Effects of emotional intelligence on academic achievement in the alternative high school classroom

Rhonda L. Marcum-Phillips
Effects of Emotional Intelligence on the Academic Achievement in the
Alternative High School Classroom

by

Rhonda L. Marcum-Phillips

Dissertation

Submitted to the College of Technology
Eastern Michigan University
in partial fulfillment for the requirements for the degree of
DOCTOR OF PHILOSOPHY
Technology
Concentration in Education

Dissertation Committee:
Alphonso Bellamy, PhD, Chair
Ali Eydgahi, PhD
Virginia Harder, PhD
Herman Tang, PhD

November 10, 2016
Ypsilanti, Michigan
Dedication

I have been supported by a lot of people throughout my life and educational career. I will begin with my mother, Carolyn Marcum. She has never failed in anything she has done, especially in a daughter’s eyes. She shows me how to love, persevere, be resilient, and be kind. She lovingly supports me in every decision and choice I make, no matter if she agrees or not. Whenever I need an ear, a kind word, or just a hug, she is there. I could have never become the woman that I am without my mother and her love. She is the best person I have ever and will ever know. I appreciate you.

Next is my father, Ron Marcum. He taught me to stand up for myself, be strong, and accept nothing less than what I deserve. His love and guidance have brought me through difficult times and situations. When I am struggling, I think about what my dad would do or say in the situation and use that as my guide. I know that he is always there when I need the strength to go forward. Thank you for the support you have given me and the skills and lessons I get from you.

To my husband, Craig Phillips, thank you for the love and support you give, no matter the circumstance. I appreciate the push to continue and improve myself in all things. You have sacrificed in so many ways in order for me to fulfill my dreams of being a doctor and I know that the sacrifices were great. You too have taught me important lessons; one of the most important is forgiveness. Thank you for allowing me the freedom to grow and expand my knowledge and experience.
Acknowledgments

I would like to express my deepest appreciation to my committee chair, Dr. Alphonso Bellamy, for his patience, guidance, motivation, and intellect. His mentoring directed me through the content, classes, and deeper thinking and questioning of my topic. His discussions and knowledge forced me to continuously analyze and reflect on my research. I am blessed to have worked with such a brilliant man.

I would also like to thank the rest of my dissertation committee: Dr. Ali Eydgahi, Dr. Virginia Harder, and Dr. Herman Tang for their insightful comments and recommendations for improvement. My sincere appreciation to Dr. Virginia Harder for her mentoring and support over the past 10 years. She has taught me about being an advocate, professionally and personally.
Abstract
This study examines the impact of emotional intelligence, academic self-efficacy in science and technology, and family background on academic achievement of alternative high school students. Gender, age, learning style, and ethnicity of the student are analyzed to determine any moderator effect on these relationships. Seventy-five students, ages 14 to 19, who attend a public alternative high school were surveyed. Analysis of the data revealed a positive relationship for males between self-efficacy in STEM classes and family background (support) and their academic achievement in science class. A positive relationship was shown between self-efficacy in STEM classes and academic achievement, between self-efficacy in STEM classes and academic achievement in science class for White/non-Hispanic and Native American students, and between family background and academic achievement in science class for White/non-Hispanic, Latino/Hispanic, and Native American students. There was a positive relationship between emotional intelligence and academic achievement in science class for Latino/Hispanic and African-American students. Kinesthetic, auditory, and visual learning styles demonstrated positive relationships as moderators on the independent variables. Students that were 17 and 19 years of age had moderating effects on the independent variables.
# Table of Contents

Dedication..............................................................................................................ii

Acknowledgments..............................................................................................iii

Abstract ...............................................................................................................iv

List of Tables .....................................................................................................vii

List of Figures.....................................................................................................viii

Introduction .........................................................................................................1

  Problem Statement ............................................................................................2

  Nature and Significance of Problem ................................................................3

  Research Objectives ........................................................................................4

  Research Questions ........................................................................................4

  Limitations and Delimitations ........................................................................5

  Definition of Terms ........................................................................................5

  Assumptions ....................................................................................................5

Literature Review ...............................................................................................6

  Emotional Intelligence .......................................................................................6

  Trait EQ versus Ability EQ ............................................................................7

  EQ in Education ...............................................................................................9

  EQ in Business .................................................................................................11

  EQ in Personal Well-Being .............................................................................14

  Science and Technology Self-Efficacy ..........................................................17

  Gender and Science and Technology Self-Efficacy .....................................20

  Learning Style .................................................................................................21
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethnicity</td>
<td>23</td>
</tr>
<tr>
<td>At-Risk Students and Alternative Education</td>
<td>24</td>
</tr>
<tr>
<td>Methods</td>
<td>26</td>
</tr>
<tr>
<td>Statement of Research Design and Rationale</td>
<td>26</td>
</tr>
<tr>
<td>Population, Sample, and Subjects</td>
<td>26</td>
</tr>
<tr>
<td>Measurement</td>
<td>30</td>
</tr>
<tr>
<td>Data Collection</td>
<td>33</td>
</tr>
<tr>
<td>Data Analysis</td>
<td>33</td>
</tr>
<tr>
<td>Results</td>
<td>34</td>
</tr>
<tr>
<td>Discussion</td>
<td>45</td>
</tr>
<tr>
<td>Conclusion</td>
<td>50</td>
</tr>
<tr>
<td>References</td>
<td>53</td>
</tr>
<tr>
<td>Appendices</td>
<td>64</td>
</tr>
</tbody>
</table>
List of Tables

Table 1. Correlations of Variables of Emotional Intelligence Total Score, Emotional Intelligence Domains, Self-Efficacy in STEM Classes, and Family Background with Academic Achievement ...........................................36

Table 2. Correlations of Gender Moderating the Variables of Emotional Intelligence Total Score, Emotional Intelligence Domains, Self-Efficacy in STEM Classes, and Family Background to Academic Achievement ..............................................37

Table 3. Correlations of Ethnicity Moderating the Variables of Emotional Intelligence Total Score, Emotional Intelligence Domains, Self-Efficacy in STEM Classes, and Family Background to Academic Achievement .............40

Table 4. Correlations of Age Moderating the Variables of Emotional Intelligence Total Score, Emotional Intelligence Domains, Self-Efficacy in STEM Classes, and Family Background to Academic Achievement .........................42

Table 5. Correlations Between Gender Moderating the Variables of Emotional Intelligence Total Score, Emotional Intelligence Domains, Self-Efficacy in STEM Classes, and Family Background to Academic Achievement ........................................44
List of Figures

Figure 1. Problem Statement ................................................................. 3

Figure 2. Emotional Intelligence ......................................................... 7

Figure 3. Self-Efficacy Theory ............................................................... 19

Figure 4. STEM .................................................................................. 21

Figure 5. VAK Learning Style .............................................................. 23
Introduction

This study will examine the impact of emotional intelligence, academic self-efficacy in science and technology, and family background and support on academic achievement of alternative high school students. Gender, age, learning style, and ethnicity of the student will be analyzed to determine its moderator effect on these relationships.

Emotional intelligence is important for learning and personal growth. “Emotional intelligence refers to an ability to recognize the meanings of emotions and their relationships, and to reason and problem-solve on the basis of them” (Mayer, Caruso, Salovey, 1999). Emotional intelligence of a person has been utilized as an indicator of future success in certain areas of life, one being academics (Zeidner, Matthews, & Roberts, 2009). If a student is able to understand, control, and manage their emotions, they are better prepared and have a higher ability of resilience to refocus, work through emotional events, and continue toward a goal. A better grasp of emotion can also assist in social interactions and controlling the emotions of others (Stough, Saklofske, & Parker, 2009). This ability allows students to work cooperatively in groups, understand other’s emotions and emotional reactions without allowing that person’s actions to interfere or interrupt progress to a goal.

Science and technology classes, called STEM, can be difficult for some students to achieve success because it doesn’t appear interesting, the need for learning scientific content isn’t relevant to them currently, and difficult because content can be complicated to understand. Academic self-efficacy in science and technology can mentally help a student be successful in a science classroom. Students can set barriers for themselves by negative self-talk. They may believe that they are “no good” in science before they enter
EMOTIONAL INTELLIGENCE

a science classroom. Past experiences in science and technology classes may help or hinder a student’s success, simply based on their preconceived notions about their success or lack of success with that topic.

People learn information in different ways (Reiff, 1992). Some learn best by writing and having things written, some by seeing and hearing the information, and others by interacting with the material. A person’s learning style is important for teachers and students to understand and utilize to engage classes and increase learning. Awareness of learning style increases the chances for students to understand the concept being taught.

Gender, age, and ethnicity will be asked within the survey to determine if these moderate the relationships between the independent and dependent variables. Socio-economic status (SES) will not be a specific moderating variable because every student in the study receives free breakfast and lunch from the school because of the family income or homeless status.

**Problem Statement**

This study will measure the impact of emotional intelligence, self-efficacy in science and technology, and family background on academic achievement of high school students. It will also examine the moderator impact of gender, age, learning style, and ethnicity of the student on the relationship between emotional intelligence, self-efficacy in science and technology, and family background. Figure 1 shows the problem statement in terms of dependent, independent, and moderator variables.
Figure 1. Problem statement.

Nature and Significance of Problem

The major thrust of this study is the impact of emotional intelligence (EQ) on academic success. EQ has been studied most recently in education as a predictor of academic success as well as emotional adjustment in school (Zeidner et al., 2009). Some believe that a certain level of EQ must be achieved before a student can access traditional material presented within the classroom. It is even thought that general success and well-being in adulthood is contingent upon applying these social and emotional learning skills to navigate life’s hurdles and maintain a balanced mental health (Humphrey, Curran, Morris, Farrell, & Woods, 2007). When emotional intelligence increases, academic success increases, and social interactions are strengthened which leads to fewer discipline issues within schools (Elias & Weissberg, 2000). This study is unique in terms that the population is selected from an alternative high school and all are considered low socio-
economic status. The ethnicities of this location are Caucasian, African-American, Native American, and Hispanic. Gender is 62% male and 38% female in this population.

**Research Objectives**

This research will examine the relationship between emotional intelligence, self-efficacy in science and technology class, and family background on academic achievement. It will also examine the moderating relationship of gender, age, learning style, and ethnicity on the independent variables to the dependent variable.

**Research Questions**

1. What is the relationship between the overall score of emotional intelligence and academic achievement?
2. What is the relationship between each of the dimensions of emotional intelligence and academic achievement?
3. What is the relationship between self-efficacy in science and technology and academic achievement?
4. What is the relationship between family background and academic achievement?
5. To what extent does gender moderate the relationship between the independent variables and academic achievement?
6. To what extent does ethnicity moderate the relationship between the independent variables and academic achievement?
7. To what extent does age moderate the relationship between the independent variables and academic achievement?
8. To what extent does learning style moderate the relationship between the independent variables and academic achievement?

Limitations and Delimitations

This study is limited to high school students, ages 14 to 20, attending an alternative public high school in the geographic area of western Michigan. It will not determine cause and effect of variables.

Definition of Terms

*Emotional Intelligence*: the ability to identify, assess, and control one’s own emotions, the emotions of others, and that of groups (Goleman, 1995).

*Academic Achievement*: a student’s academic performance in school (Fan & Chen, 2001).

*Self-Efficacy*: beliefs in one’s capabilities to organize and execute the courses of action required to produce given attainments (Bandura, 1977).

*Learning Style*: characteristic cognitive, effective, and psychosocial behaviors that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment (Curry, 1981).

Assumptions

This researcher makes the assumption that test subjects consider each survey question and are answering survey questions honestly based on their personal experience, thoughts, and feelings.
Literature Review

Emotional Intelligence

Emotional intelligence is important for learning and personal growth. “Emotional intelligence (EQ) is the capacity to reason about emotions, and of emotions to enhance thinking. It includes the abilities to accurately perceive emotions, to access and generate emotions to assist thought, to understand emotions and emotional knowledge, and to reflectively regulate emotions to promote emotional and intellectual growth” (Mayer et al., 1999). This skill has been researched and utilized in several industries and areas of study: the medical field, education, business and marketing, and human resources to name a few. EQ is broken down into five domains by Goleman (1995): self-awareness, self-regulation, internal motivation, empathy, and social skills. Figure 2 represents the interdependence of these domains to emotional intelligence.

1) Self-awareness is the ability to recognize and understand personal moods and emotions and drives, as well as their effect on others.

2) Self-regulation is being able to control or redirect disruptive impulses and moods, suspend judgment and think before acting.

3) Internal motivation is the want from within to accomplish, help, pursue goals, etc.

4) Empathy is the ability to understand others’ feelings, their emotional makeup.

5) Social skills would be described as the ability to manage relationships, build networks, find commonalities with others and build rapport (Goleman, 1995).
Figure 2. Emotional intelligence (http://dispatchist.com/emotional-intelligence-how-develop-it-part-1/). The five components that are incorporated in emotional intelligence.

EQ may contain a grid of human properties such as patience, perseverance, adaptability, impulse control, hope, and optimism (Brinia, Zimianiti, & Panagiotopoulos, 2014). Mayer and Salovey presented research and literature of which Goleman utilized to build his theory.

**Trait EQ versus Ability EQ**

Researchers have been attempting to incorporate EQ into the framework of human cognitive abilities. It is termed as an ability or an aptitude of the processing of affective information makes it a psychological construct (Davies, Stankov, & Roberts,
The construct of EQ has been researched and studied for decades. Problems have arisen on how to measure and apply the domains. Researchers have utilized surveys to participants of studies allowing for self-reporting. The action of self-reporting now places the construct as a personality trait. Other research has analyzed participants through maximum performance tests. This places the construct as a cognitive ability. The mere idea of EQ is subjective in matter due to the personal emotional experience of the situation or event. It is difficult to create an objective scoring for ability EQ because the information required for the scoring is only available to the test taker (Petrides, Furnham, & Frederickson, 2004). Trait EQ recognizes the inherent subjectivity of the emotional experience. Trait EQ is personality traits whereas ability EQ is the competencies or mental abilities or facilitators (Petrides, 2010). These differences in theoretical references make EQ the “elusive construct” because of the subjectivity of the reporting methods (Mayer, Salovey, & Caruso, 2004). Yet other researchers have added an “extension” to EQ. EQ is a precursor to emotional competence. Emotional competence is the ability to use the behaviors learned in the EQ construct and apply them in every day events (Vaida & Opre, 2014). This progression of EQ to emotional competence leads to a new decision-making theory that incorporates emotions into the equation. In order to accept this theory, some tenets must be set forth:

1) Emotions are neutral.
2) Emotions are central to the decision making process. They should be used to delineate problems to solve and the order in which to solve them.
3) Emotion helps identify which elements need to be considered in the decision making process.
4) Emotion is used to establish appropriate goals in which reason can work. Emotions can filter information to restrict possibilities to be evaluated and focus attention on specific aspects that need to be considered when decisions are being made (Humphrey et al., 2007). Emotions are often thought of as irrational states, and at times they are, but this is a small portion of the normal functioning emotional system (Mayer, Roberts, & Barsade, 2008). This study utilized the ability EQ approach. The survey questions denote a mental ability to perform or manage the behavior or circumstances.

**EQ in Education**

Emotional intelligence begins to develop at the birth of a child. If children aren’t aware of their feelings, they will have difficulty making reasonable decisions, control impulses, and say what they really mean. EQ has been studied most recently in education as a predictor of academic success as well as emotional adjustment in school. Some believe that a certain level of EQ must be achieved before a student can access traditional material presented within the classroom. It is even thought that general success and well-being in adulthood is contingent upon applying these social and emotional learning skills to navigate life’s hurdles and maintain a balanced mental health (Humphrey et al., 2007). When emotional intelligence increases, academic success increases, and social interactions are strengthened, which leads to fewer discipline issues in schools (Elias et al., 2000). Emotional intelligence programs can be implemented in individual classrooms, departments, special groups, or school-wide. Even a 12-week program implementation can show increase in a child’s emotional intelligence (Ulutas & Omeroglu, 2007). Unfortunately, the preponderance of mandatory testing and accountability to the scores
reduces the relevance of meaningful teaching, which includes emotional training as well. This overzealousness for standardized testing suffocates the students’ real-world application of the skills learned in K-12 educational institutions. It is simple to integrate emotional intelligence curriculum into daily lessons. One might incorporate personal growth book sections into the lesson, apply academic content into real-world situations that require reasonable decision-making, and personal examination of feelings during emotional events with the students (Jacob et al., 2012). Emotional intelligence education can even be introduced in music education according to Kaschub (2002). He explains that the social interaction of a music class can increase the EQ of students if presented correctly. Instead of having a whole group perform a portion of a rehearsed song with feedback only from the instructor, break the large group into smaller groups and rehearse. Each small group performs for the rest of the class, and receives feedback from the remainder of the class. This allows for more extensive meaningful interaction, which increases the social aspect of musical education.

Understanding and employing emotional intelligence within a classroom is important for satisfactory academic achievement. When students can manage their own emotions, they are able to manage their reactions and behaviors to emotional events or situations. By utilizing this skill, they can return their focus to the content being presented and away from the situation that is interfering with the learning process. Thus, learning and academic achievement are increasing.

EQ education and training is not only for K-12 educational institutions, it is also needed in higher education, including legal education. If EQ training is instituted within the K-12 education system, academic achievement may carry over into higher education.
EQ training should be included for students as well as faculty. If staff and faculty had high EQ’s, there would be a more amicable work environment. High EQ staff would also be less likely to adopt unreasonable beliefs and pass them on to students, which would perpetuate negative beliefs. High EQ faculty are more likely to possess more humanitarian teaching methods, which encourages students to develop self-esteem and be more proactive in their learning (Vandervoort, 2006). By the time a person graduates law school, the skills that have been validated rarely include emotional, empathic intelligence. EQ is a skill now being incorporated into law school education. The inability to manage the stress of being a lawyer, professionally and personally, can lead to depression and substance abuse. Having a higher EQ can also allow a practicing lawyer to better understand the client and their emotional needs as well as their legal needs (Silver, 1999).

**EQ in Business**

Within the corporate world of today, relationships are becoming very delicate and fading away completely. People are turning more toward technology for communication and away from the interpersonal communication. These communication skills are being minimized whereas they need to be retained for the continuation and betterment of the work-life balance and professional and personal relationships. Stress, depression, and anxiety are but a few consequences of the expectations of today’s ergonomic setup (Umashankar & Ranganatham, 2011). Companies are attempting to become more efficient, stream-lined, and cost effective. This is occurring at the cost of personal health and well-being of the employees.
In business, it is imperative to stay competitive in order to survive in today’s
global market. To keep this competitive edge, change is mandatory to remain a viable,
productive company. Business leaders are not only looking at the financials, marketing,
and product development, but now look at the psychology of the employees as well as the
consumers. Change experts tend to look at the microcognitive processes of the employees
but aren’t analyzing the social and emotional basis of change (Huy, 1999). Change in a
process, no matter large or small, has both a social and emotional effect on the
employees, and to be effective, the change must be accepted and incorporated into the
system. The effects of the change must be managed in the employees as well as the
company for successful change of process.

Businesses must be able to lead and manage their employees in order to be
successful. Managers with a higher EQ are better able to cultivate productive working
relationships and show greater personal integrity (Mayer, Salovey, & Caruso, 2008).
Designing a superior structure does not ensure success, rather, successful management
and leadership within a superior structure lead to success. Managers must know how the
organizational system is successful and be able to provide appropriate placement,
training, and employee selection for the variety of positions within the matrix (Sy &
Cote, 2004). This knowing and understanding means recognizing the personalities and
emotions of the employees and the proper placement of the employees who can work
effectively together. EQ is becoming recognized as an indicator of a person being an
effective leader within the industry. Two forms of leadership are recognized:
transactional and transformational. Transactional leaders reward and discipline
employees on the basis of performance. Transformational leaders encourage, motivate,
and show interest in employees needs. When examining the two basic forms of leadership, transformational and transactional, it has been determined that the transformational leadership style predicts higher rates of effectiveness, satisfaction, performance, and effort from employees. Based on this analysis, it is proposed that the transformational leaders possess higher social and emotional intelligence (Batool, 2013).

The transactional leadership style was commonplace in the past, but as businesses need to change, so do organizational structures. New organizational structures require EQ of the leaders and employees for high performance (Sy & Cote, 2004). Organizational structures include teams as well as linear hierarchy management. EQ must be developed within the persons of the company as well as in the teams (Brinia et al., 2014).

Employees must understand their emotions and reactions to situations in order to be effective employees, and teams must also be cognizant of the social and emotional dynamics of the individual persons and of the group. Emotional intelligence training that is incorporated into the education system will prepare people for their future in education, work, life, and social situations.

Effective leaders, whether in the business realm or public administration, must be able to empathize with their followers both cognitively and emotionally in order to substantiate effective change strategy. The public arena of international governments is filled with stakeholders each having a wide array of cognitive and emotional persuasions. They have a variety of intentions and means of decision-making for the public good. They must attain a certain level of EQ in order to handle emotions and actions between the public sector and the administration. Leaders in the public affairs need to enable
workers and the public to be associates in the decision-making process and capable of managing personal emotions as well as those around them (Ljungholm, 2014).

Educational leadership is another area where a developed EQ would be a skill that would increase success. The leader of a school needs in-depth knowledge of the human factor, both in dealing with students, staff, and the public. The principal is interested in two key areas: results (task-oriented), and relationships (people-oriented). A principal must be able to relate to the students and the issues they are incurring. Events are happening outside of the school realm and emotional responses to these events must be managed within the school. They must also be able to understand the staff so as to work cooperatively, influence their behavior and guide them toward achieving the goals of the school and the educational policy. When dealing with the public, whether it be parents, educational superiors, or people interested in the school and its functions, the principal must analyze each situation and the emotions of the participants in order to manage information, problems, and people in order to induce a positive outcome for all parties (Brinia et al., 2014). Businesses want employees that can manage their own emotions as well as within their environment. K-12 EQ training will facilitate the business objectives of EQ.

**EQ in Personal Well-Being**

Increasing EQ in one’s personal life can increase stability, social interactions, physical and mental health, and overall wellness. Stress is an everyday occurrence for most individuals, be it from home life, work life, or self-induced. Schneider, Lyons, & Khazon (2013) studied stress and how the brain processes stress. The stress process is...
about evaluations and appraisals of environment, situations, or events, and a person’s interpretation of that evaluation. A response is then formulated within the brain. The response can be a positive or negative outcome depending on the development of one’s EQ. The person can look at the stressor, evaluate how and why it is creating specific emotions then move toward a more positive outcome. Another person may view the same stressor, evaluate the situation without a deeper understanding of the emotional reaction it is creating and have a tendency to move toward a negative outcome. The ability to decrease the effect of the stressor and ability to manage the emotions effectively after the stressor is known as resilience. Demonstrated in this research was that the participants with higher EQ scores were better equipped to perform tasks after stressors than participants with lower EQ scores. The higher EQ participants had more positive and less negative affect demonstrating more resiliency.

Emotions serve communicative and social functions. They allow for conveyance of thoughts, emotions, and occurrence of social interaction. Positive social interactions invite others to participate in sociability whereas negative social interactions will push people away and give negative feelings about the interaction. These negative feelings will discourage others the sociability with the one providing that stimulus. A developed EQ will enable one to comprehend the appropriate communications, emotional inferences, and the increase the likelihood of further positive interactions. Positive relationships will then increase with the ability to manage one’s emotions and with the quality of social interactions (Lopes et al., 2004).

Studies have been performed specifically on “loneliness” and its relation to EQ. Loneliness is the subjective discrepancy between one’s desired and one’s perceived
existing interpersonal relationships. A developed EQ has been correlated with quality and perceived interpersonal relationships as well as social well-being and satisfaction with family relationships (Zysberg, 2011). Caplan et al., (1992) studied the outcomes of a specific social competence training program on inner city and suburban young adults. The training program focused on stress management, self esteem, problem solving, assertiveness, substances and health information, and social networks. Conclusions from the study showed that successful completion of the program indicated positive training effects on handling interpersonal problems and anxiety. Teachers indicated positive outcomes of the participants on conflict resolution with peers, popularity, and impulse control. Emotional intelligence training in the education system will increase academic achievement as well as social skills and life skills. These managing skills can be used in all arenas of a person’s future.

EQ has also been studied in its relation to creativity. Creativity is the mental ability associated with the degree to which someone engages in novel endeavors or is able to produce alternative yet viable and appropriate solutions or responses. Some research has shown that understanding one’s own emotions may allow for manipulation of the emotions to produce the maximum creativity of certain activities, thus leading to emotional creativity. This emotional creativity may then be guided toward creative behaviors (Ivcevic, Brackett, & Mayer, 2007).

Another personal area that can be enhanced with increased EQ is financial decision making. People often deem emotions and feelings as mere distractions in financial matters and decision making. It is often viewed as a weakness or illogical to incorporate emotions when deciding how to handle financial situations. It is believed that
finances should be analyzed without emotional bias and based upon direct, intense, systematic focus. It is in fact vital that people allow the unconscious brain to guide the conscious brain allowing for improvement of discovery and decision making. According to neuroeconomic research, the areas of the brain that are responsible for emotional states directly influence thoughts of risks and rewards, that which is part of financial decisions. These decisions are made from emotional input and not from data, analysis and research (Sullivan, 2011).

EQ has been studied and researched by a variety of professionals from the fields of education, business, psychology and political affairs, to name just a few. There seems to be no boundaries for the application and successful outcomes of increasing EQ in people. Learning is increased, personal happiness and stability are enhanced, understanding of other individuals is amplified, and success on several different levels and terms is augmented.

Science and Technology Self-Efficacy

Bandura (1977) defines self-efficacy as one’s beliefs of their own capabilities to organize and execute the courses of action required to produce given attainments. Bong and Skaalvik (2003) define academic self-efficacy as individuals’ beliefs in their capability to perform given academic tasks successfully at a designated level or ability. In this study the capabilities are specific to science and technology content and the given attainment is academic achievement. Academic self-efficacy is related to other behavioral and psychological variables: intrinsic interest, self-satisfaction, and mastery goal orientation (Bong & Skaalvik, 2003). It is also associated with cognitive strategy use,
self-regulation, and academic aspirations according to Schunk (2001). It is closely linked to resilience and effort, thus predicting academic achievement (Schunk & Pajares, 2002). Studies by Bandura (1993), Schunk (2001), and Zimmerman (1995) found that a student’s self-efficacy to regulate their own learning activities allowed them to master a difficult topic positively affected their academic motivation and achievement. Other findings demonstrated that a student’s positive academic self-efficacy supported their ability to endure adversities (Bandura, Barbaranelli, Caprara, & Pastorelli, 1996) and provided the tenacity and resilience to persevere and complete the accomplishments (Zimmerman & Bandura, 1994; Zimmerman, Bandura, & Martinez-Pons, 1992). A study by Wang and Neihart (2015) found that participants in their study expressed high academic self-concept and self-efficacy, which empowered their success. The students focused on their academic strengths and the interaction of their interest, with those academic strengths.

Students with higher science self-efficacy tend to have a higher academic achievement as well as score higher on emotional intelligence scales (Gharatepah, Safari, Pashaei, Razaei, Kajbal, 2015). A study by Sahile in 2014 found that college freshman science students who scored higher on self perception of competence (self-efficacy) in science obtained higher scores in their classes. Self-efficacy is a vital component for increased academic achievement. “Analysis has shown the direct effect of self-efficacy … on participants’ academic accomplishment” (Yusuf, 2011, p. 2). Hollibaugh-Baker (2015) found that students overall academic self-efficacy was increased with the use of technology for those not in the sub-group of low socio-economic status. One conclusion
was that, in general, these students did not have the tenacity to continue a task if failure occurred quickly, whereas other students would persevere through to gain success.

Sahile (2014) found that students in science courses had enhanced learning outcomes and increased academic achievement, when their judgments of their capability were positive. Chen and Pajares (2010) findings supported other researchers’ conclusions (Dweck & Leggett, 1988) that science ability self-efficacy, can be improved which will improve science achievement. Figure 3 illustrates the strategies for building self-efficacy and the outcomes of increasing self-efficacy expectations, which increases the performance outcomes.

*Figure 3. Self-efficacy theory (Adapted from McCullagh, 2005, by Ayesha Penuela. 2013). Strategies for building self-efficacy in an educational setting. Strategies for building self-efficacy are listed on the left, efficacy expectations are clear, which will lead to positive behavior, thought patterns, and emotional reactions.*
Gender and Science and Technology Self-Efficacy

The attitude toward science is a factor for analysis as well. Else-Quest, Mineo, and Higgins (2013) studied the gender difference in attitude and self-efficacy toward science and technology found that boys reported more positive attitudes than the girls. Girls may perform as well in class as the boys do, but their attitudes about the subject and ability leans toward the negative. Other studies have confirmed the conclusion that boys have more “interest” in science, even if both genders equally “enjoy” science (Akpinar, Yildiz, Tatar, & Ergin, 2009).

Sahile (2014) performed a t-test of his data which revealed that male students scored higher mean scores in perceived competence, identified regulation, and IM (internal motivation), but there were no gender differences on the other motivational orientations. Given this information, this study has situated gender as a factor that may moderate the relationship between the independent and dependent variables. Figure 4 shows the interactions of science, technology, engineering, and math to solve a problem.
Learning Style

Learning styles of students can be utilized to enhance academic achievement in the classroom. When a student is introduced information in a manner that is conducive to the way their brain processes it, they are more likely to learn that material. Omar, Mohamad, and Paimin (2015) found that learning style is not the main factor to enhance achievement, yet can be used to identify the tendency of the most effective learning of students. According to research by Jahanbakhsh (2012), the learning style is not necessarily an indicator of success, but certain learning styles had higher academic achievement in specific majors. For example, students taking courses in empirical science demonstrate increased academic achievement utilizing specific learning styles. Data shows significant correlation with both input dimension (visual-verbal) and understand dimension (sequential-global) of learning. Results in a study by Jaeger (2001) found that
students who were more aware and connected to their feelings preferred to learn by doing than observing. The findings show these students who can express their feelings and respect and accept themselves, favor activities of engagement with the course materials and in the learning process. Reflective learning styles are beneficial to more thoughtful learning. When teachers utilize classroom techniques that foster detailed processing, students may become more engaged and interested in learning, which will in turn generate increased student interest and academic achievement (Komarraju, Karau, Schmeck, & Avdic, 2011). Hasanzadeh and Shahmohamadi (2011) presented results from their study that demonstrated a significant relationship between students’ total emotional intelligence and learning strategies in males and females. They also noted a meaningful difference of the learning styles between the genders. Results from a study by Jimenez-Camargo (2011) found that specific learning styles lend themselves to certain moderating factors. For example, academic self-efficacy is closely related to verbal-linguistic thus explaining a close association with reading. Figure 5 shows the interactions of the four value systems and the emotional and mental processes which will lead to a specific or preferred style of learning.
Figure 5. VAK learning style (Johns Hopkins School of Education, 2002). Exploring connections within the figure assists in recognizing learning styles as being dynamic rather than static.

**Ethnicity**

Ogbu and Simons (1998) present “Structural barriers and discriminations in the schools are important determinants of low school achievement among minorities” (p. 161). Another study by Rabiner, Murray, Schmid, and Malone (2004) found that there are achievement gaps in ethnicities in the first grade with a focus on inattention. The findings showed “that a substantial portion of the achievement gap between African American and Caucasian students was related to higher rates of attention difficulties among the former, even though attention problems and achievement were more strongly associated among Caucasians” (p. 505).
In a study by Quinn and Cooc in 2015, science achievement gaps were examined in elementary and middle school children. It was found that there are achievement gaps as early as third grade between genders, ethnicities, as well as socioeconomic status. Some of the gaps narrowed slightly by eighth grade. Lupart, Cannon, and Telfer (2004) had research findings that males favored science classes and science fields for future occupations and tended to have higher academic achievement.

With studies demonstrating achievement gaps based on gender and ethnicity, these factors may further moderate the emotional intelligence, learning style, and self-efficacy on academic achievement.

In a study by Phillips (1992), it was found that White males scored an average of twelve points higher than Black males and females on the science MEAP test whereas White females scored an average of four points higher than Black males and females. He also found that the mean score for science MEAP for White males was 72 and White females was 64. The mean score for Black students, male and female, was 60. This study looked at the number of science courses taken and the grade received in the tenth grade science courses and found that the science MEAP scores correlated for White and Black ethnic groups as well as both genders. Jimenez-Camargo (2011) produced results in the study that suggested that ethnic identity and academic self-efficacy are significantly related to a student’s academic achievement.

**At-Risk Students and Alternative Education**

Alternative education can have a variety of meanings, missions, and disciplines depending on the location and intention of the program. According to Mills and
McGregor (2016), “young people who find their way to an alternative educational provider have left school early due to difficult personal circumstances or significant clashes with schooling authorities and their associated disciplinary requirements” (p. 198). Students are self-selecting to attend alternative education schools, even in the face of negative stereotypes, due to the need to complete their secondary education. Studies have shown that the student perceptions of teacher support at alternative high schools are significantly higher than in the traditional public school environment (Edgar-Smith & Palmer, 2015; McGregor & Mills, 2012). Re-engaging the student in the educational process is vital to success of that student. That encompasses all staff to build positive, supportive relationships with all students, utilizing relevant curriculum, and re-organizing the authoritarian and discipline structure within the educational environment (McGregor & Mills, 2012).

Just like alternative education, at-risk students have a variety of perceptions, experiences, cultures, and environments that place them in the category of at-risk. They are at risk of not completing high school, of mental issues, of alcohol and drug use, and a plethora of other negative behaviors and circumstances (Loomis, 2011). The student must look to programs that will engage them in the most productive path to decrease the circumstance of at-risk and increase the chances of success.
Methods

Statement of Research Design and Rationale

A descriptive correlational research methodology was utilized for this study. The test subjects completed a survey concerning learning style, science and technology self-efficacy, age, gender, emotional intelligence, and science and technology academic achievement with the researcher. The researcher utilized the data from the survey results for analysis.

Population, Sample, and Subjects

The alternative high school is located ten miles away from the other buildings in the district. It is housed within a satellite community college campus. The students share the building with community students during the day. The school also offers dual enrollment for the students, which is more accommodating since the students do not have to travel to another building to attend college classes. This is also an advantage for the students because they have the support of staff that they are familiar with and not embarrassed to ask questions and request help when they are struggling in a college class. The instructors chosen for this location possess the skills to understand and assist students in ways that may not occur during traditional college classes in other locations.

In 2013, a consortium was created between the high schools in two neighboring districts due to financial issues within the smaller district. In 2016, the school housing Grades 6 through 8 closed after the first semester of the school year due to financial instability, and the students were absorbed into the larger district’s middle school building. Annexation was being investigated by the larger district so as to provide a
stable education to the remaining students within that district. It was approved by the voters as well as the Michigan Department of Education. The remainder of the school system, Grades K through 5, began in the larger district at the beginning of the current school year. These changes have had a large impact on the community, families, parents, guardians, students, and other children in both communities. The communities were unsure of outcomes and integration of the communities. The larger community is more affluent, less diverse, and contain more two-parent households. The smaller, annexed school community is ethnically diverse, has lower household incomes, and more single parent households. The parents were insecure about their children attending the larger school, were concerned about equal treatment and equal education, and feared prejudice within the classroom and the school. The emotional responses that the community and parents were presenting to their children was causing students to behave inappropriately within the school buildings, the classrooms, on the buses, and at the bus pickup locations. Some parents were telling their children that they did not have to follow the rules of the new school they were attending. This created confusion within the children, animosity within the buildings and classrooms, and distrust and disrespect of all authority figures. Chaos and uncertainty were common feelings within the communities, the homes, and the schools.

The population examined in this study was high school students, between ages 14 through 20, attending an alternative public high school, 62% male, 38% female, 61% Caucasian, 23% African-American, 6% Latino or Hispanic, 7% Native American, and 100% of the subjects receive free lunch. The students are considered at-risk students. At-risk is a broad term that can describe a large number of students from different
perspectives. At-risk can mean a student is at-risk of not transitioning from childhood to adulthood successfully. It may also mean they are at risk of dropping out of school, using drugs and alcohol, having behavior issues that may prevent their allowed attendance at school, or failing academically. This “at-risk” status may be student characteristics or conditions. This status may be caused by poverty, social injustice, mental issues, social incompetence, low resilience and grit, low self-esteem, drug and alcohol abuse by the child or within the family, physical and/or sexual abuse by or against the child, homelessness, incarceration, health issues, truancy, and many more circumstances or contexts.

Enrolling in the school is based on completing an application and attending an interview with an administrator of the alternative high school. Every student is asked about their previous school experiences, why they chose to leave that school, and what is going to be different by attending this school. The administrator reviews the school’s student handbook to ensure that the student is aware of the rules and is able to comply with the expectations. Students may apply to enroll based on personal decision or self-selection, or they may be referred by the district’s traditional high school or recommended by another district’s administration team. On the average, 75% of the students self-selected to attend the alternative high school either from within district or outside district, and 25% are referred by the district’s traditional high school.

This population tends to be transient through the school building. They have often struggled for years with attendance issues and truancy, health issues, bullying, low or failing grades, being ignored by teachers, not being provided the assistance needed to understand the concepts, having little or no family support of schoolwork and overall
education, and homelessness. They have never had success and fears opening themselves up for that possibility. They usually are in the school two years or less due to a few factors:

1. They earn their diploma by working hard and earning the credits.
2. They continue the same behaviors from previous school experience and drop out or try attending another school.
3. They allow their emotions to make decisions and create environments or events where they are asked to leave school or are officially removed by the school board.
4. They become parents and have to get a job to support their family.
5. They become too old, based on Michigan Department of Education policies, to attend public school.

During the course of this research, there were females who were pregnant. None of them were still connected or communicating with the biological father. Two males were informed that they were going to become fathers. Four of the males in the school were being investigated for armed robbery, one male was being processed through the judicial system for assault and battery, and one female was being processed through the judicial system for shoplifting over $250. There was a suicide attempt by a female within the building. One student had to be removed from the building by the police on three separate occasions. This young man had been housed at the county youth home for eight months and struggled when stress began to increase at home and school and he was required to make decisions. He was comfortable in an institution where he was given orders and did not have to make choices for himself.
The majority of the students who attend the school have a large amount of negativity, little family support, low percentage of success, and rarely an adult role model or mentor to look to when they are struggling. This student population has difficulties in trusting adults, authority figures, and school professionals. They have not received the support nor been taught the skills to be successful in the education environment. Thus, they utilize the tools they have acquired outside of school to navigate the educational system.

The survey (Appendix A) was given to 75 test subjects enrolled in the school. The sampling method used was a total sample of students attending an alternative high school in the western region in Michigan in the United States. Parental consent forms were signed by those with students under the age of 18, see Appendix B. Student assent forms were signed by all students completing the survey, see Appendix C. The appropriate “Human Subjects Approval Form” was submitted and approved by the Eastern Michigan University approval, see Appendix TT.

Measurement

**STEM Academic Achievement.** The measurement scale for STEM academic achievement included a response question.

**Q1:** The final grade that I receive in a science class is…

**Age.** The measurement scale for age included a response question.
**Gender.** The measurement scale for gender of the respondent included a forced response question offering two responses.

**Ethnicity.** The measurement scale for ethnicity was a forced response structure offering eight responses.

**Learning Style Scale.** The learning style scale, adapted from Learning to Study Through Critical Thinking by Jonelle A. Beatrice (1995), was a forced response structure allowing for three choices (V=visual, A=auditory, and K=kinesthetic) and had 14 statements for the respondent. The person’s score is based on the largest number of selections of the three categories.

**STEM Self-Efficacy in Science and Technology Scale.** The science and technology self-efficacy scale was comprised of five statements, with a likert scale of 1 through 7, 1 being a strong disagreement with the statement and 7 being a strong agreement with the statement. Performing a Cronbach’s Alpha showed the reliability to be 0.895.

**Family Background Scale.** The family background scale was comprised of five statements, with a likert scale of 1 through 7, 1 being a strong disagreement with the statement and 7 being a strong agreement with the statement. Performing a Cronbach’s Alpha showed the reliability to be 0.795.

**Q1:** I have family support in regards to my education.
Q2: Education is important to my parents/guardians.
Q3: I have help available at home if I have homework questions.
Q4: I engage in conversations at home about science and technology.

**Emotional Intelligence Scale.** The Emotional Intelligence scale was adapted from TEIQue survey by Petrides, Sangareau, Furnham, and Frederickson (2006). It was comprised of 13 statements, with a likert scale of 1 through 7, 1 being a strong disagreement with the statement and 7 being a strong agreement with the statement. The reliability of the TEIQue survey as determined by an investigation by Freudenthaler, Neubauer, Gabler, Scherl, and Rindermann (2008) indicated solid internal reliabilities of 0.71 and 0.91. Performing a Cronbach’s Alpha showed the reliability to be 0.557.

1) Self-awareness is the ability to recognize and understand personal moods and emotions and drives, as well as their effect on others. Two statements pertaining to this domain were utilized within the survey. Performing a Cronbach’s Alpha showed the reliability to be 0.561.

2) Self-regulation is being able to control or redirect disruptive impulses and moods, suspend judgment, and think before acting. Four statements pertaining to this domain were utilized within the survey. Performing a Cronbach’s Alpha showed the reliability to be 0.243.

3) Internal motivation is the want from within to accomplish, help, pursue goals, etc. Three statements pertaining to this domain were utilized within the survey. Performing a Cronbach’s Alpha showed the reliability to be 0.486.
4) Empathy is the ability to understand others’ feelings and their emotional makeup. Two statements pertaining to this domain were utilized within the survey. Performing a Cronbach’s Alpha showed the reliability to be 0.649.

5) Social skills would be described as the ability to manage relationships, build networks, find commonalities with others, and build rapport. Two statements pertaining to this domain were utilized within the survey. Performing a Cronbach’s Alpha showed the reliability to be 0.300.

(Goleman, 1995)

**Data Collection**

Data was collected from a questionnaire. The researcher proctored the administration of the surveys at the selected school with the test subjects. The subjects participating in the research were identified by a unique study identification that is linked via a separate document to identifiers. The surveys and printed data are stored in a locked file cabinet within a locked office in which the researcher possesses the only key. The surveys will be destroyed six months after completion of the research paper. This will insure safety, confidentiality, and anonymity for the human subjects.

**Data Analysis**

Analysis of data was conducted using SPSS software. The researcher utilized correlation analysis.
Results

Results from the surveys were entered into SPSS software utilizing correlation analysis to determine significance and the strength of the relationship of the independent and dependent variables.

What is the relationship between the overall score of emotional intelligence and academic achievement?

The analysis of EQ and academic achievement ($r = -0.027$) within this total population showed a very weak correlation. The $p$ value was 0.821 demonstrating as not significant as shown in Table 1.

What is the relationship between each of the dimensions of emotional intelligence and academic achievement?

The analysis for emotional self-regulation and academic achievement ($r = 0.193$) demonstrated a weak correlation while $p = 0.098$ thus not significant. Analysis of self-awareness of emotions and academic achievement ($r = 0.293$) showed a moderate correlation and $p = 0.011$ thus being significant. Analysis of empathy and academic achievement ($r = 0.093$) showed a very weak correlation while $p = 0.427$ statistically not significant. Analysis of academic achievement and motivation ($r = 0.212$) was a weak correlation and $p = 0.067$ was not significant. Finally, analysis of social skills and academic achievement ($r = 0.207$) showed a weak correlation and $p = 0.067$ was not significant. (See Table 1.)
What is the relationship between self-efficacy in science and technology and academic achievement?

The analysis of Self-efficacy in STEM classes and academic achievement ($r = 0.331$) showed a moderate correlation and $p = 0.004$ as being significant within this survey population. (See Table 1.)

What is the relationship between family background and academic achievement?

The analysis of the family background and academic achievement ($r = 0.194$) for all students is a weak correlation with the survey population and $p = 0.095$, thus not significant. (See Table 1.)
Table 1

Correlations of Variables of Emotional Intelligence Total Score, Emotional Intelligence Domains, Self-Efficacy in STEM Classes, and Family Background with Academic Achievement

<table>
<thead>
<tr>
<th></th>
<th>Academic Achievement (r values)</th>
<th>Correlation Significance (p values)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emotional Intelligence Total Score</td>
<td>-0.027</td>
<td>0.821</td>
</tr>
<tr>
<td>Self-Regulation</td>
<td>0.193</td>
<td>0.098</td>
</tr>
<tr>
<td>Self-Awareness</td>
<td>0.293</td>
<td>0.011</td>
</tr>
<tr>
<td>Empathy</td>
<td>0.093</td>
<td>0.427</td>
</tr>
<tr>
<td>Motivation</td>
<td>0.212</td>
<td>0.067</td>
</tr>
<tr>
<td>Social Skills</td>
<td>0.207</td>
<td>0.074</td>
</tr>
<tr>
<td>Self-Efficacy in STEM</td>
<td>0.331</td>
<td>0.004</td>
</tr>
<tr>
<td>Family Background</td>
<td>0.194</td>
<td>0.095</td>
</tr>
</tbody>
</table>

(EQ=emotional intelligence, SE=self-efficacy in STEM classes, FB=family background, AA=academic achievement)

To what extent does gender moderate the relationship between the independent variables and academic achievement?

When using gender as a moderator value, males in self-efficacy in STEM (r = 0.336) and family background (r = 0.340) have a moderate correlation with p = 0.022 and
$p = 0.021$ are statistically significant correlations in relation to academic achievement.

Emotional intelligence and academic achievement ($r = 0.050$) has a very weak correlation and $p = 0.742$, thus not statistically significant relationships for this survey population.

Females’ self-efficacy in STEM ($r = 0.369$) is a moderate correlation to academic achievement with a $p$ value of 0.049, thus significant. EQ ($r = -0.200$) has a weak correlation to academic achievement with a $p$ value of 0.299, thus not significant. Family background ($r = 0.044$) has a very weak correlation with $p = 0.820$, again not significant. (See Table 2.)

Table 2

Correlations of Gender Moderating the Variables of Emotional Intelligence Total Score, Emotional Intelligence Domains, Self-Efficacy in STEM Classes, and Family Background to Academic Achievement

<table>
<thead>
<tr>
<th></th>
<th>Male $r$ values</th>
<th>Male $p$ values</th>
<th>Female $r$ values</th>
<th>Female $p$ values</th>
</tr>
</thead>
<tbody>
<tr>
<td>EQ &amp; AA</td>
<td>0.050</td>
<td>0.742</td>
<td>-0.200</td>
<td>0.299</td>
</tr>
<tr>
<td>SE &amp; AA</td>
<td>0.336</td>
<td>0.022</td>
<td>0.369</td>
<td>0.049</td>
</tr>
<tr>
<td>FB &amp; AA</td>
<td>0.340</td>
<td>0.021</td>
<td>0.044</td>
<td>0.820</td>
</tr>
</tbody>
</table>

(EQ=emotional intelligence, SE=self-efficacy in STEM classes, FB=family background, AA=academic achievement)
Emotional Intelligence 38

To what extent does ethnicity moderate the relationship between the independent variables and academic achievement?

The correlation analysis of the independent and dependent variables when filtering by the moderating variable of ethnicity showed varying correlations.

White/non-Hispanic students showed a weak correlation ($r = 0.106$) and not significant ($p = 0.482$) between total EQ and academic achievement; a moderate correlation between family background and academic achievement ($r = 0.330$), and the correlation significant ($p = 0.025$); and a strong correlation between self-efficacy in STEM and academic achievement ($r = 0.460$), that being significant ($p = 0.001$).

Latino/Hispanic students showed a weak correlation ($r = 0.028$) and not significant ($p = 0.965$) between self-efficacy in STEM and academic achievement; a moderate correlation between family background and academic achievement ($r = 0.309$), but the correlation was not significant ($p = 0.613$); and a strong correlation between total EQ and academic achievement ($r = 0.546$), but the correlation is not statistically significant ($p = 0.341$).

Native American students showed a weak correlation ($r = 0.147$) and not significant ($p = 0.753$) between total EQ and academic achievement; a moderate correlation between family background and academic achievement ($r = 0.335$), but the correlation was not significant ($p = 0.463$); and a moderate correlation between self-efficacy in STEM and academic achievement ($r = 0.397$), but that not being significant ($p = 0.378$).

African American students showed a weak correlation ($r = 0.076$) and not significant ($p = 0.772$) between self-efficacy in STEM and academic achievement; a
weak correlation between family background and academic achievement \((r = -0.289)\),
and the correlation was not significant \((p = 0.261)\); and a moderate correlation between
total EQ and academic achievement \((r = 0.414)\), but that not being significant \((p = 0.099)\).
(See Table 3.)

Based on the data, the correlation for total EQ and academic achievement is
highest for Latino/Hispanic and African American students. The correlation for self-
efficacy in STEM and academic achievement is highest for White/Non-Hispanic and
Native American students. The correlation for family background and academic
achievement is highest for White/Non-Hispanic students.
Table 3

Correlations of Ethnicity Moderating the Variables of Emotional Intelligence Total Score, Emotional Intelligence Domains, Self-Efficacy in STEM Classes, and Family Background to Academic Achievement

<table>
<thead>
<tr>
<th></th>
<th>White/Non-Hispanic r values</th>
<th>White/Non-Hispanic p values</th>
<th>Latino/Hispanic r values</th>
<th>Latino/Hispanic p values</th>
<th>Native American r values</th>
<th>Native American p values</th>
<th>African American r values</th>
<th>African American p values</th>
</tr>
</thead>
<tbody>
<tr>
<td>EQ &amp; AA</td>
<td>0.106</td>
<td>0.482</td>
<td>-0.546</td>
<td>0.341</td>
<td>0.147</td>
<td>0.753</td>
<td>-0.414</td>
<td>0.099</td>
</tr>
<tr>
<td>SE &amp; AA</td>
<td>0.460</td>
<td>0.001</td>
<td>0.028</td>
<td>0.965</td>
<td>0.397</td>
<td>0.378</td>
<td>0.076</td>
<td>0.772</td>
</tr>
<tr>
<td>FB &amp; AA</td>
<td>0.330</td>
<td>0.025</td>
<td>0.309</td>
<td>0.613</td>
<td>0.335</td>
<td>0.463</td>
<td>-0.289</td>
<td>0.261</td>
</tr>
</tbody>
</table>

(EQ=emotional intelligence, SE=self-efficacy in STEM classes, FB=family background, AA=academic achievement)

*To what extent does age moderate the relationship between the independent variables and academic achievement?*

The correlation analysis of the independent and dependent variables when filtering by age as a moderator variable showed very weak to very strong correlations based on the data of this population.
Students within the 16 year age category showed a weak correlation \( (r = -0.174) \) and not significant \( (p = 0.417) \) between total EQ and academic achievement; a very weak correlation between family background and academic achievement \( (r = 0.089) \), and the correlation was not significant \( (p = 0.681) \); and a weak correlation between self-efficacy in STEM and academic achievement \( (r = 0.255) \), that being not significant \( (p = 0.229) \). (See Table 4.)

Students within the 17 year age category showed an extremely weak correlation \( (r = -0.001) \) and not significant \( (p = 0.995) \) between total EQ and academic achievement; a strong correlation between family background and academic achievement \( (r = 0.553) \), and the correlation was significant \( (p = 0.009) \); and a strong correlation between self-efficacy in STEM and academic achievement \( (r = 0.589) \), that being significant \( (p = 0.005) \). (See Table 4.)

Students within the 18 year age category ages showed a weak correlation \( (r = 0.185) \) and not significant \( (p = 0.377) \) between total EQ and academic achievement; a moderate correlation between family background and academic achievement \( (r = 0.356) \), and the correlation was not significant \( (p = 0.081) \); and a weak correlation between self-efficacy in STEM and academic achievement \( (r = 0.259) \), that being not significant \( (p = 0.211) \). (See Table 4.)

Students within the 16 year age category showed a very strong correlation \( (r = 0.866) \) but not statistically significant \( (p = 0.333) \) between total EQ and academic achievement, an extremely strong correlation between family background and academic achievement \( (r = -0.992) \) but was not statistically significant \( (p = 0.078) \), and an
extremely strong correlation between self-efficacy in STEM and academic achievement ($r = 1.000$), that being significant ($p = 0.000$). (See Table 4.)

Based on the data, the correlation for total EQ and academic achievement is highest within the 19 year age category. The correlation for self-efficacy in STEM and academic achievement is highest for students within the 17 and 19 year age categories. The correlation for family background and academic achievement is highest for the students of ages 17 and 19.

Table 4
Correlations of Age Moderating the Variables of Emotional Intelligence Total Score, Emotional Intelligence Domains, Self-Efficacy in STEM Classes, and Family Background to Academic Achievement

<table>
<thead>
<tr>
<th></th>
<th>Age 16 $r$ values</th>
<th>Age 16 $p$ values</th>
<th>Age 17 $r$ values</th>
<th>Age 17 $p$ values</th>
<th>Age 18 $r$ values</th>
<th>Age 18 $p$ values</th>
<th>Age 19 $r$ values</th>
<th>Age 19 $p$ values</th>
</tr>
</thead>
<tbody>
<tr>
<td>EQ &amp; AA</td>
<td>-0.174</td>
<td>0.417</td>
<td>-0.001</td>
<td>0.995</td>
<td>0.185</td>
<td>0.377</td>
<td>0.866</td>
<td>0.333</td>
</tr>
<tr>
<td>SE &amp; AA</td>
<td>0.255</td>
<td>0.229</td>
<td>0.589</td>
<td>0.005</td>
<td>0.259</td>
<td>0.211</td>
<td>1.000</td>
<td>0.000</td>
</tr>
<tr>
<td>FB &amp; AA</td>
<td>0.089</td>
<td>0.681</td>
<td>0.553</td>
<td>0.009</td>
<td>0.356</td>
<td>0.081</td>
<td>-0.992</td>
<td>0.078</td>
</tr>
</tbody>
</table>

(EQ=emotional intelligence, SE=self-efficacy in STEM classes, FB=family background, AA=academic achievement)
To what extent does learning style moderate the relationship between the independent variables and academic achievement?

The correlation analysis of the independent and dependent variables when filtering by learning style as a moderator variable showed very weak to strong correlations based on the data of this population.

Students having a visual learning style showed a very weak correlation \( (r = -0.023) \) and not significant \( (p = 0.880) \) between total EQ and academic achievement; a weak correlation between family background and academic achievement \( (r = 0.075) \), and the correlation was not significant \( (p = 0.624) \); and a moderate correlation between self-efficacy in STEM and academic achievement \( (r = 0.299) \), that being significant \( (p = 0.046) \). (See Table 5.)

Students having an auditory learning style showed a very weak correlation \( (r = 0.114) \) and not significant \( (p = 0.654) \) between total EQ and academic achievement; a moderate correlation between family background and academic achievement \( (r = 0.372) \), and the correlation was not significant \( (p = 0.129) \); and a moderate correlation between self-efficacy in STEM and academic achievement \( (r = 0.302) \), that being not significant \( (p = 0.224) \). (See Table 5.)

Students having a kinesthetic learning style showed a moderate correlation \( (r = -0.471) \) and not significant \( (p = 0.122) \) between total EQ and academic achievement; a moderate correlation between family background and academic achievement \( (r = 0.355) \), and the correlation was not significant \( (p = 0.258) \); and a strong correlation between self-efficacy in STEM and academic achievement \( (r = 0.569) \), and the correlation is statistically significant \( (p = 0.050) \). (See Table 5.)
Based on the data, the correlation for total EQ and academic achievement is highest for kinesthetic learners. The correlation for self-efficacy in STEM and academic achievement is highest for kinesthetic learners. The correlation for family background and academic achievement is high for both auditory and kinesthetic learners.

Table 5

Correlations Between Gender Moderating the Variables of Emotional Intelligence Total Score, Emotional Intelligence Domains, Self-Efficacy in STEM Classes, and Family Background to Academic Achievement

<table>
<thead>
<tr>
<th></th>
<th>Visual Learner r values</th>
<th>Visual Learner p values</th>
<th>Auditory Learner r values</th>
<th>Auditory Learner p values</th>
<th>Kinesthetic Learner r values</th>
<th>Kinesthetic Learner p values</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EQ &amp; AA</strong></td>
<td>-0.023</td>
<td>0.880</td>
<td>0.114</td>
<td>0.654</td>
<td>-0.471</td>
<td>0.122</td>
</tr>
<tr>
<td><strong>SE &amp; AA</strong></td>
<td>0.299</td>
<td>0.046</td>
<td>0.302</td>
<td>0.224</td>
<td>0.569</td>
<td>0.050</td>
</tr>
<tr>
<td><strong>FB &amp; AA</strong></td>
<td>0.075</td>
<td>0.624</td>
<td>0.372</td>
<td>0.129</td>
<td>0.355</td>
<td>0.258</td>
</tr>
</tbody>
</table>

(EQ=emotional intelligence, SE=self-efficacy in STEM classes, FB=family background, AA=academic achievement)
Discussion

The first research question consisted of examining the relationship between the overall score of emotional intelligence and academic achievement. The results from this study indicated a very weak correlation that was not statistically significant. Research of the relationship between EQ and academic achievement has revealed mixed results. Some studies support a positive correlation, other report null results, and some report results for specific EQ dimensions. Zins, Weissberg, Wang, and Walberg (2004) present extensive evidence of the positive relationship between EQ and academic achievement. Schulte, Ree, and Carrebeta (2003) question whether EQ is a construct that can have a relationship to academic achievement or simply personality traits that lead to academic achievement.

When factoring amongst the domains of self-regulation of emotions, empathy, and social skills, the relationship was very weak for this survey population. The domain of self-awareness of emotions had a moderate relationship. Self-awareness is the most important dimension of EQ because the other dimensions work through the self-awareness dimension. When a person is more aware of their emotions, they are more capable of managing the stress of academic challenges.

Another question for analysis in this study is the relationship between self-efficacy in science and technology and academic achievement. There is a moderate correlation which is statistically significant. A positive self efficacy in one’s ability to regulate their own learning and academic achievements contributes to positive academic achievement and promotes high academic aspirations according to Bandura et al. (1996). The results of this study support this proposition. According to Sahile (2014), when
students increase their feelings of efficacy then student motivation will increase, in turn, increasing students’ achievement.

This study examined the relationship between family background and academic achievement. There is a weak correlation and not statistically significant relationship between these variables. A study by Bandura et al. (1996) linked parental expectations and aspirations of their children and their academic achievement. Abd-el-fattah (2006) discussed results from his study that parental involvement factors were the most important predictor of academic achievement and parents’ education level was the next important factor. The parents’ education level was the major predictor of school disengagement as well.

Another research question within this study is to examine the extent that gender moderates the relationship between the independent variables and academic achievement. This research demonstrated gender does somewhat moderate and is statistically significant, the self-efficacy in STEM and family background in males, and somewhat moderates for emotional intelligence and self-efficacy in STEM for females. There is a very weak correlation between males and their emotional intelligence on academic achievement and females and their family background. Gorard, Rees, and Salisbury (2001) found that in their research, males attain higher scores on science literacy tests than females, despite their lower academic scores in the science classroom. Time investment in homework between genders was noted as a reason for the achievement gaps often found in STEM classes. Females tend to exert more effort into classroom work whereas males exert more effort in hands-on activities. Kelly (2008) reasons that academic achievement is not always content based, but behaviorally based as well. If
behavior is not conforming to classroom morals or lack of homework completion, as often time with males, grades will be reduced.

The sixth research question examines the extent that ethnicity moderates the relationship between the independent variables and academic achievement. The ethnicity has a moderating effect on relationship between emotional intelligence and academic achievement for the Latino/Hispanic students as well as the African-American students. There is also a moderating effect for the White/Non-Hispanic and Native American students in the relationship between self-efficacy and STEM. When examining the relationship between family background and academic achievement, the White/Non-Hispanic, Latino/Hispanic, and Native American students are moderating relationship by their ethnicity. According to research by Quinn and Cooc (2015), the academic achievement gap between African-American students, Hispanic students, and Caucasian students in STEM curriculum begins in younger grades and widens as students age. Socioeconomic status and prior achievement are moderating factors that were also considered in the study as students progress through school. Quinn and Cooc (2015) addressed factors of lowered expectations and less rigorous curriculum than required of Caucasian students. Other research by Hubbard (2005) established that African-American females collectively defended their academic ambitions to authority when removal from academic classes was threatened as discipline, thus maintaining their academic pursuit.

The next research question examines the extent that age moderates the relationship between the independent variables and academic achievement. The respondents at age 16 showed a weak relationship between self-efficacy and STEM and academic achievement. The respondents at age 17 showed a strong relationship between
self-efficacy and STEM and academic achievement as well as family background and academic achievement. Respondents of age 18 have a moderate correlation between family background and academic achievement and weak relationship between the other independent variables and academic achievement. The age 19 respondents showed very strong relationships between the independent variables and academic achievement.

According to research by Brouzos, Misailidi, and Hadjimattheou (2014), emotional intelligence and academic achievement change as a function of age. This is supported by the research of developmental models of emotional intelligence by Meerum, Terwogt, and Stegge (2001). Upon review of the data and examining the students’ backgrounds and current life situations, it was recognized that two of the students in the 18 year category were more than six months pregnant. This circumstance may have a negative impact on their emotional intelligence skills, cognitive skills, and coping mechanisms that might have traditionally been utilized. These females were not with the baby’s father, there was little family support from any grandparents, and they were experiencing medical issues that were requiring frequent doctor visits and reduced attendance at school.

The final research question of this study examined the extent that learning style moderates the relationship between the independent variables and academic achievement. The data analysis showed that the kinesthetic learner has a stronger relationship between all three independent variables and academic achievement. The auditory learner has a moderate relationship between self-efficacy and STEM and family background with academic achievement. According to Jimenez-Camargo (2011), academic self-efficacy is thought to be more closely related to verbal-linguistic intelligence. This would relate with
the characteristics of the auditory learning style. Auditory learners want to engage in conversations, discussions, and group work (Gholami & Bagheri, 2013). The visual learner has a moderate relationship between self-efficacy and STEM and academic achievement.
Conclusion

This research was intended to examine a small population of students at an alternative high school and measure relationships between some specific factors and academic achievement. Analysis of the data revealed some relationships between the variables.

There is a relationship between self-efficacy in STEM as well as family background on academic achievement for males in this population. Statistically, there is a relationship between self-efficacy and STEM and academic achievement for females. From this research, males and females in this population have an increased academic achievement in STEM classes when they believe that they are able and capable of the content and completing the assigned work. Males have an increased academic achievement when they feel supported and have higher expectations from parents and family members. Family support is often weak or non-existent within this population of at-risk students within an alternative education high school. The students are attending in part due to the lack of support, mentoring, and concern from their home.

When factoring for ethnicity, the results revealed that there is a relationship between self-efficacy and family background upon the academic achievement for White/non-Hispanic students. Latino students showed a relationship between their emotional intelligence and family background and their academic achievement. Native American students’ data demonstrated a relationship between self-efficacy in STEM and family background with their academic achievement. African-American students’ data shows the relationship between their emotional intelligence and academic achievement.
African-American and Latino/Hispanic students in this population have a higher academic achievement in STEM classes when they have an increased score in the emotional intelligence category. White/non-Hispanic and Native American students attain higher academic achievement when they have a positive self-efficacy in STEM classes as well as family support of their education pursuits.

When examining the relationships and learning style, the kinesthetic learner has increased academic achievement when they have and increased emotional intelligence, self-efficacy in STEM, and feels the family support of their education. The auditory learner is more academically successful when they have the positive self-efficacy in STEM and the family support for their education. The visual learner shows a slight relationship between the self-efficacy in STEM with increased academic achievement.

The relationship between the variables when factoring in age reveals a strong relationship. At age 17, self-efficacy in STEM and family support reveals a positive relationship with academic achievement. The students at age 19 have a strong correlation between emotional intelligence, self-efficacy in STEM, and family support of education in relations to increased academic achievement. The age factor is important to examine because many of these students are forced to grow up more quickly than their peers that do not have the burden of drug and alcohol abuse, either personally or within the home by relatives. They also may be required to supplement or provide the entire financial support for the household. This circumstance interferes with attendance, classwork, and assessments at the educational institution. The students are often the main caregiver for younger siblings because the responsible adult is working or is not accepting the responsibility of raising the children in the home.
Alternative education schools are being closed yearly due to the decrease of financial resources from state revenue. These schools and staff provide students with another option to the traditional high school. Students that attend the alternative education high schools are traditionally “at-risk” of not attaining the same successes their counterparts are in the public high school. They struggle academically, personally, and often with authority and discipline policies. Alternative education high schools offer smaller class sizes, alternative styles of learning and earning credit, as well as a support system from the adults within the building. There should be an increase in these schools, negate the stereotypes of these not being “real” schools or teachers. All teachers need to professional development on managing the at-risk student and pedagogical strategies to increase the success of these students. That training should include the teaching of emotional intelligence, utilizing the learning styles to increase understanding, and incorporating families and communities into the education process.

This research has caused me to look to other experts in the field of alternative education and increasing emotional intelligence. I was unable to locate research specific to this education style, for this population, within this educational setting. Further research is necessary on this population of students and increasing their emotional intelligence. They need to understand the emotions they are experiencing in order to increase their resiliency and grit, improve their social skills, and attain higher academic success. It is imperative that we determine some relationships that may be creating the environments and attitudes that place these students in the “at-risk” category. More attention needs to be given in research to these students to assist them to increase their chances of success after secondary education has been completed.
References


http://doi.org/10.1016/j.sbspro.2011.11.430


http://doi.org/10.1080/09518390500224887


http://doi.org/10.1080/01443410601066735


Appendices
Appendix A: Student Survey

Directions: Please answer the following.

1. The final grade that I receive in a science class is: __________________

2. My age is __________

3. Please mark how you classify yourself: _____ Male _____ Female

4. Someone in my family is a scientist or uses science in their job. ___ Yes ___ No

5. Did your mother/mother figure graduate from high school?
   _____ Yes _____ No

6. Does your mother/mother figure have education beyond high school?
   _____ Yes _____ No

7. Which of the following best represents your racial or ethnic heritage? Choose all that apply:
   _____ Non-Hispanic White or Euro-American   _____ Black or African American
   _____ Latino or Hispanic American   _____ East Asian or Asian American
   _____ South Asian or Indian American   _____ Middle Eastern or Arab American
   _____ Native American or Alaskan Native   _____ Other

Learning Style

Directions: Circle the letter before the statement that best describes you.

1. If I have to learn how to do something, I learn best when I:
   (V) Watch someone show me how.
   (A) Hear someone tell me how.
   (K) Try to do it myself.

2. When I read, I often find that I:
   (V) Visualize what I am reading in my mind’s eye.
   (A) Read out loud or hear the words inside my head.
   (K) Fidget and try to “feel” the content.

3. When asked to give directions, I:
   (V) See the actual places in my mind as I say them or prefer to draw them.
   (A) Have no difficulty in giving them verbally.
   (K) Have to point or move my body as I give them.

4. If I am unsure how to spell a word, I:
   (V) Write it in order to determine if it looks right.
   (A) Spell it out loud in order to determine if it sounds right.
   (K) Write it in order to determine if it feels right.

5. When I write I:
   (V) Am concerned with how neat and well spaced my letters and words appear.
   (A) Often say the letters and words to myself.
   (K) Push hard on my part or pencil and can feel the flow of the words.

6. If I had to remember a list of items, I would remember it best if:
   (V) Wrote them down.
   (A) Said them over and over to myself.
   (K) Move around and used my fingers to name each item.

7. I prefer teachers who:
   (V) Use a board or overhead projector while they lecture.
   (A) Talk with lots of expression.
   (K) Use hands-on activities.
8. When trying to concentrate, I have a difficult time when:

(V) There is a lot of clutter or movement in the room.
(A) There is a lot of noise in the room.
(K) I have to sit still for any length of time.

9. When solving a problem I:

(V) Write or draw diagrams to see it.
(A) Talk myself through it.
(K) Use my entire body or move objects to help me think.

10. When given written instructions on how to build something, I:

(V) Read them silently and try to visualize how the parts will fit together.
(A) Read them out loud and talk to myself as I put the part together.
(K) Try to put the parts together first and read later.

11. To keep occupied while waiting, I:

(V) Look around, stare, or read.
(A) Talk or listen to others.
(K) Walk around, manipulate things with my hands, or move/shake my feet as I sit.

12. If I had to verbally describe something to another person, I would:

(V) Be brief because I do not like to talk at length.
(A) Go into great detail because I like to talk.
(K) Gesture and move around while talking.

13. If someone were verbally describing something to another person, I would:

(V) Try to visualize what he/she was saying.
(A) Enjoy listening but want to interrupt and talk myself.
(K) Become bored if her/his description got too long and detailed.

14. When trying to recall names, I remember:

(V) Faces but forget names.
(A) Names, but forget faces.
(K) The situation where I met the person rather than the person’s name or face.
### Emotional Intelligence

**Instructions:** Please answer by putting a circle around the number that best shows how much you agree or disagree with each sentence below. If you strongly disagree with a sentence, circle a number close to 1. If you strongly agree with a sentence, circle a number close to 7. If you’re not too sure if you agree or disagree, circle a number close to 4. Work quickly, but carefully. There is no right or wrong answer.

<table>
<thead>
<tr>
<th></th>
<th>Disagree</th>
<th>Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. It’s easy for me to talk about my feelings to other people.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>2. I often find it hard to see things from someone else’s point of view.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>3. I find it hard to control my feelings.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>4. I find it hard to know exactly what emotion I'm feeling.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>5. I can make other people feel better when I want to.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>6. I find it hard to cope when things change in my life.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>7. I’m able to deal with stress.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>8. I don’t know how to show the people close to me that I care about them.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>9. I’m able to “get into someone’s shoes” and feel their emotions.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>10. I can control my anger when I want to.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>11. Sometimes, I get involved in things I later wish I could get out of.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>12. I’m able cope well in new environments.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>13. I try to control my thoughts and not worry too much about things.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>
**Science and Technology Self-Efficacy**

Instructions: Please answer by putting a circle around the number that best shows how much you agree or disagree with each sentence below. If you strongly disagree with a sentence, circle a number close to 1. If you strongly agree with a sentence, circle a number close to 7. If you’re not too sure if you agree or disagree, circle a number close to 4. Work quickly, but carefully. There is no right or wrong answer.

<table>
<thead>
<tr>
<th></th>
<th>Disagree</th>
<th>Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I am capable of doing well in science and technology classes.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>2. I am capable of understanding science and technology concepts.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>3. I am capable of applying scientific concepts in real world</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>situations.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. I am capable of using technology in the classroom setting.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>5. I am capable of using technology in real world situations.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>

**Family Background**

Instructions: Please answer by putting a circle around the number that best shows how much you agree or disagree with each sentence below. If you strongly disagree with a sentence, circle a number close to 1. If you strongly agree with a sentence, circle a number close to 7. If you’re not too sure if you agree or disagree, circle a number close to 4. Work quickly, but carefully. There is no right or wrong answer.

<table>
<thead>
<tr>
<th></th>
<th>Disagree</th>
<th>Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I have family support in regards to my education.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>2. Education is important to my parents/guardians.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>3. I have help available at home if I have homework questions.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>4. I engage in conversations at home about science and technology.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>
Appendix B: Parental Consent Form

The person in charge of this study is Rhonda Phillips. Rhonda Phillips is a student at Eastern Michigan University. His/her faculty adviser is Dr. Alphonse Bellamy. Throughout this form, this person will be referred to as the “investigator.”

Purpose of the study

The purpose of this research study is to examine the impact of emotional intelligence, self-efficacy in science and technology, and learning style on academic achievement of alternative high school students.

What will happen if my child participates in this study?

Participation in this study involves

- Students will complete a survey asking questions pertaining to demographics, learning style, feelings about science and technology, academic achievement, and emotional responses.
- The survey will be given only once to the students.
- The survey should take less than 30 minutes to complete.
- The investigator will be accessing the Michigan Department of Education (MDE) website to acquire standardized test data on the students. This access through the MDE website has been granted by the Superintendent of the school district. A report will be generated with current MEAP scores for literacy and science.

The students’ identities will be confidential, the surveys will be coded with a number. The standardized test data recovered from the MDE website will also be coded and destroyed 6 months after publication. The investigator and faculty advisor will be the only people having access to the completed surveys and test data.

What are the anticipated risks for participation?

There are no anticipated physical or psychological risks to participation.

The primary risk of participation in this study is a potential loss of confidentiality.

Some of the survey questions are personal in nature and may make your child feel uncomfortable. Your child does not have to answer any questions that make him or her feel uncomfortable or that he or she does not want to answer.
Are there any benefits to participating?

You and your child will not directly benefit from participating in this research.

Benefits to society include determining learning styles of students and creating strategies to increase emotional intelligence in high school students in order to increase academic achievement in science and technology classes.

What are the alternatives to participation?

The alternative is not to participate.

How will my information be kept confidential?

We will keep your child’s information confidential by using a code to label data with the code linked to identifiable information in a key stored separately from the data. Your information will be stored in a password-protected computer and the surveys will be in a locked filing cabinet and will be destroyed 6 months after publication. We will make every effort to keep your child’s information confidential, however, we cannot guarantee confidentiality. There may be instances where federal or state law requires disclosure of your child’s records.

If, during your child’s participation in this study, we have reason to believe that elder abuse or child abuse is occurring, or if we have reason to believe that your child is at risk for being suicidal or otherwise harming him or herself or anyone else, we must report this to authorities as required by law. We will make every effort to keep your child’s research information confidential. However, it may be possible that we have to release your child’s research information. If this were to occur, we would not be able to protect your child’s confidentiality.

Other groups may have access to your child’s research information for quality control or safety purposes. These groups include the University Human Subjects Review Committee, the Office of Research Development, the sponsor of the research, or federal and state agencies that oversee the review of research. The University Human Subjects Review Committee is responsible for the safety and protection of people who participate in research studies.

We may share your child’s information with other researchers outside of Eastern Michigan University. If we share your child’s information, we will remove any and all identifiable information so that your child cannot reasonably be identified.

The results of this research may be published or used for teaching. Identifiable information will not be used for these purposes.
Storing study information for future use

We would like to store your child’s information from this study for future use related to emotional intelligence. Your child’s information will be labeled with a code and not your child’s name. Your child’s information will be stored in a password-protected or locked file. Your child’s de-identified information may also be shared with researchers outside of Eastern Michigan University. Please initial below whether or not you allow us to store your child’s information:

__________Yes ___________No

Are there any costs to participation?

Participation will not cost you or your child anything.

Will my child be paid for participation?

Your child will not be paid to participate in this research study.

Study contact information

If you or your child has any questions about the research, you can contact the Principal Investigator, Rhonda Phillips, at rballard@emich.edu or by phone at 517-673-5774. T: You can also contact Mrs. Phillip’s adviser, Dr. Alphonse Bellamy, at abellamy@emich.edu or by phone at 734-487-1864.

For questions about your child’s rights as a research subject, contact the Eastern Michigan University Human Subjects Review Committee at human.subjects@emich.edu or by phone at 734-487-3090.

Voluntary participation

Participation in this research study is your and your child’s choice. Your child either will be asked independently for assent or his or her dissent will be respected. You and your child may refuse to participate at any time, even after signing this form, with no penalty or loss of benefits to which you and your child are otherwise entitled. You and your child may choose to leave the study at any time with no loss of benefits to which you and your child are otherwise entitled. If you and your child leave the study, the information your child provided will be kept confidential. You and your child may request, in writing, that your child’s identifiable information be destroyed. However, we cannot destroy any information that has already been published.
Statement of Consent

I have read this form. I have had an opportunity to ask questions and am satisfied with the answers I received. I give my consent to for my child to participate in this research study.

Signatures

______________________________________  __________________________
Name of Child

______________________________________  __________________________
Name of Parent

______________________________________  __________________________
Signature of Parent  Date

______________________________________  __________________________
Signature of Child  Date

I have explained the research to the parent and answered all his/her questions. I will give a copy of the signed consent form to the parent.

______________________________________
Name of Person Obtaining Consent

______________________________________  __________________________
Signature of Person Obtaining Consent  Date
Appendix C: Student Assent Form

Introduction
- You are being asked to participate in a research study. Research studies are conducted by scientists or other researchers to answer questions and learn new things.
- The researcher conducting this study is Rhonda Phillips. Mrs. Phillips is a student. His/her supervisor is Dr. Alphonse Bellamy. In this form Rhonda Phillips will be referred to as the investigator.
- The purpose of this study is to examine the impact of emotional intelligence, self-efficacy in science and technology, and learning style on academic achievement of alternative high school students.
- Please read this form carefully and ask any questions you have before deciding to participate in this study.

Study Procedures
- If you agree to participate in this study, we will ask you to complete a survey.
- Your participation will last for 1 study sessions, lasting 30 minutes.
- The investigator will be accessing the Michigan Department of Education (MDE) website to acquire standardized test data on the students. This access through the MDE website has been granted by the Superintendent of the school district. A report will be generated with current MEAP scores for literacy and science.

Risks
- There is a risk that people outside of the research study might find out some of your information. The investigator will do his/her best to protect your information, but cannot guarantee complete confidentiality.
- You might feel uncomfortable answering some of the questions in the survey. You do not have to answer any questions that make you feel uncomfortable. If any questions make you feel uncomfortable, you can also talk to the investigator about this, take a break, or stop the study.

Benefits
- You will not benefit from participating in this study.
- Other people might benefit from this study. Benefits to society include determining learning styles of students and creating strategies to increase emotional intelligence in high school students in order to increase academic achievement in science and technology classes.
Confidentiality

- The investigator will do everything he/she can to protect your information. However, the investigator cannot guarantee complete confidentiality.
- Your information will be kept confidential by using a code on each survey. The data will then be coded and linked to identifiable information in a key stored separately from the data.
- Your information will be stored in a password-protected computer and the surveys and standardized test scores will be in a locked filing cabinet and will be destroyed 6 months after publication.
- If, during your participation in this study, we have reason to believe that elder abuse or child abuse is occurring, or if we have reason to believe that you are at risk for being suicidal or otherwise harming yourself or anyone else, we must report this to authorities as required by law. We will make every effort to keep your research information confidential. However, it may be possible that we have to release your research information. If this were to occur, we would not be able to protect your confidentiality.

Payments

- You will not be paid to participate in this research study.

Voluntary Participation

- The decision to participate is up to you. You can refuse to participate in this study now or at any time. You can choose to participate and then, at any time during the study, choose to stop participating.
- Your parents will also be asked to give permission for you to participate. Even if your parents let you participate, you can still refuse to participate.
- If you choose to participate and change your mind, you can ask the investigator to destroy all of your information collected. Please be aware that any published information cannot be destroyed.

Contact Information

- If you have questions about this study at any time, you can contact the investigator, Rhonda Phillips at 517-673-5774 or rballard@emich.edu. You can also contact Mrs. Phillips's advisor, Dr. Alphonse Bellamy, at abellamy@emich.edu or by phone at 734-487-1864 with any questions.
- If you have questions about your rights as a research participant, you can contact the Eastern Michigan University Human Subjects Review Committee (UHSRC) at 734-487-3090 or human.subjects@emich.edu. The UHSRC reviews and monitors research studies to make sure that participants’ rights are respected.
Assent Statement

- By signing below, you indicate that you have read this form, that all of your questions have been answered to your satisfaction, and that you agree to participate in this research study.

Signatures

Name of Participant (print):

_______________________________________________________

Signature of Participant: _________________________________ Date: _____________

Signature of Investigator(s): ______________________________ Date: _____________

.................................................................
Appendix D: Grades by Count
Appendix E: Age by Count

![Bar chart showing age distribution by count]

- **Count** on the y-axis.
- **Age** on the x-axis, ranging from 13.00 to 20.00.
- The bars represent the number of individuals in each age group.
Appendix F: Learning Style by Count
Appendix G: Grades by Gender
Appendix H: Grades by Age
Appendix I: Grades by Age
Appendix J: Overall EQ by Count
Appendix J: Grades by Learning Style
Appendix K: Grades by Overall Emotional Intelligence
Appendix L: Overall Emotional Intelligence by Age and Gender
Appendix M: Overall Emotional Intelligence by Gender
Appendix N: Overall Emotional Intelligence by Learning Style
Appendix O: Overall Emotional Intelligence by Ethnicity
Appendix P: Self-Efficacy in STEM by Count
Appendix Q: Grade by Self-Efficacy in STEM
Appendix R: Self-Efficacy in STEM by Gender
Appendix S: Self-Efficacy in STEM by Learning Style
Appendix T: Self-Efficacy in STEM by Ethnicity
Appendix U: Family Background Total by Count
Appendix V: Grade by Family Background
Appendix W: Family Background by Gender
Appendix X: Family Background by Learning Style
Appendix Y: Family Background by Ethnicity
Appendix Z: EQ Self-Awareness by Age
Appendix AA: EQ Self-Awareness by Gender
Appendix BB: EQ Self-Awareness by Learning Style
Appendix CC: EQ Self-Awareness by Ethnicity
Appendix DD: EQ Self-Regulation by Age
Appendix EE: EQ Self-Regulation by Gender
Appendix FF: EQ Self-Regulation by Learning Style
Appendix GG: EQ Self-Regulation by Ethnicity
Appendix HH: EQ Motivation by Age
Appendix II: EQ Motivation by Gender
Appendix JJ: EQ Motivation by Learning Style
Appendix KK: EQ Motivation by Ethnicity
Appendix LL: EQ Empathy by Age
Appendix MM: EQ Empathy by Gender
Appendix NN: EQ Empathy by Learning Style
Appendix OO: EQ Empathy by Ethnicity
Appendix PP: EQ Social Skills by Age
Appendix QQ: EQ Social Skills by Gender
Appendix RR: EQ Social Skills by Learning Style
Appendix SS: EQ Social Skills by Ethnicity
Appendix TT: IRB Approval Document

RESEARCH @ EMU

UHSRC Determination: EXPEDITED INITIAL APPROVAL

DATE: April 1, 2016

TO: Rhonda Marcum-Phillips
    Eastern Michigan University

Re: UHSRC: # 839227-1
    Category: Expedited category 7
    Approval Date: April 1, 2016
    Expiration Date: March 31, 2017

Title: Effects of Emotional Intelligence on the Academic Achievement In the Alternative High School Classroom

Your research project, entitled Effects of Emotional Intelligence on the Academic Achievement in the Alternative High School Classroom, has been approved in accordance with all applicable federal regulations.

This approval included the following:

1. Enrollment of 75 subjects to participate in the approved protocol.
2. Use of the following study measures: Dissertation Survey
3. Use of the following stamped recruitment materials: All School Meeting script
4. Use of the stamped: Child Assent form; Parental Consent form

Renewals: This approval is valid for one year and expires on . If you plan to continue your study beyond , you must submit a Continuing Review Form by to ensure the approval does not lapse.

Modifications: All changes must be approved prior to implementation. If you plan to make any minor changes, you must submit a Minor Modification Form. For any changes that alter study design or any study instruments, you must submit a Human Subjects Approval Request Form. These forms are available through IRBNet on the UHSRC website.

Problems: All major deviations from the reviewed protocol, unanticipated problems, adverse events, subject complaints, or other problems that may increase the risk to human subjects or change the category of review must be reported to the UHSRC via an Event Report form, available through IRBNet on the UHSRC website.

Follow-up: If your Expedited research project is not completed and closed after three years, the UHSRC office requires a new Human Subjects Approval Request Form prior to approving a continuation beyond three years.

Please use the UHSRC number listed above on any forms submitted that relate to this project, or on any correspondence with the UHSRC office.

Good luck in your research. If we can be of further assistance, please contact us at 734-487-3090 or via e-mail at human.subjects@emich.edu. Thank you for your cooperation.

Sincerely,
Joan Cowdery, PhD
Vice Chair
University Human Subjects Review Committee