300	.616	.298	.523
	N	49	49	49	49	49	49	49	49	49
Admired	Pearson Correlation	-.109	1	-.015	.517**	-.225	.227	.229	.187	.135
	Sig. (2-tailed)	.455		.917	.000	.120	.116	.113	.197	.353
	N	49	49	49	49	49	49	49	49	49
Students are Mean	Pearson Correlation	.689**	-.015	1	-.233	.571**	.081	.029	.131	.031
	Sig. (2-tailed)	.000	.917		.108	.000	.580	.845	.370	.834
	N	49	49	49	49	49	49	49	49	49
Respected	Pearson Correlation	-.214	.517**	-.233	1	-.117	.219	.141	.094	.323*
	Sig. (2-tailed)	.140	.000	.108		.423	.131	.333	.522	.024
	N	49	49	49	49	49	49	49	49	49
Called Names	Pearson Correlation	.415**	-.225	.571**	-.117	1	-.035	-.064	-.020	.177
	Sig. (2-tailed)	.003	.120	.000	.423		.812	.661	.894	.224
	N	49	49	49	49	49	49	49	49	49
Cool to do Well	Pearson Correlation	.151	.227	.081	.219	-.035	1	.637**	.678**	-.033
	Sig. (2-tailed)	.300	.116	.580	.131	.812		.000	.000	.824
	N	49	49	49	49	49	49	49	49	49
Enjoy Learning	Pearson Correlation	-.073	.229	.029	.141	-.064	.637**	1	.725**	-.134
	Sig. (2-tailed)	.616	.113	.845	.333	.661	.000		.000	.360
	N	49	49	49	49	49	49	49	49	49
Try Hard on Assignments	Pearson Correlation	.152	.187	.131	.094	-.020	.678**	.725**	1	.038
	Sig. (2-tailed)	.298	.197	.370	.522	.894	.000	.000		.795
	N	49	49	49	49	49	49	49	49	49
Disinterested in Learning	Pearson Correlation	.094	.135	.031	.323*	.177	-.033	-.134	.038	1
	Sig. (2-tailed)	.523	.353	.834	.024	.224	.824	.360	.795	
	N	49	49	49	49	49	49	49	49	49

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

APPENDIX E

Paired T-Test

Negative Attitudes

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Negative_English	2.9745	49	.77434	.11062
	Negative_Math	3.0918	49	.75120	.10731
Pair 2	Negative_English	2.9745	49	.77434	.11062
	Negative_Science	2.8214	49	.73775	.10539
Pair 3	Negative_Math	3.0918	49	.75120	.10731
	Negative_Science	2.8214	49	.73775	.10539

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Negative_English & Negative_Math	49	.490	.000
Pair 2	Negative_English & Negative_Science	49	.671	.000
Pair 3	Negative_Math & Negative_Science	49	.632	.000

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Negative_English - Negative_Math	-.11735	.77072	.11010	-.33872	.10403	-1.066	48	.292
Pair 2	Negative_English - Negative_Science	.15306	.61411	.08773	-.02333	.32945	1.745	48	.087
Pair 3	Negative_Math - Negative_Science	.27041	.63908	.09130	.08684	.45397	2.962	48	.005

Positive Attitudes

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Positive_English - Positive_Math	-.11327	.59361	.08480	-.28377	.05724	-1.336	48	.188
Pair 2	Positive_English - Positive_Science	-.31020	.56725	.08104	-.47314	-.14727	-3.828	48	.000
Pair 3	Positive_Math - Positive_Science	-.19694	.46012	.06573	-.32910	-.06478	-2.996	48	.004

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Positive_English & Positive_Math	49	.538	.000
Pair 2	Positive_English & Positive_Science	49	.519	.000
Pair 3	Positive_Math & Positive_Science	49	.668	.000

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Positive_English	3.4490	49	.63052	.09007
	Positive_Math	3.5622	49	.60368	.08624
Pair 2	Positive_English	3.4490	49	.63052	.09007
	Positive_Science	3.7592	49	.50329	.07190
Pair 3	Positive_Math	3.5622	49	.60368	.08624
	Positive_Science	3.7592	49	.50329	.07190

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APPENDIX F

ANOVA Analysis

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Positive_English	Between Groups	2.739	4	.685	2.011	.113
	Within Groups	12.595	37	.340		
	Total	15.333	41			
Negative_English	Between Groups	1.423	4	.356	.631	.643
	Within Groups	20.852	37	.564		
	Total	22.275	41			

Multiple Comparisons

Bonferroni

Dependent Variable	(I) CodeMath	(J) CodeMath	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Positive_Math	1	2	.34258	.20310	.600	-.2236	.9087
		3	.57364	.28913	.328	-.2323	1.3796
		4	1.13030*	.27206	.001	.3719	1.8887
	2	1	-.34258	.20310	.600	-.9087	.2236
		3	.23105	.26944	1.000	-.5200	.9821
		4	.78772*	.25103	.020	.0879	1.4875
	3	1	-.57364	.28913	.328	-1.3796	.2323
		2	-.23105	.26944	1.000	-.9821	.5200
		4	.55667	.32460	.568	-.3482	1.4615
	4	1	-1.13030*	.27206	.001	-1.8887	-.3719
		2	-.78772*	.25103	.020	-1.4875	-.0879
		3	-.55667	.32460	.568	-1.4615	.3482
Negative_Math	1	2	-.39354	.28046	1.000	-1.1753	.3883
		3	-.24091	.39926	1.000	-1.3539	.8721
		4	-.21591	.37569	1.000	-1.2632	.8314
	2	1	.39354	.28046	1.000	-.3883	1.1753
		3	.15263	.37207	1.000	-.8846	1.1898
		4	.17763	.34666	1.000	-.7887	1.1440
	3	1	.24091	.39926	1.000	-.8721	1.3539
		2	-.15263	.37207	1.000	-1.1898	.8846
		4	.02500	.44825	1.000	-1.2245	1.2745
	4	1	.21591	.37569	1.000	-.8314	1.2632
		2	-.17763	.34666	1.000	-1.1440	.7887
		3	-.02500	.44825	1.000	-1.2745	1.2245

*. The mean difference is significant at the 0.05 level.