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The main purpose of the New England College Journal of Applied Educational Research (NEC JAER) is to further the ability of educators to provide equity to all students. In order to make education become transformative for all students, NEC JAER offers professionals in the field, pre-school through higher education, opportunities to share original research and access to the latest and most accurate research information in the practices of teaching and learning.

In alignment with the New England College (NEC) mission statement, our goal is to create an equity-based scholarly journal that focuses on current and applied research in the field of education to expand upon the institution's desire to be a creative and engaged learning community. The NEC JAER will further NEC's vision to be an equitable, creative, innovative, engaged, supportive, and environmentally sustaining learning environment by establishing the college as a center for international research in education.

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Message from the Director

This year marks the 10th anniversary of the launch of the Doctorate of Education program at New England College. It has been my pleasure and honor to teach in and direct this program for the past 9 years. There are a number of things I enjoy about my job, but my favorite part is supporting students with their dissertation research. Between reading students' literature reviews and their actual study, I have learned a number of things I would never have otherwise. Some of the topics I found particularly fascinating include retention rates for Baptist seminarians, characteristics of effective nurse educators, the impact of participation in theater arts on adolescent woman empowerment, and education for sustainability in rural schools. The EdD faculty created this journal so that our students (and faculty) are able share their intriguing research and enable others to put their findings into practice. We hope that you find the articles interesting and useful.

This journal would not be possible without the vision and hard work of Carlton Fitzgerald.

Gavin Henning

Professor of Higher Education
Director, Doctorate of Education Program

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Abstract

This participatory action research study describes the Flagway program at New England College. The purpose of the study is to share the historical origins of the Flagway program that is rooted in the youth leadership of the civil rights movement, discuss how Flagway is being implemented with college students at New England College, and describe the program's initial effects on middle school students who score in the bottom quartile on mathematics achievement tests. The study focuses on one small New Hampshire college's role as one of many "little springs" sprouting up as part of a larger national youth voice movement to expand access to math education and literacy, which has historically been denied to students of color across the United States. In this article, we describe the development, implementation, and initial impacts of the program using a participatory action research design. The study also demonstrates how this college, with an enrollment of predominantly White students, is collaborating with several nonprofit, social justice-based organizations to provide college students with opportunities to develop critical and antiracist thinking, cultural competence, and skills as math literacy workers. Through the use of qualitative data collection methods (i.e., storytelling, interviews, photographs, and observations), data are shared to provide evidence that the program is helping college, elementary, and middle school students build their competence and confidence as math learners and antiracist leaders.

Keywords: Flagway program, systemic racism, eugenics movement, math literacy, generational wealth

INCREASING ACCESS TO MATH LEARNING FOR ALL: NEC'S FLAGWAY MATH LITERACY INITIATIVE

This participatory action research (PAR) study focuses on New England College's (NEC) effort to develop culturally responsive programs (Ladson-Billings, 1994) and pedagogical practices to meet the needs of our college students. Participatory approaches to research engage those people or groups who are most affected by an inquiry as partners in a process of research and action. By adding youth into the PAR process, research is done in partnership to inform solutions to problems that young people care about.

Teachers in this study invited their students to "own a piece of the problem" of working to ensure educational equity and access to effective mathematics instruction for ALL students. Results from this study describe how a student-led, community-based, math outreach program called Flagway is providing learning and leadership opportunities for NEC's increasingly diverse student population. The PAR study demonstrates the ways in which our college, which enrolls students who are predominantly White, is looking inward and reaching out to help local schools address the needs of diverse students, especially those groups of students who historically have struggled to learn math. As NEC helps others to become more culturally responsive and proficient, we are learning and growing as a college community.

The Flagway program at NEC focuses on the question, "Is quality education, and math literacy for ALL students, a civil right?" The inspiring leader whose work is at the center of NEC's program, is Robert "Bob" Parris Moses. Moses began his work as a civil rights leader when he traveled south from New York City in the 1960s to get involved in the civil rights struggle. Initially, he began working in the offices of the Southern Christian Leadership Conference (SCLC) led by Dr. Martin Luther King, Jr., but he soon met Ella Baker and other young activists who had joined together to form a youth-led organization called the Student Nonviolent Coordinating Committee (SNCC).

In the book, *Radical Equations* (Moses and Cobb,1981; 2001), Moses wrote:

> Although I'd come to Atlanta with the intention of working for SCLC, I had little to do and found myself gradually moving in a direction I couldn't have anticipated—toward SNCC. There'd been no mention of SNCC in the New York SCLC office. The students may have been uncertain about their long-range plans then, but at least I could involve myself in their process.

SNCC's approach to leadership was fundamentally different than that of SCLC and Dr. King. Moses and his fellow organizers in SNCC learned from another important civil rights leader, Ella Baker, in the way in which she created the space for young people to bring SNCC into being, they passed it on and replicated it in their work with Mississippi sharecroppers around the right to vote. The belief that enacting leadership by creating space for, processes for, and organizing others to be leaders is embedded in the DNA of the leadership model that grew out of SNCC and that became the guiding principle of Moses's civil rights work and his organization, the Algebra Project. This legacy of youth voice and creating space for young people to dream and work together, to organize and lead themselves, is also the story of the founding of the Young People's Project and at the heart and soul of the creation of Flagway.

Since his early work as a voting rights activist, in the 1960's, Moses has taken the lessons he learned from Ella Baker, SNCC, and their voting rights organizing work in Mississippi about amplifying youth voices, grassroots leadership, and activism for social justice into schools and communities across the United States. With an emphasis on providing access to math literacy for students who have historically been denied access to quality mathematics education, Moses created the Algebra Project (2020) in 1982 with the money he received when he was awarded the MacArthur Genius Award for his efforts to link his civil rights activism to the critical need to ensure all students have access to math literacy. The Algebra Project develops curricular materials and trains teachers and teacher-trainers to provide ongoing professional development and community involvement activities to schools.

Moses went on to create the Flagway Game in 1992, which we will discuss in detail later, and he wanted to apply the principles of youth voice and leadership that he had learned with SNCC to create a space for Flagway to take hold, grow, and flourish. This is how his daughter Maisha Moses (personal communication, Feb. 3, 2021), the current Director of YPP, described how YPP was formed in 1996:

> Bob did not form or found YPP. He challenged the young people, his children included, to "get their act together," and he created the space for it to happen. He left it up to the young people to decide IF they wanted to do it, if they WOULD do it, IF they could figure out how to make it work. He resisted the push and pull from adults in the Algebra Project to form a youth arm of the Algebra Project, and to do it for the young people, or to make it happen faster, or different, or better. In doing so he was channeling Ella Baker, who fought Dr. King and the SCLC leadership to create the space for SNCC to grow itself as an independent organization and not as an arm of, or extension of, or subgroup of SCLC. So, in 1996, YPP was formed and founded by nine 8th graders, Algebra Project students, from Brinkley middle school in Jackson, MS and 3 Black men in their early twenties, from Cambridge, MA.

Bill, one of the authors of this article, was fortunate to be invited by Bob Moses to participate in the early development of the Alliance in 2016 and 2017, because they shared a mutual commitment to amplifying youth voice and leadership, as a key strategy for promoting social justice through transformative educational reform. Since then, NEC faculty and students, have been privileged to have worked closely as learners and partners with Maisha Moses and her staff at YPP to try to provide space and encourage NEC students to develop a student-led organization at New England College. This group will learn how to co-design, create, and lead to help all students gain access to effective math education and the opportunities that math literacy will open up for young people who have typically been marginalized by their schools.

The central premise behind this work is that math literacy is fundamental to getting a quality education and a decent job. We are living in the Digital and Information Age of the 21st century. Just as the literacies of reading and writing were essential for getting a good job in the Industrial Age of the 20th century, Moses has taught us that math is a new "basic literacy," (1981) which every child will need to develop to have a real shot at gaining access to a good education and a well-paying job. Math literacy, especially for children of color, will open up vast new educational and career opportunities, and thereby allow each child to gain access to living a happy, healthy, life, and equitably engage in the pursuit of happiness in the 21st century.

> *"We hold these truths to be self-evident, that all men [people] are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty and the pursuit of Happiness."* **United States Declaration of Independence (1776)**

Flagway: A Gateway to Math Literacy

This study documents the development and implementation of YPP's Flagway program and NEC's role in expanding the program in New England. Flagway is a game-based, hands-on, highly competitive, physical math learning game designed to be led by young, near-peer student coaches or mentors who take on the roles of math literacy workers (MLWs).

Those of us who believe in the power of Flagway reject the biases and mindset of "adultism"—the idea that adults know it all, should always be in charge, and have the right to exert their powers to dominate, tokenize, and manipulate young people (Fletcher, 2015). Maisha Moses (personal communication, Feb. 1, 2021) described the essential role that young people of color have played in the historical and current work of YPP and Flagway:

> After thinking about the Mobius Function for two years Bob Moses realized that it could be physicalized and turned into a game that young people could play to learn and practice their numbers. He worked with YPP, which was still in its infancy, and with

students in The Algebra Project, to further develop and bring the game to life. From the beginning, Flagway was popular. After receiving a patent on the game, he gave exclusive rights to YPP to develop and disseminate Flagway. He said that he wanted Flagway to go out into the world through the culture of the black and brown kids Flagway was intended to reach, with their handprints and footprints all over it, and not to become something that the dominant culture takes ownership of, then returns back to black and brown kids, in the process becoming something they consume rather than something they have an integral part in developing and creating. Since then, YPP has worked to stay true to this vision through a 25-year R&D effort to develop Flagway with young people: how it's played, what games are played, how it's sequenced, how it's taught, all in the context of YPPs near peer instructional model with YPP MLWs and students. I think this is very important, perhaps one of the most important parts of the story. Flagway is designed to be something that young people do with each other, through a near peer learning model, as a tool to help young people whose educational and economic prospects have been confined and restricted to the lowest level of America's democratic caste system to work together to struggle and build demand for quality and equitable education for themselves and for all children.

Since those first meetings of the Alliance, our NEC students and Bill, an education professor at NEC, have received several years of training from YPP. YPP trains young people from middle schools, high schools, and colleges to become MLPs and has shared the values and philosophy of Moses and SNCC with our students and Bill. The organization has taught us ways to help elementary and middle school students learn how to play and ultimately lead a set of math and team building games needed to play and compete in the Flagway Game.

NEC is one of dozens of colleges and universities, nonprofits, educational leaders, and student voice and advocacy groups that came together as Moses and many others formed the

We the People – Math Literacy For All Alliance. Through this work, we hope to address the failure of our schools and our nation to serve the needs of so many of our young people.

In this article we will critically examine the historical problem of educational inequity in the United States by sharing important stories from the past that have shaped the field of education today in ways that contribute to educational inequality. We explore the ways in which science and math have been used to institutionalize racism and classism in our nation's policies and institutions. This exploration will lead to a deeper understanding of and discussion about the philosophical and theoretical roots of the Flagway program, through an examination of the critical role of youth in this work, and how youth leadership and student voice (Mitra & Gross, 2009) serve as key components of the program. The first section of this article further describes the "Arc of Flagway," which summarizes the mathematical skills and concepts the program helps students to learn by playing the Flagway game. Finally, the first section examines how NEC became one of dozens of "little springs" that have popped up across the country, as Bob Moses, the Algebra Project, YPP and The We the People Math Literacy for All Alliance taught us to take ownership of the problem of educational inequity.

The second portion of this PAR study discusses the ways in which the values, key concepts, and challenging ideas about youth voice, antiracism and cultural competence were presented to NEC students as part of an NEC undergraduate, service-learning course called, Is Math Literacy a Civil Right? We discuss the Flagway training NEC students received from YPP to prepare them to take on their roles as MLWs and how these youth voice- and service-learning-based pedagogies fit within a philosophical and pedagogical framework that aligns with culturally responsive pedagogy.

In the final section, participants share stories and qualitative evidence demonstrating some of the visible effects of the Flagway program on NEC students and the elementary and middle school students with whom the NEC students and their YPP partners worked in 2019 and 2020. From this work, and the results of this program, we have developed a set of recommendations for continuing to expand and influence the educational policies, practices, and priorities that must change if educators expect to reduce the gaps in educational, economic, and quality of life opportunities for marginalized students. We also propose several key steps that can refocus our nation's commitment to ensure educators more fully address the human needs and rights of all children.

Background of the Problem

The problems Flagway has been designed to address are deep and wide. This article cannot do justice to or offer a full discussion of the problems that have led to the need for this program. Rather than attempting to list or show evidence of the many factors that have contributed to the problems of racism and social and educational inequality in the United States today, we have chosen to share a crucial story that captures the essence of problems that began more than a century ago, which still impacts the lives of American children, schools, and society.

The American Eugenics Movement and the Mismeasurement of Intelligence

According to Buche and Rivard (2014), the United States has an imperfect history. They have stated that some of our darker chapters include slavery, the decimation of Native American populations, and atrocities committed during our various wars. They have found that most Americans have learned about or at least heard of these events. However, when they surveyed people about their knowledge of our nation's history, they found that most people have no knowledge or understanding of the American Eugenics Movement and how it has shaped our nation.

The problems Flagway seeks to address can be boiled down to a problem with numbers: the meaning, uses, and power of numbers to change people's lives, for better or for worse. There is one specific number that has been reified, or made so important, that is has taken on an especially powerful role in U.S. society and people's lives over the last century. That number is the IQ, or intelligence quotient. But it is not so much that the IQ itself is at the heart of the problem. It is just as important to understand how the creation of the IQ score is intertwined with the problem of social and educational inequality, and how a social movement vaguely familiar to most of us, the American Eugenics Movement, made a lasting imprint on the thinking, school practices, and lives of many Americans (Gould, 1981, 1996).

The term eugenics stems from the Greek word meaning “good” or “origin” or “good birth.” The term was coined by Francis Galton, cousin to Charles Darwin. During the early 1900s, the Eugenics Movement took hold in communities across the United States and Europe. These ideas about improving the natural, physical, mental, and temperamental qualities of the human family (Norrgard, 2008) became viewed as wholesome, sensible, and socially desirable.

These ideas, which were refined, spread, and nurtured in the United States during the early years of the 20th century, also became the underbelly of the White supremacy movement and eventually spread to the National Socialist, or Nazi, Party, which rose to power in Germany. We are all familiar with the principal ideas of the Eugenics Movement, ideas like genetic superiority, selective breeding, the elimination of undesirable genetic traits, etc. (Fendley, 2020). The implications and effects of these ideas were revealed to the world, in all their horror, toward the end of WWII, but these ideas have been commonly associated with Hitler, not the United States.

No wonder the American Eugenics Movement and the ideas of genetically based racial supremacy lost face and dissolved from U.S. history after WWII, once the world saw their power to destroy common decency and rationalize the killing and marginalization of entire peoples. We wish to share another story that preceded the rise of Hitler and the Nazis in Germany, the story of the history and growth of the standardized testing and intelligence testing industry in the United States. This story will, we hope, offer some important links between this faded history of the American Eugenics Movement and the power prejudice and mathematics have had to shape people's lives.

The Story of the IQ

For more than a century, predominantly white American educational and psychological researchers have used “science” and “data” to develop an immensely powerful and profitable “intellectual and psychological testing” industry (Benson, 2003). Ask any American student about their experience with testing, and you will get an earful!

Tests are used for everything. Academic testing is pervasive in schools for nearly all subjects and skills. Personality tests are used in business and industry to choose the right workers. Dating sites use tests to help people find their soulmates. People must pass tests to become teachers, doctors, lawyers, massage therapists, nurses, police officers, or citizens. Taking tests to prove one’s mettle has become a normal, natural, and inevitable expectation in our culture. What most people do not know is that the historical roots of psychological, intellectual, or cognitive testing in the United States was one of the foundational pillars and tools of building a “meritocracy” in the country (Appiah, 2018). This notion of U.S. meritocracy promised every person would have an equal chance to an education and positive life chances based on their personal merit rather than family ties and influence, but the notion of merit never strayed far from deeply engrained beliefs and practices associated with systemic racism (Appiah, 2018).

Many of the most influential scientists who created these tests were motivated by explicit and implicit biases and beliefs about “heredity and race” that stood at the center of the American Eugenics Movement. Tests and mathematics were used to “empirically demonstrate” the “innate” superiority and inferiority of specific racial and ethnic groups, immigrants, and children (Gould, 1981).

The first standardized tests were developed by Alfred Binet in France. A small but powerful group of intelligence scientists brought Binet’s standardized tests to the United States at the dawn of the 20th century. H. H. Goddard, L. M. Termin, R. M. Yerkes, and others took these new tools of psychological and intellectual "testing" and "misapplied" them, according to their original inventor (Gould, 1981, 1996).

Binet (1911) had devised his cognitive assessment tools and procedures for "formative" educational purposes: to identify individual student's cognitive strengths and deficits, at a given time, for the purpose of diagnosis and remediation by schools and teachers. These same assessment tools, in the hands of these American scientists, were used from the very beginning to "scientifically" evaluate, judge, sort, label, and discriminate against people of color based on what they viewed as fixed—or genetically predetermined—levels of intellectual capability. These practices dramatically betrayed Binet's intentions for the use of his original tests, which were to evaluate, intervene, and improve student intellectual abilities through education. Binet's (1911) own words clearly make this point:

> Some recent philosophers seem to have given their moral approval to these deplorable verdicts that affirm that the intelligence of an individual is a fixed quantity, a quantity that cannot be augmented. We must protest and react against this brutal pessimism; we will try to demonstrate that it is founded on nothing. (p. 141)

According to Gould (1981, 1996), after learning of Binet's breakthroughs in cognitive testing in France in 1908, Henry Goddard translated the Binet-Simon Intelligence Scale into English, so he could use the test on his own psychiatric patients, as director of research at the Vinland School, a training school for "feeble-minded" girls and boys. Goddard's use of these tests was shaped by the fact that he was a devout Eugenicist. He used these new tests to determine the levels of "feeble mindedness" or mental defectiveness of his patients. These scientific data could then guide and inform his decisions to place patients who scored in the lowest range of the test into asylums, or residential schools for the feebleminded, thereby permanently isolating them from society (Gould, 1981, 1996).

Many American cities and towns adopted Goddard's approach. Eugenics-driven laws were passed in states and local communities across the United States to implement forced sterilization programs. Once-hidden lists of U.S. citizens, who were forcibly sterilized based on this logic, have been surfacing routinely in cities and towns across the United States over the last several decades. The promise and undeveloped talent of generations of children were exterminated under these forced sterilization policies and laws (Gould, 1981, 1996).

Another important breakthrough in the field of cognitive and intellectual testing came about in 1912. William Stern, a German psychologist, calculated the results of these cognitive tests to fit within a clear, concise, and easily understood mathematical paradigm. Stern took the scores of previous intelligence scales, then divided the subject's "mental age score" on the test by their "chronological age" and multiplied the resulting fraction by 100. Voila! The IQ score was born (Stern, 1914).

Once a person's total intellectual capacity could be captured and summed up with one simple, single number, it became easy to use this score to show which Americans were born "intelligent" and which were "unintelligent" human beings. This simple calculation, using the IQ score, combined with the ideology of eugenics, provided "scientific" fuel to stoke the fires of the Eugenics Movement and their beliefs about hereditarian roots of innate human inequality.

Goddard and his colleagues (Gould, 1981, 1996) had previously used the general term "mental defective" to describe mental disability or dysfunction in people; but, with the new IQ score paradigm, he introduced a clearer, more specific set of descriptive labels to describe those who fell along the intelligence continuum. "Idiots" were those poor souls who scored between 0 and 25 on the IQ tests; "imbeciles" scored between 26 and 50; and "morons" scored between 51 and 70. One surviving remnant of this era and the eugenicists are these three words: idiot, imbecile, and moron. Most kids today fully understand that these terms mean "stupid", and unfortunately, they still use these terms liberally, to attack and diminish those whom they view as intellectually inferior to them.

Lewis Termin (1923) further developed Binet's tests at Stanford and created the highly popular and still-used Stanford-Binet Intelligence Scale. Termin was a respected pioneer in the field of educational psychology and a well-known eugenicist. According to Appiah (2018), he was known for his studies of highly gifted students with "extreme talent." Termin advocated for his intelligence tests to be universally administered to all children across the nation, to identify the "geniuses" among the population, and to develop plans to "socially manage" society using these data on the intelligence of U.S. citizens. Testing would assess "intellectual merit" and provide a rational way of screening young people for admission to higher education, whereas, previously, these decisions were made based primarily of family connections and ability to pay (Appiah, 2018).

Termin (1923) proposed dramatically different educational settings and opportunities for those with high and lower levels of intelligence and intellectual promise. Termin was responsible for the adoption of social and educational policies to control access to educational, vocational, and life-changing opportunities based on IQ testing. The higher one's IQ score, the wider the doors of opportunity would be open. With access came the economic, social, and political rewards associated with those positions of merit, all made available by having the right test scores (Appiah, 2018).

But it was our final eugenicist, Robert Yerkes, who took the science of IQ testing and the ideologies of the Eugenics Movement to a national, systemic level. Yerkes began his college education at the turn of the 20th century in biology at Harvard. After graduating, he taught at Radcliff in the field of comparative psychology. Yerkes went on to take on influential roles as director of psychological research at Boston Psychopathic Hospital and served as president of the American Psychological Association (APA).

Using his influence as president of the APA, Yerkes and the APA were enlisted to develop several programs for the U.S. Army during WWI. They conducted the first large-scale psychological intelligence studies of more than 1 million soldiers in the U.S. military using their new Army intelligence tests. Yerkes and his coresearcher, Carl Brigham, reported their important findings back to the military brass, the U.S. Congress, and the entire scientific community (as cited in Gould, 1981). The Army tests supposedly empirically confirmed *the* innate intellectual superiority of white Americans. Their research also indicated there had been an overall decline in American intelligence, to the point where more than 47% of White draftees in the U.S. Army during WWI scored in the range of "feeble mindedness" on their tests. The studies confirmed levels of intelligence among Blacks and newer immigrant groups were even lower than these feeble-minded White soldiers (Gould, 1981).

Obviously, the numbers of immigrants coming to the United States at the turn of the 20th century were booming, due to the industrialization of the nation. Yerkes and Brigham (as cited in Gould, 1981) concluded the results of the Army intelligence tests showed the integrity and security of both the U.S. military and the nation itself were at risk due to the genetic intermingling of the races in the United States (Gould, 1981). There is an ongoing debate in the scientific community as to whether these scientists, and the use of their Army-based intelligence testing findings, were in fact the basis for the Immigration Restriction Acts of 1921 and 1924; but, regardless of their intent, these studies had a profound impact on the nation (Snyderman & Herrnstein, 1983).

In 1921, the United States shut its doors to the influx of Jews attempting to escape persecution in Eastern Europe. In 1924, The Reed Johnson Act expanded the bans to include Asians and placed additional dramatic limits on immigrants from Eastern European and all other nations.

People of color and other Americans living in poverty were cast in the same unfavorable light as these foreign immigrants. The eugenicist claims that Black and Brown and poor White Americans were cursed with defective genetic stock and that these groups were destined to remain at the bottom of U.S. society took root.

The notion of judging entire groups of other human beings to be inferior to yourself is the essence of racism. The persuasive power of science and (supposedly) easy to understand numbers like IQ scores were used as weapons by these respected and influential American figures to scientifically, and permanently, divide our society through the creation of a set of beliefs, institutions, and systems that remain firmly intact, in many cases, more than a century later.

Caroline Hodges Persell (1981) called the development of this hierarchical system of beliefs, and the social and institutional tools required to reinforce it, a "structure of dominance." She described an American caste system that began with pervasive and powerful ideas, values, and beliefs associated with the racial superiority of White people that permeates the consciousness of the nation. Members of non-White subgroups are systematically singled out and continually subjected to routine and pervasive macro- and micro-level aggression. They are denied educational, economic, and personal access and opportunity. Too often, victims of this structure of dominance even begin to believe in their own inferiority. Persell claimed the pain and damage to people's lives caused by this structure of dominance and its resulting social inequality in the United States is incalculable. This article examines newer models and theories of racial inequality and the ways in which race has become a permanent fixture in U.S. society, as we discuss how the work of Bob Moses, the Algebra Project, YPP, the We the People Alliance, and Flagway offer solutions for undoing some of this damage.

Charles Darwin (1839) said it best when he proclaimed in his influential book on evolution, *Voyage of the Beagle*, "If the misery of our poor be caused not by the laws of nature but by our institutions, great is our sin" (p. 500). We hope exploring this hidden history of the American Eugenics Movement, its influence on the development of the standardized testing industry, and the creation of racial hierarchies in the United States will provide a contextual lens that shows why educational and social justice programs like Flagway are so essential in our nation today.

Conclusion

The purpose of this study is to share the results of NEC's efforts to do something that may begin to help undo the historical marginalization of people, especially people of color.

NEC's Flagway story provides a pathway toward hope, support, and access to educational opportunity for students who have a right to develop their full potential. This PAR study will demonstrate the effectiveness of Flagway and the ways in which NEC students have applied respectful, engaging, and culturally responsive pedagogical practices to help address these problems. It will also show in some anecdotal but important ways the initial effects of participation in Flagway on the learning of mathematics by students who have fallen into the bottom quartile on standardized tests of mathematics achievement.

Literature Review

There are two important theoretical frameworks that provide a rationale for bringing the work of Bob Moses, the YPP, and the Flagway program to NEC. First, it is important to understand how a predominantly White institution (PWI) like NEC is developing and offering curricular and instructional options to empower our rapidly growing population of students of color and to demonstrate how this work fits within the traditions of culturally responsive pedagogy (Bell, 1992; Crenshaw, 2011; Delgato & Stefencic, 2001). Second, the cultural proficiency framework (Lindsey et al., 2019) adds important dimensions to NEC's efforts to raise its level of cultural awareness and proficiency, which will enable the college to support all members of our diverse educational community. This article will demonstrate the ways in which these theoretical frameworks and the Flagway program are embedded within the traditions of the civil rights movement; the ways in which YPP's Flagway program and NEC's work is centered around the essential element of youth voice; and how the empowerment of youth as leaders, mentors, and role models plays an essential role in successful social and educational change.

Critical Race Theory and Access to Math Learning

Critical race theory (CRT; Bell, 1992; Crenshaw, 2011) is a broad intellectual movement with deep roots in critical theory, which has focused on Marxist, neo-Marxist, feminist, indigenous, LGBTQ, and emancipatory theories and research. Recent applications of CRT have focused on legal biases and barriers to equitable treatment of people of color. CRT uses critical theory to examine power relations in society and the ways in which social and cultural issues, especially social inequality, relate to race. CRT states White supremacy and White racial power are embedded in all aspects of U.S. society and are deliberately and systematically maintained over time. CRT examines the roles ideologies play in justifying and sustaining social inequality and the ways in which institutional, economic, and legal structures perpetuate inequitable access and lower levels of opportunity for non-White individuals and communities to support and sustain White power and supremacy (Delgato & Stefencic, 2001).

CRT critics sometimes point to the field as being overly negative and pessimistic; however, they make the point that stories of social justice, emancipation, and expanding civil rights, freedoms, and opportunities are essential messages associated with this field. Recent bestselling books, such as *How to Be an Antiracist* by Ibram X. Kendi (2019) and *White Fragility: Why Is It So Hard for White People to Talk About Race?* by Robin DeAngelo (2018) are being widely used by schools, business, and other organizations to challenge norms and habits in the workplace and schools to bring about new awareness of racism and much needed change.

In the context of this study, we use our understanding of CRT to assert that students of color whose families have been historically marginalized, disenfranchised, and denied equal access to educational, economic, health-related, and basic social services deserve and must demand equal access to educational opportunities, especially in the area of mathematics. Furthermore, we believe that programs like YPP, that provide spaces where students of color can co-create solutions to these problems are both needed and effective.

One of the villainous components of our entrenched and inequitable educational system has been to establish algebra as a gateway that disproportionately serves as a barrier to higher level math classes and higher education for non-White or middle-class students (Strauss, 2017). Algebra has historically been taught in highly traditional ways, using pedagogies that are not typically culturally, linguistically, or personally responsive to the unique needs of students of color, poor students, or many other students who struggle with math. For millions of students—especially students of color and certain groups of White students—access to the education system begins and ends with algebra. Algebra puts walls in front of these students in relation to higher education options and opportunity (Nicholes, 2020). This institutional racism translates directly into reducing financial earning power over the lifetimes of these students, which means they will have severely limited opportunity to gain generational wealth for their families. So, the cycle of poverty and lack of education and career advancement is sustained by these structures of dominance. Enabling students of color to overcome these barriers has been the essence of the work of Moses and the Algebra Project since the 1980s.

Cultural Proficiency

Another important theoretical framework for this study is Lindsey et al.'s (2019) cultural proficiency framework. Cultural proficiency pertains to both individuals and institutions. Our work at NEC is an effort to build both the cultural proficiency of our college as an organization, as well as the cultural competence and proficiency of our students, faculty, and staff. The story of NEC's journey toward becoming a more culturally proficient institution of higher education goes something like this:

1. Although we would claim many of our cultural deficiencies have been unintentional, NEC has long served as an unwitting partner in the process of cultural destruction of people of color. The college was founded after WWII with an unabashed mission to provide access to higher education and career advancement for White, suburban, middle class men, from the Northeast, many of whom were initially returning veterans taking advantage of the GI Bill. Early on, NEC chose not to place much weight for admission on students' standardized test scores. This opened opportunities for young, White (mostly) men, to gain access to higher education and

professional career opportunities through NEC. Little effort or attention was paid to enrolling people of color, and NEC developed as a PWI.

2. NEC has started to acknowledge what Lindsey et al. (2019) described as cultural incapacity and cultural blindness (p. 8). The NEC community is starting to see that our institution has been part of the historic, national enterprise of contributing to and sustaining racial inequity and injustice. We are recognizing that we have failed to understand and acknowledge racial and cultural differences that existed in our college's DNA—our recruitment procedures, financial aid practices, faculty hiring, student support systems, and pedagogy.
3. Now that NEC is more fully acknowledging these facts, the college is working to address these deficiencies and thereby entering a stage Lindsey et al. (2019) call cultural pre-competence (p. 8). The college is admitting a much more diverse student body. Administrators, faculty, staff, and our students are working to learn more about cultural competency, diversity, equity, unconscious bias, microaggression, and culturally responsive pedagogy. The institution is setting up infrastructure, new programs, and new staff and offices to support our students of color, and the college is collecting and analyzing data in new ways. Though our community has much work to accomplish to become a fully functioning, culturally responsive institution, NEC is committed to continuing our push forward to become more culturally aware, empathic, equitable, and competent, and to invite our students to join us in this work.
4. Over the next several years, NEC administrators, faculty, and staff will be committed to becoming increasingly "culturally competent," serving as effective advocates for ALL students and ALL people, especially those who have been traditionally underserved and marginalized. The retention and graduation rates for all students will continue to increase. Concrete steps will be taken to ensure that measurable changes will be seen for our students of color and that the climate and culture of the

college will become safer, more inclusive, and more welcoming toward and supportive of all students. NEC's president has assembled a college-wide taskforce made up of members of the senior administration, faculty, staff, and students to review all NEC policies, programs, curriculum, and learning opportunities for our students of color. The president and the board of trustees created five full-tuition scholarships in the name of George Floyd that will be awarded annually to diverse students to ensure the college provides additional opportunities for students of color to enroll at NEC, earn their college degrees, and enter the professional workforce.

5. NEC will continue to build its cultural proficiency, and these changes in philosophy, programs, and practices will begin to infiltrate deeply into our relationships throughout the community. Pedagogical practices will become increasingly personalized, culturally responsive, student centered, and tied to critical inquiry by creating empowering roles and authentic learning experiences and opportunities that allow students to identify and solve important problems together. NEC has determined to prioritize community outreach, and students will increasingly learn from and alongside respected national antiracists and equity leaders, as well as from and with their NH neighbors. NEC will share what it is learning locally, regionally, and nationally, modeling and advocating for antiracist policies, programs, and pedagogy in our region and state.
6. The hope of the Flagway program participants is that NEC will continue along our current path toward becoming a national Flagway training center and play an important part in expanding a national Flagway League. The goal is for NEC to become a source of student learning about issues of social justice, educational equity, youth voice, and culturally responsive mathematics pedagogy. If NEC is successful, students will develop advocacy skills, agency, empowerment, and

institutional pride as they work to address issues of educational equity and math literacy at the local, regional, and national levels.

This is how we view our pathway toward cultural proficiency at NEC.

Conclusions

This literature review highlighted key theories and fields of research that have informed the design of this study and have served as the backbone of NEC's YPP Flagway initiative. Through integrating of these important ideas, this study will demonstrate how stories can communicate experiences and ideas and unlock the human imagination. The literature explored the connections between this project and critical race theory (Bell, 1992; Crenshaw, 2011), as we at NEC work to address historical and pervasive educational inequity in math literacy. This review of the literature has examined the important links between access to math, educational opportunity, and economic security. Finally, this review introduced the cultural proficiency framework (Lindsey et al., 2019) and applied that framework to the journey on which NEC has embarked. These theories have highly practical implications for the design and understanding of NEC's YPP Flagway initiative. Our intent is that readers will see these connections even more clearly in the following sections.

Methodology

This study is framed around a PAR design, intended to provide a rich description of the work NEC students and faculty have been doing for the past 2 years to help address the problem of inequity in schools. The NEC YPP Flagway story highlights the challenges and opportunities at play when asking a group of predominantly White, middle class college students to assist groups of struggling elementary and middle school students of color in learning math. The research question this study addresses is "In what ways does participation in Flagway at NEC, affect elementary, middle school, and college students?"

Research Design

There are several reasons why we chose to use a PAR design for this study. PAR is based in social justice (Kemmis et al., 2014). The goal of PAR is not only to improve problematic educational issues within a school and/or district and in education in general but also to correct issues of injustice and inequity in society. According to Efron and Ravid (2020), "The focus of participatory action research is on change, promotion of democracy, and equity. Its advocates take into account that teaching and learning are nested within political and social dimensions" (p.10). The goal of action research is to attempt to improve education through a systematic study of interventions developed to help students more effectively. PAR has the added goal "to unmask injustice and inequities, and to enhance practitioners' commitment to becoming agents of change within the school and beyond" (Efron & Ravid, 2020, p. 12).

One of the most important developers of the concept of PAR was Paulo Freire (1970, 1998). Freire was concerned with the ideas that teachers were missing in their teacher training and research. His colleague, Donaldo Macedo, wrote in the foreword of *Pedagogy of Freedom: Ethics, Democracy, and Civic Courage* (Freire,1998) that Freire contended:

> Teaching requires a recognition that education is ideological.
>
> Teaching always involves ethics.
>
> Teaching requires a capacity to be critical.
>
> Teaching requires the recognition of our conditioning.
>
> Teaching requires humility.
>
> Teaching requires critical reflection. (para. 3).

To teach democratic principles means, for example, educators must understand how and why, with all of the advances available in education and in society, so many students fail to be successful in school. Freire (1970, 1998) believed all teachers should teach to the freedom of all students. Freire (1998) wrote, "The educator with a democratic vision or posture cannot avoid in his [their] teaching praxis insisting on the critical capacity, curiosity, and autonomy of the learner" (p. 33). When people said this ideal was a pipe dream, Freire responded:

> I prefer to be criticized as an idealist and an inveterate dreamer because I continue to believe in the human person, continue to struggle for legislation that would protect people from the unjust and aggressive inroads of those who have no regard for an ethical code that is common to us all. (p. 116)

The goal of education—for teaching and for research—is to make the world a better place.

PAR was a perfect research design for this study because making society more inclusive and ethical toward all people, especially those whom society has left out, should be the goal of any educational programming and research. Students and their adult and near-peer mentors at YPP developed Flagway to help make education equitable in partnership with those students who have been left behind. NEC, as an educational community, is working to become an increasingly antiracist and inclusionary institution. This study will, we hope, represent an important step in this process.

Narrative Research Methods

We chose narrative data collection techniques for this study for a variety of reasons. First, stories are a powerful way to share information. The practice of storytelling goes back to the very beginning of humanity; there must be some reason why storytelling has lasted so long as a form of communication, entertainment, and learning. Recent research, using magnetic resonance imaging by Yaun et al. (2018), reported in the *Journal of Cognitive Neuroscience*, indicated storytelling activates a section of the brain referred to as the "narrative hub." The authors concluded "people adopt an intrinsically mentalistic and character-oriented perspective when engaging in storytelling, whether using speech, pantomime or drawing" (Yaun et al., 2018, p. 1310). This research provided further evidence that narrative communication reaches deeply into the human brain, causing strong cognitive and emotional responses. Wang and Geale's research (2015) also suggested narrative inquiry has an underlying philosophy enabling the illumination of real people in real settings through the "painting" of their stories.

According to Wang and Geale (2015), narrative inquiry is important because it raises the voices of students who otherwise would have remained silent. The idea of amplifying the voices of students whose parents gifted them with beautiful names like Naveah, Aphasana, Momen, Serenity, Yahya, and Dheyaa suggests Flagway serves a population of American children who may often go unnoticed in their schools and communities or whose names may trigger unflattering and misguided stereotypes or mental images among White teachers or fellow students, which can only deepen their marginalization. Sharing the words, stories, and the profound learning of my mostly White, middle class, NEC students, whose parents gifted them with beautiful names like Taylor, Stephanie, Colin, Kayleigh, Thomas, Brianna, Cole, and Hayleigh helps to characterize the cultural "positionality" of my students, as their words convey what they have learned about educational equity, social justice, and their own naivete about the multicultural, pluralistic world.

Wang and Geale (2015) also explained that narrative inquiry employs storytelling as a way of allowing participants' realities to be shared with a larger audience. Sharing the stories of middle school students, who live and attend school in one of New Hampshire's largest cities, and students from NEC will hopefully engage and inspire others to begin to own a piece of these problems. Our hope is the stories shared in this article will inspire others to step up and take their place as antiracist advocates (Kendi, 2016, 2019) within their families, schools, and communities.

One powerful application of storytelling has been adopted within CRT research. Hartlep wrote in his 2009 review of research on CRT:

> The idea of storytelling comes from its powerful, persuasive, and explanatory ability to unlearn beliefs that are commonly believed to be true. CRT calls this concept "storytelling" and "counter-storytelling." This dichotomy—storytelling and counter-

> storytelling—is predicated upon the belief that schools are neutral spaces that treat everyone justly; however, close examination refutes this. (p. 10)

Purpose

This study explored the pedagogical and personal experiences of elementary, middle school, and college-age students who participated in the NEC YPP Flagway program during 2019 and 2020 in diverse schools in one of NH's largest cities. We present qualitative research through narrative inquiry to amplify the voices of the elementary, middle school, and college students. This PAR study will hopefully communicate and inspire other colleges and schools to engage their students in strategies like Flagway to help them support math literacy and learning for all students in their regions, with a focus on students as partners in learning rather than objects of adult instruction or intervention. We hope that teachers and school leaders who read this article will see the value in moving beyond traditional, adult-driven, and curriculum-focused teaching methods and models. School leaders and teachers may begin to apply the power of near-peer mentoring, game-based pedagogy, or other culturally responsive teaching and learning methods to engage students who have traditionally failed academically in math and enable them to successfully and joyfully engage in rigorous mathematics learning.

Methods

Over the past 2 years, NEC has worked with numerous department chairs, deans, vice presidents, directors of cultural diversity and inclusion, and several faculty and staff colleagues to launch a Flagway initiative at NEC. The NEC YPP Flagway program has engaged more than 25 undergraduate students so far, in an undergraduate course supported by the general education program and the education department, we call, Is Math Literacy a Civil Right? The course meets once a week for 4 hours to provide enough time for student training and class work, as well as time to travel to work in an afterschool program once a week for 7–10 weeks with elementary and middle school students.

The NEC student participants learned about Flagway, how to play many different math games, how to work with middle and elementary students as learning partners, and how to run our Flagway tournaments with the support of Maisha Moses and several of YPP's youth Math Literacy Workers (MLW's).

This project has received funding and support from NEC and from an outside nonprofit that received a large federal grant to provide services to low-performing students across New Hampshire. Working closely together, we have all built a version of YPP's Flagway program at NEC.

Bill and his students have worked with several community partners as we developed and implemented the program. The NEC YPP Flagway has had excellent support from our K-12 school partners, and we have worked closely with the assistant superintendent of schools for curriculum and instruction, principals from the first elementary school where we initiated our first Flagway pilot program, and the principals from the four middle schools have all supported and participated in helping us offer the program.

We invited a respected youth voice advocate and leader to work with us in the middle school, because of his experience as a longtime community leader in the city, and because of his close ties and connections with communities of color in the city. This partner is a local basketball legend in the city, and he serves as the high school basketball coach at the largest and most diverse high school in the city. He brought along five of his high school students of color who participate in his youth leadership organization to work alongside the mostly white NEC students and to co-teach the Flagway game to our middle school students. We felt strongly that this opportunity to engage these local high school students as our partners allowed us to approach our work with diverse groups of middle school students in ways that were consistent with YPP values and culturally responsive mentoring practices.

We have tried to capture the process we have used to implement Flagway over three semesters, between Spring 2019 and Spring 2020. This study addressed the research question, "In what ways does participation in Flagway affect elementary, middle school, and college students?" To address this question, this article reports on:

- observations of NEC students being trained to become MLWs by our YPP trainers;
- student reflections during class discussions and on written assignments about the history of the Civil Rights Movement and the connections between our work at NEC and the Algebra Project, YPP, the We the People – Math Literacy For All Alliance, and the Flagway Program;
- student discussions and reflections on class readings related to cultural competency and antiracism;
- students' writing reflecting their experiences meeting and working with diverse groups of elementary and middle school students;
- the contents of hundreds of pictures of students playing team building and math games, working together in groups to run the Flagway structure, and competing in our first New Hampshire Flagway tournaments; and
- small group discussions held at the end of the program with middle school students to understand what happened to them as math learners because of their work with their NEC Flagway coaches.

Developing the Flagway program has been a process of trial and error, start and stop, one step forward, one step backward. We believe that telling a number of key stories to illustrate the major milestones and challenges we faced on our journey is the best way to capture the essence of the NEC YPP Flagway program and some of the important effects of this experience on both the elementary and middle school students and on the NEC students who have helped to build and run this program.

Participants and Setting

Three groups of students participated in the Flagway program and in this study. The first group consisted of three groups of college students who took our three 15–week Is Math Literacy a Civil Right? classes (6–8 students per class x 3 semesters). The NEC undergraduate students represented first-year college students through college seniors, who enrolled in the course in Spring 2019, Fall 2019, and Spring 2020. Each semester, the program held multiple training sessions and a weekend training retreat to prepare for our 7- to 10-week afterschool program.

The second group of participants was a group of approximately 45 elementary school students from Grades 4–5 who participated in our Flagway pilot project and a few of their parents who attended the first annual NH Flagway Tournament.

The third group of participants was a group of approximately 90 middle school students from Grades 6–8 who participated in our Flagway middle school program in Fall 2019 and Spring 2020. Note that the 45 students who attended in the third cohort (Spring 2020) attended only the first meeting before schools closed due to COVID-19.

The elementary and middle schools in which we have offered Flagway are in one of the largest, most demographically diverse cities in New Hampshire with 86% of the population White and 14% of its citizens people of color. The city has long served as a refugee resettlement community and has become home to a highly diverse citizenry from all over the world. This diverse community is not the norm in NH, as the 2017 U. S. Census Bureau reports NH is the 4th most White state in the nation (90.3% White).

Limitations

There are limitations to relying on stories alone to provide rigorous evidence of any phenomenon or issue, especially if the goal is to generalize findings. The PAR study presented here should not be construed as being a rigorous study on the effects of the Flagway program on students' math learning or literacy. That is the next Flagway study planned once the program resumes.

The original goal of this PAR study was to employ both quantitative and qualitative data collection methods to develop a complete picture of the effects of the Flagway program for all student participants. In future research, NEC students will collect more in-depth quantitative and qualitative data through pre- and post-tests using a nationally normed math literacy test used by the YPP to study the learning effects of Flagway. We will also conduct additional focus groups and collect interview data when the program resumes. We had already collected baseline mathematics test data in the early spring from our middle school students but were unable to complete the post-test or the program itself due to the pandemic.

Data reported in this study are based on the initial findings gathered before schools shut down the program in March. This in no way suggests the narrative data in this PAR study is not informative and useful in understanding the Flagway program and its impact on elementary, middle school, and NEC students. The stories that follow provide a rich description of the Flagway program as experienced and discussed by participants.

Results

> I have learned that it was a mistake to just accept myself being mediocre at math when I was young. It wasn't until the end of the Flagway training that I realized that I really could learn, understand and apply these mathematical ideas to compete in the game. FLAGWAY has taught me that there are fun ways for me to learn math that really work. (Samantha, NEC Flagway Coach and Math Literacy Worker)

What Is Flagway?

According to The Young People's Project (n.d.), "The goal of The Flagway Game is to create environments where students can practice and celebrate learning math. There are many ways to create a cultural context in which mathematics emerges naturally from students' experience (para.1). The Flagway Game was developed by Bob Moses in 1992 to allow students who have historically been denied effective mathematics learning opportunities to gain access to mathematic skills and knowledge.

Flagway can be played with students as early as 1st grade. Typically, the game is played with 3rd–6th graders, however, Flagway has been enjoyed by elementary, middle school, high school, college-aged students and adults. During game play students navigate a Flagway structure that is set up in a large open space such as a gymnasium, library, or cafeteria. There needs to be plenty of room for running!

The Flagway structure is a course of radial "paths" that students run based on the Flagway rules (derived from the "Mobius" Function). Speed counts, as well as accuracy, so as students develop into skilled players, several may be running through the course simultaneously, creating dynamics similar to that of a sporting event. Part of the beauty of Flagway is that students can play the game without knowing the rules at first, learning and increasing their speed and accuracy as they play the game. This allows all students to access the game and learn the underlying mathematical principles as they compete in the game.

Flagway is designed to support the mathematical thinking, learning, confidence, and engagement of students who score in the bottom quartile of national tests of mathematics. The game provides opportunities for struggling students to build on their understanding of basic number facts by incorporating those facts into a game where students guess, conjecture, reflect on the options in the game, and also tie these mental operations into the kinesthetics of running the patterned network of the game. YPP has created board games and physical games that capitalize on young students' propensity for running, the galvanizing energy of team competition, and the intrinsic sense of achievement when the team has figured out the correct category for a given number.

For the past 2 years, we have worked with YPP and our colleagues and students at NEC and have tried to do what Bob Moses taught us to do: to organize and to act, working in partnership with young people as agents of change, learning, leadership, and inspiration, and to learn from and leverage their ideas, energy, and voices to help members of our community. We created a course at NEC for undergraduate students that would provide them with a space and an opportunity to immerse themselves in the history and traditions of the Civil Rights Movement and help them gain cultural competence as they explored issues of educational equity, cultural proficiency, critical thinking, and social justice through experiential and service learning.

What We Learned From the YPP Flagway Pilot Program

In Spring 2019, we worked with Maisha Moses and her MLWs from YPP to train 8 NEC students to take on their roles as Flagway coaches in a pilot program. We worked with elementary students who were invited to attend an afterschool math club one day a week for 10 weeks. These students were selected by their principal and teachers because they fell into the bottom quartile in mathematics on state tests. The pilot program involved eight NEC students and about 45 fourth and fifth graders.

Relationships

We all learned a great deal through this pilot project about how to play the Flagway game and engage students in a series of math games that taught them the skills they needed to learn to play Flagway. One of the most important things the NEC students learned was how important it was to develop relationships with their younger students.

We often discussed how to apply the concepts our YPP trainers taught us each week when we traveled 40 minutes in our NEC van to work with the elementary and middle school students. Some of the important ideas students shared about the ways that they thought about how to reach their students included:

- "It's all about building the relationships first, then the math will come."
- "Take time to get to know your kids."
- "Don't try to be their teacher, just help them learn how to play the games and have fun."

- “It is fine if some kids learn it quickly and others take more time. . . . Let the students help and teach each other, it is fine if they teach each other how to make their flags, there is really no such thig as cheating!”

There is a very important point about the importance of building relationships that must be made here. It relates to our fidelity of implementation of the YPP and Flagway model in our pilot program. The college and program staff are working to meet the challenges of recruiting students of color into our Flagway program. In some ways, it is the elephant in the room. Most of the NEC students that joined our pilot Flagway class were not students of color. Part of this may have been related to the fact that the program was located within the Education Department. Faculty in the Education Department have seen a pattern among our students of late, and particularly among NEC students of color. Our students have increasingly been avoiding the Education major due to fear of, avoidance, or inability to pass the dreaded Praxis Exam. This Praxis requirement for teacher certification poses a classic systemic hurdle for many of our NEC students, but it is having a disproportionately negative effect on many of our students of color. One of the main reasons we wanted to adopt and implement Flagway, when we learned about it, was to give the education department a more effective way to help our students become more proficient in math.

It may also very well be that Bill, the instructor, is White, with limited connections to our diverse student population, and most students who signed up had personal connections to faculty in the education department. We began to rectify this situation when we were able to hire our first Flagway Co-Director, Shania, who was a student of color, and her leadership and presence made the program more consistent with the YPP model. Our efforts to gain traction in this math literacy leadership program with students of color at the college remains a challenge.

The YPP Flagway program has been specifically designed based on a near-peer mentoring model that focuses on bringing positive, personal, and engaging math learning opportunities to specific groups of “priority students”; Black students, Latino students, ELL students, and students experiencing poverty. One of the primary relational and pedagogical assets that the Flagway model brings to the table are the racial, cultural identities of the near-peer MLW mentors who share racial affinity with the younger students with whom they are working. Despite NEC's Flagway program's struggle to attract as many students of color as we will need, in order to provide this relational pedagogical connection for the numerous diverse students with whom we have worked so far, we have seen these relational connections occur in other ways.

Two factors were often discussed about building relationships and making connections with the younger students. The first relational connection point we saw was the fact that so many of our NEC students have had, and continue to have, their own personal struggles as math learners. When we asked our class why more NEC students were not signing up for this great class, our students said, "students will never sign up for this class because the word MATH is in the title!" So, math avoidance was a problem from the very beginning. On the other hand, our NEC students' personal struggles with math actually became a great source of empathy and connectedness with their elementary students. The NEC students authentically shared their own math struggles and showed they were learning new math ideas and skills along with their elementary students through Flagway, even if they are in college. They were able to make the point that anyone can learn math when it is fun.

The second relational connection we have seen is the personal experience that several of our most successful MLW's have had with the traumatic effects of poverty in their lives. Numerous younger students in program, who all too obviously suffer from poverty, developed very positive relationships with these MLWs. NEC student mentors have shown deep levels of empathy and have effectively reached out and made powerful personal connections with their elementary and middle school students.

NEC has faced difficult challenges when it comes to recruiting racially diverse students to become MLW's in the Flagway program. Despite this limitation, our NEC students have done a remarkable job building positive, powerful, and personal relationships with their Flagway teams by leveraging their empathy, sharing other commonalities, and whole heartedly embracing the mission and purpose of the program. The NEC staffs needs and yearns to do a better job recruiting from NEC's diverse student body as we move forward.

The Importance of Snack Time

Week by week, the relationships between the elementary students and NEC coaches grew stronger, and one of the best ways we found to connect with the elementary students was during snack time. NEC students always brought healthy snacks for the children. The NEC students sat with their elementary student teams during snack time, during which they talked, watched, listened, and learned a great deal about the children. The NEC students were shocked at how much the food meant to the young students. Some students always asked for more, some packed their snacks away to take home and the NEC students took pleasure in planning, purchasing, and sharing snakes with their teams every week. My students also got to see firsthand that food was not always available to the students on their teams.

The Power of "Cool"

Our students quickly learned one of the secrets to helping young people "buy in" to something (like math) is to make it cool. Learning math through games was a cool way to approach this work with struggling students. The younger students could not wait each week for the NEC students to arrive at their school. These younger students admired and looked up to their NEC Flagway coaches. The students seemed honored that the NEC students took an interest in them and wanted to spend time with them.

Having young people serve as near-peer math literacy mentors and coaches to younger students is one of the most important aspects of the Flagway program. If adults took the same games and activities and tried to 'directly teach" them to these elementary students, the experience would not be at all the same. The near-peer mentors bring the cool factor to this work, and they ask their younger students to explain things to their teammates and help others on their team figure things out. The near-peer mentors listen to their students and try to respond to their ideas. They point out the strengths and abilities they see in each child and praise students for contributing to the team and working to win the games together. Younger students respond proudly to such acknowledgement and recognition from their cool college coaches, and they work even harder to make them proud.

Another way to make this work "cool" was to create Flagway T-shirts. My NEC students designed and purchased Flagway T-shirts for their students, which were a huge hit. Developing the design for the Flagway T-shirts each semester became a great project for the NEC students. One semester, our NEC students held a campus-wide T-shirt design contest to publicize our Flagway class. The T-shirt design contest helped spread the word about Flagway across the campus and helped us recruit new NEC students.

Eventually, the Flagway T-shirt design contest was won by one of the students in our class named May. May was quite shy, hesitant, and quiet at times, but when she won the contest and her "very cool" Flagway T-shirts were printed and worn by everybody in our class and all the students in the Flagway program, May began to come alive and find her voice. As her T- shirts gave our students some swagger, identity, and purpose, May's body language and commitment to the program changed; her self-confidence seemed to grow exponentially when she saw how her love of art and talent as an artist helped her make a significant contribution to the program.

There is a great book about student activism and youth voice by Tina Roseberg (2011), called *Join the Club: How Peer Pressure Can Change the World,* which shows the power of "cool" when it comes to reaching young people. The book describes the incredible success of many civic action and political movements led by young people throughout the world over the last several decades. Here are three examples or models from the book we have used as models to bring in the "cool factor" to our Flagway work at NEC:

1. A college-age group of student activists from Serbia created a program called RESIST. This group led college-age young people throughout Serbia to stand up to "the man": Serbian dictator Slobodan Milosevic, one of the most brutal and long-standing dictators in the world. Young people from RESIST used audacious, funny, and fun resistance tactics, some reminiscent of James Bond, the likes of which had never been tried in Serbia before. These strategies for making resistance cool—as opposed to scary—made headlines and earned RESIST lots of national attention. RESIST sparked a popular peaceful uprising that overthrew the vicious dictator. The RESIST youth leadership model was used a few years later to inspire young people throughout the Middle East and sparked the Arab Spring.
2. A highly successful teen-inspired and youth-led HIV-Aids prevention program, LoveLife, sprung up in South Africa when HIV-AIDS was ravaging the continent. The LoveLife youth did not focus on preaching to their peers about safe sex practices. Instead, they organized events and activities and created fun, positive experiences and messaging targeting youth. They organized amazing free concerts featuring popular musicians; they developed slick radio ads that encouraged young people to aspire to "live life fully and have fun"; and they handed out millions of Love Life T-shirts young people proudly wore to show they were part of the LoveLife Movement. The program worked far better than anything adults had tried before to flatten the HIV pandemic curve and to help young South Africans understand how to avoid HIV-AIDS.
3. Rosenberg (2011) also shared the story of successful antitobacco advertising campaigns led by young people from several southern states in the United States. They produced simple, cool, rebellious antismoking, anticorporate TV ads to rebel against big tobacco's $35 million cigarette ad campaign developed to target young people to buy cigarettes. These young activists made it cool to quit smoking. Their

> public health campaign was designed to show teens that being a smoker meant teens had been manipulated by adults. These ads revealed to young people that by smoking, teens were doing exactly what the adult goons from big tobacco wanted them to do. This successful youth campaign helped launch a nationwide movement by young people to choose to move away from buying and smoking cigarettes.

There is power in a cool T-shirt, or a cool message of "resistance or rebellion," to rally young people to a cause. There is also power to joining and belonging to a "club of your peers" whom you see as being cool. When NEC students brought math games and Flagway to these elementary and middle school students, they brought the "cool factor" to math in ways that broke down resistance to math learning. The RESIST activists believed cool tee shirts can actually change the world. The Flagway program adopted these strategies about the power of cool near-peer math mentors to teach younger students rigorous mathematical concepts. Our NEC students saw that helping to fight against systemic racism and educational inequity was a cool thing to do and has made learning about history and CRT engaging for them. It may seem trivial, but cool really works!

Flagway Moves to the City's Middle Schools

By the beginning of the summer of 2019, we had written and received a sizable grant from a New Hampshire nonprofit organization that had received a major federal grant to support middle school students deemed at risk of dropping out of high school or not aspiring to postsecondary education. This grant would provide full funding for the program for a 2-year period and cover the costs of transportation, 2 years of Flagway training from YPP, instructional materials, the purchase of Flagway game structures, healthy snacks for our students, T-shirts, and stipends for our veteran NEC students who have become certified FLAGWAY MLWs after completing the first class and working at the elementary school. The MLWs play an increasingly important role in developing and implementing the program.

The college is providing matching funds, thereby fulfilling its commitment to the program. This financial support and recognition of the value of the program by our funding partners has provided additional credibility and a source of pride for all of us.

The Fall 2019 session of the program with middle school students went incredibly well. Our class met each Monday for 2 hours to prepare our games and activities and to prepare the NEC students to assume their roles. We gathered up snacks and drinks, white boards, whole number and prime factorization cards, markers, and paper and pencils and loaded up the NEC van to travel to the middle school to work with our middle school students.

Each Monday afternoon, the buses would arrive at the middle school, and the NEC students would greet the middle school students and reconnect. They always took time to informally mix and mingle before getting into their teams to play the week's team building games. The team building games spilled seamlessly into simple math games. Each week, we worked our way down our list of math games that our NEC students learned from our YPP mentors or created themselves. Each week's games built on one another and allowed our middle school students to become familiar with and practice the math skills and concepts that make up the arc of Flagway.

The Arc of Flagway

The arc of Flagway is a set of mathematic concepts and skills necessary for students to understand so they can crack the code of the Mobius function, which is at the heart of the Flagway game. Here is the sequence of mathematical skills and concepts that both NEC and middle school students learned from our YPP trainers and that our weekly math games and activities were designed to help students play with, practice, understand, and apply so they could play the Flagway Game. We all learned:

- about the properties of **odd and even numbers;**
- to understand **prime and composite numbers;**
- to break down any whole number into its **prime factorization;**

- to create factor trees and compete in factor tree races to build speed and accuracy in prime factorization;
- how to convert prime factors into one of three **mutually exclusive groups,** each representing a different **algebra form;**
- **how to convert those algebra forms into one of three colors** (red, yellow, blue);
- how to put all this information together to **make their Flagway FLAGS**, so they could play the Flagway game;
- how to practice **running the Flagway structure** along the proper colored pathways, at the end of which they learned how to place their FLAGS to gain points; and
- how to build their individual and team **speed and accuracy**, so they could compete successfully against the other teams and try to WIN the Flagway game.

Our students saw growing evidence each week that the elementary and middle school students were not only learning how to play the math games but also learning how to play together and work cooperatively to compete in the game as a team. Each week, we saw dramatic improvements in student focus, collaboration, and positive behavior as students gained social and emotional skills by working together to play the math games and build their speed and accuracy. We saw students rely on one another and acknowledge and appreciate one another's unique talents and skills as teammates for different parts of the games.

Applying Our Learning to Compete in the First Annual New Hampshire Flagway Tournament

Our first New Hampshire Flagway tournament took place in Spring 2019 as part of our first pilot project at the elementary school. About 45 elementary students participated, and they had a blast. The school principal who had helped us recruit students and organize the weekly afterschool meetings came and watched his students compete in the Flagway tournament. He brought a few of the teachers to observe their students competing in the Flagway Tournament.

We were proud to show the principal and teachers what their supposedly poor math students could do. After the tournament, the principal asked, “How can we get this program into the hands of our teachers?” We told him that YPP is working to develop a plan for this.

That first Flagway tournament demonstrated to the principal and teachers that these highly diverse students had far more potential as math learners than may have been recognized. It is quite impressive to see fourth and fifth graders applying pre-algebra skills to try to win the Flagway game and loving it!

When students who score in the bottom quartile on math tests demonstrate they are fully capable of learning basic math and pre-algebra—when taught using more appropriate, culturally responsive pedagogies—teachers and school leaders are faced with the realization they may be underestimating the talents, abilities, intelligence, and potential of whole groups of students. The Flagway tournament was a celebration and a testimony to the abilities of these so-called, struggling students and hopefully a wakeup call to educators and parents about the untapped potential of these and every student. Check out this video from The Young People’s Project (2019) showing what the National Flagway Tournament looks like in action: https://www.youtube.com/watch?v=IFVIU0tuFqk

Middle School Flagway Program

We moved the NEC Flagway Program to 3 of the 4 city middle schools in the fall of 2019 using resources we received through our grant. One powerful way to understand the impact of this middle school program is to fast forward 14 weeks from when we first started the YPP training of the NEC students from this second class to prepare them to go into the middle schools and work with a group of 45 middle school students. Next is a description of what happened at the second NH Flagway Tournament held in fall of 2019.

There were no parents, teachers, or administrators in attendance at this second New Hampshire Flagway tournament, which was disappointing to us, so adults did not see the amazing work their students had done to learn lots of new math skills and concepts. A wonderful part of this second tournament, however, was when I noticed all of the NEC student coaches were sitting on a bench together in the cafeteria, away from their teams, watching proudly as their middle school teams worked feverously playing and competing in the Flagway game.

Step-by-Step Guide to Playing the Flagway Game

Here is my attempt to explain what those NEC coaches were beaming about as they watched their teams competing in the second annual New Hampshire Flagway tournament:

1. Several teams of students are clustered around their HOME tables at the end of the middle school cafeteria. The Flagway structure is set up on the floor in front of the teams. At the other end of the cafeteria, each team has a NUMBER table that contains whole number cards ranging from 2 to 100.
2. Once a tournament judge says, "Ready, Set, GO!," one student player from each team runs as fast as possible from their HOME Table across the space to their NUMBER table at the far end of the room, where they quickly choose three random number cards from the scattered pile of cards lying face down on the table.
3. The player then turns and runs as fast as they can the length of the cafeteria, back to their team's HOME table, where they throw the three whole number cards on to the table face up. Each of their teammates looks at and analyzing the three cards.
4. The player who ran grabs a blank 3 x 4 column FLAG and writes down the three whole numbers on the number cards in the first column of their FLAG from top to bottom.
5. The whole team quickly completes prime factorizations for each of the three whole numbers, and the team members check each other's work to make sure the factorizations are accurate. The player, or anyone on the team, writes these factorizations down in the second column of the 3 x 4 column of their FLAG.

6. Then, the player who ran, with help from the team, quickly converts the prime factorizations of all three cards into one of three algebra forms and writes the algebra forms for each of the three numbers down in the third column of the FLAG.
7. Once the correct algebra form has been selected, the students on the team work together to "crack the code," which means they translate each of the three algebra forms into a color (red, yellow, or blue) and they fill out the last column on their flag, writing the names of the colors associated with each of the three whole numbers, in the proper order, to create the final FLAG for this turn.
8. The player then runs clockwise around the multicolored paths of the Flagway structure set up in the middle of the room and enters the entrance to the Flagway structure. The player shows the completed flag to the NEC judge who quickly checks it, once the judge says," GO," the student Runs the Flagway STRUCTURE.
9. To Run the STRUCTURE, the player runs to the center DOT of the STRUCTURE, then follows the three correct colored paths that match with the order of the colors on their FLAG.
10. Once a player has Run the STRUCTURE, they place their FLAG on the spot at the end of pathway and exit the STRUCTURE.
11. The player then runs clockwise back to their HOME table.
12. When that player touches the hand of the next player in line, it is now that player's turn to run to the number table, grab three new whole number cards, and run as fast as they can back to their team's HOME table to create their next FLAG, crack the code, and repeat the process.
13. The teams play 6- or 7-minute ROUNDS of the game, where student teams make as many runs and as many FLAGS as possible.
14. At the end of each round, the judges review the FLAGS left on the structure by each team. The judges make sure the FLAGS were filled out accurately and placed

properly on the structure. Teams get 1 point for each FLAG and 1 point extra if the FLAG has been filled out accurately, so a team can earn 2 points for each FLAG.

15. The teams play 2 to 3 ROUNDS, take a snack break, and then play the second 2 to 3 ROUNDS for a tournament. The team with the most points at the end wins, and those players are then eligible to go to the next level and may ultimately end up traveling to the annual National Flagway Tournament to compete for the National Flagway Championship.

When one considers all the skills and collaborative group work needed to compete in a Flagway Tournament, it is easy to understand why watching a highly diverse middle school team of supposedly poor math students running the structure and playing this complex math game on their own would give their NEC coaches such pride! Playing Flagway offers powerful assessments of student learning in mathematics and offers students a chance to become fully engaged as they use their bodies, their minds, and their teammates' help to solve these amazing mathematical puzzles.

Effects of Participation in Flagway

The annual National Flagway Tournament, sponsored by YPP, is held in May each year as part of the National Math Festival. Five of our NEC students were invited by YPP to travel to Washington, DC, in spring of 2019, after we wrapped up our first Flagway pilot project. They were invited to help coach student teams from across the United States that would be attending and competing in the National Flagway Tournament.

The NEC students worked alongside young MLWs from across the country to lead math games and help run the national tournament. One of our students, Shania, one of two women of color in the class, was invited to be part of a small group of MLWs in Washington, DC to accompany Bob Moses and other Alliance members as he testified before the U.S. House of Representatives Education Committee, endorsing a new bill that would ensure support for quality education for every child in the United States as a civil right.

Shania was so inspired by this opportunity that she changed her future plans when she got back to NEC for her senior year. Shania was a biology major and planned to start her journey toward medical school and becoming a pediatrician after graduating from NEC. However, she was so personally moved by her role as a Flagway coach and MLW that she was now determined to become an elementary math and science teacher so she could continue her work with Flagway and YPP and serve the needs of children who struggle with STEM learning in her home city of New York. We hired Shania in fall of 2019 to become the first co-director of the NEC Flagway program, and she helped run the program, develop our trainings, build the budget, and train the next two Flagway cohorts during her senior year.

One of the most important contributions that Shania made to the NEC YPP Flagway program was to help build an organizational bridge to NEC's new Office of Diversity and Inclusion. Ever since Shania took on the role of Co-Director of Flagway, we have begun to co-plan and work more closely with the Director of that office, to build connections between NEC's YPP Flagway Program and the many students of color who are strongly tied to the Office of Diversity and Inclusion. Our hope is to build upon and sustain this organizational connection moving forward and to continue to strengthen our links and bonds to NEC's students of color through our growing relationship with the Office of Diversity and Inclusion. This is an essential part of creating a more fully authentic Flagway program at NEC.

Reflections From NEC Flagway Coaches

After participating in the 10-week afterschool programs and the Flagway pilot program, our NEC students wrote reflections to describe some of the important things they learned:

- "My understanding of math literacy as a civil right has changed, over the course of this semester. I did not view math literacy to be in the same conversation as civil rights, prior to entering the course. Now, I view math literacy as having great importance for everyone, especially those students in the bottom quartile. If students can excel in math, they may be able to excel in most other subjects."

- "I will seek to inspire these students that have been marginalized in the education system; to view their potential to be far more powerful than the circumstances in their lives which they cannot control. "
- "The NEC coaches and I should [find] different ways of inspiring these children to succeed and to have hope in their ability to overcome circumstances that seem futile in their lives, especially as it pertains to math."
- "FLAGWAY should be implemented in inner city schools because when you come from an impoverished place, and on top of that, you are a minority student, your chances of going to college are slim. It is a struggle to graduate from high school, coming from poverty, which then makes it impossible to ever start post-secondary education. This program has sparked a new passion in me about what this program could really do for our students."

Parents' Roles

Bob Moses says one of the most important parts of Flagway is to show students, as well as their teachers and parents, that each of them is fully capable of learning math. Moses makes this critical connection between high expectations for all children as math learners and quality of life in the 21st century and for generations of families.

Parents and families can also feed into the self-fulfilling prophecy of math failure. Teachers often hear parents say, "Oh, I don't do math," or, "We aren't math people." Imagine the power of these messages and the damaging effects they might have on a child's confidence or motivation to "do math."

The NEC Flagway Program followed Bob Moses's advice and invited parents of the elementary students to come and watch their children compete in the first New Hampshire Flagway tournament. We ended up with six parents who came to watch their children play Flagway. At the half-time break in the tournament, Bill asked the parents to come out into the hallway while their students were having their snacks. He asked the parents what they thought about their children doing math in this way. The parents were very vocal about their reactions to their children's engagement in the program and to Flagway:

- "I can't believe that he tells me every Monday that he wants to stay after school to do Math Club!
- "He has never been able to work with or play like this with other kids", I can't believe it!," one mother said with great shock and surprise.
- "No one in our family is good at math, so we are surprised when she comes home every week saying how much she is loving playing the math games and explains these math ideas to the whole family."

Bill told these parents that now that they had seen that their children are fully capable of learning math and can be successful and gain confidence as math learners, it will be up to them as parents to advocate for their children as math learners in the future and not buy into the low expectations they may have had for their children as math learners. He also told the parents they will also need to be prepared to push their child's teachers or their schools to offer different math learning opportunities for their children, opportunities that do not turn them off to math or convince their children they are incapable of learning math. These parents were surprised that what seemed like a game was so much more.

Flagway Made a Difference

After the middle school tournament, several of the middle school students began asking the same question: "What do we do next?" We told them, after our tournament, there would be the end-of-December school vacation, and another group of NEC students would take the Is Math Literacy a Civil Right? course in the spring. Those new NEC students would then be coming back to the middle schools to work with a new set of 40-50 middle school students. These students did not like this answer! They wanted to come back. They wanted to keep going with Flagway. We felt badly that we had developed these relationships with them, and after the 10-week program was over, that would be it.

Spring 2020

Our third group of eight NEC students signed up for the Is Math Literacy a Civil Right? class for the Spring 2020 semester. They received their Flagway training from YPP, and we continued to have a few experienced former NEC MLWs work with this group to prepare them to go into the middle school.

There was a delay in starting the 10-week after school program in the spring due to standardized testing conflicts, so our start date kept getting pushed back later into January. February came, and we still had not started with Flagway. Delays in starting the middle school program continued, so while we waited for the schedule to be sorted out so we could begin the program, we contacted a colleague who is the math specialist in a rural elementary school in our area. She invited our class to come work with her fourth- and fifth-grade students so we could practice our math and team building game facilitation and group management skills. Those sessions went great. Our NEC students gained valuable experience and greater confidence, but we were all eager to get going with the new class of diverse middle school students in the city.

Finally, the day came in late February when we could begin the next Flagway afterschool program with the middle school students. Our students were not only super well prepared but also had been doing a good deal of additional reading and discussion on issues of racial injustice in the United States; the Civil Rights Movement; and the ongoing learning, funding, and opportunity gaps and disparities in U.S. schools. More than any NEC students yet, this third cohort of NEC students understood the equity issues that were the heart and soul of the Flagway program. By the time they met with the new cohort of 45 middle school students, they were pumped up and deeply committed to this work!

We arrived at the middle school early to set up the library into areas where we could meet in small groups with the students. The new group of middle school students arrived excited, and, at the beginning, things were chaotic.

One incredible fact was clear immediately, at least 12 of the students had returned from the previous semester. These veteran middle school students hugged the two NEC MLWs who had worked with them the previous semester. Within a few minutes, the MLWs brought these veteran middle school students over to tell Bill they had something to show him.

Many of the returning students took out what we quickly realized were their report cards. One student exclaimed, "I went from Fs to As in math, Bill!" Another girl shouted, "Ds to Bs for me!" Pretty soon, the entire room gathered around, and we heard these 12 returning students telling our new NEC coaches about how playing Flagway and the afterschool math games they had done before their December break had helped them understand and succeed in math like they had never done before! It was a huge celebration.

One of the Campus Compact Gear Up coordinators and Bill decided to pull those 12 returning students aside in three small groups to talk more fully with them while the new students got going with their team building and initial math games. We asked these students two simple questions: "What worked well for you last time?" and "Why did you come back?" One student jumped right in and said, "I definitely noticed an increase in my grades in math. I was failing before." Another student said, "I came back because now I do math faster." One boy said, "Since a lot of the activities that we do involve running, I came back because I really like running and jumping in general, and I feel like that could be helpful to me." Another said, "The factor trees really helped . . . doing those helped . . . to break down things and do it as a race, and stuff like that."

We also asked these students to tell us what advice they would give their teachers to help more kids learn math better as they had done. One student said, "Teachers should try to incorporate more games in the teaching of mathematics." Another student said, "My teacher just jumps right into the lesson, and sometimes it seems like the students interrupt her because they may not really be ready to learn." One other remarkable student said, "Incorporating movement is another thing that seems to be a good idea. I learn kinesthetically, and so I need to move if I want to learn things. I think our teachers need to learn about kinesthetic learners!" Finally, one student said, quietly but determinedly, "I wish we could tell teachers, 'Don't be so mean.'"

On the van ride back to NEC, students in this third Flagway cohort were ecstatic about how their first day went with their students. They had finally met the new middle school students. Their games and activities had gone great because they were so well prepared after the long wait. They spent a lot of time talking about how incredible they thought it was that those 12 students had insisted on coming back and how they had brought their report cards to show us how much they had learned by participating in Flagway, and they were really impressed that these 12 middle school students wanted to become MLWs and help the new group of middle school students learn to play Flagway. This new class of NEC students was determined to tap into the energy and talent of those veteran students and produce impressive results just as the previous class had done.

Bill told our NEC students that several of the site coordinators, who worked with these students at the four middle schools as part of a grant program, mentioned they had seen some standardized testing data in January for the Flagway students who had participated in the fall semester. They said the test scores showed dramatic growth in the students' academic achievement scores in math. The coordinators said they would gladly share these test results with us when we came back the next Monday.

Sadly, we received the word that all the schools in the city would be shut down immediately due to the COVID-19 pandemic at the end of that first week. We would not be returning to the middle school. We would not be seeing these middle school students whom we had met this one time. We would not be seeing those 12 students who had returned on their own to stay engaged with Flagway and help their fellow students as MLWs alongside their former NEC coaches. Our students were devastated at first, but they soon recovered and kept working.

Conclusions

We had the rest of the Spring 2020 semester to try to make something positive out of the shocking situation we found ourselves in as a class when the schools shut down. There is another story about the work this third cohort of NEC students did in the weeks that followed the announcement of schools closing due to the pandemic. The NEC students put all of their Flagway games and activities online by making a set of fun videos demonstrating how to play all the Flagway games we planned to do with the students. They wrote up clear descriptions of each game—using principles of Universal Design for Learning—to help ensure the English language learner (ELL) students would understand the explanations. They tried to provide an online tool kit to allow the students, their parents, or older siblings to help the students play many of the games at home, so they might reap at least some of the benefits they had seen in evidence when those 12 students came back with their report cards on the first day. They created a YouTube channel and a Google site to hold all of these materials and make them available to the students.

That story ended with our collective sadness and anger when we learned most of the 45 students with whom we had worked on that first Monday afternoon in March had no internet access, despite the tremendous city schools made to quickly build the capacity to reach 95% of their students. The vast majority of the Flagway participants were among the 5% who fell into the abyss of the digital divide.

Our NEC students experienced the power of their voices in the development and offering of our weekly Flagway sessions to middle and elementary school students. The Flagway participants got to see the impact they could have on students' attitudes and confidence as math learners. When the pandemic hit, NEC students recognized, in a very personal way, the educational inequity that their students experienced, when we learned their Flagway students would not be able to access their online videos and games NEC students had worked so hard to create and make available. Our students saw firsthand the ways in which institutional racism and social injustice work in the real world and how students of color and families suffer disproportionally in times of crisis. As future educators and citizens, we know they will not forget their anger and deep disappointment, or their new understanding of the ways things often go for children in the bottom quartile. The NEC students can now more fully understand Bob Moses's primary message and the rationale behind his activism for quality education for all students as a civil right and his reasons for creating Flagway and YPP. Through their work with Maisha Moses and her staff at YPP, our NEC students began to understand and own their roles as allies, partners, and near-peer mentors, who have experienced what it means to organize, plan, and advocate for social justice, while listening to the needs and voices of their students.

We have geared up to offer Flagway online in those middle schools again as soon as we can. The good news is we may be able to invite more students to join us if we can learn how to effectively implement the program using online tools, and if the students we need to reach and work with have access to online learning by then.

Our goal is to follow YPP's vision of helping to develop and join a National Flagway League. We may also be able to invite other rural students from across New Hampshire, who could easily join us online, if they have access. If our program works, everyone will not only learn more about math, but perhaps we will also be able to bring New Hampshire students from rural and urban schools together to play Flagway as members of a league. Maybe these students will make some new friends and learn more about each other. White students from rural areas playing Flagway with diverse students of color living in urban areas might begin to build bridges across these different communities within our state.

By working together through Flagway, the NEC students hope these young people can show adult leaders and teachers the power of youth voice and how capable they are of learning math when the right approaches are available and used. Perhaps the co-creation of teaching and learning experiences and opportunities for young people to assume active roles as peer-mentors and partners in learning, rather than always being the recipients of adult designed and led curriculum and instruction, will become more widely available, and in that way, the YPP way, perhaps more kids can learn to engage in and enjoy math, especially those who have always been left behind.

Maisha Moses's (personal correspondence, Feb.1, 2021) words best summarize the journey we have all been on with Flagway:

> If I were framing it, I would say that Bob Moses invented the Flagway game, then turned it over to YPP which provided a space for young people (MLWs and staff) to develop both the curriculum and the program which YPP did over many years. This work happened in the context of the Algebra Project network and now is happening in the context of the We the People - Math Literacy For All Alliance, both of which created space and opportunity for young people in YPP to grow and develop both the Flagway program and as an organization.
>
> Flagway works as it does because it was developed and enculturated by the kids for whom it was intended, and who had to learn through trial and error over many years how to make it work, first as a game, then as a curriculum module (including the Arc of Flagway), then as a training process, and now as a league. Hundreds of young people and YPP staff have contributed to all aspects of that work and all that has been produced. YPP worked hard as an organization to make sure this was so, and to find and establish partners and spaces, and develop programs to enact a shared vision around this work. Of course, NEC is a great example of this partnership.
>
> All of this work has enabled Flagway to take root, which meant both creating opportunities for collaboration, but also holding the space and preventing it from being usurped (and that also took work). Our partnership with NEC grows precisely out of that history, and this approach.

What is clear to each of us at NEC who has been involved in Flagway is we have seen that Flagway works. It works in multiple and important ways. Here are a few final thoughts my students shared at the end of our latest Flagway course:

- “Learning about Bob Moses redefined for me what playing an active role in antiracism means. Reading about the founding of the Algebra project through grassroots efforts was encouraging and refreshing. I am delighted to have provided a small contribution to students through the Flagway program.”
- “I have learned that teaching is so much more than just regurgitating information to a room of students. It is caring and giving guidance to the youthful generations. It is the purpose of a teacher to instill courage, confidence, and curiosity in each student. Children are naturally curious, we need to take that curiosity and cherish it, let it thrive and build the desire to learn in our students.”
- “Being in the class has shown that racism is real, as much as people think it’s been put to an end in 1875, to this day it is real.”
- “By doing the Flagway program, these students are going the extra mile for their education. They are pushing themselves further to do better for themselves. I want to keep encouraging students to have this self-driven motivation.”
- “I learned about myself, that I have a passion for teaching, but not just teaching, I have a passion for connecting with students on a personal level. Having a good connection with students makes teaching more enjoyable for them and for me as well. I love this course, and I’m grateful that I had the opportunity to learn about Flagway. I learned that teaching can be fun. It’s all about having FUN! If you don’t have fun while you teach, then you’re not doing your job correctly.”

Final Thoughts and Recommendations

We hope NEC’s Flagway story may help others begin to change the trajectories of their thinking and behavior related to issues of racial justice, educational equity, and powerful, personal effective teaching every child deserves in the United States today. We hope it will provide options, choices, and commonsense solutions for other colleges, K-12 schools, and educators, and for high school and middle school students who want to play critical and unique roles as antiracist leaders in their schools and communities. Finally, we hope the solutions we discussed here can help us all to more honestly and more fully embrace the democratic and humanistic traditions and values we proclaim to cherish and apply them more fully every day to lift up all students so they can fulfill their potential as fellow human beings.

Recommendations

1. ***Open doors of opportunity to students, their voices, their questions, their ideas, and suggestions for improving education and invite them to serve their peers and schools as partners.***

   Prepare and provide spaces for students to become civic leaders who think critically and develop clear-eyed, reparative/restorative programs and practices to undo past injustices to black, Latinx, indigenous, immigrant, and other historically marginalized communities.

2. ***Teach the uncomfortable stuff, use it to learn and inspire us all to move forward.***

   Provide resources, encouragement, and opportunities for students to learn the hidden histories of our nation and the lessons that can be drawn from such knowledge.

3. ***Take affirmative steps to bring diverse pedagogies, leaders, teachers, and students into predominantly white institutions.***

We hope that this PAR study demonstrates there are important things that white, privileged leaders, faculty, and students within the nation's predominantly white institutions, like NEC, can do to work as allies and partners and use their authority and power to open doors and welcome more diverse people into our organizations, and to help to bring about antiracist and culturally responsive pedagogies and learning opportunities like Flagway.

4. ***Fight for socially just, humane laws, polices, and legal solutions to eliminate systemic, institutional racism in our states and country.***

   Stand up against systemic educational inequality and social injustice and advocate for a new round of civil rights laws and policies to break through and deliver on the promises of the civil rights movement to achieve equity, quality education, housing, food security, health care, clean air and water, and access to digital skills, tools, and resources required for full participation in the 21st century economy and educational system.

5. ***Join the community of nations and commit to ensuring the rights of all children.***

   The people of the United States, schools, colleges, universities, teachers, parents, and economic and political leaders need to overturn our nation's failure to adopt and ratify the United Nation's Convention on the Rights of the Child (UNCRC) (2002), adopted by every country in the world except the United States. Our nation must adopt the UNCRC to establish new youth-informed and youth-centered norms, policies, laws, and a renewed commitment to guarantee and protect the rights of all children.

These are big steps, and they will not be accomplished easily. Working as true partners with our young people will empower them and enable us to reach these goals. If kids can overthrow dictators, help end the HIV-AIDS pandemic, and deter their fellow young people from being manipulated to start smoking, then who knows what else they can do. Flagway shows us all young people are fully capable of creating spaces where learning math is possible, and when we work together with young people as partners and hear their voices, we can all take more effective action and have a lot of fun along the way.

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Middle School Students' Mathematics Attitude Profiles: Real-Time Origins and Classroom Implications[1]

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Abstract

Interpreting findings from the numerous research studies that identify macrovariables linked with attitudes toward mathematics and their connections to achievement is complicated by the lack of theoretical clarity around the construct of attitudes. This mixed-methods, multiple-case phenomenological study expands the body of research that describes the origins of students' attitude profiles. Moreover, this study used the experience sampling method (ESM) to capture real-time microvariables in the classroom that impact students' attitudes toward mathematics as described by students in their voices. The use of the ESM increased the ecological validity and reliability of students' statements, compared to questionnaires and interviews alone, while using many moments in time rather than a single measurement. Seventy-five students participated in the study representing one low-, one middle-, and one high-performing middle school in New Hampshire. I coded 3,988 students' statements from 477 randomly captured classroom moments. Quantitative results suggest students' attitudes toward mathematics change over time, the number of attitude changes does not differ across performance levels, and the distribution of students within various attitude profiles differs across performance levels. Using a three-dimensional theoretical framework with eight attitude profiles and a holistic and systematic coding process, I discovered eight themes used to develop detailed, rich descriptions of the essence of each attitude profile. Students' perceived competence was linked to the successes

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they experienced daily. Tests and quizzes dominated classroom activities among all four of the eight attitude profiles that contain a negative emotional dimension.

Keywords: mathematics, attitudes, experience sampling method (ESM), middle school

MIDDLE SCHOOL STUDENTS' MATHEMATICS ATTITUDE PROFILES: REAL-TIME ORIGINS AND CLASSROOM IMPLICATIONS

Federal and state policymakers cite strong science, technology, engineering, and mathematics (STEM) educational pathways in elementary, secondary, and postsecondary education as a key component to a strong STEM-capable workforce in the United States (National Science Board [NSB] & National Science Foundation [NSF], 2020). According to NSB and NSF (2020), the United States has shown minimal growth in national mathematics assessments over the past decade and continues to rank in the middle tier of advanced economies in international mathematics and science assessments. However, the assessment debate remains complex.

Ravitch (2014) argued concerns over the poor performance of students on mathematics assessment in the United States are unfounded, as scores on the National Assessment of Educational Progress (NAEP) are at all-time highs for students who are White, Black, Hispanic, and Asian, while also showing dramatic increases over the past 2 decades. Immediately following the passage of the No Child Left Behind Act of 2001, test scores on NAEP increased but have remained flat for an entire decade after 2007 (Ravitch, 2020). As such, many educational reformers in the United States who advocate for high-stakes assessment, accountability, charter schools, and the privatization of the U.S. school system use comparisons on international assessments to argue the United States has lost its competitive edge (Ravitch, 2016).

Despite poor performance on international assessments in mathematics, the United States has historically ranked well on the Global Competitiveness Index (GCI) and continues to do so. The GCI seeks to capture various factors believed to contribute to the productivity and prosperity of a nation such as infrastructure, higher education and training, innovation, health, and primary education (Schwab, 2016). The GCI 4.0 was developed in 2018 and comprises 103 individual indicators that measure national competitiveness and outline the factors and attributes that drive productivity (Schwab, 2019). The United States ranked second in the 2019 report (Schwab, 2019).

The United States continues to lead the world in research and development. Globally, the United States performs the largest share of research and development, accounts for the largest share of industry output, graduates and awards the largest number of science and engineering doctoral degrees, and accounts for a significant share of science and engineering research articles and citations (NSB & NSF, 2020). However, measuring the magnitude of contributions from individuals educated within the United States versus individuals who received their primary education outside of the United States, and who attended undergraduate or graduate institutions within the United States and remain in the country after graduation, is complicated.

More than half of the doctorate recipients in engineering, mathematics, computer science, and economics are foreign-born noncitizens; many stay in the United States after graduation and account for a sizeable share of the science and engineering employment (NSB & NSF, 2020). The Business Higher Education Forum (BHEF, 2011) noted too few students in the United States are interested in pursuing careers in STEM fields, only approximately half of those who start their studies in STEM fields graduate in those fields, and STEM worker shortages will be exacerbated by the retirement of current workers in those fields. Despite recent efforts to emphasize STEM instruction in the United States, attrition within the U.S. educational system in STEM continues to hinder the ability to produce enough workers to fill the STEM demand (BHEF, 2017).

Problem Statement

Between 2018 and 2028, employment for operations research analysts, mathematicians, and statisticians is projected to grow at 25.6%, 26%, and 30.7%, respectively, due to the availability of big data and the demand to use statistical analysis to make informed business, health care, and policy decisions (Dubina et al., 2019). ACT (2017) noted little change in STEM interest among ACT-tested high-school graduates between 2012 and 2017. Moreover, of those students interested in pursuing a STEM career, only .17% and .43% were interested in pursuing a career in science or mathematics education, respectively (ACT, 2017).

According to ACT (2017), 23% of ACT-tested high school graduates who had an expressed interested in STEM met the ACT STEM benchmark, and 20% of those students who had a measured interest in STEM, met the ACT STEM benchmark, whereas 33% of those students who had both an expressed and measured interest in STEM met the benchmark. ACT (2017) concluded expressed or measured interest in STEM is associated with higher levels of students' college readiness in STEM fields compared to those students who do not have either an expressed or measured interest in STEM fields. Additionally, attitudes were associated with mathematical achievement, as demonstrated by Hattie's (2009) meta-analysis of 288 studies and interest in the field.

Students often choose different educational pathways and careers based on their mathematics self-beliefs (Organization for Economic Co-operation and Development [OECD], 2013). Results from successive Trends in International Mathematics and Science Studies (TIMSS) show strong positive relationships between mathematical achievement and students' attitudes toward mathematics. However, at the same time, they tend to show drops in positive attitudes toward mathematics from fourth to eighth grade.

On the 2015 TIMSS assessment, 38% of eighth-grade students reported they do not like learning mathematics compared to 19% of fourth-grade students (Mullis et al., 2016). Although the percentages in the "like learning mathematics" category were similar across fourth and eighth grade, the percentage of students in the "very much like learning mathematics" category dropped from 46% in fourth grade to 22% in eighth grade (Mullis et al., 2016).

Mathematical Attitudes

Educators have ingrained the concept of attitude into their everyday vernacular. The development of the construct of attitude, as it applies to mathematics education, is essential to understand and interpret research findings in the field. Aiken and Dreger (1961) were among the first researchers to spend significant time researching students' attitudes toward mathematics.

From a historical standpoint, it is interesting to note that Aiken and Dreger (1961) analyzed paragraphs written by 310 college students, describing their attitudes toward mathematics, and reduced that work to an attitude scale containing a dichotomy of 10 items representing positive attitudes and 10 items representing negative attitudes. Subsequently, much research has focused on establishing causal relationships between attitudes and performance and uncovering the macrovariables having the greatest impact on attitudes (Hannula et al., 2016; Zan & Di Martino, 2007).

As Zan and Di Martino (2007) noted, much of that research is contradictory and confusing due to a lack of careful attention to the construct of attitudes (i.e., the construct is being used differently across various research studies). Moreover, questionnaires and measurement scales used to judge students' attitudes are often chosen by others and sometimes irrelevant to students (Hannula et al., 2016). The integration of qualitative approaches in attitude research studies allows students to express what is most important to them while ignoring the irrelevant (Hannula et al., 2016).

Student Mathematics Attitudes and Learning

Aiken and Dreger's (1961) early work, together with the strong belief that attitudes play a crucial role in learning mathematics (Neale, 1969), resulted in several research studies on the topic. Multiple studies, syntheses of studies, and meta-analyses identify numerous macrovariables impacting students' attitudes toward mathematics or associate attitudes with performance (Aiken, 1976; Choi & Chang, 2011; Di Martinio & Zan, 2009; Hattie, 2009; Idil et al., 2016; Ma & Kishor, 1997; Mata et al., 2012; McLeod, 1992; Ruffell et al., 1998; Schofield, 1982; Wilkins & Ma, 2003).

Variables that impact students' attitudes toward mathematics or performance include teachers' attitudes toward mathematics, teachers' preparation, school climate, gender, parental educational levels, instructional techniques, motivation, and social support variables. Few, if any, studies focus on the day-to-day, real-time variables that impact students' attitudes toward mathematics. This study responded to the call for the development of qualitative approaches for measuring students' attitudes toward mathematics while identifying the origins of various attitude profiles (Hannula et al., 2016) in real time by testing a theoretical three-dimensional framework for attitudes toward mathematics.

Di Martino and Zan's Three-Dimensional Model for Attitude

Due to the lack of theoretical clarity on the construct of attitudes as it applies within mathematical research, Di Martino and Zan (2009) used a grounded theory approach based on the analysis of students' essays to develop a theoretical three-dimensional model for attitudes toward mathematics (see Figure 1). They drew upon the origins of attitudes in social psychology; Mandler's (1984) theory of emotions; McLeod's (1992) work on emotions, beliefs, and attitudes; and the addition of the construct of value in DeBellis and Goldin's (1999) work.

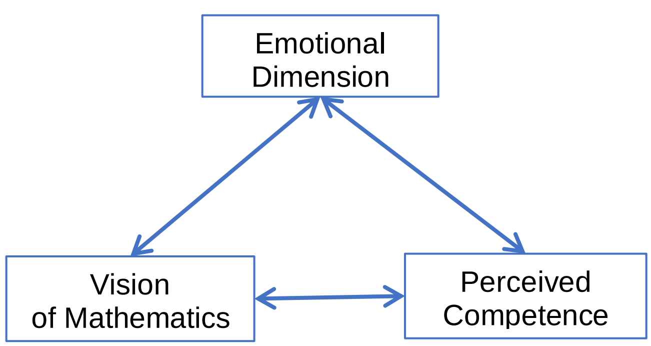
Di Martino and Zan (2009) suggested attitude toward mathematics can be considered negative when at least one component of a dimension is negative. The emotional dimension contains two components—positive and negative. The vision of mathematics dimension contains a relational component (positive) and an instrumental component (negative). Relational understanding refers to the ability to see mathematics as connections within and across ideas and extends to understanding why those ideas and procedures work. An instrumental understanding of mathematics refers to viewing mathematics as a set of procedures, algorithms, and rules to be followed with little focus on understanding the origins of the procedures or why they work. The perceived competence dimension contains a high (positive) and a low (negative) component. The two components of each of the three dimensions result in eight possible attitude profiles:

1. positive, relational (positive), high (positive) (PRH),
2. positive, relational (positive), low (negative) (PRL),
3. positive, instrumental (negative), high (positive) (PIH),
4. positive, instrumental (negative), low (negative) (PIL),
5. negative, relational (positive), high (positive) (NRH),
6. negative, relational (positive), low (negative) (NRL),
7. negative, instrumental (negative), high (positive) (NIH), and
8. negative, instrumental (negative), low (negative) (NIL).

As an instrumental understanding of mathematics and low perceived competence are considered negative attributes, there is only one profile, PRH, that contains no negative components.

Figure 1

Di Martino and Zan's Three-Dimensional Model for Attitude



Note. Figure 1 illustrates the interconnected dimensions of Di Martino and Zan’s three-dimensional model for attitude.

Even though each dimension of Di Martino and Zan's (2009) framework contains a dichotomy, their work represents an important shift from viewing attitudes toward mathematics as solely negative or positive, as the model allows educators to effectively diagnose which dimension of a students' attitude profile is negative and develop appropriate intervention techniques.

Di Martino and Zan (2009) described attitude as a construct used by observers to understand the intentional actions of an individual rather than an inherent quality of an individual. McLeod (1992) stated belief and attitudes are relatively stable over time. Consistent with these findings, Wilkins and Ma (2003) found little change in students' notions of the nature of mathematics from seventh grade to secondary school. However, Di Martino and Zan's work indicated it may never be too late to change students' attitudes toward mathematics.

Capturing Students' Mathematics Attitudes in Real Time

This study added to the body of literature calling for qualitative approaches to measuring students' attitudes toward mathematics (Di Martino & Zan, 2009; McLeod, 1992) while describing the origins of various attitude profiles (Hannula et al., 2016) as outlined in Di Martino and Zan's (2009) framework. Using the experience sampling method (ESM), students recorded in real time the aspects of the classroom environment that impacted their attitudes toward mathematics as aligned to Di Martino and Zan's framework.

Larson and Csikszentmihalyi (1983) described the ESM as "a research procedure for studying what people do, feel, and think during their daily lives" (p. 21). In this study, students, while in mathematics classes, received signals through electronic devices that triggered them to answer a series of questions related to each of the dimensions of Di Martino and Zan's (2009) framework. The random signals captured a representative set of moments in time in the mathematics classroom where students recorded, in their voices, how they thought and felt about mathematics, and what happened in the classroom that was influencing those thoughts.

The ecological validity of questionnaires and interviews is often doubted as the data are collected outside the environment from the context referenced (Larson & Csikszentmihalyi, 1983). The encoding specificity principle suggested episodic memory is enhanced when information available at the time of encoding is also available at the time of decoding (Tulving & Thomson, 1973). Using the ESM allowed for the stability of conditions present during the encoding and decoding process. As students completed their journal protocols in real time, which were aligned to Di Martino and Zan's (2009) framework (see Appendix A), the location of the settings, classroom conditions, and likely the mental and physical states of the students remained constant. Moreover, the use of the ESM, compared to diary methods, mitigates differences between the historical reality and a student's later interpretation of that reality.

Significance of This Study

This mixed-methods phenomenological study explored a set of qualitative research questions aimed at understanding Di Martino and Zan's (2009) framework, the ways students experiencing their first middle-school mathematics course describe the real-time classroom origins that impact their attitude profiles, and how participating in the ESM study impacted their awareness of their attitudes toward mathematics. The use of the ESM resulted in detailed, rich descriptions of real-time classroom factors impacting various attitude profiles. Furthermore, descriptive statistics and frequency analysis were used to determine the extent to which students' responses fell within Di Martino and Zan's framework, the extent to which students' attitudes were stable throughout the study, and the distribution of students within each attitude profile disaggregated by school-wide performance levels in mathematics.

Results of this study can aid teachers in identifying the various classroom factors impacting students' attitudes toward mathematics. For example, this study showed tests and quizzes were the dominant classroom activities contributing to students' negative emotional states toward mathematics. Furthermore, even though students in all eight attitude profiles tended to exhibit positive self-perceptions as learners of mathematics, their perceived competence was highly linked to the successes they experienced.

There is a lack of substantial evidence that the mandates of large-scale annual assessments have resulted in sustained educational improvements (Ravitch, 2014). These large-scale assessments have created an overreliance on testing within the classroom that may be counterproductive to the challenges outlined herein. Results of this study can aid policymakers and educators in reshaping curriculum, pedagogy, and assessment in ways that facilitate a larger number of students developing positive attitudes toward mathematics, which in turn can help mitigate concerns about STEM worker shortages based upon projected future demands.

Literature Review

The concept of attitudes has its origins in social psychology, and several authors in the early 1900s defined social psychology as the scientific study of attitudes (as cited in Allport, 1935). The chronological development of the construct of attitude is particularly important to the methodology applied in this study. Throughout the early part of the 20th century, research focused on conducting robust quantitative procedures, including multivariate analysis studies, to determine which variables impacted attitudes toward mathematics and the extent to which these variables predicted performance.

These procedures allowed researchers to disentangle individual and group effects on response variables while accounting for variation both within and across levels, such as classrooms and classrooms within schools. However, even equipped with robust statistical techniques, conflicting findings have left researchers dissatisfied. Di Martino and Zan (2009) postulated the conflicting findings are due to a lack of consensus and careful development of the theoretical construct of attitudes. This lack of consensus has resulted in a shift in the call in the literature to focus on qualitative studies aimed at the development of the construct of attitude as it applies within mathematics (Di Martino & Zan, 2009) and uncovering the origins of various attitude profiles (Hannula et al., 2016).

Early Development of Attitudes

Psychologist Herbert Spenser used the concept of attitude in 1862 to refer to both mental and motor attitudes (Allport, 1935). Subsequently, Thomas and Znaniecki (1918) popularized the term attitude within social psychology and used the term to describe both responses and potential responses in a social world directed toward an object (Allport, 1935). Dewey (1922) suggested the common use of the terms attitude and disposition referred to something latent that is activated by a positive stimulus.

Allport (1935) examined common threads in several definitions to conclude "an attitude is a mental and neural state of readiness, organized through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related" (p. 803). Allport (1935) noted the inherent difficulty of defining attitudes and suggested attitudes should include habits and only be considered approximations of true attitudes, as the mental state of an individual at the time an attitude scale is completed might differ from the individual's true state. This is consistent with Tulving and Thomson's (1973) encoding specificity principle and mitigated using the ESM in this study.

Early Origins of Attitudes and Mathematical Achievement

Aiken and Dreger (1961) were among the first researchers to study the relationship between attitudes toward mathematics and achievement measures, personality measures, and experiences with mathematics. They called for further studies focused on attitudes and mathematical achievement. In 1976, Aiken published his second synthesis of research on attitudes toward mathematics, noting more dissertations and articles on the topic had appeared between 1970 and 1975 than in the previous decade.

His synthesis pointed to several research studies indicating low but significant positive correlations between attitudes and achievement at all levels of schooling, with additional studies highlighting the importance of late elementary and early junior high grades on the development of attitudes toward mathematics. Additional studies showed attitudes toward mathematics and achievement were significantly related to a sense of personal worth, a sense of responsibility, high social standards, motivation, and decreases in the tendency to withdraw (Aiken, 1976).

However, Aiken (1976) criticized the use of "homegrown" attitude scales and the lack of proper statistical techniques used in a variety of the studies analyzed. The various instruments researchers have continued to use to measure attitudes toward mathematics remain criticized for a variety of reasons including: (a) questionnaire items might not reflect what is important for participants, (b) attitudes are treated as only positive or negative, (c) causal relationships are often inferred, and (d) there is little attention devoted to the factors regarding behaviors, beliefs, and emotions from which the construct of attitude is developed (Di Martino & Zan, 2009; McLeod, 1992). Aiken concluded attitudes toward mathematics are dependent upon course content, instructional methods, parental and peer support, interactions between students and teachers, and the methods measuring changes.

While researchers were focused on quantitative studies positioned within a positivistic epistemology seeking to establish causal relationships between attitudes and performance, a new paradigm began to emerge with influences from developmental psychology and cognitive psychology. Neale's (1969) study concluded attitudes toward mathematics only had a slight causal influence on learning mathematics; however, the study highlighted that schools, as institutions, can overpower the influences of attitudes toward learning, but the system needs to be redesigned to allow for more individualism. As the National Research Council (NRC) and the National Council of Teachers of Mathematics (NCTM) sought to reform mathematics curricula by placing a greater emphasis on process standards, researchers began to explore beliefs, emotions, and attitudes toward mathematics through qualitative approaches (McLeod, 1992).

Attitudes and the Affective Domain

Early studies on attitudes and mathematics focused on quantitative approaches and establishing causal relationships between attitudes and performance. Noting discontent in the literature with these traditional approaches, due to the lack of strong theoretical foundations, McLeod (1992) applied Mandler's (1984) theory to organize research on affect into three areas: (a) students hold beliefs about mathematics and themselves, (b) students experience both positive and negative emotions while learning mathematics, and (c) students develop positive or negative attitudes toward mathematics as they encounter similar situations over time.

The progression from beliefs, attitudes, and emotions involves an increase in affective involvement and intensity of response and a decrease in cognitive involvement and response stability (McLeod, 1992). The willingness to engage in the complexity introduced by considering including affective factors in the study of mathematical attitudes creates momentum to work on theoretical frameworks for analyzing the construct of attitude as it applies in mathematics and the greater use of qualitative techniques to link cognitive factors to the affective domain.

As an example, Hannula (2002), who believed Mandler's (1984) theory was too simplistic to capture less intense emotional states, developed an analytical framework for analyzing attitudes and changes in attitudes. The framework involved four aspects of attitudes and the psychology of emotions: (a) emotions aroused in the situation, (b) emotions associated with stimuli, (c) expected consequences, and (d) relating situations to personal values (Hannula, 2002). Hannula illustrated the framework through an ethnographic case study by following a student over 6 months and documenting the change in the student's attitude from negative to positive.

As theoretical models developed, researchers studied the variables impacting attitudes, beliefs, and performance in mathematics through quantitative studies. These studies, together with the qualitative work, enhanced researchers' understandings of students' attitudes toward mathematics. Before shifting the focus to the development of Di Martino and Zan's (2009) theoretical model for attitudes, it is important to look at some of the variables impacting attitudes, beliefs, and performance.

Variables Impacting Attitudes, Beliefs, and Performance

Numerous studies have examined the impact of mathematical attitudes on performance and the various variables impacting attitudes (Ma & Kishor, 1997). Research findings have varied, and a challenge in making meaningful generalizations stems from the lack of consistent use of definitions and constructs. Additionally, numerous variables impacting attitudes, beliefs, and performance have been studied, including (a) the relationship between attitudes and achievement, (b) gender, (c) grade level, (d) the time when tests are administered, (e) teachers' attitudes, (f) parents' attitudes, (g) school climate, (h) class level, (i) educational aspirations, (j) parental education level, (k) students' backgrounds, (l) motivation, (m) social supports, (n) instructional techniques, and (o) teacher knowledge.

Many of these variables are the types of variables referred to in this study as macrovariables. This study aimed to focus on microvariables—those variables that occur within the classroom on a day-to-day basis that have the potential to impact attitudes and that teachers can control. See Andrusiak (2018) for a detailed summary of many of these studies covering macrovariables. A couple of important meta-analyses have been developed from the large number of studies focused on the relationships between attitudes, beliefs, and performance (Hattie, 2009; Ma &Kishor, 1997).

Due to the lack of consensus in the literature about the relationship between attitudes toward mathematics and performance in mathematics, Ma and Kishor (1997) performed a meta-analysis of 113 studies. Their meta-analysis revealed four key findings for the attitudes in mathematics and achievement in mathematics relationship:

1. The overall mean effect size, .12, was statistically significant but not large enough to have practical implications for educational purposes.

2. Grade, ethnicity, sample selection, sample size, and date of publication had reliable effects on the relationship.
3. Gender did not have reliable effects on the relationship.
4. There was no reliable evidence of the interaction effects among gender, grade, and ethnicity on the relationship.

Hattie's (2009) meta-analysis of 288 studies on attitudes toward mathematics and science on performance resulted in an effect size of .36, leading Hattie to conclude that while developing positive attitudes toward school and subjects is desirable, having a positive attitude is also a correlate of achievement. Ma and Kishor (1997) suggested the small effect size for the relationship between attitudes and achievement was likely due to attitude measures at the time being crude approximations of true attitudes, measurement techniques needed to be refined, and previous researchers likely omitted indirect factors impacting attitudes.

Attitude as a Construct to Understand Actions

Due to the lack of theoretical clarity on the construct of attitude as it applies in mathematics and conflicting results on associations between attitudes and achievement in mathematics, Di Martino and Zan (2003) suggested researchers use multiple approaches when assessing attitudes. Importantly, they suggested researchers shift their focus from a normative approach to an interpretive approach where attitude is used as a construct by the observer to understand the intentional actions of an individual rather than an inherent quality of an individual (Di Martino & Zan, 2003). Furthermore, Di Martino and Zan (2009) suggested researchers embrace multiple definitions as different research problems call for different definitions.

Di Martino and Zan (2009) applied a grounded theory approach when analyzing nearly 1,500 autobiographical essays to discover a set of categories that fit how students described their relationships with mathematics. Data analysis revealed only 2.1% of the essays failed to refer to at least one of the dimensions in Figure 1 (Di Martino & Zan, 2009).

Summary

Attitude has its origins in social psychology. Early definitions focused on the cognitive aspect of attitudes and the preparation for a response to stimuli. Initial queries into attitudes in mathematics focused on establishing causal relationships between attitudes and performance in mathematics and identifying which variables had the greatest impact on performance (Andrusiak, 2018; Hattie, 2009; Ma &Kishor, 1997).

As inconsistent results developed across quantitative studies, mathematicians theorized the differing results were due to the varying treatment of the construct of attitudes. When the National Research Council and the National Council of Teachers of Mathematics placed a greater emphasis on process standards and affective domains in mathematics, researchers turned to qualitative approaches to develop theoretical models for the study of attitudes as they applied to mathematics education. Such constructs and models involved the addition of values, beliefs, and emotions together with cognitive components. Di Martino and Zan (2009) suggested attitudes should be a construct used by researchers to understand the intentional actions of an individual rather than an inherent quality of the individual and that varying definitions fit varying research agendas.

Although comparing results across studies is complicated by different uses of the construct of attitudes, researchers have identified numerous macrovariables that impact attitudes, beliefs, and performance in mathematics (Andrusiak, 2018; Hattie, 2009; Ma &Kishor, 1997). Furthermore, Hattie's (2009) meta-analysis suggested attitudes are associated with performance. Various studies seem to indicate the transition from elementary school to middle school is an important time in attitude formation (Mullis et al., 2016). Moreover, Mullis et al. (2016) indicated attitudes tend to decline from fourth to eighth grade. Although McLeod (1992) and Wilkins and Ma (2003) indicated attitudes remain relatively stable over time, Di Martino and Zan's work (2009) suggested it may never be too late to change students' attitudes toward mathematics.

Over time, various criticisms occurred in the literature regarding attitude studies as they applied to mathematics. Some of these concerns include the varying use of the construct of attitude, measuring attitudes with Likert scales and questionnaires containing items that may be irrelevant for students, and measuring attitudes outside the context the measurement tools reference, which results in approximate attitudes versus true attitudes.

Much of the new research on attitudes toward mathematics involves the use of qualitative methods. This study mitigated many of the concerns outlined by being intentionally clear about testing Di Martino and Zan's (2009) theoretical framework for the construct of attitudes and using the ESM to mitigate memory retrieval issues while having students fill out journal protocols while in the context they referenced. These journal protocols also contained open-response items so students could record what was relevant to them in their words. Moreover, this study responded to the call to determine the origins of various attitude profiles (Hannula et al., 2016) while filling a gap in the literature by focusing on the microvariables teachers can control on a day-to-day basis that impact students' attitudes toward mathematics.

Methodology

Students' self-beliefs about mathematics have an impact on their life decisions, educational choices, and ultimately their career pathways (OECD, 2013). Successive TIMSS show strong positive relationships between mathematical achievement and students' attitudes toward mathematics (Mullis et al., 2016) as does Hattie's (2009) meta-analysis of 288 studies. Additionally, Mullis et al. (2016) indicated students' attitudes toward mathematics tend to decline from fourth to eighth grade, and approximately twice the percentage of eighth-grade students report disliking mathematics compared to fourth-grade students on each successive TIMSS from 1995 to 2015. Studies as far back as Aiken's (1976) synthesis indicate the transition period from elementary to middle school is particularly important to the formation of students' attitudes toward mathematics.

Numerous studies and meta-analyses identify or cite macrovariables that impact students' attitudes toward mathematics and establish associations between attitudes and performance (Aiken, 1976; Choi & Chang, 2011; Di Martino & Zan, 2009; Hattie, 2009; Idil et al., 2016; Ma & Kishor, 1997; Mata et al., 2012; McLeod, 1992; Ruffell et al., 1998; Schofield, 1982; Wilkins & Ma, 2003). Traditional studies positioned in a positivistic epistemology have resulted in conflicting results, which have led mathematics educational researchers to theorize the conflicting results were caused by the lack of careful attention devoted to the construct of attitudes. Thus, a new call emerged in the literature for qualitative studies aimed at developing theoretical frameworks for attitudes toward mathematics.

Di Martino and Zan's (2009) framework ties many elements from the literature together while seeking to avoid the traditional positive-negative dichotomy applied to attitudes by using an emotional dimension, perceived competence dimension, and vision of mathematics dimension. These three dimensions result in eight potential attitude profiles. Hannula et al. (2016) called for research studies aimed at uncovering the origins of various attitude profiles.

Although a solid ontological argument can be made for students' piecing together fragments of various situations to form an approximate attitude profile, the use of the ESM allows students to describe, in their voices, the real-time classroom factors impacting their attitudes toward mathematics. As I sought to describe the origins contributing to various attitude profiles as students experienced their first middle-school mathematics course, a common phenomenon, I used a mixed-methods, multiple-case phenomenological study design. Di Martino and Zan's (2009) shift to using attitude as a construct for the observer to understand the intentional actions of an individual, rather than an inherent quality of an individual, is consistent with Moustakas's (1994) transcendental phenomenology, which focuses more on the descriptions of participants than the researchers' interpretations (Creswell, 2013).

Although attitudes have been associated with performance (Hattie, 2009), conflicting results from quantitative studies are well documented in the literature, including the stability of attitudes over time; thus, I preferred a mixed-methods approach. Such an approach is appropriate when the use of only a quantitative or a qualitative method is insufficient for answering the research questions and understanding the problem (Creswell, 2014). Descriptive statistics gave perspective to the present study and established context while allowing for the analysis of the extent to which students' responses fell within Di Martino and Zan's (2009) framework, the stability of attitudes over time, and the distribution of attitude profiles across various performance levels.

Research Questions

The positioning of this study within a postpositivistic epistemology was ideal for taking a scientific approach to answering the research questions. Rather than investigating a single reality, this study integrated logical and empirically oriented theories that valued multiple perspectives to assess the following research questions (Creswell, 2014):

- In what ways do students describe the real-time classroom origins of their emotional relationship with mathematics, their vision of mathematics, and their perceived competence with mathematics?
- What are the real-time classroom factors or origins contributing to the eight attitude profiles as defined in Di Martino and Zan's (2009) three-dimensional framework?
- In what ways do students describe their experiences participating in the study, the stability of their attitudes over time, and the impact of the ESM on their awareness of the real-time classroom factors impacting their attitudes toward mathematics?
- To what extent do students' responses to the ESM journal fall within Di Martino and Zan's (2009) framework?
- To what extent are students' attitude profiles stable throughout the study?
- Are there statistically significant differences in the distribution of students within each attitude profile across school performance levels?

Furthermore, the multiple perspectives provided by the methodology employed in this study aided in expressing a universal essence for each attitude profile without using a reductionist research method.

Research Design

I used a mixed-methods multiple case study phenomenological design by using the ESM, journal protocols, interviews, and descriptive statistics and frequency analysis. Creswell's (2013) data collection circle formed the basis for the research design. The circle represents a series of interrelated tasks that qualitative researchers engage in to answer emerging research questions. Moreover, the circle represents the multiple phases of research design and data collection that extend beyond conducting interviews and making observations (Creswell, 2013). These phases included: (a) locating the sites and individuals, (b) gaining access to the sites, (c) establishing rapport, (d) purposefully sampling, (e) collecting data, (f) recording information, (g) resolving field issues, and (h) storing data.

Sampling

I used maximum variation sampling to select participants based on schoolwide mathematics performance. Maximum variation sampling is a purposeful sampling technique that allows the researcher to maximize differences at the beginning of the study to increase the likelihood the study will discover and reflect multiple perspectives (Creswell, 2013). This was an ideal method for this study, resulting in detail-rich descriptions of each of the eight attitude profiles in Di Martino and Zan's (2009) framework through the discovery of common themes while also allowing for the analysis of the distribution of attitude profiles across performance levels.

Table 1

Distribution of Study Participants

School	ESM Study Sixth Grade	ESM Study Seventh Grade	Interviews Sixth Grade	Interviews Seventh Grade
WTMS				
Teacher 1—Block A				
Group 1		4		1
Group 2		4		
Group 3		5		
Teacher 2—Block A				
Group 1		6		
Group 2		7		1
Group 3		6		2
HTMS				
Teacher 1—Block A				
Group 1	2			
Group 2	2			
Teacher 1—Block B				
Group 1	3			
Teacher 1—Block C				
Group 1	4			
Group 2	3		2	
Group 3	3		1	
Teacher 1—Block D				
Group 1	1			
MTMS				
Teacher 1—Block A				
Group 1	5			
Group 2	5		1	
Group 3	4			
Teacher 1—Block B				
Group 1	4		2	
Group 2	4			
Group 3	3		1	

Note. WTMS, HTMS, MTMS = the researcher's coding for low-, middle-, and high-performing schools, respectively. ESM = experience sampling method.

I ranked all middle schools in New Hampshire, my home state, according to the percentage of students meeting or exceeding the achievement levels on the statewide annual mathematics assessments. I identified low-, middle-, and high-performing schools by which third of the ranking they resided, respectively. As this study involved extensive classroom time, I was not able to randomly select schools for participation. I contacted schools within each performance level until I identified one middle school from each performance level to participate in the study. The three middle schools that participated were coded as WTMS, HTMS, and MTMS, representing the low-, middle-, and high-performing schools, respectively. Coding protected the identity of the schools.

The common phenomenon for participants in the study was students were experiencing their first middle school mathematics class. Since different middle schools begin at different grade levels, participants were either sixth- or seventh-grade students. A total of 75 students participated in the ESM study. After the ESM study, I randomly selected four students from each school performance level to be interviewed from all possible students consenting to interviews. One selected student from the middle-performing school did not show up to class on the day of interviews. Table 1 shows the disaggregation of the 75 students who participated in the ESM study and 11 students who participated in the interviews by schools, teachers, blocks, and groups. I randomly divided the students in each class into three groups as described in the next section.

Data Collection

I collected data through journals, interviews, and final study reflections. Prior to administering the ESM, I met with teacher and student participants to review the purpose of the study and the ESM protocols, including semantic scales, and to test signaling methods. Students assigned captains and co-captains to watch for signals. They also collected journal packets, sealed packets, and brought them to the main office. Students viewed their roles as "secret agents" uncovering the classroom factors that directly impacted their attitudes toward mathematics. Their perception of their roles helped students create a sense of empowerment and responsibility for data collection.

ESM Data Collection

The student ESM protocol (see Appendix A) served as the main data collection tool in the study. I administered the ESM at one random time during the beginning, middle, and end of mathematics class over 3 consecutive days during the first, second, and third month of the study at each participating school and class. I divided each class into three groups.

On each day of the study, I randomly assigned each group a different page of the protocol to complete at each signal. Each page corresponded to one dimension of Di Martino and Zan's (2009) framework. I assigned a unique page to each group at each signaling time. This allowed each signaling time to capture responses aligned to each dimension of Di Martino and Zan's framework while being able to generate a complete attitude profile for each student at the end of each class due to covering all three dimensions.

The random assignment introduced novelty and captured students' attention. Moreover, this design empowered students as they understood their unique responses were together contributing to the data collection process. Table 2 illustrates a sample ESM signaling schedule used on one day of the study.

Table 1

ESM Signaling Schedule

	ESM signaling schedule					
	Group 1		Group 2		Group 3	
Time Block	Journal	Time	Journal	Time	Journal	Time
8:10 – 8:15 A.M.	Transition Time					
8:15 – 8:30 A.M.	3	8:29	2	8:28	1	8:24
8:30 – 8:35 A.M.	Transition Time					
8:35 – 8:50 A.M.	1	8:45	3	8:36	2	8:46
8:50 – 8:55 A.M.	Transition Time					
8:55 – 9:10 A.M.	2	9:00	1	9:02	3	9:02
9:10 – 9:15 A.M.	Transition Time					

Note. WTMS M_2D_2 = the researcher's coding for the low-performing school and month 2 and day 2 of the study. ESM = experience sampling method.

I individually coded a total of 171 packets by teacher, month, day, block, and group and organized them to the randomly generated ESM signaling schedules. As illustrated in Table 3, I developed a total of 63 ESM signal schedules and captured 477 random classroom moments over the course of the study. In total, I collected 574 journals. Of these, 50 resulted in incomplete attitude profiles on students as signals were missed for a variety of reasons (e.g., student was in the bathroom or at the nurse). Weather-related events impacted the scheduling of days, and two schools completed eight of the nine scheduled days as interviews had already been scheduled, and it was obvious that saturation of themes had been achieved.

Table 3

ESM Protocols and Random Moments Captured

School	Number of teachers	Number of blocks	Number of ESM protocols per day	Random moments captured per day[a]	Days completing ESM study	Number of ESM Protocols developed	Number of random moments captured
WTMS	2	1	1	9	8	9	144
HTMS	1	4	4	21	9	36	189
MTMS	1	2	2	18	8	18	144
Total						63	477

Note. WTMS, HTMS, MTMS = the researcher's coding for low-, middle-, and high-performing schools, respectively. ESM = experience sampling method.

[a]The number of random moments captured per day was dependent upon the number of classes participating and the number of groups per class or block. For example, HTMS had four blocks participating with two groups in A block, one group in B block, three groups in C block, and one group in D block. Each group received three signals per class, resulting in a total of 21 random moments captured per day. Each journal collected represented three random moments in time, and multiple students were in the same group. The total number of journals collected was dependent upon the total number of study days and the number of students participating per day. Not every student who participated in the study was present for each day of the study (e.g., not in school due to being ill).

Signaling techniques varied by school dependent upon available technology and district technology policies. I presented two options to schools: (a) receive signals through individual cell phones via text messages and (b) receive signals through an online polling software via an iPad or Chromebook. In both cases, I could monitor the progress of the signals. Table 4 details the signaling procedure used at each school.

Table 4

ESM Signaling Methods at Each Participating School

School	ESM Signaling Method
WTMS	▪ Signals sent through an on-line polling website remotely activated by researcher ▪ Students did not interact with website—only used for receiving signals ▪ Each signal activated according to signaling schedule ▪ Signals activated for one minute ▪ 1 Chromebook per group each directed to a different URL ▪ 1 captain and 1 co-captain per group watching for signals ▪ Captain and co-captain signaled classmates
HTMS	▪ Signals sent as pre-programmed text messages through a marketing app ▪ Parents and guardians notified of number generating text messages ▪ Students did not interact with app—only used for receiving signals ▪ Each signal activated according to signaling schedule ▪ Each group had at least one student carrying a cell phone ▪ Students carrying cell phones assigned as co-captains watching for signals ▪ Co-captains signaled classmates
MTMS	▪ Signals sent through an on-line polling website remotely activated by researcher ▪ Each signal activated according to signaling schedules ▪ Signals activated for one minute ▪ 1 iPad per student with each group directed to a different URL

Note. WTMS, HTMS, MTMS = the researcher's coding for low-, middle-, and high-performing schools, respectively. ESM = experience sampling method.

Interviews

Subsequent to the ESM study, I interviewed students and asked about their experiences participating in the ESM study, the stability of their attitudes, and how they felt about doing mathematics. I recorded all interviews and transcribed them verbatim; students provided their unique student identifiers so their interviews could be matched with their data from the ESM study. Appendix B contains the student interview protocol.

Final Reflection

On the final day of the study at each school, I asked students to complete a final reflection. This reflection gave students a last opportunity to capture anything relevant to them regarding how they were thinking and feeling about mathematics and the classroom factors contributing to their attitudes toward mathematics. This reflection also provided another opportunity to test Di Martino and Zan's (2009) framework.

Students provided their unique student identifiers so their reflections could be matched with their ESM data and interviews. The final reflection contained one open question asking students if there was anything additional they wanted me to know about their attitudes toward mathematics or relationships with mathematics.

Data Analysis

I created an Excel database to include all the information from the students' journal packets and associated schools, along with their final reflections. The database contained all 574 journal entries; I coded each entry, except for the 50 incomplete journals mentioned earlier, to 1 of the 8 attitude profiles based upon each student's complete journal protocols. I entered all data into the database.

The first set of questions from the ESM protocol (see Appendix A) resulted in the classification of a student's emotional dimension as positive or negative. The second set of questions resulted in the classification of a student's perceived competence as high or low. The final set of questions resulted in the classification of a student's understanding of mathematics as relational or instrumental. Thus, each completed ESM journal resulted in an attitude profile aligned to Di Martino and Zan's (2009) framework. Students completed all three pages of the ESM journal protocol within a single class period, resulting in one attitude profile per student per class period. I created formulas within the database such that attitude profiles were automatically generated.

I assigned scores of 1, 2, 3, 4, or 5 from the low to high end of the emoticon scale and semantic scale for the emotional dimension and perceived competence dimension, respectively. I coded scores of 4 or 5 as positive. I coded all other scores as negative, including the neutral option. I coded the understanding of mathematics dimension I or R for instrumental (negative) or relational (positive), respectively. I designated positive scores as 1 and negative scores as 0. The neutral option proved useful for three reasons: (a) students perceived nothing was happening in the classroom at the time they received a signal, (b) a new topic had just been introduced and students had not decided how they thought and felt about the topic, and (c) students had not received feedback on work associated with the topic.

Some students unintentionally changed their unique student identifiers. In almost all cases, students could be positively identified from school-level information recorded such as school codes, teacher codes, blocks, or groups. In a few cases, IDs were so different that they were not reliably matched. This is reflected in one aspect of the data analysis, where the total number of students appeared to be 79 rather than 75.

Quantitative Analysis

I used descriptive statistics, frequency analysis, and chi-square tests to address the quantitative research questions focused on the extent to which students' responses to the ESM journal fell within Di Martino and Zan's (2009) framework, the extent to which attitude profiles were stable throughout the study, and the distribution of students within each attitude profile disaggregated by school performance.

Attitude Dimensions Distributions. I created frequency and relative frequency bar graphs to show the distribution of scores for all journal entries within each of the three attitude dimensions. I used box and whisker plots to display median scores and spread, and I used a divergent bar plot to compare the distributions.

Attitude Profiles Distributions. I treated each student's complete attitude profile from each ESM journal protocol as a separate data point, which allowed for the saturation of themes and the descriptions of each attitude profile. As each day of the study resulted in an attitude profile for each student, and students often changed attitude profiles, the collection of entries for a single student might spread about multiple piles. This variety of student profiles aided in analyzing the stability of attitudes. I created virtual piles for each of the eight attitude profiles, and pivot tables were used in Excel to create both frequency and relative frequency bar graphs displaying the number and proportion of entries within each attitude profile, respectively. Subsequently, I disaggregated the data by school performance level (low, middle, high) and used bar graphs and stacked bar graphs to display the information.

Chi-Square Tests. I performed chi-square tests using the disaggregated attitude profiles by school performance level and the chi-square goodness of fit test to look for statistically significant differences between low-, middle-, and high-performing schools within each attitude profile, assuming an equal distribution within the profile. Specifically, I treated each attitude profile as a sample of a population of the attitude profiles to test the null hypothesis that the sample comes from a population with equal proportions within each performance level. A chi-square test of homogeneity assumed each performance level represented a different population to test the null hypothesis that the distribution of attitude profiles is the same for each performance level.

Stability of Attitudes Distributions. I recorded the total number of attitude profiles each student exhibited and used pivot tables in Excel to help create frequency and relative frequency bar graphs to display the information. Subsequently, I disaggregated the number of attitude profiles per student by school performance level and used stacked bar graphs and bar graphs to display the information. I used box and whisker plots to compare the number of attitude changes for all students to those within each performance level.

Qualitative Analysis

The qualitative analysis began when I typed journal entries into the database and transcribed interviews verbatim. I entered data throughout the study when collected. This allowed me to employ Colaizzi's (1978) method, as I read journal entries and interviews multiple times, resulting in the coding of significant phrases and sentences. A holistic coding process produced eight broad coding themes that captured the sense of the entire data set.

I started by analyzing the first two qualitative research questions for each of the eight attitude profiles. I pulled the data for each attitude profile from the Excel database into NVivo. The eight broad categories identified in the holistic coding process served as the initial coding categories or nodes within the coding of the positive-relational-high (PRH) profile.

I chose the PRH profile as the first profile to code since all the dimensions are positive. Once I initially coded the PRH profile, I created subcodes to delineate negative, neutral, and positive attitudes within the broader codes. I then applied these categories across each attitude profile and added additional nodes as necessary.

The Likert scale and semantic scale resulted in natural magnitude coding. As the purpose was to examine real-time classroom factors impacting students' attitudes toward mathematics, the coding process had to be detailed enough to cover nearly all students' statements. Frequency coding allowed for the examination of differences between attitude profiles.

I coded a total of 3,988 statements across eight attitude profiles. Once coding was completed, I completed hierarchy charts to help illustrate similarities and differences across attitude profiles. This coding process, along with detailed notes, resulted in the creation of an overall essence for each theme along with a detailed description of the real-time classroom factors impacting students' attitudes toward mathematics in each attitude profile and the ways in which students described the real-time classroom origins of their emotional relationship with mathematics, their vision of mathematics, and their perceived competence with mathematics.

I followed a similar process with transcripts from students' interviews. I uploaded transcripts to NVivo. The initial themes developed during the holistic coding process and the themes that developed during the coding of each attitude profile served as the foundation for the themes for interviews. I then used structural coding to further develop a set of nodes addressing the last qualitative research question focusing on the ways students described their experiences participating in the study, the stability of their attitudes over time, and the impact of the ESM on their awareness of the real-time classroom factors impacting their attitudes toward mathematics.

Reliability, Validity, and Trustworthiness

The use of the ESM increased the ecological validity and reliability of the students' statements, compared to questionnaires and interviews alone, by capturing many representative moments in time. Moreover, the ESM mitigated typical memory retrieval issues by maintaining the stability of conditions during the encoding and decoding process.

The volume of student journal entries resulted in clear saturation of themes. The detailed, rich descriptions of the essence of each theme and each attitude profile description allowed for transferability (Creswell, 2014). I enhanced reliability by using students' journals and transcribing interviews verbatim. Questions on the ESM journal protocol have face validity with Di Martino and Zan's (2009) framework. Student interviews and final reflections provided an opportunity to use triangulation to corroborate the evidence that resulted in themes and descriptions. Furthermore, the descriptive statistics aided in developing a comprehensive picture of each attitude profile.

I maintained detailed notes during the coding process to ensure consistency of coding themes. Although it was possible for two students to provide different ratings on the emotional or perceived competence dimension for the same reasons, students' explanations made these cases evident. This resulted in detailed rules for coding.

Frequency analysis was necessary to delineate differences across attitude profiles but was not sufficient. I also analyzed statements across each journal protocol. The ESM signaling protocols were developed in such a way as to vary the attitude dimension each group was working on at a particular signal while capturing a complete attitude profile for each student by the end of the class. This design contributed to the validity and reliability of the study. As this was a real-time study, many students were concise with their explanations. However, multiple students captured the same moments in time. This allowed me to accurately piece together fragments of statements for a complete picture of what was happening in the classroom at any particular signaling time while also creating a type of interrater reliability among students. Looking across an individual's journal protocol and within the protocols capturing the same moments in time allowed for an accurate representation of the real-time classroom factors impacting students' attitudes toward mathematics.

Student captains and co-captains collected journal protocols, sealed envelopes, and delivered them to the main office, where they were picked up by me. It was evident that students took the process seriously and felt a sense of empowerment as they often sealed the envelops with phrases such as "Confidential" or "Top Secret" written across the seals.

Results

This mixed methods multiple-case phenomenological study filled a gap in the research by examining the real-time classroom origins, or microvariables, impacting students' attitudes toward mathematics. The study purposely targeted students experiencing their first middle-school mathematics course, as researchers suggest the transition from elementary to middle school is a pivotal time for attitude formation (Mullis et al., 2016; Wilkins & Ma, 2003). Since numerous researchers have indicated attitudes are associated with performance (Aiken, 1976; Choi & Chang, 2011; Di Martino & Zan, 2009; Hattie, 2009; Idil et al., 2016; Ma & Kishor, 1997; Mata et al., 2012; McLeod, 1992; Ruffell et al., 1998; Schofield, 1982; Wilkins & Ma, 2003), I used purposeful and maximum variation sampling to select a low-, middle-, and high-performing middle school in New Hampshire. This sampling technique allowed results to be disaggregated by performance level while looking for similarities within the attitude profiles across the performance levels to develop detailed-rich descriptions of the classroom origins of each attitude profile. The ESM captured 477 representative moments in time in the classroom as students completed journal protocols aligned to Di Martino and Zan's (2009) framework. This allowed for saturation of themes and the analysis of the stability of students' attitudes over time—an issue debated in the literature.

Quantitative Results

Quantitative analysis focused on the distribution of responses within each of the three attitude dimensions, the distribution of students within each attitude profile, attitude profile differences by performance level, and the stability of attitudes over time.

Attitude Dimension Distributions

Table 5 shows the frequency of scores within the emotional dimension and the perceived competence dimension for all journal responses during the study. As demonstrated by the data in Table 5, the distributions across the emotional dimension and perceived competence dimension were nearly identical with about 60% of responses in both dimensions being positive. Students tended to view their emotional states toward mathematics as favorable and generally maintained confidence in their abilities to do mathematics.

Table 5

Emotional and Perceived Competence Dimensions Scores

Attitude dimension	Strongly negative/ not smart (1)	Negative (2)	Neutral (3)	Positive (4)	Strongly positive/smart (5)
Emotional dimension	31	30	162	173	159
Perceived competence dimension	28	49	152	174	173

Note. Emotional dimensions scores were assigned based upon one of five emoticons selected by students and coded from 1 to 5 to represent a strongly negative to strongly positive emotional reaction toward mathematics at the time a signal was administered. Perceived competence dimension scores were based upon one of five blanks on a semantic scale that represented how students were feeling at the time a signal was administered from not smart to smart.

Table 6 shows the relative frequency of 536 journal responses classified as I or R for an instrumental or relational understanding of mathematics at the time a signal was administered. Although the sample should not be considered a random sample from the population, testing the hypothesis that students randomly selected a response equivalent to guessing results in z = 4.09 and p < .001. These data suggested students in the study were more likely to view mathematics as a series of steps and procedures than interrelated concepts and relationships.

Table 6

Understanding Mathematics Dimension

UMD	Relative Frequency
I	.59
R	.41

Note. UMD = Understanding Mathematics Dimension. I = Instrumental Understanding, R = Relational Understanding.

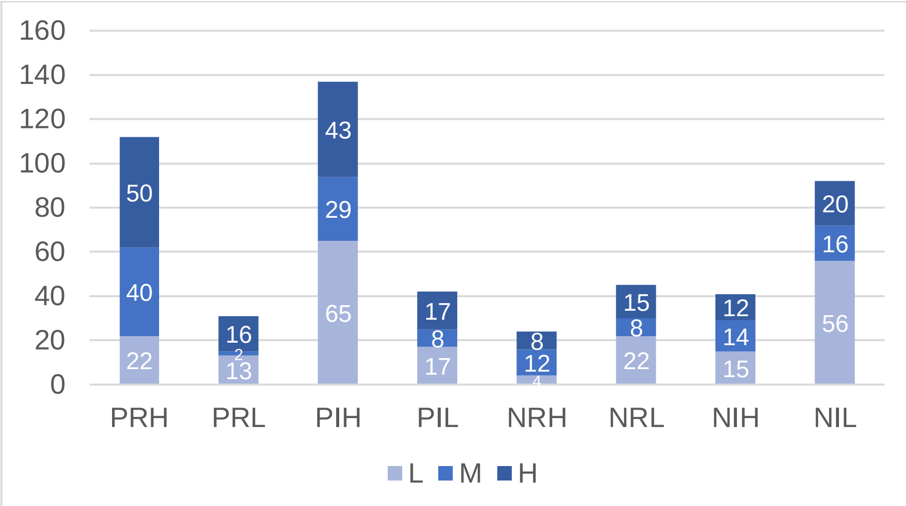
Attitude Profiles Distributions

I collected a total of 574 journals over the course of the study, with 524 resulting in attitude profiles; 50 journals were incomplete for various reasons. Figure 2 shows a stacked bar graph to illustrate the frequency of journal entries classified by attitude profile along with the data disaggregated by school-performance level. Even though the positive-relational-high (PRH), positive-instrumental-high (PIH), and negative-instrumental-low (NIL) profiles are the top three profiles of each performance level, these distributions reveal potential differences across performance levels.

The PRH profile is considered the most desirable profile, and the greatest number of students within that profile are from the high-performing schools. The greatest number of students in the least desirable profile, NIL, come from the low-performing schools. Moreover, the greatest number of students in the positive-instrumental-high (PIH) profile come from the low-performing schools, suggesting perhaps a greater focus needed in those schools on understanding connections across ideas and why mathematical procedures work. These results suggest possible statistically significant differences within attitude profiles across performance levels and possible associations between attitudes and performance.

Figure 2

Attitude Profile Stacked Bar Graph Disaggregated by Performance Level



Note. This figure shows the total journal entries for each attitude profile disaggregated by the school performance level. L = low performing; M = middle performing; H = high performing; PRH = positive-relational-high; PRL = positive-relational-low; PIH = positive-instrumental-high; PIL = positive-instrumental-low; NRH = negative-relational-high; NRL = negative-relational-low; NIH = negative-instrumental-high; NIL = negative-instrumental-low.

Chi-Square Tests

I used a chi-square goodness of fit test to determine if there were any statistically significant differences between performance levels within each attitude profile, assuming a theoretical equal distribution within the profiles. As indicated in Table 7, the proportion of students within the various performance levels was statistically significantly different from an equal distribution within the PRH, PRL, PIH, NRL, and NIL attitude profiles.

Table 7

Chi-Square Goodness of Fit Results

	Observed			Expected				
Profile	L	M	H	L	M	H	$\chi2$	*p*
PRH	22	40	50	36.96 (0.33)	36.96 (0.33)	36.96 (0.33)	10.91	.004
PRL	13	2	16	10.23 (0.33)	10.23 (0.33)	10.23 (0.33)	10.63	.005
PIH	65	29	43	45.21 (0.33)	45.21 (0.33)	45.21 (0.33)	14.58	<.001
PIL	17	8	17	13.86 (0.33)	13.86 (0.33)	13.86 (0.33)	3.90	.142
NRH	4	12	8	7.92 (0.33)	7.92 (0.33)	7.92 (0.33)	4.04	.132
NRL	22	8	15	14.85 (0.33)	14.85 (0.33)	14.85 (0.33)	6.60	.037
NIH	15	14	12	13.53 (0.33)	13.53 (0.33)	13.53 (0.33)	0.35	.840
NIL	56	16	20	30.36 (0.33)	30.36 (0.33)	30.36 (0.33)	31.98	<.001

Note. Numbers in parentheses, (), are expected proportions. Profile = Attitude Profile; L = low performing; M = middle performing; H = high performing; PRH = positive-relational-high; PRL = positive-relational-low; PIH = positive-instrumental-high; PIL = positive-instrumental-low; NRH = negative-relational-high; NRL = negative-relational-low; NIH = negative-instrumental-high; NIL = negative-instrumental-low.

Students from the low-performing school seem overrepresented in the PIH and NIL categories. Students from the high-performing school seem overrepresented in the PRH category. Moreover, considering the sample of all journal entries with an instrumental understanding of mathematics as a subset of the population of all students with an instrumental understanding of mathematics, a chi-square goodness of fit test revealed that the distribution of instrumental understanding profiles was not the same across performance levels, $\chi^2(3, N = 317) = 39.32, p < .001$. Similar results hold for the relational understanding category, $\chi^2(3, N = 219) = 6.00, p = .050$.

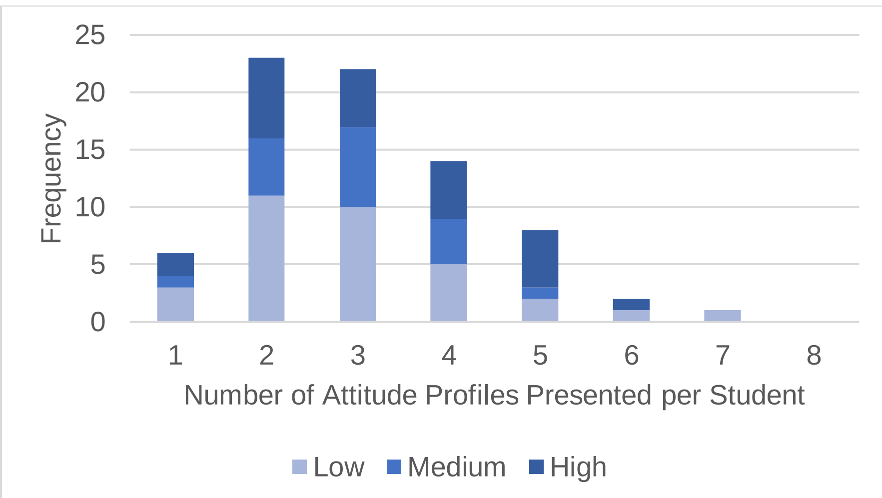
Considering each performance level as a subset of a different population of low-, middle, and high-performing schools, a chi-square test of homogeneity indicated the distribution of attitude profiles is not the same for each performance level, $\chi^2(14, N = 524) = 60.18, p < .001$.

Stability of Attitudes Distributions

As students submitted multiple ESM journals, I recorded the total number of attitude changes for each student. Figure 3 shows the frequency of attitude changes and disaggregated data by performance level.

Figure 3

Attitude Profile Changes Stacked Bar Graph Disaggregated by School-Performance Level



Note. This figure shows the number of attitude profile changes disaggregated by school performance level.

Students tended to exhibit between two and four attitude changes, with about 8% of students not changing their attitudes and approximately 14% of students presenting five or more attitude profiles. These results suggest students can and do change their attitudes toward mathematics and attitude profile changes do not appear to differ by performance level.

Qualitative Results

I have presented the qualitative results in the order they were described in the data analysis section: (a) eight broad coding themes that resulted from the analysis of all students' statements across all journals, (b) descriptions of the essence of the experience for each of the eight attitude profiles, and (c) a description of the essence of the experience based upon students' interviews addressing the third qualitative research question. I used textual and structural descriptions as students described what was happening in the mathematics classroom at the time a signal was administered, what they and their teacher were doing at that time, and how they were thinking and feeling about mathematics at that time.

Emergent Themes

Eight initial themes emerged from a holistic coding process of all students' statements: (1) technology and games, (2) novelty, (3) difficulty level, (4) success perception, (5) self-perception, (6) timely feedback, (7) student choice, and (8) speed. My analysis of these eight themes revealed several key observations: (a) the success or failure students experienced was linked to their self-perceptions as learners of mathematics, to their emotional states, and to their perceived competency; (b) students' perceptions of the difficulty of a task was connected to their success perceptions; (c) the mathematics classes in the study were highly structured, and the use of technology (e.g., Kahoot, Cool Math Games, Banazi) provided novelty to that structure; and (d) the 477 random moments in time captured rarely revealed moments when students were explaining their thinking or talking about mathematics. Detailed statements from students supporting these conclusions are provided in Andrusiak (2018).

Each theme provided insight into the entire data set and was subsequently expanded for the coding of each attitude profile. For example, even though student choice did not emerge from frequency coding, it was worth capturing, as marginalized voices are often overlooked. M10316 was a student in the study who exhibited the least desirable attitude profile, negative-instrumental-low (NIL), and only changed that profile once during the duration of the study. This student was one of the most articulate students in the study but often described feeling dumb or stupid despite capturing some of the most detailed descriptions of the mathematical content being covered at the time of a signal. M10316 provided deep insights into ways to shape attitudes toward desirable profiles through student choice when the student justified her attitude profile by saying, "In math, we don't really get to choose anything. [The teacher] just tells us what to do and doesn't give us a choice." The development of this theme of choice resulted in the addition of a student- and teacher-directed theme in the analysis of the attitude profiles.

Real-Time Origins of Attitude Profiles

I coded the positive-relational-high (PRH) attitude profile first, as all dimensions were positive. Subsequently, I expanded the themes that emerged from the PRH profile as necessary and added subcodes delineating negative, neutral, and positive attitudes within the broader codes. This allowed for the coding of almost all students' statements. While such a systematic approach is not normally taken in qualitative research, it was ideal in this study to reveal the real-time origins of each attitude profile and to capture differences across profiles. Although frequency coding played an important role, I also examined statements across each journal protocol and within the context of the real-time moments captured as multiple students captured the same moment in time.

I developed a table, showing the number of references coded to each node and subnode, to support each attitude profile description, a hierarchy chart to convey the relative frequency of references coded to each node and subnode through an area model, and a table of students' statements supporting the overall essence of the real-time classroom factors contributing to each attitude profile. All three of these elements are presented for the PRH profile and subsequently only the table of students' statements are presented in support of each profile description. See Andrusiak (2018) for further details.

As rich descriptions can lead to transferability in qualitative studies (Creswell, 2013), I wrote each attitude profile description mostly in present tense. Using present tense aids in capturing how students in each profile think and feel about mathematics and the classroom activities that contribute to each attitude profile. Past tense is used when referring to the number of references made.

Positive-Relational-High (PRH) Profile. Table 8 shows the number of nodes, subnodes, and references coded in the PRH profile.

Table 8

PRH Nodes, Subnodes, and References

Node	Number of references
Complexity	56
Challenged	10
Confused	6
Easy	29
Not challenged	7
Other	4
Connections	8
Content description	89
Corrections	15
Enjoyment	23
Negative	2
Neutral	1
Positive	20
Exit tickets	2
Group work	3
Homework	6
Journals	1
Multiple methods	3
Notes	22
Problem-solving strategies	1
Questioning teacher	1
Real-world connections	26
Review	3
Rules and steps	4
Self-perception as learner	125
Negative	2
Neutral	11
Positive	112
Speed	4
Other	4
Too fast	0
Too slow	0
Student directed	11
Success perception	90
Negative	0
Neutral	5
Positive	85

Node	Number of references
Teacher directed	25
Negative perception	0
Positive perception	6
Teacher helped	15
Teacher perception	12
Negative	0
Positive	12
Technology & games	90
Tests and quizzes	67
Test prep	21
Warm-ups	25
Working problems	44

As Andrusiak described (2018):

Students in the PRH attitude profile experience success, have positive self-perceptions as learners of mathematics, and demonstrate confidence in learning new concepts. These students are more likely to describe mathematics as being easy than challenging and they often express the desire to be challenged. Students in the PRH profile often give content descriptions of the material they are studying and have positive views of their teachers and their teachers' abilities to support their learning. These students enjoy learning new material and cite real-world connections and working with technology frequently. They do not describe the pace as being too fast. Students cited teacher-directed activities more than double student-directed activities and it is rare that signals captured moments where students described talking about mathematics. As these students have a relational understanding of mathematics, they do not often describe mathematics as a set of rules or steps. Moreover, these students describe making connections across ideas and find mathematics enjoyable. Some students, such as M10717 seem to indicate that they have an intrinsic relational understanding of mathematics as evident by statements such as, "She (the teacher) hasn't really done anything to make me understand math in that way that's just what I think." Technology and games, followed by test prep and quizzes, working problems, making real-world connections, and warm-ups dominate classroom activities. Low level activities are journals, exit tickets, questioning the teacher, and group work. (p. 123)

Table 9 shows selected student statements in support of the PRH profile description.

Table 9

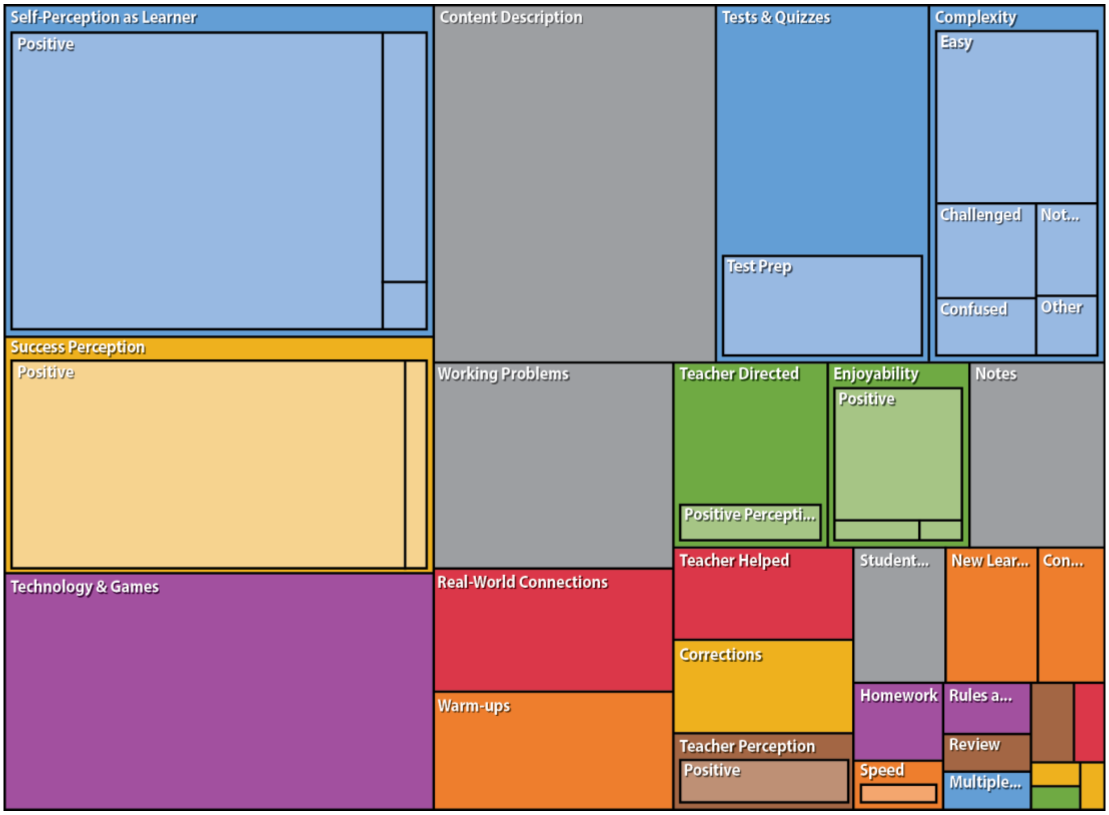
Select Students' Statements in Support of PRH Profile Description

Student	Statements
M00813	• I feel good so far because I understand everything so far.
D10516	• I feel I understand mathematics very well and am very good at it.
R51114	• I'm somewhat confused but I think I can figure it out.
F00105	• I am doing well on Khan an [*sic*] I'm being productive
L00515	• I'm getting all the answers fairly easily.
M10717	• I do great in math. I love doing math and reading about math. I'm reading "understanding Physics" by Isaac Asimov. I think I need a greater challenge because math class now is too easy.
E20619	• We are learning "Net" which is when a three dimensional shape is layed [*sic*] flat.
A20513	• I never liked math until sixth grade until I met [the teacher]. He brings joy to the classroom.
A40513	• He is helping us with knowing why an answer is an answer.
M20917	• I really like hard problems and [it] is fun for me to learn new math things
M10818	• We saw how much water was in our body.
F00115	• I have been playing Kahoot and doing well. This made me feel smart.
C10908	• I think this because different ideas make procedures work.
R51114	• Because math is basically strategy like a game you have to figure out. Everything in math is connected
M00215	• I am sort of having fun with this woo hoo!!!

Figure 4 shows the related hierarchy chart.

Figure 4

PRH Hierarchy Chart



Note. This figure shows a geometrical representation of the relative frequency of the number of references coded at each node and subnode in the PRH profile.

Positive-Relational-Low (PRL) Profile. As described in Andrusiak (2018):

> Students in the PRL attitude profile tend to have positive self-perceptions as mathematics learners and express a positive enjoyment of mathematics. However, these perceptions often were coded neutral due to the successes students' experienced. Out of the 31 journal protocols coded to the PRL category, only six of them fall into the category due to students selecting a one or two on the perceived competence scale as 25 of these journals contained a neutral rating in this category. PRL students often give content descriptions of what is happening in class and frequently work with real-world

connections which they view positively. They are more likely to cite teacher-directed activities than student-directed activities and are just as likely to have positive impressions as neutral impressions of teacher-directed activities. PRL students never express positive impressions of their teachers and never cite receiving help from their teachers. They most often cite technology and games, real-world connections, test and quizzes and test prep, working problems, and note taking as class activities. These students tend to have a positive outlook on technology and games but choose neutral categories if not experiencing success. They have a slightly more negative view of test prep than working on actual test and quizzes. PRL students tend to choose neutral or positive ratings for their perceived competence when working problems or taking notes. They rarely cite journals or warm-ups as activities. (pp. 127–128)

Table 10 shows selected student statements in support of the PRH profile description.

Table 10

Select Students' Statements in Support of PRL Profile Description

Student	Statements
E10114	▪ I feel good as a learner because I get it.
M10213	▪ Because I ♡ math.
E20619	▪ I feel smart like I know some stuff but I also don't know stuff and I don't feel super smart I just feel smart.
R00913	▪ Pretty good but I think I could work a little bit harder in some places.
S31005	▪ Going over examples of solving equations by multiplying/dividing.
K00616	▪ I am learning how to spend money for my life.
M20113	▪ Just doing the test no teacher for help yet.
S31005	▪ Because the teacher is explaining things more. [Note: It is plausible that this student has a negative impression of the teacher's explanation or that the student has low perceived competence since students in general did not understand the concept or experience success and the concept needed to be explained again.]

Student	Statements
C10908	• We are watching a video about statistics on Khan Academy. [Note: This statement was followed by the student saying, "I'm excited to learn." These statements were provided by the student as explanations of choosing a 5 on the emotional dimension.]
J10403	• For the pretest I got a 40% and I'm not feeling that good about it.
S10115	▪ Doing [g]ood on test.
H01216	▪ We are doing 3.4 exercises in the hard cover book. [Note: This statement paired with a neutral score on the perceived competence dimension.]

Positive-Instrumental-High (PIH) Profile. Table 11 shows selected student statements in support of the PIH profile description.

Table 11

Select Students' Statements in Support of PIH Profile Description

Student	Statements
D01015	▪ I feel good and able to complete the problems and apply logic to solve problems.
I10815	▪ I'm getting it and I'm getting them right.
C10908	▪ I am feeling pretty smart about linear equations (what we are learning about) because during the math homework I am getting almost all of the problems correct.
D01015	▪ I enjoy mathematics very much and hope to learn even more in the future.
R11216	▪ I want math to be more challenging. We're doing things from like 2 years ago.
R20613	▪ Its [*sic*] really easy what we are doing in class.
R20415	▪ Bored.
M11213	▪ I don't think so because I like math. I just think it can be boring, which has nothing to do with mathematics. So no I don't. [This was M11213's final reflection and the students' modal attitude profile was PIH.]
L10614	▪ We're going over how to put inequalities that are in 2 word sentences into 1 equation.
R20114	▪ He explained it very clearly and answered all of our questions.
I10815	▪ You can't go from a fraction to a percent you have to make a fraction a decimal. If you break the rules it won't work.
A00216	▪ I still think if you don't follow the assigned rules you will get a wrong answer!

Student	Statements
L01214	▪ I have passed in my test and I think that with all of the practice that I did good on it.
A00615	▪ I have continued the Banazi scenarios. It is fun! I am having fun with the real life scenarios.

As Andrusiak (2018) described:

Students in the PIH attitude profile tend to experience success, have positive self-perceptions as learners of mathematics, and describe mathematics as enjoyable. Similar to students in the PRH profile, these students express an interest in being challenged. Students' statements in this profile were much more likely to be coded to the easy category of the difficulty/complexity node than students in the PRH profile. It is also worth noting that no statements in the PRH profile mentioned being bored or that mathematics was boring; however, while not many, some statements in the PIH category are coded to this sub-node. Students in the PIH profile often give content descriptions of the material they are studying. In comparison to students in the PRH profile, PIH students are less likely to mention their perceptions of their teachers or cite their teachers helping them. However, when they do, they have positive views of their teachers and their abilities to support their learning. As these students have an instrumental understanding of mathematics, they often describe mathematics as a set of rules or steps. These descriptions often describe specific processes being applied in problems. Students in this profile never specifically mentioned making connections across ideas. The two dominating classroom activities are test and quizzes, including test prep, and working problems. Students have positive outlooks on both activities and rarely cite anything negative associated with testing or working problems. These activities are followed by, in terms of frequency of students' statements, technology use, working on warm-ups, and real-world applications. This is a slightly different order of activities in comparison to the PRH profile. Low level activities include reviewing material, homework, and group work. (pp. 133–134)

Positive-Instrumental-Low (PIL) Profile. Table 12 shows selected student statements in support of the PIL profile description.

Table 12

Select Students' Statements in Support of PIL Profile Description

Student	Statements
S01007	▪ I can do math.
K01118	▪ I feel ok but I don't think I got the answers correct.
A00216	▪ I got the correct answer on a surface area math problem and I didn't last time so that was exciting!
M30917	▪ It seems like it is easy.
J10214	▪ Ok. What we are about to do is kind of confusing.
M00813	▪ I don't really fully understand.
A00213	▪ I don't understand what we do sometimes.
M20619	▪ You can only do math following rules.
M11213	▪ We were adding and subtracting positive and negative numbers. There are rules, to add and subtract them, like if they are different you have to add.
M20619	▪ I enjoy doing math mall.
A00213	▪ She doesn't explain things good enough and when we learn something new she jumps into the other half a day later and doesn't give much time to learn it.
M30113	▪ Feeling good and positive in class today and my teacher will help me today.
A00216	▪ I don't fully understand how checking, and balances works. I understand debt and some stuff though.

As Andrusiak (2018) described:

Students in the PIL attitude profile tend to have positive self-perceptions as mathematics learners even though they tend to rate their perceived competence as neutral or low. Only about 26% of the 42 students' journals, classified to this attitude profile, indicated a true negative rating. The remainder of journals indicated a neutral option. PIL students are about equally likely to give content descriptions as students in the PRH, PRL, and PIH profiles, where about 10% of the total statements coded had specific content references. Students in this category, are equally likely to describe the content as easy, confusing, or hard. PIL students recognize that they are getting material correct, but sometimes describe that they do not understand what they are doing and cite the material as confusing. As students in the PIL category have an instrumental understanding of mathematics, they often cite having to follow the rules. PIL students tend to be tentative about feeling positive as mathematics learners due to the success being experienced. N00614 seems to exemplify this profile. This student selected a positive emotional rating and described going into google classroom to play a mathematics game. At the subsequent signal, the student justified a negative perceived competency selection by stating, "I am still playing the game but it got hard." However, the student later went on to say, "Playing the math game with money made me understand what I picked up there. I feel good but sometimes I don't get it." C10908 provided a similar example. At the first signal, this student selected a positive emotional reaction to mathematics and justified the rating by stating, "Excited to start test and I feel ready." However, once the test started, the student described being confused on the test and selected a neutral score for perceived competence. However, by the end of the class, the student referred to feeling good "because I understand what's on the test." Tests and quizzes, technology, and working problems dominate the classroom activities. The distributions of negative, neutral, and positive reactions to technology and games

> and working problems are fairly uniform. Students in the PIL category are as likely to describe tests and quizzes in a negative or neutral way as in a positive way. They do not tend to mention their perceptions of their teachers very often and when they do, they exhibit the same type of pattern as just described by having split reactions. Real-world connections are not often referenced, and when they are, students tend to exhibit mixed reactions. Journals, homework, and group work are rarely if ever mentioned. (pp. 135–137)

Negative-Relational-High (NRH) Profile. Table 13 shows selected student statements in support of the NRH profile description. Less than 5% of all journals were coded to this category, and two thirds of them were due to a neutral selection on the emotional dimension.

Table 13

Select Students' Statements in Support of NRH Profile Description

Student	Statements
E10114	▪ I feel good as a learner because I get it.
F00115	▪ I got most questions right and the ones I got wrong I fixed without much trouble.
M21016	▪ Feel like I am being held back from new thing[s] in math.
M21016	▪ I don't like test[s] but I don't hate them it is a bit boring.
M00118	▪ Bored.
S60915	▪ We are doing our summative.
E10114	▪ I chose this face because all we do is stuff in our book which get boring.
R00614	▪ Because I feel good about the sheet of work. [This statement was underlined by the student for emphasis.]
M10116	▪ We got on to Banzai. [This statement was provided as an explanation for selecting a high perceived competence score.]

Student	Statements
E10114	▪ We are working in our group and everyone is doing their part to help solve answers. [Note: This response was provided at a different signal in the same class period after the response referenced above where the student had a negative emotional state due to book work being considered boring.]
M10213	▪ I feel good because we can work together and it's kind of like a project.

As Andrusiak (2018) described:

Students in the NRH attitude profile tend to see themselves as being successful with mathematics and have positive perceptions about their learning. In 782 coded statements in the PRH category, students never mentioned that mathematics was boring or that they were bored in mathematics class. About 5% of the coded statements in the NRH category made such a reference. While this might be considered a small percentage of the overall statements, in comparison to their PRH peers, NRH students rarely mention mathematics as enjoyable which was the dominate perception of mathematics in the enjoyment node in the PRH profile. Slightly over 11% of the coded statements in the PRH profile included content descriptions, whereas, slightly less than 8% of the coded statements in the NRH profile contained content descriptions. Test and quizzes by far dominate the classroom activities referenced, followed by working problems and technology and games. NRH students rarely if ever mentioned their perceptions of their teachers or receiving help from teachers. Real-world connections were never associated with a negative experience when mentioned. While these students rarely mention group work, when they do, they have a positive perception. (p. 139)

Negative-Relational-Low (NRL) Profile. Table 14 shows selected student statements in support of the NRL profile description. As described in Andrusiak (2018):

Students in the NRL attitude profile tend to have positive self-perceptions as mathematics learners even though they tend to have negative success perceptions. Students in the NRL profile do experience some success, just not as often as they experience failure. NRL students overwhelmingly describe mathematics as boring and tend to be less likely to provide content descriptions than their peers in attitude profiles with positive emotional states. NRL students never mentioned their teachers helping them, and when they refer to their perceptions of their teachers or teacher directed activities they are associated with negative responses. Test and quizzes and working problems dominate the classroom activities, and these students rarely have a positive perception of these activities. Out of 81 total references to these activities, only one was coded as positive. Technology is the next referenced activity; however, the number of references is less than half of the references to test and quizzes and some of these references simply state that mathematics is boring and that more technology should be integrated into the classroom. Lower experienced activities were notes, real-world learning, and warm-ups. There were no positive references to taking notes or working on warm-ups. Rarely or ever mentioned was time working on homework, journals, or review. When describing their relational understanding of mathematics, students tended to cite always thinking that way or struggled to explain why they held that belief. (pp. 141–142)

Table 14

Select Students' Statements in Support of NRL Profile Description

Student	Statements
K01118	▪ I feel good because I know a little of this.
M10213	▪ I feel good.
NM30816	▪ The summative really stumped me and I feel like I got my first NYP. [Note: NYP refers to not yet proficient.]
L21214	▪ It feel[s] okay I guess. Math has always been my subject even if I'm not great at it.
H1404	▪ I feel like a dumb potato.
E10419	▪ Math has been boring and I don't understand our teacher.
M10316	▪ Teacher is talking about unit rates. I want to go home so badly. I'm so bored. It's 1:25 ugh. I have to wait almost an hour for the bell to ring. We're going over the warm-up. I didn't know how to do it though.
S10115	▪ I feel great as a learner but math can get boring.
L21214	▪ Once again testing. [Note: This response was given as a rationale for the selection of a low perceived competence score.]
J51015	▪ Confused and bored. We need more math games to play.
E10419	▪ We are writing boring notes.
NM30816	▪ Because its [*sic*] how I think. [Note: This is in reference to selecting a relational understanding of mathematics.]

Negative-Instrumental-High (NIH) Profile. Table 15 shows selected student statements in support of the NIH profile description.

Table 15

Select Students' Statements in Support of NIH Profile Description

Student	Statements
J51015	▪ I [am] feeling really good about math but I think we should add [m]ore math games so math is more fun.
R11216	▪ I didn't really get how to solve the problems but now I understand the rules I have to follow.
M11016	▪ I didn't know anything about it unlike everyone else but I still solved it on the board. [The student added a smiley face at the end of the statement.]
A00213	▪ What we are doing is really easy.
M11213	▪ Because taking notes is boring and I kinda already know how to do this.
J31015	▪ Math class is getting more boring.
J10214	▪ He (the teacher) was just talking so it was kind of Boring.
M20716	▪ I got 80–100 on the last 3 tests.
M20716	▪ I do not like tests. [Note: This response was given in the same lesson as the previous quote by the same student explaining a negative emotional reaction with a high perceived competence.]
N10914	▪ The tests are kinda boring.
N00614	▪ I feel good about that because we are doing an activity called Banazi and it's hard but fun.

As Andrusiak (2018) described:

Students in the NIH attitude profile tend to have positive self-perceptions as learners and often express experiencing success with their work. They are more likely to describe the material as easy in comparison to challenging or hard. They tend to have negative emotional reactions to mathematics due to feeling that mathematics is boring. They never make reference to working in groups and seldom reference independent activities. While NIH students do tend to refer to teacher directed activities, they rarely ever mention their perceptions of their teachers or teachers helping them. NIH students were the least likely out of all the attitude profiles to provide content descriptions with only 6%

> of the coded references in this category referring to content. Whereas, about 12% of the total coded references referred to content in the PIH category. The PIH category had the highest proportion of references referring to content. Test and quizzes are the dominating activities and students in the NIH category are about as likely to have negative as positive reactions to these activities. Students often demonstrate high perceived competence due to experiencing success with tests and quizzes, but often describe not liking them. The second most referenced category is technology and games, but the number of references to tests and quizzes is nearly double the references to technology and games. Students have an overall positive experience with technology and games. This is followed by working problems and taking notes. These are activities where students express mixed reactions. There are few references to real-world connections or warm-ups, and almost no references to homework or journals. (p. 144)

Negative-Instrumental-High (NIL) Profile. Table 16 shows selected student statements in support of the NIL profile description. As Andrusiak (2018) described:

> Students in the NIL attitude profile tend to have self-perceptions as mathematics learners that are more neutral and positive than negative, but their success perceptions are overwhelmingly negative. Students in the NIL category tend to describe mathematics as boring, confusing, and sometimes too fast. They never mention working in groups and rarely mention receiving help from their teachers. They hold negative perceptions of their teachers, and teacher-directed activities are perceived negatively. This is the modal category of M10316 mentioned earlier in the student choice theme. Recall that M10316 articulated how students have no choices in their learning. Test and quizzes dominate the classroom activities, and no references were coded to a positive experience with these activities. The next referenced activities were warm-ups and working problems. Both categories received nearly equal references and out of 92 total references only one

is positive. These negative references are largely due to the lack of success with these activities. Technology and taking notes followed in the number of references with notes receiving no positive references. Real-world learning, homework, and journals are rarely mentioned. NIL students do not seem to be able to make connections to what they are learning to the real-world. (pp. 146–147)

Table 16

Select Students' Statements in Support of NIL Profile Description

Student	Statements
A00516	I feel okay about math and that I am horrible at math but still enjoy the class.
A00213	I feel ok but what we are working on is so confusing that I don't feel that smart.
J00115	Feeling good because we get to use our iPads to help us with our math.
T10507	I have no clue how to do this even though we've been doing it for a while. It's probably because it gets really boring so I space off. I'm most likely gonna fail everything about this.
T10507	It's really boring, confusing and I don't feel good so. I don't understand why we need to learn this stuff cause it's not like we will have to use it in the "real world."
M10306	We're doing our warmup. I'm solving this question: $6 + h > 9$. Ugh I hate math this is so boring. Yesterday right after iready testing (math) the teacher made us do more work (math).
N10914	I feel like we move on to fast and I can't keep up.
E10419	I don't understand it that well because the teacher is confusing.
A00213	I don't understand at all. The problems are one way but she did it the other.
R00913	Because I don't really understand how she is teaching me.
M11016	We have a summative to work on Nuf said. [This was an explanation for a negative emotional dimension score.]
N10914	I don't think it's fun to do endless questions.
A00213	Because word problems frustrate me and I don't get what we had to do.

Student Interviews

After the ESM study, I interviewed students and asked them to describe their experiences participating in the study, the stability of their attitudes over time, and the effect of the ESM on their awareness of the classroom factors impacting their attitudes. Students expressed positive sentiments regarding participating in the study and valued expressing their opinions about mathematics classes in a way that could impact future courses. Students provided insights into the classroom factors impacting their attitudes that had fidelity with the attitude profile descriptions and ESM analysis. Participating in the study did not necessarily heighten students' awareness of the factors impacting their attitudes, but participation enhanced students' abilities to self-reflect on what was happening in the mathematics classroom by heightening their focus in the classroom as they waited for signals.

Summary

My quantitative results suggested students' responses fit within Di Martino and Zan's (2009) framework and were consistent with their findings that attitudes can and do change over time. Students mostly maintained positive emotional states toward mathematics and believed they could be successful doing mathematics. Distributions of attitude profiles and the proportion of students within certain attitude profiles differed across performance levels. Students from the high-performing school were overrepresented in the most desirable attitude profile, PRH, and students from the lowest performing school were overrepresented in the least desirable profile, NIL, and the PIH profile. The number of attitude profile changes did not appear to differ by performance levels.

Qualitative results revealed students in all eight attitude profiles tended to exhibit positive self-perceptions as learners of mathematics and their perceived competency was highly linked to the successes or failures they experienced. Tests and quizzes were the dominant classroom activity among all four attitude profiles containing a negative emotional dimension. Analysis revealed differences in various classroom activities and their impact on students' attitudes, such as (a) the use of technology and games, (b) real-world connections, (c) quizzes and tests, (d) homework, (e) working problems, (f) students' perceptions of their teachers, (g) the enjoyment of mathematics, (h) and the difficulty of the material. Interviews helped me triangulate the data and revealed students developed their abilities to self-reflect on their own understanding of mathematics and what was happening in the classroom at the time a signal was administered.

Discussion and Conclusion

I used the ESM in this mixed-methods, multiple-case phenomenological study to reveal insights into the real-time classroom factors impacting students' attitudes toward mathematics. Teachers can use the rich descriptions of the attitude profiles when developing intervention strategies for students and when working on curriculum development and designing classroom instruction, pedagogy, and assessment. Both the quantitative and qualitative results provide insights into how students think and feel about doing mathematics as they transition from elementary to middle school.

Quantitative Results

The ESM journal protocol has face validity with Di Martino and Zan's (2009) framework and the open-ended questions, along with the final reflection, allowed students to elaborate on the classroom factors impacting how they were thinking and feeling about mathematics. In Di Martino and Zan's study, only 2.1% of essays failed to refer to at least 1 of the 3 dimensions of their framework. Consistent with those findings, only one journal out of 574 in this study did not clearly fall within the framework.

Only 8% of students in this study maintained a consistent attitude profile. McLeod (1992) found attitudes tend to be stable over time. Wilkins and Ma (2003) found students' notions of mathematics changed little from the beliefs they held in seventh grade to secondary school. Successive TIMSS studies since 1995 show nearly double the percentage of students reporting disliking doing mathematics in eighth grade compared to fourth grade. Results of this study showed a greater percentage of students presenting five or more attitude profiles than no profile changes. This supports evidence that the transition from elementary school to middle school is crucial to the formation of mathematical attitudes. Consistent with Di Martino and Zan's (2009) findings that attitudes can and do change over time, this is encouraging news for educators as they can use the results from the qualitative analysis to shape classrooms in ways that help shift students' attitudes toward more desirable profiles.

Students mostly maintained positive emotional reactions toward mathematics and had positive perceptions of themselves as learners of mathematics. The two highest occurring attitude profiles presented in the study were the positive-relational-high (PRH) and positive-instrumental-high (PIH) profile. However, the next most frequently occurring profile was the least desirable profile, negative-instrumental-low (NIL). This last result suggests a shift in attitudes could be occurring at middle school.

Consistent with beliefs and findings related to associations between attitudes and performance, this study revealed students from the high performing school were overrepresented in the most desirable attitude profile, PRH, whereas students from the low-performing school were overrepresented in the least desirable profile, NIL. However, nearly the same number of students exhibited a PIH profile as a NIL profile. The PIH profile could be considered a single step away from the most desirable profile, PRH. Students exhibiting an instrumental understanding of mathematics often cited their teachers as teaching mathematics as a series of steps and procedures for solving problems. Moving from the PIH to the PRH profile could be a matter of exposure. Teachers need to provide greater opportunities for students to make connections both within and across ideas in mathematics while focusing on the conceptual underpinnings and problem solving. The qualitative results reveal greater insights into how to transition students from less desirable attitude profiles to more desirable profiles.

Qualitative Results

The eight emergent themes provide insight into how teachers can shape classrooms in ways that promote positive attitudes toward mathematics. In particular, it is important for teachers to focus on (a) the use of technology and games, (b) novelty, (c) students' perceptions of success, (d) students' self-perceptions as learners, (e) timely feedback, and (f) student choice. The attitude profile descriptions delineate clear differences among various profiles.

Technology and Games

The use of technology can either enhance or inhibit student learning. Students' reliance on technology can negatively impact their creativity and critical thinking and process skills (Sousa, 2017). However, a meta-analysis of the integration of computer applications in K–12 classrooms showed a greater impact on mathematics achievement than programs without computer applications (Sousa, 2016). Thus, technology needs to be used in meaningful ways within safe and nurturing learning environments where students feel respected, valued, and empowered.

Kolb's (2015) triple E framework outlined three essential components of technology integration for meeting student learning outcomes and objectives: (a) engagement, (b) enhancement, and (c) extension. Technology needs to not only capture students' attention but also engage them in the content while scaffolding learning in ways not easily captured in traditional methods and extending learning to support real-world connections (Kolb, 2015).

Novelty

The volume of random moments in time captured in this study made it evident that the classrooms in the study tended to follow the same daily routines. The vast number of students who fell within undesirable attitude profiles cited mathematics as boring. Introducing novelty in the classroom through a variety of activities such as technology integration, games, music, movement, humor, and encouraging student choice can make teaching and learning more interesting (Sousa, 2016).

Self-Perceptions and Success Perceptions

As justification for rankings on the various attitude dimensions, students often cited their perceptions of themselves as mathematical learners and the success or failures they encountered. These results are also consistent with Di Martino and Zan's (2009) findings where low perceived competence was reinforced by repeated failures. Teachers need to find ways to ensure that students experience success every day in the classroom.

Overemphasis of large-scale assessment, despite evidence these assessments result in educational improvements (Ravitch, 2016), has resulted in an overreliance on traditional exams and quizzes in the classroom. Exams and quizzes dominated the classroom activities among all four attitude profiles containing a negative emotional dimension. Andrusiak et al. (2020) detailed core principles for how educators can transform education through student-centered learning that ensures that each student is valued in every school and in every classroom while recognizing that success looks different for each student. Success is intimately connected to timely feedback and student choice.

Timely Feedback

The timely feedback theme mostly presented with summative assessments. While not dominant, the theme was powerful, as students were noticeably tentative about their attitudes toward mathematics when they were awaiting feedback. Lack of timely feedback inhibited students' abilities to move forward in their learning. Formative assessments provide an opportunity to provide timely feedback. The privilege of feeling success is often reserved only for the best students as feedback is often delayed, particularly on summative assessments (Christensen et al., 2011). Moreover, the added pressure of timed tests can cause anxiety by releasing cortisol into the bloodstream and causing the frontal lobe to disengage in learning (Sousa, 2017). Andrusiak et al. (2020) discussed ways to progressively give more authority and responsibility to students, including suggestions for reforming assessment by creating student-centered open projects.

Student Choice

Students often cited real-world learning as a key classroom factor impacting their attitudes in the most desirable attitude profile, PRH. Working problems was a common activity cited in the least desirable attitude profile, PIH. Providing students choices in their assignments can result in authentic learning opportunities while increasing the depth of knowledge and complexity of tasks in comparison to traditional problems while increasing enjoyment and valuing that all students learn differently.

Students who have choices in assignments experience greater proficiency and satisfaction with their work while producing higher quality work in comparison to students who have less autonomy (Sousa, 2016). Preble and Gordon (2011) found students in schools with negative climates almost never have the opportunity to make choices on assignments or how they learn. Every school improvement initiative is subject to fail if there are issues with school climate and culture (Sarason,1990).

Student choice also increases student voice. Students interviewed in this study valued the opportunity to express how they thought and felt about mathematics. For example, when I asked Joe, or R20415, what he liked about participating in the study he stated, “Um, you got to voice your opinion on what was going on and how math class made you feel.” The signaling process provided moments where students could self-reflect on their understanding of mathematics while empowering them to be part of the change process. Elizabeth, or E20619, summarized this idea when she stated, “It was like . . . it kinda felt cool [to participate in the study] . . . that we get to like try and help change the math class and like make it kinda how we want to learn and not the way the teachers [want us to learn].”

Middle school students value their schooling most when their voices are heard by their teachers (Mitra, 2009). This study demonstrated a dearth of classroom moments where students talked about mathematics. Connecting back to technology, document cameras allow students to showcase their work while discussing their thoughts and solutions. They also provide opportunities for teachers to examine students' mathematical notation and writing. Out of the eight attitude profiles, the four profiles containing a negative emotional dimension had the least number of references coded to specific content descriptions.

Attitude Profile Descriptions

The attitude profile descriptions, presented in the results section, are sufficiently detailed to delineate differences between real-time classroom activities that impact students' attitudes toward mathematics. Researchers and practitioners can think about each attitude profile as a node interconnected. The connections represent the classroom factors contributing to traveling between nodes or attitude profiles, with the goal of navigating from less desirable to more desirable profiles by implementing the strategies discussed in this section.

Recommendations for Teachers

Table 17 presents several important quotes from students in the study relative to research connections. A list of teacher recommendations is provided for teachers to examine in relation to their own classrooms and practices.

Table 17

Important Student Quotes Connected to Research

Quote	Research Connections	Teacher Recommendations
M120317: I realized that like in the beginning before we did [this study] I thought math would be hard but after I saw like the five minutes on it and how what was going on in five minutes I realized…that it should be fairly easy.	Peak learning times tend to occur at the beginning and end of sessions and breaking sessions into smaller blocks of time, with breaks between blocks, can free up working memory and improve the processing of information (Sousa, 2017).	Present new material first. Use down time for activities. Divide learning objectives into sublearning objectives. Allow for closure at the end of objectives
E20619: I realized that like we sit around more now and usually I thought like we kinda did more stuff at the beginning, but when like [the journal protocol] asks like what are you doing in the past five minutes, it's kinda like we're just sitting and doing problems the entire time and not really like getting up and doing anything.	Exercise and movement reduce cortisol, increases the number of capillaries in the brain, and increases oxygen concentration levels in the blood thereby resulting in enhanced cognitive performance and increases in episodic memory (Sousa, 2017).	Invite students to act out mathematical concepts such as locations of points on a number line. Allow students to collaborate and move among groups during down times. Use document cameras to allow students to share and discuss solutions.

Quote	Research Connections	Teacher Recommendations
M10316: In math we don't really get to choose anything. [The teacher] just tells us what to do and doesn't give us a choice.	Student choice introduces novelty into learning making it more interesting (Sousa, 2016). Student choice aligns to Universal by Design (UDL) principles (CAST, 2011). Students produce higher quality work and express greater satisfaction and less apprehension in their work when given choices on assignments compared to students with less autonomy (Sousa, 2016).	Provide choice in assignments and learning activities aligned to the same learning objectives. Reduce the volume of tests and quizzes by using student choice projects aligned to students' talents and interests.
T105K7: I have no clue how to do this even though we've been doing it for a while. It's probably because it gets really boring so I space off. I'm most likely gonna fail everything about this.	The use of novelty can make teaching and learning more interesting (Sousa, 2016).	Integrate the appropriate use of technology, games, music, and movement and encourage student choice on assignments. Allow students to choose activities connected to learning outcomes.
D01015: I found that it was kinda interesting to occasionally take a break and then look back at what we had been doing over the past over the past few minutes. And so, I also it also kinda made me reevaluate how I understood mathematics and like how I thought about it…and so I thought…so, I never thought of that before. And so that caused me to think a little bit. So… I came out of this knowing more than I did before.	Critical reflection and writing about mathematics have positive impacts on students' affective responses toward mathematics while giving students a sense of control over their learning and promoting feelings of accomplishment (Powell & López, 1989).	Allow breaks where students can self-reflect on what they have learned. Allow opportunities for students to write about what they have learned.

Quote	Research Connections	Teacher Recommendations
K01118: For once I actually feel good about math because I actually understand it right now.	Students move along in school unmotivated as education is not a core job they are trying to accomplish; a core job students try to engage in everyday, while at school, is feeling successful (Christensen et al., 2011).	Scaffold problems to allow students multiple entry points. Use formative assessments. Provide student choice that allows students to connect material to their passions, interests, and talents. Provide timely and detailed feedback.
	A constant theme impacting students' attitudes toward mathematics is low perceived competence which is reinforced by repeated failures (Di Martino and Zan, 2009).	Aid students in focusing on feedback as learning opportunities. Deemphasize exams and quizzes.
	Students need to feel physically and emotionally safe before cognitive processing can occur and strong negative reactions toward mathematics can result in anxiety and the avoidance of new learning situations (Sousa, 2017). The overreliance on speed and timed test creates fear and shuts down students' working memories (Ruef, 2018).	Do not overemphasize speed as a means of judging those that are good at mathematics. Recognize that all students learn differently and at different paces.

Note. Codes before quotes are students' unique identifiers.

Table 18 presents specific teacher intervention strategies for working with students in each attitude profile based upon the key characteristics presented in each profile.

Table 18

Attitude Profiles and Teacher Intervention Strategies

Attitude Profile	Teacher Intervention Strategies
Positive-Relational-High (PRH)	Students in the PRH profile have positive impressions of their teachers and their teachers' abilities to support their learning. Seek to keep students within this profile by using technology, games, and real-world connections. Students in this profile describe an intrinsic relational understanding of mathematics, rarely cite talking about mathematics or engaging in student-directed activities, and often do not feel challenged. Challenge PRH students to understand mathematics as a set of relationships through student-directed explorations and allow them to discuss their understandings of mathematics. Seek to increase the complexity of tasks (e.g., by focusing on conceptual underpinnings such as which linear relationships are directly proportional relationships and "why") for these students while maintaining the difficulty level (e.g., do not increase the number of steps and procedures—vary the complexity by focusing on "why" and "how" concepts work).
Positive-Relational-Low (PRL)	These students tend to have positive self-perceptions as mathematics learners but are tentative about their perceived confidence due to successes experienced. A noticeable difference between these students and students in the PRH profile is that PRL students never cite positive impressions of their teachers or indicate that they receive help from their teachers. Consider all recommendations for PRH students. Additionally, carefully scaffold activities so students experience success. Check in with them frequently and help them understand productive struggle as an important step in mathematical learning. Make certain they analyze mistakes and use them as learning opportunities.
Positive-Instrumental-High (PIH)	Focus on the same strategies noted for PRH students and note that like PRH students, PIH students express the desire to be challenged. However, unlike PRH students, PIH students start to cite mathematics as boring and are slightly less likely to mention their perceptions of their teachers or cite help from their teachers. Moving students to a relational understanding of mathematics is likely an issue of exposure. Deliberately focus on making connections across ideas and understanding problems from multiple perspectives (e.g., ask students to show how to divide two fractions using the traditional algorithm, explain why it works and how it connects to the structure of our number system, and model the division using a number line).
Positive-Instrumental-Low (PIL)	Students in the PIL profile often recognize that they are getting content correct but cite that they do not understand what they are doing or refer to the material as confusing. These students tend to have mixed reactions to many classroom activities specifically tied to the successes they experience. Combine the intervention strategies for PRL and PIH students. Check in with these students frequently, scaffold activities for success, and aid them in understanding productive struggle. Allow these students plenty of time to explain their thinking and how they are feeling about mathematics.

Attitude Profile	Teacher Intervention Strategy
Negative-Relational-High (NRH)	NRH is an extremely rare profile. Compared to their PRH peers, NRH students rarely mention mathematics as enjoyable, which was the dominant perception of PRH students. They also rarely mention their perceptions of their teachers. Check in with these students often and provide students choices on assignments, aligned to the learning outcomes, that allow them to connect mathematics to their passions and interests. NRH students rarely mentioned group work but had positive perceptions working together. Implementing group projects where students propose their own research questions connected to their interest might be sufficient to move these students to the PRH profile.
Negative-Relational-Low (NRL)	NRL students tend to experience failure more often than success, overwhelmingly describe mathematics as boring, and rarely provide detailed content descriptions. They have negative perceptions of their teachers and tests and quizzes. Implement the strategies in the NRH profile by appropriately scaffolding assignments for success and consider using technology and games more frequently for these students.
Negative-Instrumental-High (NIH)	NIH students have positive self-perceptions as learners of mathematics and often find the material too easy. These students are the least likely, out of all profiles, to provide detailed content descriptions. Focus on time for students to write about mathematics and how they think and feel about what they are learning. Challenge them to make connections within and across ideas using strategies from the PIH profile while allowing them choices in assignments to discover connections to their talents and interests. These students need to find mathematics interesting and need to be challenged.
Negative-Instrumental-Low (NIL)	NIL students likely carry anxiety, failures, and traumatic events with them from previous experiences. Show these students that you care about them and value them by spending significant time getting to know them. Focus on establishing what they can do rather than what they cannot do. Create numerous opportunities for them to experience success through scaffolding and student-choice assignments. Take a slow and measured approach to course competencies while still maintaining the same high standards as for all students. These students need to feel that school is a safe and nurturing environment and that they are valued before they can learn. Value their voice and allow them opportunities to shape their learning environments. Consider involving these students in mini-action research projects that help shape a positive classroom culture and climate.

Limitations

It is difficult to generalize results from phenomenological and qualitative research and the interpretations are subject to the researcher's biases. In this study, I mitigated biases through bracketing exercises, and the in-depth descriptions of the attitude profiles aid in transferability. Purposeful and maximum variation sampling are not random sampling methods, and the samples in this study should not be considered representative of all schools in each performance level.

The chi-square tests provided valuable insight into the data and connections to previous research, but the sampling method does not meet the necessary conditions for running the tests. However, as the study was inductive in nature, the results provide important information for research and practice. The volume of data collected along with the number of random moments captured in the classroom through the ESM aid in confidence in the results.

The study was logistically very complex and will provide some challenges for replication. Limiting the distance between the researcher and participants likely would have resulted in more detailed student responses and interviews. However, maintaining distance was necessary to not influence what was happening in the classroom. As no coresearchers participated in the study, interrater reliability was not possible. However, I completed all coding in a relatively short period of time following a detailed list of rules and entered data into a database; I transcribed all interviews verbatim, and I studied the data over an extended period of time through multiple methods.

The descriptions of the attitude profiles were limited by the classroom activities observed. However, all classrooms in the study were remarkably similar in terms of classroom activities. So, it is possible that the study captured the activities most typical of middle-school classrooms. The repeated nature of the study and volume of statements analyzed could have resulted in dominant voices over representing moments in the classroom. However, the possibility of dominant voices was mitigated by looking both within and across journals over time and not relying solely on frequency analysis.

Recommendations for Future Research

A natural extension of any inductive qualitative research is to operationalize the variables discovered and attempt to generalize. Numerous directions are possible, including examining associations between school-wide performance and attitude profiles, creating new attitude scales based on the real-time classroom factors identified in this study, and using generalized linear mixed models to determine the extent to which the variables identified through the qualitative work contribute to the various attitude profiles.

Additional qualitative work is possible, including developing the connections between attitude profiles. For example, a potential difference between the PRH and PIH profile was feeling challenged. Challenging students by focusing on building connections between mathematical ideas could move students from the PIH profile to the PRH profile. Unlike students in the PRH profile, students in the PRL profile never cited receiving help from their teachers and rarely expressed positive perceptions of their teachers. Additional teacher support with a sustained focus on developing independent learners could move students from the PRL profile to the PRH profile. A model illustrating these key connections can result in important intervention strategies and begin to shift students' attitudes and performance in mathematics and interest in STEM fields.

Historically, researchers used beepers to accomplish the ESM. This study provided a viable method to revitalize an important sampling technique using current technology. The methods outlined extend beyond the mathematics classroom and can easily be modified for other content areas and school culture and climate studies.

The methodology and research methods outlined can easily be adapted to an action research model in which students act as collaborators in the learning community. Students can set up the signaling protocols and procedures, organize the packets, collect, and analyze the data, and provide recommendations to their teachers, administrators, and larger community. In doing so, students will engage in making real-world connections and using technology while increasing self-worth and having a voice for change. These are all origins of the most desirable attitude profile, positive-relational-high (PRH).

Final Thoughts

The study helped participants move toward a better understanding of themselves, their attitudes, and the world, while focusing on critical growth and empowerment. The results of the study provide hope for the field of mathematics education as students, who are experiencing their first middle-school mathematics course, generally have positive self-perceptions as learners of mathematics. Moreover, students demonstrated their attitudes toward mathematics develop and change in fluid and flexible ways through a variety of classroom experiences.

Students crave safe, nurturing, fun, and challenging classroom environments that respect and value every student. They want to explore connections to their environments through games and technology. Experiencing repeated failure, due to the overemphasis of test and quizzes, degrades students' attitudes toward mathematics and is counterproductive to increasing students' interests in STEM fields. Implementing student choice empowers students to shape their learning environments while developing into strong independent learners. Students are helping educators understand how to shape the future of education. It is time to listen.

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Appendix A

Student ESM Protocol

Please fill out a Unique Student Identifier using the instructions to the right.

Box 1	Box 2	Box 3	Box 4

Unique Student Identifier Instructions

Box 1 – Enter your middle initial or initials.

Box 2 – Enter the number of older siblings you have.

Box 3 – Enter your two-digit birth month.

Box 4 – Enter a 1 if you have pets or a 0 if you do not have pets.

1) Describe what is currently happening or happened during the past five minutes?

2) Please check the emoticon that **best** represents how you are currently feeling about mathematics?

Please explain anything that happened during the observation period that contributed to your choice.

Please fill out a Unique Student Identifier using the instructions to the right.

Box 1	Box 2	Box 3	Box 4

Unique Student Identifier Instructions
Box 1 – Enter your middle initial or initials.
Box 2 – Enter the number of older siblings you have.
Box 3 – Enter your two-digit birth month.
Box 4 – Enter a 1 if you have pets or a 0 if you do not have pets.

1) Describe what is currently happening or happened during the past five minutes?

2) Please place a check mark in the blank closest to the word that **best** describes how you are currently feeling about mathematics.

NOT SMART _____ _____ _____ _____ _____ SMART

3) Please explain what happened, or what you or the teacher were doing, when you received the text message for the study, that helped you feel good about learning math or that made you feel not so good about learning math.

Please fill out a Unique Student Identifier using the instructions to the right.

Box 1	Box 2	Box 3	Box 4

Unique Student Identifier Instructions

Box 1 – Enter your middle initial or initials.

Box 2 – Enter the number of older siblings you have.

Box 3 – Enter your two-digit birth month.

Box 4 – Enter a 1 if you have pets or a 0 if you do not have pets.

1) Describe what is currently happening or happened during the past five minutes?

2) Please circle the option that **best** describes how you understand mathematics.

   a) Mathematics is a set of rules to be applied to solve problems.

   b) Mathematics is a method for understanding connections across ideas and why procedures work.

   Please explain what happened, or what you or the teacher were doing, when you received the text message for the study, that made you see or understand math this way.

3) In your own words, describe how you feel right now about yourself as a mathematics learner.

Appendix B

Student Interview Protocol

I am a graduate student at New England College conducting the study that recently occurred in your mathematics classroom. I would like to ask you a few questions about your experience with the study. I have five questions and the interview should take about ten minutes.

I would like to ask that you begin by choosing a pseudonym. A pseudonym is a fictitious name. This will help keep your responses confidential and I will use this pseudonym from this point on when I refer to you. Can you please tell me what pseudonym you would like to choose?

I will now turn on the recorder.

Please confirm that you have previously agreed to participate in this interview process, and you have signed the form indicating this agreement. This form was sent home at the beginning of the study.

Thank you for agreeing to speak to me about your experience in this study.

1. Please tell me a little about your experience participating in the study over the past three months. What was it like for you?
2. What did you like about being a part of this study?
3. What did you dislike about being a part of this study?
4. Do you think your attitude toward math tends to stay the same or change over time?
5. Tell me a little more about how you think and feel about doing math.
6. What happens in the classroom on a day-to-day basis that impacts how you think and feel about doing math?
7. Did participating in the study have any impact on how aware you are of classroom factors that contribute to how you think and feel about doing math?
8. Is there anything else you would like to tell me about participating in this study or your attitude toward mathematics?

The Correlation Between School-Based Externalizing/Acting Out Behaviors, Belonging, and Opioid Misuse

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Abstract

Opioid misuse is considered a national epidemic (The White House Office of National Drug Control, 2011); however, not much is known about school-based behaviors or experiences correlated with opioid misuse. This phenomenological study explored the correlation between externalizing/acting out behaviors in a school setting and opioid misuse and identified sources of participants' feelings of not belonging to school. The purpose of this study was to help identify school-based correlations to opioid misuse and identify sources of not belonging at school. The following research question guided this study: To what extent did young adults who have and have not misused opioids experience externalizing/acting out behaviors in high school and in what ways did participants describe feelings of not belonging at school? All of the externalizing/acting out behaviors had a statistically significant positive correlation to opioid misuse, with effect sizes ranging from small to large. This study used a survey of 180 participants. Out of the 78 who have misused opioids, 44 were in treatment or recovery groups for opioid use disorder, and 34 ranged in their misuse of opioids, from taking them frequently (daily/almost daily) to seldom (taken once or twice); the remaining 102 survey participants made up the control group of not misusing opioids. This study brings important information on identifying potential school-based behaviors and experiences correlated with opioid misuse to help guide school staff, school administrators, and policy makers in preventing opioid misuse and having students feel more connected to school.

Keywords: opioid misuse, externalizing/acting out behaviors, school belonging, phenomenological study, correlation

THE CORRELATION BETWEEN SCHOOL-BASED EXTERNALIZING/ACTING OUT BEHAVIORS, BELONGING AND OPIOID MISUSE

This phenomenological study using quantitative methods explored the correlation between school-based externalizing/acting out behaviors, feelings of belonging, and opioid misuse, and explored sources around feelings of not belonging at school for individuals who have and have not misused opioids. Opioid use and misuse have become a national epidemic (Welsh et al., 2017), with an average of 130 opioid-related deaths a day (Scholl et al., 2019). Externalizing/acting out behaviors consist of behaviors directed outwards toward others. Feelings of belonging at school impact academic success and engagement in school (Korpershoek et al., 2019). This section summarizes the problem and prevalence of opioid misuse and explains the purpose of this study.

Opioids are a class of drugs that include (a) prescription pain relievers such as oxycodone (Oxycontin), hydrocodone (Vicodin), codeine, and morphine; (b) illegal drugs such as heroin; and (c) synthetic opioids such as fentanyl (U.S. Department of Health and Human Services, 2020). According to the National Institute on Drug Abuse (2017), opioid use is the use of opioids prescribed by a doctor to treat a medical condition, and opioid misuse is consuming opioids in a different way or a larger quantity than prescribed or taking opioids without a doctor’s prescription. The category of opioids consists of legal and illegal drugs that can help relieve pain, cause sedation, and have a euphoric effect (Welsh et al., 2017). The positive effects of opioids can make them appealing to use and during opioid withdrawal many people experience symptoms of depression and anxiety (Kosten & George, 2002).

Externalizing/acting out behaviors are associated with substance use (Barnes et al., 2009; Taylor, 2010) and disengagement in school (Catalano et al., 2004; Maddox & Prinz, 2003). Anderson-Butcher et al. (2013) defined externalizing/acting out behaviors as actions directed outward toward people or property and behaviors that harm others. The externalizing/acting out behaviors in the study consisted of getting in trouble in class, having the school call home about troublesome behaviors, lying about something important, skipping class, being in a fight, being bullied, bullying someone, and skipping schoolwork assignments.

School belonging is associated with student engagement and behaviors in school (Hascher & Hagenauer, 2010; Kiefer et al., 2015; Walker & Greene, 2009). Goodenow (1993) provided a widely accepted definition of school belonging: the extent to which students feel included, respected, accepted, and supported by others in school. School belonging, often synonymous with school connectedness, can be seen as a predictor of students' academic, social-emotional, and behavioral outcomes (Korpershoek et al., 2019). Feelings of belonging are a fundamental human need, and a sense of belonging to school supports the social emotional needs of students (Allen & Kern, 2017). Feelings of belonging to school are critical for student health and well-being (Allen & Kern, 2017).

Background of the Problem

Opioid use and misuse have become a significant contemporary crisis at both the national (Welsh et al., 2017) and international (Dhalla et al., 2011) levels. In 2017, with 47,600 overdose deaths involving opioids (Scholl et al., 2019), the number of opioid-related deaths surpassed the number of deaths from motor vehicle crashes for the first time ever (National Safety Council, 2020). Drug overdoses were the leading cause of deaths for Americans under the age of 50 (Katz, 2017). The death toll of opioids remained similar in 2018, with 47,590 deaths (Goodnough et al., 2019). The Council of Economic Advisers (2017) estimated the total cost of opioid use and misuse in the United States during 2015 was $504 billion.

Opioid misuse negatively impacts individuals beyond the risks of overdose and death. People who misuse opioids have a lower quality of life than those with chronic illnesses such as high blood pressure or diabetes (Heslin et al., 2011). The intravenous misuse of opioids results in an increased risk of HIV and/or hepatitis C (Van Handel et al., 2016). Individuals misusing opioids are more likely to (a) be unemployed (Catalano et al., 2011), (b) not be enrolled in school (Catalano et al., 2011), (c) have mood disorders (Catalano et al., 2011), (d) be violent

(Murphy et al., 2014), (e) have a history of arrests (Buttram et al., 2014), and/or (f) have committed a property offense (Catalano et al., 2011).

Although opioid misuse during adulthood has significant negative repercussions, substance use, including opioid misuse during adolescence, poses additional problems interfering with brain development (Feinstein et al., 2012). Substance use during adolescence can (a) increase the risk of serious health and mental health conditions (Feinstein et al., 2012); (b) increase the risk of dependency later in life (Feinstein et al., 2012); (c) result in accidents, injuries, or unintended pregnancies (National Center on Addiction and Substance Abuse, 2011); and (d) reduce levels of academic achievement (National Center on Addiction and Substance Abuse, 2011).

Regular misuse of opioids can lead to dependence and addiction, otherwise known as substance use disorder (National Institute on Drug Abuse, 2017). Substance use disorder is a chronically relapsing disorder characterized by (a) compulsion to find and take the drug, (b) loss of control over restricting consumption, and (c) development of a negative emotional state during withdrawal from the drug (Koob & Volkow, 2010). Substance use disorder is the psychological and physiological state of dependence, relying on the drug to aid in emotional regulation of feeling calmer, more energized, or numb (Hari, 2015). Substance use disorder is often associated with the word addiction. The term *addiction* has not always referred to a dependence on drugs, as it stems from the Latin term *addictus*, meaning a person who defaulted on a debt and became a slave to a creditor (Maté, 2010). During the 17th century, the word addiction described an activity a person was passionate about or dedicated to doing (Maté, 2010).

This study predominantly looked at opioid misuse in three states that have been greatly impacted by the opioid crisis: Maine, New Hampshire, and Vermont. In 2018, these three states were among the top 10 states in the United States with rates of the highest opioid overdose deaths (National Institute of Drug Abuse, 2020). According to the National Institute of Drug

Abuse (2020), New Hampshire had a rate of 33.1 opioid-involved overdose deaths per 100,000 people, Maine had a rate of 23.4, and Vermont had a rate of 22.8**.** Given the devastating extent of the opioid epidemic on the northern New England states, these three states became the focus of this study.

Purpose of the Study

This study had three different purposes: (a) to compare rates of school-based externalizing/acting out behaviors for participants who have and have not misused opioids, (b) to compare feelings of belonging at school for participants who have and have not misused opioids, and (c) to examine examples of feelings of not belonging at school. The school-based factors leading to opioid misuse are not widely known as few studies have examined opioid misuse and the role of reduced sleep duration (Guo et al., 2019), lowered school performances (Nalven et al., 2020), and lower levels of educational attainment (Ford et al., 2020), however scholars have not widely studied this area. A better knowledge of risk and protective factors for opioid misuse can help educators better support youth (U.S. Department of Education, n.d.). Prior studies (Bradshaw et al., 2013; Luk et al., 2016; Murphy et al., 2015) have acknowledged externalizing/acting out behaviors as a critical risk factor for substance use; however, researchers have not determined if and how school-based externalizing/acting out behaviors connect to opioid misuse.

Opioid misuse and dependence can lead to a long-term, persistent affliction (Hser et al., 2001). Hser et al.'s (2001) follow-up study of almost 600 men dependent on heroin concluded that 33 years later almost half of the participants had died, most often from drug overdoses, and the remaining participants had high rates of disability, psychological distress, criminal involvement, continued opioid misuse, and lower rates of employment. Another 33-year follow-up study on heroin-dependent males found the majority (82.2%) of participants reported periods of abstinence, and only 60.3% of those episodes lasted at least a year (Nosyk et al., 2013).

Opioid misuse can become a lifelong problem (Nosyk et al., 2013); therefore, any interventions to prevent misuse are crucial.

Significance of the Study to Education

If school staff and community members had knowledge around identifying risk and protective factors of opioid misuse, they could save lives by helping aid in the prevention and recovery of opioid misuse (U.S. Department of Education, n.d.). Many studies have examined the important role feelings of connectedness and belongingness to school plays in adolescents as a protective factor against health-harming behaviors such as substance use (Blum et al., 2002; Fleming et al., 2010; Taylor, 2010). However, studies have not specifically looked at how feelings of belonging to school can impact opioid misuse and how externalizing/acting out behaviors relate to opioid misuse. Externalizing/acting out behaviors commonly lead to discipline actions, and disparities in discipline practices reduce students' sense of belonging to school (Anyon et al., 2016).

As teenagers, students feel less connected to school (McNeely et al., 2002), a time when many start using substances, including opioids (Schulenberg et al., 1994). The National Center for Drug Abuse Statistics (2019) reported almost half (47%) of all teenagers have used an illicit drug by the time they graduate from high school. Substance use that starts in high school tends to increase and escalate into young adulthood, according to a review of 26 studies (Kirst et al., 2014). Emerging adults ages 18 to 25 have some of the highest rates of illicit drug and prescription drug (Diomede, 2015) and opioid misuse (Daniulaityte et al., 2009; C. M. Jones, 2013).

With school staff and community members' better understanding of school-based risk and protective factors, students can receive interventions and supports to help reduce their chances of future opioid misuse (U.S. Department of Education, n.d.). Communities and schools can then work to bolster and strengthen those protective factors. This study aimed to provide a better understanding of the connection between externalizing/acting out behaviors and opioid misuse and identify sources of feelings of not belonging at school to help reduce rates of opioid misuse.

Theoretical Frameworks

A person's trajectory of opioid misuse can be better understood through two theoretical frameworks. First, the brain opioid theory of social attachment describes how opioids play a role in social relationships (Inagaki, 2018). Second, Maslow's (1943) hierarchy of needs describes human motivation as consisting of a hierarchy of needs, with a sense of belonging the third of five levels of needs. These theories help explain, in part, the trajectory of opioid misuse and link both externalizing/acting out behaviors and a lack of belonging to opioid misuse.

Opioids influence people's emotions because they mimic and resemble naturally occurring chemicals in the brain (Pasternak & Pan, 2013). Opioids are separated into two types: exogenous and endogenous. Exogenous opioids refer to the classification of opioids drugs, commonly known simply as opioids (Corder et al., 2018). Opioid receptors in the brain are activated by both the endogenous opioid peptides and by exogenous opioids, such as heroin or prescription pain relievers (European College of Neuropsychopharmacology, 2007). Researchers have demonstrated the link between social attachment and the brain, as endogenous opioid peptides in the brain show sensitivity to both social inclusion and social rejection (Dalgleish et al., 2017; Hsu et al., 2015).

Maslow's (1943) hierarchy of needs theory described a five-tier model of human needs, starting with physiological, then safety, then love and belonging, then esteem, and finally progressing to self-actualization. According to Maslow (1943), these needs cannot be viewed in isolation, as every need is related to the satisfaction of prior needs. The need for love and belonging is the third level of need (Maslow, 1943). For people to develop self-esteem and be held in esteem by others, the fourth level of need, and for people to develop self-actualization of self-fulfillment, the highest level of need, they must have a foundation of belonging (Maslow, 1943).

According to the Centers for Disease Control and Prevention (2021), the New England States have some of the highest rates of overdose mortalities in the United States. Given the devastating effects of the opioid crisis on youth, families, and communities in New England, schools have the opportunity to join in the prevention efforts with some better understanding of risk and protective factors around externalizing/acting out behaviors and opioid misuse. The brain opioid theory of social attachment helps to explain the trajectory of opioid use, the importance of feelings of belonging, and why adolescents with externalizing/acting out behaviors may be especially at risk for initiating opioid misuse. Maslow's (1943) hierarchy of needs helps to explain the importance of belonging as a fundamental need for success. This study aimed to examine any connections between school-based externalizing/acting out behaviors, feelings of belonging at school, and opioid misuse and to better understand potential sources of students feeling they do not belong at school.

Literature Review

Although recent research has examined the trajectory patterns of opioid misuse, starting with nonmedical prescriptions leading to overdoses (Guarino et al., 2018), the complete sequence of events, experiences, and emotions leading to the misuse of opioids remain unknown. The literature review focuses on gaining a better understanding of previous research on factors contributing to substance use and, more specifically, opioid misuse. The two guiding theories help explain the importance of belonging as a protective factor for opioid misuse. An examination of the literature also demonstrates the interconnected links between (a) externalizing/acting out behaviors and substance use, including opioid misuse; (b) externalizing behaviors and feelings of school belonging; and (c) feelings of school belonging and substance use.

Theoretical Frameworks

Two theoretical theories framed this research: the brain opioid theory of social attachment (Inagaki, 2018) and Maslow's (1943) hierarchy of needs. I used each of these theories to help explain the potential trajectory of opioid misuse by examining the link between the neurobiology of opioid misuse and social connections, and by examining the importance of having feelings of belonging to well-being and optimal success.

The Brain Opioid Theory of Social Attachment

The premise of the brain opioid theory of social attachment originated from the findings of emotional and behavioral similarities of social connections and opioid dependency (Machin & Dunbar, 2011). Researchers in the 1970s first discovered the link between the brain opioid system and social connections through studies concluding low doses of opioids can reduce crying and behavioral agitation during times of social isolation (Panksepp et al., 1978). This conclusion led researchers to suggest connections between the brain opioid system and social bonds (Panksepp at al., 1978). Endogenous opioids in the brain play a significant role in social relationships as evidenced by the following observations: (a) during social separation, opioid levels drop; (b) during social interactions, opioids are released; and (c) opioids can prompt the initiation of social contact (Nelson & Panksepp, 1998). Social interactions (Inagaki, 2018) and laughter (Manninen et al., 2017) trigger the release of endogenous opioids, both of which reinforce the importance of social bonds.

Opioid consumption causes physiological and emotional deactivation of the naturally occurring opioids in the brain (Schindler et al., 2009), triggering the brain to believe there is an adequate or excessive quantity of opioids, thus slowing or stopping the production of endogenous opioids (Kosten & George, 2002). Opioid drugs and endogenous opioids in the brain have many similarities, as people who develop a dependence on relationships have the same three phases as that of people developing a dependence on opioids: The initial euphoria leads to seeking out more pleasure, tolerance habituation, and withdrawal, which can lead to negative affective states (Machin & Dunbar, 2011). These studies (Inagaki et al., 2016; Manninen et al., 2017; Schindler et al, 2009) suggested opioid drugs activate the same part of the brain that deals with connections and relationships.

As opioid drugs activate opioids in the brain that stimulate the same feelings of pleasure as social attachment without adequate social bonds, people may seek opioid drugs to activate that aspect of their brain (Panksepp et al., 2002). Therefore, opioid drugs may be used “as chemical substitutes” (Nummenmaa et al., 2015, p. 6) for attachments. Given that social isolation results in lower levels of opioids in the brain, people often seek social contact to elevate those brain levels (Machin & Dunbar, 2011); however, if social contact is not available, or is seen as anxiety provoking, then individuals may seek opioids in the form of substances. When people do not or cannot form connections with others, they are at increased risk for opioid misuse (Nummenmaa et al., 2015).

Experiences of unsatisfying relationships or an absence of positive relationships impact the brain’s opioid system (Inagaki, 2018). Social rejection and social isolation lead to reduced opioid activity in the brain (Inagaki, 2018), as does repeated social stress, predisposing a person to opioid misuse (Chaijale et al., 2013). The baseline availability of opioid receptors in the brain impacts people’s social experiences of reacting to the social pain of rejection, to the pleasure of social connections, and to predicting levels of laughter (Manninen et al., 2017). These differences in emotional responses and sensitivity to social pains or pleasures stem from variations in the brain’s opioid system (Carver et al., 2016) and from the availability of opioid receptors (Hsu et al., 2013). Researchers have found people with higher levels of distress intolerance and sensitivity are more likely to misuse opioids (McHugh et al., 2016). The brain opioid theory of social attachment helps explain a potential link between unsatisfying and/or a deficit of social connections to opioid misuse.

Maslow’s Hierarchy of Needs

Maslow’s (1943) theory of hierarchy of needs supports the premise of the brain opioid theory of social attachment by highlighting the importance of feelings of belonging to one’s well-being and success. According to Maslow (1987), humans have a hierarchy of needs, with a new level of need emerging only once the previous need is mostly satisfied. First, people need to have their physiological needs (e.g., food, shelter, and water) met; if those are mostly satisfied, the next category of safety needs, developing a sense of security in life, emerges (Maslow, 1943). If both the physiological and safety needs are satisfied, the next category of love, belonging, and acceptance needs emerges (Maslow, 1943). Maslow (1943) described this need as a hunger for affection and a desire for relationships. To accomplish this need, people try to find their social place in the world and make connections with others. Maslow (1987) believed personal motivation depends on the social environment and other people, deeming a sense of social belonging almost as important as physiological needs and a sense of physical safety.

If people successfully accomplish a sense of belonging, then, according to Maslow (1943), they can move on to the next level of need, which is esteem. The esteem need represents a desire for consistent and genuine high evaluation of the self along with others holding them in high esteem and respect (Maslow, 1943). The esteem need includes the desire for adequacy, achievement, competency, confidence, and prestige (Maslow, 1943). Satisfying the need for esteem leads to developing self-confidence and self-worth; a lack of these needs leads to feelings of inferiority and helplessness (Maslow, 1943). The final and highest level of need, according to Maslow (1943), is the need for self-actualization. Self-actualization explains the ultimate happiness one achieves in life through self-fulfillment and achieving one’s full potential (Maslow, 1943).

With a hierarchical model, Maslow (1987) believed the basic motivation to grow and learn can help people achieve self-actualization; however, that progress may be thwarted by challenges in meeting previous needs, such as not developing a sense of belonging.
The fact that esteem and self-actualization needs arise after developing a sense of belonging indicates Maslow (1943) believed a sense of belonging precipitated the ability to develop a positive sense of self and optimal well-being. Without a sense of belonging, people may be more susceptible to other challenges and struggles that impede their ability to achieve success

and well-being. Maslow's (1943) hierarchy of needs highlights the importance of having a sense of belonging.

Externalizing/Acting Out Behaviors, Substance Use, and School Bonding

Externalizing/acting out behaviors consist of behaviors directed outward, such as fighting, as imposed to internalizing behaviors directed inward, such as withdrawal. Recent studies have demonstrated a link between externalizing/acting out behaviors and substance use (Obando et al., 2014; Riehm et al., 2019). Obando et al. (2014) reported a positive association between substance use and behaviors of increased hostility, aggression, defiance, deceit, and a reckless disregard for others. Researchers have also highlighted the connection with acting out behaviors and smoking, as evident by the conclusions that adolescents with externalizing behaviors were more likely to use e-cigarettes and combustible cigarettes (Riehm et al., 2019).

In addition to a series of externalizing/acting out behaviors linked to substance use, specific behaviors, such as bullying, have also been connected to substance use. For both perpetrators and victims, experiences with bullying experiences were associated with increased risk of engaging in substance use (Bradshaw et al., 2013). Bullying victimization is associated with substance use (Luk et al., 2010). Bullying experiences were also associated with increased rates of alcohol use and alcohol-related problems (Luk et al., 2016). Adolescents who are bullied at least on a weekly basis were at increased risk for substance use (Murphy et al., 2015).

Recent studies (e.g., Modestin et al., 2001; Sharma & Kaur, 2017; Shorey et al., 2013) have found a link between externalizing/acting out behaviors and opioid misuse. Modestin et al. (2001), in their study of a group of 100 men with opioid dependency, found increased rates of conduct disorder, frequently understood as a pattern of disruptive behaviors, in this population compared to the general population. A study of women with opioid dependency found the majority of participants experienced a lack of self-control over their behaviors (Shorey et al., 2013). A large-scale study of people who misused opioids in Appalachia found rates of antisocial personality disorder, frequently hallmarked by aggressive acting out behaviors, almost

10 times higher than in the general public (R. V. Smith et al., 2017). Another study found, compared to a control group, participants with opioid dependency had decreased self-regulation skills (Sharma & Kaur, 2017).

Externalizing behaviors, such as fighting, can result in student behaviors leading to disciplinary actions, which can impact students' feelings of belonging at school. Out-of-school suspensions were negatively associated with school bonding and positively associated with externalizing behaviors (Bottiani et al., 2017). Traditional forms of discipline, such as suspensions and expulsions, can lead students to feel disconnected to school and that they do not belong at school (Blum et al., 2002), particularly in schools that expel students for minor first-time infractions (McNeely et al., 2002). Student behaviors resulting in suspension or expulsion can put students at increased risk for substance use and feelings of alienation from school (American Academy of Pediatrics, 2003). A recent study found students who received suspensions had increased negative attitudes toward school and negative perceptions of the school climate (Huang & Anyon, 2020).

Although behaviors leading to discipline actions can impact feelings of belonging at school (Huang & Anyon, 2020), feelings of belonging at school impact the health and well-being of students. Student feelings of alienation to school were associated with social problems with others (Morinaj & Hascher, 2019). Through a series of longitudinal studies, researchers demonstrated school bonding, defined by close affective relationships at school and an investment in school, was significantly negatively associated with substance use, violence, and delinquent behaviors (Catalano et al., 2004). School bonding has been linked to a variety of health and well-being outcomes, such as substance use and delinquency (Moddox & Prinz, 2006). Students who do not feel attached to school are more likely to skip classes (Hascher & Hagenauer, 2010; Korpershoek, 2019). The benefits of feeling committed and attached to school is a demonstrated preventative factor for substance use (Su & Supple, 2014; Taylor, 2010; Vidourek et al., 2012), as adolescents who do not feel they belong at school may seek escape through substance use (Jamal et al., 2013). School belonging extends as a protection factor against substance use into young adulthood (Catalano et al., 2004; Fleming et al., 2010), demonstrating the importance of feelings of belonging to student well-being even beyond high school.

Conclusions

Both the brain opioid theory of social attachment (Machin & Dunbar, 2011) and Maslow's (1943) hierarchy of needs help elucidate the trajectory of opioid misuse by highlighting the importance of belonging as a protective factor for opioid misuse. Previous researchers have demonstrated the following interconnected links: (a) externalizing behaviors/acting out behaviors were risk factors for substance use and opioid misuse (Barnes et al., 2009; Bradshaw et al., 2013; Murphy et al., 2015; Sartor et al., 2014; Taylor, 2010), (b) externalizing behaviors can lead to discipline actions that can impact feelings of school belonging (Bottiani et al., 2017; Huang & Anyon, 2020), and (c) feelings of school belonging can impact substance use and acting out behaviors (Korpershoek, 2019; Moddox & Prinz, 2006).

Methodology

In this phenomenological study, I compared the extent to which young adults who have and have not misused opioids experienced school-based externalizing/acting out behaviors and feelings of belonging to school. This study also explored sources of participants' feelings of not belonging at school.

Research Questions and Hypothesis

This phenomenological study explored two correlations: (a) the correlation between externalizing/acting out behaviors in a school setting and opioid misuse and (b) the correlation between feelings of belonging at school and opioid misuse. This study also identified sources of participants' feelings of not belonging to school. The research questions were:

1. To what extent did young adults who have and have not misused opioids experience externalizing/acting out behaviors in high school?

2. To what extent did young adults who have and have not misused opioids experience feelings of belonging to school?
3. In what ways did participants describe feelings of not belonging at school?

Based on the literature reviewed, I hypothesized:

1. There would be a correlation between externalizing/acting out behaviors and opioid misuse.
2. There would be a correlation between feelings of not belonging and opioid misuse.
3. There would be a negative correlation between a positive sense of belonging to school and opioid misuse.

My null hypotheses would show no differences between participants' experiences with externalizing/acting out behaviors and opioid misuse, no differences between participants' experiences with feelings of not belonging and opioid misuse, and no difference with feelings of belonging and opioid misuse, indicating no relationship between the presence or absence of those behaviors or emotions and opioid misuse.

Purpose

Given the devastating effect of the current opioid epidemic with an average of 130 opioid-related deaths a day (Scholl et al., 2019), this study sought to identify potential school-based behaviors and experiences correlated with opioid misuse to hopefully reduce youth from initiating opioid misuse and preventing further overdose deaths. The secondary purpose of this study was to identify sources of not belonging in schools, as feelings of connection and belonging to school is a proven protective factor against health-harming behaviors (Centers for Disease Control and Prevention, 2015; Su & Supple, 2014; Vidourek et al., 2012).

I intended the results in this study to aid in promoting the well-being of youth in schools. By better understanding a potential connection between externalizing/acting out behaviors and opioid misuse, school administrators and teachers will have better knowledge of how to target opioid prevention. By better understanding potential sources of feeling disconnected to and not belonging at school, school administrators and teachers may better help students feel more connected to and belonging at school. Given that substance use that starts in high school tends to increase and escalate into young adulthood (Kirst et al., 2014) and that young adults ages 18 to 25 have some of the highest rates of opioid misuse (Daniulaityte et al., 2009; C. M. Jones, 2013), this study provided critical information about the role school systems and educators can play in preventing opioid misuse.

Research Design

I used a phenomenological lens to describe the lived experiences of a group of people by reducing participants' experiences to a description of the essence of the phenomenon (Creswell, 2013)—in this case, externalizing/acting out behaviors, feelings of belonging, and opioid misuse. A phenomenological approach captures a common meaning of a shared experience (Creswell, 2013), which helps to best describe the overall experiences of externalizing/acting out behaviors and opioid misuse. This approach helped to bring meaning to an experience based on a multitude of perspectives.

Methods

The method for collecting data for this study consisted of using a survey to collect the data. To access a larger number of participants, this research relied on the use of a survey. Surveys allow researchers to collect self-reported data targeted at a large sample size. The use of a survey helps researchers better understand trends among collective responses. I used the questions around externalizing/acting out behaviors from the Community and Youth Collaborative Initiative School Experiences Survey (Anderson-Butcher et al., 2013) and added one additional question about skipping class. The survey also included three questions about feelings of belonging at school and included an open-ended question to identify sources of not belonging at school. Most of the participants accessed the survey online. The 44 participants in treatment/recovery centers used paper copies to complete the survey. I analyzed the survey through descriptive statistics and correlational analysis, and I coded the open-ended question to uncover major themes around sources of not belonging in schools.

In this phenomenological study, I used a survey that contained Likert-scale questions, one open-ended question, questions on demographic information, and questions to determine any opioid misuse. Surveys allow many participants to engage in a study. Surveys allow researchers to uncover correlations among social phenomena to have numerical data represent real-life experiences (Gall et al., 2007). In this study, I used a survey with questions on externalizing/acting out behaviors in schools and feelings of belonging to school to measure the potential relationship between the set of behaviors and feelings and opioid misuse.

I used correlational analysis to examine the survey data. Correlational research seeks to determine if two variables are connected to each other and in what ways they are connected. Correlational studies measure the direction and degree of the relationship between variables (Gall et al., 2007). In this study, the correlational analysis measured whether the independent variables were connected to the presence of opioid misuse or no misuse, and measured the direction of that connection.

Participants and Setting

All of the participants engaged voluntarily in this study. This study had a total of 180 participants, with 102 participants who had not misused opioids and 78 who have misused opioids. Out of the 78 who have misused opioids, 44 were in treatment or recovery groups for opioid use disorder; the remaining 34 ranged in their opioid misuse, from taking them frequently (daily/almost daily) to seldom (taken once or twice).

All of the participants were 18 years old and older, with an average (mean) age of 37. Demographic data on participants indicated 71% identified as “she,” 92% identified as White, 58% lived with both parents during high school, 64% never moved homes during middle or high school, and 16% of participants received special education services. I used receiving free or reduced-price lunch or breakfast at school as the socioeconomic indicator for this study; 30% of participants reported receiving free or reduced-price lunch or breakfast.

Participants completed the survey virtually or at a treatment/recovery center for opioid use disorder. I used purposeful convenience sampling to locate participants who had misused opioids, purposefully seeking out convenient-to-reach treatment/recovery sites. Two treatment/recovery centers participated in this study, one in New Hampshire and one in Vermont. The additional participants were recruited through social media. I requested various social media groups targeted at people in recovery and other treatment/recovery centers in Maine to share the survey virtually. I used a snowball sampling approach through social media to target additional participants who have and have not misused opioids.

Results

I conducted a Spearman correlation analysis to examine the relationship among survey questions to opioid misuse or no misuse. A correlation analysis uses the correlation coefficients to indicate the direction of the relationship through a positive or negative value. A positive correlation coefficient indicates the variables move in the same direction (i.e., they both increase), and a negative correlation coefficient indicates the variables move in opposite (i.e., one increases while the other one decreases; Urdan, 2017). In this study, a positive correlation indicated a correlation to not misusing opioids, and a negative relationship indicated a correlation to misusing opioids.

Correlation coefficients also measure the strength of the relationship. A correlation coefficient of .00 indicates no relationship, thus supporting the null hypothesis, and a coefficient of -1.00 or 1.00 indicates an exact relationship (Urdan, 2017). I used Cohen's standard to assess the strength of the relationship with a coefficient (r_s) between +/- .10 and .29 representing a small effect size, a coefficient of +/- .30 and +/- .49 representing a moderate effect size, and a coefficient of +/- .50 or larger representing a large effect size (Cohen, 1988). I conducted the Spearman correlations based on an alpha value of 0.05; therefore, a *p* value of

0.05 or less indicated a statistically significant correlation. All the survey questions produced a statistically significant correlation to opioid misuse.

Correlation Between Externalizing/Acting Out Behaviors and Opioid Misuse

To answer the research question about the extent to which school-based externalizing/acting out behaviors were correlated with opioid misuse, the survey focused on eight aspects of externalizing/acting out behaviors at school. Table 1 displays the correlation between externalizing/acting out behaviors at school and opioid misuse. All eight behaviors yielded a statistically significant (p ≤. 013) relationship to opioid misuse, indicating school-based externalizing/acting out behaviors and opioid misuse are correlated with each other.

Table 1

Spearman Correlation Results: Externalizing/Acting Out Behaviors and Non-Misuse of Opioids

Question	Effect Size	r_s	Lower	Upper	*p*
School called home because of troublesome behaviors	Large	-0.54	-0.64	-0.43	< .001
Skipped class	Large	-0.54	-0.64	-0.42	< .001
Was in a fight	Moderate	-0.48	-0.59	-0.36	< .001
Skipped schoolwork assignments	Moderate	-0.48	-0.59	-0.35	< .001
Got in trouble in class	Moderate	-0.47	-0.58	-0.35	< .001
Lied about something important	Moderate	-0.43	-0.55	-0.30	< .001
Was bullied at school	Small	-0.23	-0.37	-0.08	.003
Bullied someone at school	Small	-0.19	-0.34	-0.04	.013

Note. n = 165.

A significant negative correlation with a large effect size was observed between not misusing opioids and having the school call home due to participants getting in trouble for their behavior (r_s = -0.54, p < .001). A significant negative correlation with a large effect size was observed between not misusing opioids and skipping class (r_s = -0.54, p < .001). A significant negative correlation with a moderate effect size was observed between not misusing opioids and being in a fight during high school (r_s = -0.48, p < .001). A significant negative correlation with a moderate effect size was observed between not misusing opioids and skipping schoolwork assignments (r_s = -0.48, p < .001). A significant negative correlation with a moderate effect size was observed between not misusing opioids and getting in trouble in class (r_s = -0.47, p < .001). A significant negative correlation with a moderate effect size was observed between not misusing opioids and lying about something important (r_s = -0.43, p < .001). A significant negative correlation with a small effect size was observed between not misusing opioids and bullying someone at school (r_s = -0.19, p = .013). A significant negative correlation with a small effect size was observed between not misusing opioids and being bullied at school (r_s = -0.23, p = .003).

All aspects of these school-based externalizing/acting out behaviors had a statistically significant correlation to opioid misuse. The correlational analysis indicated a negative relationship with these behaviors and not misusing opioids, meaning all aspects of these school-based externalizing/acting out behaviors were correlated with opioid misuse. Results suggested the presence of externalizing/acting out behaviors in school is a potential signal of a student needing additional support and help.

Correlation Between Belonging and Opioid Misuse

To answer the research question about the extent to which feelings of belonging at school are correlated with opioid misuse, I studied three aspects of belonging at school: (a) feeling lonely, (b) having supportive peers, and (c) overall feelings of belonging at school. Given the common definition of school belonging as students feeling included, accepted, and supported by others in school (Goodenow, 1993), I included questions on feeling lonely, supportive friends, and overall belonging to measure feelings of belonging at school. Table 2 displays the correlation between feelings of belonging at school and opioid misuse. All three aspects of belonging yielded a statistically significant ($p \leq .001$) relationship to the variable of opioid misuse.

Table 2

Spearman Correlation: Sense of Belonging and Non-Misuse of Opioids

Question	Effect Size	r_s	Lower	Upper	*p*
Belonged at school	Moderate	0.38	0.24	0.50	< .001
Supportive peers	Moderate	0.31	0.16	0.44	< .001
Felt lonely	Small	-0.25	-0.39	-0.10	.001

Note. $n = 164$.

I observed a significant correlation with a moderate effect size for not misusing opioids for feelings of belonging at school ($r_s = 0.45$, $p < .001$). I found a significant correlation with a moderate effect size for not misusing opioids and supportive peers at school ($r_s = 0.31$, $p < .001$). I found a significant negative correlation with a small effect size for not misusing opioids and feeling lonely ($r_s = -0.25$, $p = .001$), indicating feelings of loneliness correlated with opioid misuse. Overall feelings of belonging at school and having supportive peers at school correlated with an increase in not misusing opioids and an increase in feeling lonely during high school correlated with an increase in opioid misuse.

Sources of Feelings of Not Belonging at School

I used the survey question “What are some things that made you feel like you did not fit in with people (e.g., peers, teachers) or did not belong at school” to answer the research question about identifying sources of not belonging at school; 123 participants responded to this open-ended question. I coded the sources into major themes and separated the major themes into two parts, school-based (see Table 3) and outside of school (see Table 4).

Table 3 displays the school-based sources of not belonging at school as separated by the following categories: (a) peers, (b) teachers, (c) academics, and (d) extracurricular activities. For the theme of peers, participants discussed how peers and classmates contributed to feelings of not belonging at school. Participants discussed instances of not having any friends, being physically and/or emotionally bullied, not being part of certain social groups/cliques, and having to deal with peer pressure or peer drama. For the theme of teachers, participants discussed how teachers and educational staff contributed to feelings of not belonging at school.

Table 3

Open-Ended Results for School-Based Sources of Belonging at School

Peers	I was a loner and had no friends could not get close to anyone
	I didn't use substances and wasn't included or involved in many social aspects of my high school.
	Teachers never listened when I complained about bullies, I'd end up having to fight the bullies myself, most of the students around me picked on me and called me names and would try to fight with me
	I was frequently bullied due to my shyness, my intelligence, and unpopular status among classmates
	Consistently bullied through middle school- high school which ultimately I started to throw hands: no talking; just fighting! *(anyone who even looked at me wrong)*
	The "popular" crowds and people who were cliquey
	I was not popular and didn't play sports
	Peer pressure, relationship drama, weekend parties I was not allowed to be at.
Teachers	Ironically, the same things that made me feel like I belonged sometimes made me feel like I didn't- like when teachers would public ally give praise for doing well.
	Everyone else at my public school cared about homework and I would get shamed by teachers for not doing it
	Homophobic comments from my peers, teachers, and adult leaders.
	I did not think adults cared or noticed how I was doing or if I was there or not.
	Guidance telling me I didn't have problems compared to other kids
	Clique behavior & Teachers participating in it, Teachers being more interested in students that had academic potential, Teachers being dismissive when I did attempt to catch up or when I was feeling particularly depressed
	I worked hard to earn As and Bs in most classes. I did not cheat or lie, and was frustrated when peers cheated on tests and mistreated others - and many teachers would 'look the other way' to avoid the confrontation.
Academics	Studying more than everyone else.
	Not being in advanced classes Not being good at certain subjects like others
	Kids picked on me because I had a learning disability which made me have to study harder or have trouble in school. I sometimes felt stupid
	Grades, always criticized for missing my potential,
	Being a 'smart kid' sometimes made me an outsider; I didn't do any school sports
	I honestly hated schoolwork and didn't see the point of it. Everyone else at my public school cared about how and I would get shamed by teachers for not doing it

Extracurricular Activities	Trying out for sports wasn't encouraged if you didn't fit a particular model. It was too intimidating to try
	I was not popular and didn't play sports
	liked different things than others

Note. n = 123.

Participants discussed instances of teachers using private praise or public praise, sharing their personal divisive beliefs, not caring about student(s), and having favorite students. For the theme of academics, participants discussed how engagement or disengagement in academics contributed to feelings of not belonging at school. Participants cited examples of feeling they did not fit in at school due to studying more than others, having a learning disability, earning high or low grades, and hating schoolwork. Participants discussed the theme of extracurricular activities as the final theme of school-based sources contributing to feelings of not belonging at school. For the theme of extracurricular activities, participants discussed not being involved in sports and having different interests than others. Participants identified sources of not belonging to school for each of the major aspects of school experiences of peers, teachers, academics, and extracurricular activities.

In addition to identifying school-based sources contributing to feelings of not belonging in school, participants identified sources outside of school such as (a) their personal identity, (b) family, and (c) community (see Table 4).

For the theme of personal identity, participants discussed how their own identities and characteristics contributed to feelings of not belonging at school. Participants discussed how their own emotions, beliefs/choices, appearances, lack of self-esteem, and characteristics such as race/ethnicity, gender, and sexuality influenced feelings of not belonging at school.

For the theme of family, participants discussed how their family members and family environment contributed to feelings of not belonging at school. Participants cited examples of how poverty, moving, family structure, and challenging home lives impacted how they fit in at school. For the final theme, community, participants discussed how their community contributed to feelings of not belonging in school. Participants cited examples of how being new in town and taking the bus impacted feelings of not belonging at school.

Table 4

Open-Ended Results for Outside of School Sources of Belonging at School

Personal	My anxiety made me feel like an outsider, especially because I did not know I had anxiety, or why I struggled to focus or feel comfortable at school.
	I was mature, didn't party or drink, didn't dress particularly fashionably.
	Not being "cool," not sexually active or comfortable around drugs and alcohol.
	Being kind
	My size and dressing athletically. I was always called fat and a lesbian
	Weight, intelligence (as a negative), outspoken feminism/bisexuality, lack of "coolness"
	Not feeling thin or pretty enough.
	My overwhelming shyness and inability to speak to people
	I didn't have the same clothes oh and I was gay and closeted
	Some groups were based mainly on ethnicity, I fit in with the kids in my ethnic group
Family	Not owning a car. The fact that my family rented a small apartment and then a house.
	I was a less financially stabilized student at an expensive boarding school and I knew it. Being on scholarship made me feel like I had to work harder to prove I belong
	I moved from the East coast to the Midwest & found the differences in personal interactions, interests, & lifestyle curious.
	both parents were dead, lived with other family
	parents being divorced and I lived with grandma almost an hour from school and had to get driven to my bus stop in the different town
	My home life. If people knew what was going on at home I probably would've felt completely ostracized.
	The main reason I felt I did not fit in was my past. My parents being active addicts, living with someone other than my parents. Most of the kids who I attended school with had normal loving homes with one or both their parents. I wasn't even sure where my mother was at that stage of my life and that was difficult to explain to most of my peers.
Community	My high school was small and generations of families go through school system. Since my family moved into town, felt like an outsider at times within the larger community
	Being a bus student and not living close enough to the school to participate in after school activities, both my parents worked and I was expected to care for my three younger siblings.

Note. n = 123.

Summary/Conclusions of Results

Through correlational analysis, I identified some potential signs of struggling students. All eight aspects of school-based externalizing/acting out behaviors positively correlated with opioid misuse. These behaviors correlated with opioid misuse: (a) the school calling home due to troublesome behaviors, (b) skipping class, (c) getting in a fight, (d) skipping schoolwork assignments, (e) getting in trouble in class, (f) lying about something important, (g) being bullied, (h) bullying someone else, and (i) feeling lonely; all are potential signs of struggling students. Overall feelings of belonging at school and having supportive peers at school were identified as potential protective factors. The correlational analysis indicated that although school-based externalizing/acting out behaviors correlated with opioid misuse, feelings of belonging to school and feeling supported by peers correlated with not misusing opioids.

The second part of the study addressed the research question on identifying sources of participants' feeling of not belonging at school. Participants identified four school-based sources of peers, teachers, academics, and extracurricular activities. Participants also identified three sources outside of school—personal identities, family, and community—that contributed to sources of not belonging at school. My analysis of the open-ended question suggested aspects of students' experiences in school and their lives outside of school can impact feelings of belonging to school.

Discussion

Results of this study suggest school-based externalizing/acting out behaviors and feelings of belonging to school are correlated with opioid misuse. Through my correlational analysis of the survey, I identified some signs of student struggles that may put them more at risk for opioid misuse; however, this is not an exhaustive list. Therefore, school administrators and staff should be mindful not to judge students based on the results of this study. This study suggests the following as risk factors for opioid misuse: (a) having the school call home due to participants getting in trouble for their behavior (r_s = -0.54, p < .001); (b) skipping class (r_s =

-0.54, $p < .001$); (c) being in a fight during high school ($r_s = -0.48$, $p < .001$); (d) skipping schoolwork assignments ($r_s = -0.48$, $p < .001$); (e) getting in trouble in class ($r_s = -0.47$, $p < .001$); (f) lying about something important ($r_s = -0.43$, $p < .001$); (g) being bullied at school ($r_s = -0.23$, $p = .003$); (h) feeling lonely ($r_s = -0.25$, $p = .001$); and, (i) bullying someone at school ($r_s = -0.19$, $p = .013$). This study suggests two potential protective factors for opioid misuse: (a) feelings of belonging at school ($r_s = 0.45$, $p < .001$) and (b) having supportive peers at school ($r_s = 0.31$, $p < .001$). This study suggests some of the experiences and behaviors at school differ between those who have and have not misused opioids.

This study supported the guiding hypothesis and previous literature. Researchers behind the brain opioid theory of social attachment have suggested social relationships and isolation impact the levels of endogenous opioids in the brain (Machin & Dunbar, 2011), surmising opioid drugs may act as a chemical substitution for attachment to others (Nummenmaa et al., 2015). Maslow's (1943) hierarchy of needs highlighted the importance of belonging to one's well-being and success. This study supported both theories in that feelings of belonging were correlated with not misusing opioids ($r_s = 0.45$, $p < .001$), as was having supportive peers in school ($r_s = 0.31$, $p < .001$). Individuals who felt they belonged in school and had supportive attachments to others seemingly did not need the chemical substitutions for attachments and achieved the important need of belonging.

Previous researchers have suggested externalizing/acting out behaviors were risk factors for substance use and opioid misuse (Bradshaw et al., 2013; Murphy et al., 2015; Riehm et al., 2019; Sartor et al., 2014; Taylor, 2010). The results of this study supported that externalizing/acting out behaviors were risk factors for opioid misuse, as the eight identified school-based externalizing/acting out behaviors correlated with opioid misuse. Researchers have noted externalizing behaviors can lead to discipline actions that can impact feelings of school belonging (Bottiani et al., 2017; Huang & Anyon, 2020), and although this study did not specifically ask about discipline actions, the results support the literature on how feelings of school belonging correlate with substance use (Moddox & Prinz, 2006; Korpershoek, 2019).

Results of this study have several implications for school administrators, educators, and policymakers. The results suggest certain school-based experiences and behaviors are correlated with opioid misuse or not misusing opioids. The results show students who struggle in school academically, socially, and emotionally need help. There is a chance that students who struggle in school also struggle outside of school. Thus, school staff can help by making sure no students are left out, are connected to some adults in school, are provided help to be successful in school, and are treated with compassion. Schools can intervene to promote the positive well-being of students by focusing on the mental health of students, using restorative discipline practices, and improving the school climate.

A potential preventative measure for opioid misuse involves supporting the social and emotional well-being of students. Given the following, that self-regulation skills predict externalizing behaviors and substance use (Robson et al., 2020), the presence of externalizing behavior at a young age can predict later in life mental health struggles (Kjeldsen et al., 2016), people may use substances to alleviate mental health struggles (L.L Smith et al., 2017), and that mental health struggles can predict substance use after high school (Kirst et al., 2014*),* a focus on supporting the social and emotional well-being of students will aid in their overall well-being and may help prevent opioid misuse. One in five students experience a mental health struggle, and up to 60% of students do not receive the necessary treatments (National Association of School Psychologists, 2016); therefore, embedded mental health providers within schools may help improve the social and emotional well-being of students. The National Association of Social Workers (2012) recommended one school social worker for every 250 regular education students and one for every 50 students with more intensive needs. Having the recommended ratios of mental health providers and teaching social and emotional skills in classrooms will help improve students' overall well-being and may help prevent opioid misuse.

This study also highlights the importance of having a discipline system in schools focusing on restorative consequences as learning opportunities instead of traditional exclusionary discipline practices. Discipline interventions act as critical opportunities for students to either feel included and supported or to feel excluded and rejected by schools (E. P. Jones et al., 2018). To best support students, school administrators should address externalizing/acting out behaviors through building more connections instead of cutting off potential connections through exclusionary discipline practices. Often with traditional forms of discipline, school administrators react to students demonstrating externalizing/acting out behaviors through suspending or even expelling them, further pushing these students away from school despite the fact these students need the opposite; they need to feel they belong in school.

Results of this study also support the importance of fostering a supportive school climate. This study suggests feelings of belonging to school and having supportive peers in schools may help prevent opioid misuse, highlighting the importance of positive connections within schools. School staff and administrators can help foster a positive school climate and encourage feelings of belonging through creating supportive environments and forming positive relationships with students (Allen & Kern, 2017). Promoting the mental health of students (National Association of Secondary School Principals, 2019) and using non-exclusionary discipline practices (E. P. Jones et al., 2018) can help form a positive and supportive school climate. Hari (2015) argued the “opposite of addiction isn’t sobriety. It’s connection” (p. 293). This study supports the premise that connections may matter and feeling connected to school may help prevent opioid misuse.

Limitations

This study had several limitations. The participant pool lacked diversity, meaning the conclusions drawn from this study can only be applied to primarily White people from New England. This study only focused on a limited number of externalizing/acting out behaviors and school experiences; therefore, the study does not provide a complete understanding of the phenomenon of opioid misuse and school-based behaviors. This study relied on a survey using participants' memories to reflect on their experiences in high school; therefore, there was the potential for bias in participants' responses.

The methods of this reflective study resulted in the potential for a negativity bias, a recollection bias, and a social desirability bias. A negativity bias occurs when participants may more easily remember negative events instead of positive events, as the reflection of negative events elicits a faster and stronger response (Carretie et al., 2001). This negativity bias may have led to the possibility of participants having a more negative reflection about their high school experiences. A recollection bias occurs when participants may not accurately or fully remember things, as the passing of time appears to influence memory recall and an individual's emotions (Stolarski et al., 2014). A social desirability bias occurs when participants may underreport socially undesirable activities and overreport socially desirable ones due to concerns over their self-image (Krumpal, 2013). This was not a longitudinal study; therefore, participants had to rely on their memory, which may have distorted some experiences.

Recommendations for Future Research

Additional studies should continue this research on identifying critical school experiences and behaviors that can influence the trajectory of opioid misuse. Given the reflective nature of this study and the potential for biases with surveys, future researchers should conduct longitudinal studies to track student experiences into adulthood to determine the connections between school-based behaviors/experiences and opioid misuse. Additional studies should also consist of a more diverse group of participants from different geographical areas and backgrounds.

This study focused only on identifying the correlation between opioid misuse and school-based externalizing/acting out behaviors and feelings of belonging in school; therefore, future studies should examine additional aspects of school experiences and behaviors to help identify additional school-based risk and protective factors for opioid misuse. Future researchers should also look at potential factors outside of schools, such as adverse childhood experiences and experiences within the family or community that may play a role in opioid misuse.

Final Thoughts

In conclusion, this study suggests that feelings of belonging act as a potential protective factor while the presence of externalizing/acting out behaviors act as a possible risk factor for opioid misuse, suggesting that the nation, states, and communities should continue to improve school policies to promote student well-being. The results of this study suggest school administrators and staff can help improve student well-being and reduce opioid misuse by (a) supporting the social and emotional well-being of students, (b) using non-exclusionary discipline practices, and (c) improving the school climate. To do this, communities, states, and the nation must provide appropriate funding for schools. In 2015, opioid use and misuse cost the United States $504 billion through legal, criminal justice, employment, and health care costs (Council of Economic Advisers, 2017). Investing the time and money during the school years can improve the well-being of students and potentially save lives. By investing time and money during the school years to aid in the emotional well-being of students, schools can play not only a critical role in the health of students but also potentially save lives.

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An Examination of Educational Resources on Student Performance

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Abstract

This study examined the relationship between educational resources and student performance in mathematics and science on the Program for International Student Achievement (PISA). Many countries face educational inequality and achievement gaps between high- and low-performing students. To a large extent, the resources invested in education determine student performance. This study examined the resources with the greatest potential to increase student performance. The educational resources of time, material, and finance are defined within the study. The measurement of these resources on the international scale uses the PISA questionnaire, which is completed by students, parents, and school principals. Student performance in mathematics and science is also evaluated using the PISA tool. This study used a correlational approach to analyze the relationship between educational resources and student performance. Results identified the optimum areas in which a country should invest their educational resources to increase student performance. Results showed a strong relationship between educational materials, cumulative spending, preprimary school attendance, and student performance on the science and mathematics 2012 PISA. I found no relationship between student performance on the 2012 PISA and the following variables: (a) student learning time in school, (b) class size, (c) participation in extracurricular activities, and (d) teacher salaries. The findings of this study have the potential to support changes in education that could increase student performance and increase the social and economic impacts those students will have in the future.

Keywords: student performance, educational resources, PISA, mathematics, science

AN EXAMINATION OF EDUCATIONAL RESOURCES ON STUDENT PERFORMANCE

This study examined the relationship between educational resources and student performance in mathematics and science on the 2012 Program for International Student Achievement (PISA). By identifying the resources that had the strongest relationship with student performance, I was able to suggest areas of focus for educational leaders and policymakers. Leaders must make decisions prioritizing spending of resources on building repairs and upgrades, access to computers, smaller class size, or increased teacher salaries. Every dollar spent on longer class periods is a dollar not spent on professional development for teachers, increased internet access for students, or extracurricular activities. Leaders need to know which elements have the strongest relationship with student performance. This study examined the relationships among resources and student performance on the 2012 PISA in mathematics and science. By identifying the types of resources that have a significant relationship with student performance, school leaders could potentially maintain spending yet increase student performance. An adjustment of educational resources in such a manner could decrease educational inequality and close the achievement gap. If the achievement gap narrows as a result of increased student performance, more students would become successful in school, and that success may result in a decrease in violent and nonviolent crime, increase the future earned income of individuals, decrease poverty, and increase participation in society. The findings of this study have the potential to increase student performance now and increase the social and economic impact those students will have in the future.

It is not yet known whether considering this much more nuanced understanding of educational resources might uncover useful associations between greater investments in certain kinds of resources and gains in students’ performance. Such research is needed to discover whether policymakers and educational leaders should take a much more nuanced approach to allocating not only financial but also other resources in their efforts to improve student learning. The specific educational resources examined in this study come from common themes expressed in the literature. There are three predominant educational resources identified: financial resources, material resources, and the resource of time. In this study, financial resources focus specifically on cumulative expenditure and teacher salaries. For this study, material resources focus specifically on availability of computers at school, instructional use for the internet, and the quality or physical infrastructure and schools' educational resources. Finally, resources associated with time focus specifically on students' learning time in school, class size, preprimary school attendance, and extracurricular activities. This study focused on these three educational resources and their impact on student performance.

Background of the Problem

Educational inequality, the difference in educational opportunities for students, is a problem at the local, national, and global level (Darling-Hammond, 2010; Le Donné, 2014; Mostafa, 2010; Ravitch, 2020; Takayama, 2013). Educational inequality, on the international scale, has led to a significant achievement gap between high- and low-performing students (Le Donné, 2014; Mostafa, 2010; Takayama, 2013). Students who are low performers are more likely to live in poverty (Le Donné, 2014; Mostafa, 2010; Robinson, 2017; Takayama, 2013). According to Levitt and Dubner (2005), mothers who perform at a low educational level have a much higher chance of their children being incarcerated.

Moreover, the achievement gap in many countries is expanding (OECD, 2012, 2013a, 2013b; Ripley, 2013). Mathis (2011) reported 20% of the achievement gap in the United States is attributable to social class. Darling-Hammond (2014) stated the achievement gap on the international stage continues to expand as a result of growing child poverty, increasing segregation, income inequality, and disparities in access to educational resources.

Studies in several countries have shown a link between the greater availability of educational resources and higher student performance (Archibald, 2006; Aztekin & Yilmaz, 2014; Demir, 2012; Greenwal et al., 1996; Kilic et al., 2013; OECD, 2014). The lack of educational resources is a major cause for low student performance; an increase in such resources would improve student performance (Archibald, 2006; Aztekin & Yilmaz, 2014; Demir, 2012; Greenwal et al., 1996; Kilic et al., 2013; OECD, 2014). Though effective resource allocation can maximize the efficiency of investment in education and increase student performance, there are limits. Educational institutions are directed by local and national programs. The direction of leaders may have a significant impact on student performance, perhaps more so than efficiency of educational spending (Ravitch, 2020). Additionally, because many countries have a tradition of democratic elections, they often have political environments filled with new leaders, visions, and policies. Hanushek and Wößmann (2015) stated it might take as many as 40 years to experience the full effect of educational reform. Further, only 2.5% of the educational workforce is exchanged each year with new workers coming in and old workers leaving, so it takes 40 years to fully turn over the workforce with individuals who attended a reformed education. Governments have mandates tied to special education, school certification, civil rights, standardized testing, and various other initiatives that require participation and funding. The problems of educational inequality and the achievement gap could be reduced by more efficient spending, but an effective solution would require other initiatives, resources, and attention from a multifaceted economic and social perspective. The results from this study can be used to inform decisions about educational spending but only within the confines of educational sovereignty.

History of PISA

In this study, student performance was measured by the Program for International Student Assessment (PISA), a test developed in 1997 by Andreas Schleicher, who worked with the Organization for Economic Co-operation (OECD) to develop the PISA. PISA's assessment of critical thinking, problem solving, and communication skills in science, mathematics, reading, and writing shows the world which countries were teaching students to think for themselves (Ripley, 2013). The PISA assessment was first administered in 2000, followed by 3-year intervals in 2003, 2006, 2009, and 2012 (OECD, 2013a, 2013b, 2014).

PISA focuses on math and science and includes both a survey that examines variables associated with educational resources and an assessment that looks at academic performance. Created by the OECD, a group of nations with a goal of greater economic growth and development, the survey is completed by students, parents, and school principals. Participants from 63 countries completed the 2012 PISA/OECD survey (OECD, 2013). The PISA asks students, parents, and principals questions about their experiences related to the stated resources: financial, material, and time (Gumus, 2011; OECD, 2013a). The survey also collects information regarding student, family, and school characteristics, allowing researchers to investigate the possible interactions between educational resources and student achievement, and the opportunity to compare student performance across many countries (Gumus, 2011; OECD, 2013a, 2013b, 2014). By using data internationally, researchers have the potential to identify various societal variables that impact student performance.

Using data from the PISA 2000 to 2009 results, researchers determined the countries with the highest student performance overall. Finnish students ranked highest on the PISA (OCED, 2014). Students from the country with the highest per-pupil spending, Luxembourg, along with students from the country with the highest teacher salaries, Spain, ranked far below student performance in Finland. Finland's per pupil spending is average for the countries PISA covers and, for comparison, is almost $5,000 USD less than the nearly $12,000 USD the United States spends per pupil (OECD, 2013a, 2013b, 2014; Ripley, 2013).

Some countries allocate substantial resources to their education program, yet many of these systems are outperformed by nations with varying levels of investment (OECD, 2013a). Data collected from PISA show educational institutions, despite their educational resources, have difficulty advancing student performance (OECD, 2013b; Ripley, 2013). A possible explanation is that countries are not investing in the most effective educational resource to improve student performance (OECD, 2013a; OECD, 2013b).

It is possible the PISA score is not connected to the alignment of educational resources; however, that determination cannot be made until such research has been conducted. The mathematics PISA is scored on a scale up to 650 points. In 2013 students from Shanghai, China, scored on average above 600 points, while students from Viet Nam scored slightly above 500 points, and those from Luxembourg scored slightly below 500 (OECD, 2013b). However, the country of Viet Nam spent less than $10,000 USD per pupil; Shanghai-China spent a little less than $50,000 USD per pupil; and Luxembourg spent just under $200,000 USD per pupil (OECD, 2013b). According to the OECD (2013b), Luxembourg spent $190,000 USD per pupil more than Viet Nam, but the students of Luxembourg had an overall lower performance. Additionally, between 2003 and 2012, Mexico started spending almost $5,000 USD less per pupil and increased their mathematics performance almost 30 points, while Sweden increased its per pupil spending more than $25,000 USD and mathematics performance dropped more than 30 points (OECD, 2013b). Overall, however, many educational leaders, politicians, and members of the greater public see educational resources as linked to educational achievement, even though some countries' PISA numbers do not currently reflect those opinions.

Statement of the Problem

Despite similar availability and allocation of educational resources, educational inequality and results in student performance on the 2012 PISA varied widely across the globe. The 2012 PISA installment was the most recent PISA data I could analyze at the time of this study. It appears that the results of later studies are showing similar results to 2012. If leaders could identify resources that had the strongest relationship with student performance on the 2012 PISA, educational leaders could allocate their resources more efficiently. More efficient resource allocation could increase student performance without additional investment, which could close the achievement gap and increase educational equality.

Purpose of the Study

The purpose of this study was to identify the resources with the greatest relationship to student performance on the 2012 PISA. Sixty-three countries participated in the 2012 PISA. In this study, I reviewed the educational resources (financial, material, and time) each country invested in its education program and compared the resource investment to the countries' student performance in science and mathematics on the 2012 PISA. By analyzing the relationship between the countries' resources and student performance, I developed a clearer understanding of those relationships. I compared the impact of a nation's expenditures and distribution of educational resources to the nation's student performance on the PISA to determine if there was a high impact or, any impact at all, that could be determined between these variables. The results of this study indicated there were, indeed, positive correlations between resource allocation and achievement in mathematics and science.

Research Questions

Knowing the identified resources that had the strongest relationship with student performance on the 2012 PISA, educational leaders could allocate their resources more efficiently. To determine these relationships, I developed the following research questions:

- Which of the educational resources of time, financial, and material have the strongest relationships with student performance in science and mathematics on the 2012 PISA?
- What are the most significant resources one can use to consistently increase student performance?

The research questions were developed on the following hypothesis: More efficient resource allocation can increase student performance, without additional investment, which could close the achievement gap and increase educational equality.

Significance of the Study

This study has added to the literature through an examination of the relationship between educational resources and student performance. Although this research is limited to the PISA 2012 data and OECD survey results, researchers can use the most recent data from the PISA and OECD to replicate this study. Additionally, educational leaders and policymakers at the international, national, local, and school levels can use this information when allocating and distributing resources in an effort to prevent social and economic problems in the future by increasing student performance on the PISA in mathematics and science. Educational leaders can use the information from this study to determine the quality and quantity of resources to be spent on cumulative educational expenditure, available computers at school, and student learning time in school. Educational leaders who allocate resources more effectively can improve student performance on the PISA in mathematics and science by focusing on the resources with greatest impact on student performance, which, in turn, may adjust educational inequality and the achievement gap and have a specific impact on student individual future income and participation in society. The most important goal is to close the achievement gap among students, schools, and nations to give more people an equitable education.

Literature Review

In this study I sought to find evidence related what resources have the greatest relationship with student performance on the 2012 PISA. Through my analysis of the data, I found those resources that have the strongest relationships with student performance, showing the possibilities that school leaders have to adjust resource allocation to be more efficient and increase student performance without increasing the need to invest more resources. Researchers (Ripley, 2013) have widely studied educational inequality, educational resources (time, finances, and material), and how resources are used. According to Ripley (2013), some scholars have argued the way in which educational resources are used has a greater impact on student performance than the quantity of resources they have available.

In this study, I sought to construct a global understanding of relationships between resources and achievement, described previously by Engel (2015) and Edwards (2012), within the large pool of available data from PISA. Knowing these data are used to develop reforms, and reforms have yet to significantly reduce educational inequality, educational leaders can return to the raw data to try to create different assumptions and frameworks about how to more effectively lessen, and eventually eliminate, educational gaps in the success of students around the world.

High student performance is important not only for a student to be well educated but also for a student to be successful as an adult. Researchers have found an educated and active citizen body is critical for effective governance in a democratic society (Gutman, 1987; Westheimer & Kahne, 2004). Additionally, student performance is the greatest predictor of individual earned income as an adult and individual participation in society (OECD, 2004, 2013, 2014; OECD/UNESCO, 2003; Ripley, 2013). Hanushek and Wößmann (2015) analyzed international testing data to find the relevance of education in economic growth. There was an assumption that 1 year of schooling in different countries was equivalent; however, Hanushek and Wößmann concluded the knowledge base held by the country's population, what the people know, determined if a country was rich or poor; thus, the quality of education varies in each country. These researchers concluded countries whose members do well on international tests have greater economic growth; additionally, 75% of a country's economic growth rate incorporates the mathematics and science skills of the population (Hanushek & Wößmann, 2015).

Resource of Time

Studies have suggested the educational resource of time impacts student performance (Angrist & Lavy, 1997; Belinski et al., 2009; Bloom, 1977; Eccles & Barber, 1999; Fischer, 1981; Guskey, 2001). The resource of time consists of (a) the amount of individual student–teacher time, (b) students' time spent invested in the school or the greater school community outside of school academic hours, and (c) the amount of time a student spends on learning (e.g., the age at which children start their education, the length of their classes). Similarly, time, as an educational resource, defined by OECD (2013), consists of (a) students' learning time in school, (b) class size, (c) extracurricular activities, and (d) students' attendance at preprimary school. Angrist and Lavy (1997) noted a decrease in class size has a significant increase in student reading and mathematics scores for fourth and fifth graders. Each student receives more individual time with the teacher if there are fewer students in the class. Therefore, Angrist and Lavy suggested these are the reasons for improved performance. Additionally, Bloom (1977) and Guskey (2001) stated, to reduce variation in students' achievement and to have all students learn well, educators must increase learning time. Fisher (1981) also found additional student learning time in school and smaller class sizes increased student performance. Furthermore, student involvement in extracurricular activities has been correlated with increased academic performance (Eccles & Barber, 1999) because the student's time is invested in school and education becomes more of a priority, even if the extracurricular activities are not academic. Berlinski et al. (2009) found preprimary education increased student test scores by 8%; the student's time in school and academics started early, as did their skill development.

Material Resources

Researchers have identified educational material resources (e.g., computers, pencils, books, paper, staplers, copiers, printers) as having a positive impact on student performance (Evans, 2006; Faith, 209; Gouda et al., 2013) According to Evans (2006), Faith (2009), and Gouda et al. (2013), the material resource consisted of (a) the availability of computers, (b) the instructional use of the internet, (c) the quality of the physical infrastructure, and (d) the school's educational resources. Likewise, material resources, defined by OECD (2013), consisted of both physical infrastructure and educational resources. Faith explained physical infrastructure and material educational resources such as computers and internet access have a statistically significant positive impact on student achievement in the fourth and eighth grades. The same study identified between 55.8% and 77.2% of variation in student achievement can be attributed to investment in educational resources.

Financial Resources

Studies by the Education Commission of the States (1992), the Federal Deposit Insurance Corporation (2007), Gius (2013), Husted (2005), Ripley (2013), and Vegas and Coffin (2015) suggested financial educational resources have an impact on student performance; additionally, the OECD (2013) stated that financial resources consisted of the total amount of money spent on education and money spent on teacher's salary. Financial resources, defined by OECD (2013), consisted of teacher's salary and expenditures for education. Gius (2013) performed a study that showed positive changes in teacher pay had decreased the district-level dropout rate by 2.36% and increased the graduation rate by 3.04% over a 7-year period. Additionally, Vegas and Coffin (2015) discovered overall expenditure had a positive correlation with student performance, as mean student performance was approximately 14 points higher on the PISA scale for every additional $1,000 USD spent.

The indication that finances are connected to student achievement has been replicated by more recent studies. For example, the Learning Policy Institute found a meta-analysis of research conducted by Baker (2018) from Rutgers Graduate School of Education indicated finances matter to student achievement. According to the LPI Brief, written by Baker (2018), there were three important conclusions from the meta-analysis:

1. An analysis of the relationship between financial resources and student outcomes indicates that money matters in a positive way for student achievement.
2. Educational resources that cost money (e.g., smaller class sizes, salaries for expert teachers) are positively correlated with student achievement.
3. Test scores and graduation rates rise when school districts sustain their efforts to improve educational resources.

There appear to be three issues related to resources: (a) the quantity of resources, (b) the quality of the resources, and (c) how resources are allocated. These issues were at the heart of this study.

Conclusion

Some countries allocate substantial resources to their education programs, yet many of these systems are outperformed by nations with varying levels of investment (OECD, 2013a). Data collected from PISA show educational institutions, despite their educational resources, have difficulty advancing student performance (OECD, 2013b; Ripley, 2013). This study examined the educational inequality and varying results in national student performance on the 2012 PISA despite similar availability and allocation of educational resources. Knowing the identified resources that had the strongest relationship with student performance on the 2012 PISA, educational leaders could allocate their resources more efficiently. More efficient resource allocation could increase student performance without additional investment, which could close the achievement gap and increase educational equality. The resources of time, material, and financial resources have been identified as having a relationship with student performance (OECD, 2013a; OECD, 2013b); however, information is not available regarding which relationships have the greatest impact on student performance. A comparison of the impact these resources have is needed; it is not enough to determine if a relationship exists. A narrow view of one resource relationship with student performance is limited; however, a broader of view of which resources have the greatest relationship with student performance can be more informative.

PISA has collected data on the allocation of educational resources and student performance. Certain resources may be more closely related to improved student performance on the PISA. In the mid-1960s, Finnish students earned a score of 510; by 2010, Finnish students earned a score of 545, gaining 35 points in 50 years, which is a modest but steady improvement (Ripley, 2013). In the same time span, the United States went from 485 to just above 490, and, in 50 years, France's score had no change, Canada's student performance increased from 490 to 525, and Norway's student performance decreased from 490 to just above 465 (Ripley, 2013). The data suggested that, over time, some countries increased student performance, others did not change, and some countries had declining performance.

The impact of educational resources on student performance is not well studied. Research is needed so policymakers and educational leaders can make careful decisions regarding resource allocations. This study addressed part of that gap by focusing on the quantity of a resource and its impact on student performance. The distribution of educational resources is not limited to financial means; education requires talented and dedicated people, facilities to support and advance education, and time dedicated to proper preparation and instruction (OECD, 2012, 2013a, 2013b). I examined the impact educational resources have on student performance, specifically the resources of time, material resources, and financial resources and their impact on student performance in mathematics and science on the 2012 PISA.

Methodology

This study reviewed the 2012 PISA data to determine the educational resources that had the greatest relationship with student performance. If school districts were aware of the resources that had the strongest relationship with student performance, administrators could adjust resource allocation to be more efficient and increase student performance without investing more resources. This section outlines the correlational methodology used to determine the relationship between educational resources and student performance on the 2012 PISA.

Research Design

The research design for this study was a correlational study. A correlational study, according to Gall et al. (2007), allows for an investigation examining the direction and magnitude of the relationship among variables using correlation statistics. Correlational analysis can be used to examine complex relations among many variables. This study used 11 variables for performance in science and 12 for mathematics, for a total of 23 interactions between each resource variable and measures of student performance. The number of variables, with different units of measure, provided a complexity in this study that correlational analysis could manage.

The OECD has collected data from 63 countries around the world. The information collected is in two forms: (a) a test assessing student academic performance in mathematics and science and (b) a survey completed by schoolteachers, principals, parents, and other members of the education community. The survey provides information on the allocation of resources within the educational system. A qualitative or mixed method study would not have been appropriate for analyzing the data collected by the OECD. A correlational analysis study was necessary to determine the strength of the relationship between the educational resources and student performance. With this method, I answered the research question, “Which of the educational resources of time, financial, and material have the strongest relationship with student performance in science and mathematics on the 2012 PISA?” This method allowed me to analyze data even where there were varying units of measure, as there were in this study. It can be difficult to analyze statistics of various, seemingly incomparable, units of measure into something useful and meaningful; in such cases, it is appropriate to employ correlational statistics.

I used a correlational analysis methodology; additionally, I used Intellectus Statistics software for calculations and graphing. I also used Intellectus Statistics software to determine *r*, the Pearson correlation coefficient, and *p*, the probability value, with a 95% confidence interval. This methodology (Gall, 2007) can examine the complex relationships between resources and student performance.

Research Method and Rationale

In this quantitative study, I employed correlation analyses to determine the relationship of time, material, and financial educational resources with student performance in science and mathematics on the 2012 PISA. The OECD has already collected data on student performance and resource allocation. The data collection section in this article expands on the specific data harvested from the OECD 2012 PISA. With the data collected from the OECD database, I converted the data to a *z* score. A *z*-score conversion was necessary because some of the survey questions were answered in percentages, others in number of minutes, dollar amount, etc. The units are different, and, in this study, using *z* scores put each element of the educational resource on the same scale, making comparison easier. I used Intellectus Statistics software to convert the data to a *z* score; the formula for a *z* score is (score – mean) / standard deviation. Each resource element needed to be compared to the mathematics and science 2012 PISA scores. I created scatterplot graphs to compare the *z* score of each resource element on one axis and the countries' student performance *z* score in mathematics and science on the other. I used Intellectus Statistics software to create the scatterplot graphs and to subsequently determine the Pearson correlation coefficient, *r,* and *p* value, with a 95% confidence interval. This methodology (Gall et al., 2007) examined the complex relationships between resources and student performance. I calculated and compared the correlation coefficients to understand the magnitude of each suggested resource with student performance.

Participants

The member countries of the OECD and nonmember countries participating in the PISA and OECD research composed the participant pool. The 2012 assessment was administered to 510,000 students who were between 15 years 3 months and 16 years 2 months old (OECD, 2013). Sixty-three countries participated in the 2012 PISA; I used the data collected from those 63 countries in this study. Country participation was voluntary and included: Albania, Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, Columbia, Costa Rica, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong-China, Hungary, Iceland, Indonesia, Ireland, Israel, Italy, Japan, Jordan, Kazakhstan, Korea, Latvia, Liechtenstein, Lithuania, Luxembourg, Macao-China, Malaysia, Mexico, Montenegro, Netherlands, New Zealand, Norway, Peru, Poland, Portugal, Qatar, Romania, Russian

Federation, Republic of Serbia, Shanghai-China, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Taipei-China, Thailand, Tunisia, Turkey, United Arab Emirates, United Kingdom, United States, and Uruguay (OECD, 2013).

The sampling techniques of the OECD and participating countries, along with parental and governmental consent to participate in the PISA, had already been determined, validated, submitted, and approved by the participants or their guardians. According to the OECD (2015), schools are randomly selected in each participating country by the international contractor for participation in PISA, and the selection of schools and students is kept as inclusive as possible, so the sample of students comes from a broad range of backgrounds and abilities. I used the mean scores, by country, to analyze academic student performance in this study. Specific student scores were available; however, data for specific students do not contain identifying information. Each student is referred to only as a number.

Sampling

The OECD's (2014) school sampling process used a cluster model; the target cluster size did not fall below 35 students. According to the OECD, an international contractor used the countries' school sampling frame to select the school sample. Each school prepared a list of eligible students, according to the OECD (2014):

> Each school drawing an additional grade sample was to prepare a list of age and grade-eligible students that included all PISA-eligible students in the designated grade (e.g., Grade 10); and all other 15-year-old students (using the appropriate 12-month age span agreed upon for each participating country) currently enrolled in other grades. This form was referred to as a student listing form. (p. 85)

The following criteria were considered important according to the OECD (2014):

- Age-eligible students were all born in 1996 (or the appropriate 12-month age span agreed upon for the participating country).

- The list was to include students who might not be tested due to a disability or limited language proficiency.
- Students who could not be tested were to be excluded from the assessment after the student sample was selected. Students were to be excluded after the students' sample was drawn, not prior.
- Schools were to retain a copy of the student list in case the national project manager had to contact the school with questions.
- Student lists were to be up to date at the time of sampling rather than a list prepared at the beginning of the school year. Students were identified by their unique student identification numbers.

Once the international contractor received the list of PISA-eligible students from a school, the school was responsible to select the student sample (OECD, 2014). The schools were "required to use KeyQuest, the PISA Consortium sampling software, to select the student samples unless otherwise agreed upon. For PISA 2012, all countries used KeyQuest" (OECD, 2014, p. 85). According to the OECD (2014), the overall response rate for the 2012 PISA was 85%. To select the student particiants and ensure the students participating in the 2012 PISA were representative of their country, the OECD (2014) developed the following framework and guidelines:

> Selected students attending the same school cannot be considered as independent observations as assumed with a simple random sample because they are usually more similar to one another than to students attending other schools. For instance, the students are offered the same school resources, may have the same teachers and therefore are taught a common implemented curriculum, and so on. (p. 186)

The OECD (2014) stated differences among schools can be larger if different educational programs are not consistently available. For example, one would expect to observe greater differences between a vocational school and an academic school rather than between two comprehensive schools. To have more reliable data, the OECD has taken strides to have a diverse sample of schools and students. The OECD (2014) addressed how geographic places of residence could have an impact:

> It is well known that within a country, within sub-national entities and within a city, people tend to live in areas according to their financial resources. As children usually attend schools close to their home, it is likely that students attending the same school come from similar social and economic backgrounds. A simple random sample of 4,000 students is thus likely to cover the diversity of the population better than a sample of 100 schools with 40 students observed within each school. It follows that the uncertainty associated with any population parameter estimate (i.e., standard error) will be larger for a clustered sample estimate than for a simple random sample estimate of the same size. (p. 186)

Within the participating countries, the schools taking the PISA are randomly selected (OECD, 2015). The PISA aims to assess performance at the national level, not an individual student level, so not every student completes the same test (OECD, 2015), providing a broader assessment. Additionally, there are 13 different survey booklets and three different questionnaires distributed randomly to the randomly selected participating students (OECD, 2015). Different assessments are used to gain more data about the general population; a single student would not have enough time to complete all the assessments. The OECD (2013) assesses between 4,500–10,000 students in each participating country.

Variables

This study analyzed which educational resources had the strongest relationship with student performance in mathematics and science on the 2012 PISA. Later in this section, I expand on the educational resource variables and the variables of student performance. To determine the relationship between the two variables, I graphed each resource element against student performance, in both mathematics and science. Each graph had information from all 63 participating countries, allowing a large sample size for determining the relationship strength between the variables.

In this study, I analyzed student performance on the international scale by looking at national scores in science and mathematics. Analyzing national student performance scores requires a tool that can collect data consistently, independently, and without bias while assessing students from many nations. I provide a table with the survey questions used to collect data on each resource in Appendix A.

Financial educational resources, according to the OECD (2013), include:

- cumulative expenditure on education
- teacher salaries, ratio per GDP

Material educational resources, according to the OECD (2013), include:

- physical infrastructure quality
- educational resource quality
- availability of computers at school
- proportion or computers that have access the internet.

Time educational resources, according to the OECD (2013), include:

- student learning time in school: mathematics and science
- class size
- extracurricular activities
- student attendance at preprimary school

Results

In this study, I aimed to determine the educational resources that have the greatest relationship with student performance on the 2012 PISA. By identifying resources that have a strong relationship with student performance in this study, I have provided information to make it possible for school leaders to adjust resource allocation to increase student performance without investing more resources. This information can help guide the decision making of Board of Education members, Superintendents, and other school leaders.

Study Findings

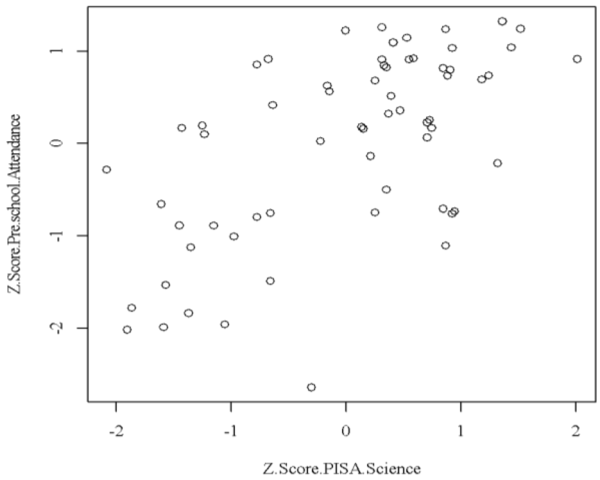
I conducted a Pearson correlation analysis to determine the strength of the relationship between each educational resource and student performance in mathematics and science. I used Cohen's standard to evaluate the strength of the relationship, where coefficients between .10 and .29 represent a small association, coefficients between .30 and .49 represent a moderate association, and coefficients equal to or above .50 indicate a large association (Cohen, 1988). A Pearson correlation requires the relationship between each pair of variables is linear (Conover & Iman, 1981). This assumption is violated if there is curvature among the points on the scatterplot between any pair of variables.

Science and Mathematics Scores and Preprimary school

There was a significant positive correlation between PISA science scores and preprimary school attendance ($r = 0.60$, $p < .001$; see Table 1). The correlation coefficient between PISA science scores and preprimary school attendance was 0.60, indicating a strong relationship. As preprimary school attendance increased, PISA science scores tended to increase (see Figure 1).

Figure 1

Science and Preprimary school Attendance

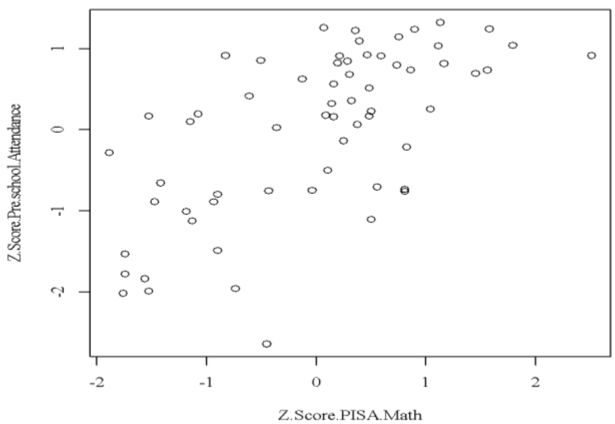


Note. Scatterplot between PISA science scores and preprimary school attendance. Pearson correlation coefficient = 0.60. Data retrieved from "Education Spending," by OECD, 2012 (https://data.oecd.org/eduresource/education-spending.htm).

There was a significant positive correlation between PISA mathematics scores and preprimary school attendance (*r* = 0.64, *p* < .001; see Table 2). The correlation coefficient between PISA mathematics scores and preprimary school attendance was 0.64 indicating a large relationship (see Figure 2). As preprimary school attendance increased, PISA mathematics scores tended to increase.

Figure 2

Mathematics Scores and Preprimary school



Note. Scatterplot between PISA mathematics scores and preprimary school attendance. Pearson correlation coefficient = 0.64. Data retrieved from “Education Spending,” by OECD, 2012 (https://data.oecd.org/eduresource/education-spending.htm).

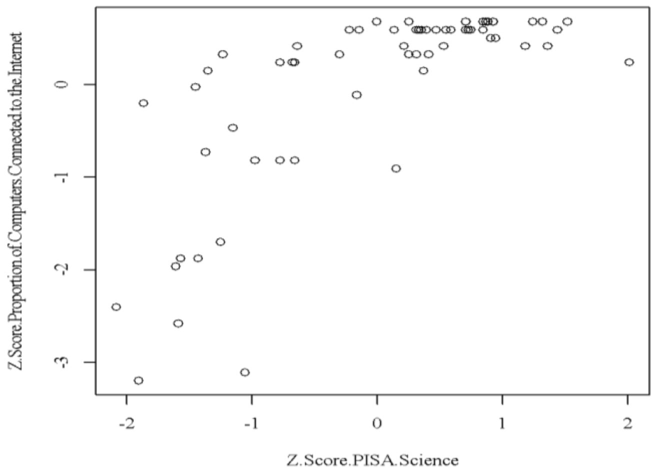
These scores indicated an important correlation between both mathematics and science scores on the PISA and student attendance at preprimary school. Preprimary school may be an important area for educational leaders to consider in terms of closing the achievement gap for young students.

Science and Mathematics Scores and Computers

There was a significant positive correlation (see Figure 3) between the science scores and the proportion of computers connected to the internet (r = 0.74, p < .001; see Table 1). The correlation coefficient between science scores and the proportion of computers connected to the internet was 0.74, indicating a strong relationship. As the proportion of computers connected to the internet increased, the PISA science scores tended to increase. Figure 3 presents a scatterplot of the correlation.

Figure 3

Science Scores and Internet Computers

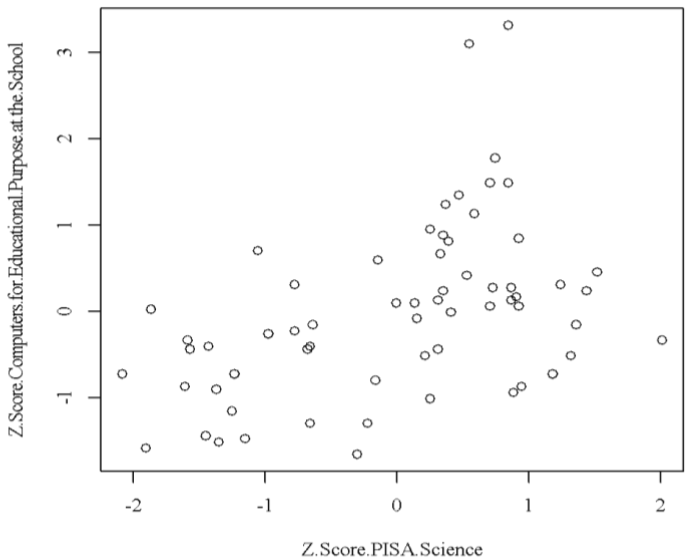


Note. Relationship between PISA science scores and the proportion of computers connected to the internet. Pearson correlation coefficient = 0.74. Data retrieved from “Education Spending,” by OECD, 2012 (https://data.oecd.org/eduresource/education-spending.htm).

The data also revealed a significant positive correlation between PISA science scores and the number of computers for educational purpose at school (r = 0.46, p < .001; see Table 1). The correlation coefficient between PISA science scores and the number of computers for educational purpose at school was 0.46, indicating a moderate relationship. As the number of computers for educational purpose at school increased, PISA science scores tended to increase (see Figure 4).

Figure 4

Science Scores and Educational Computers

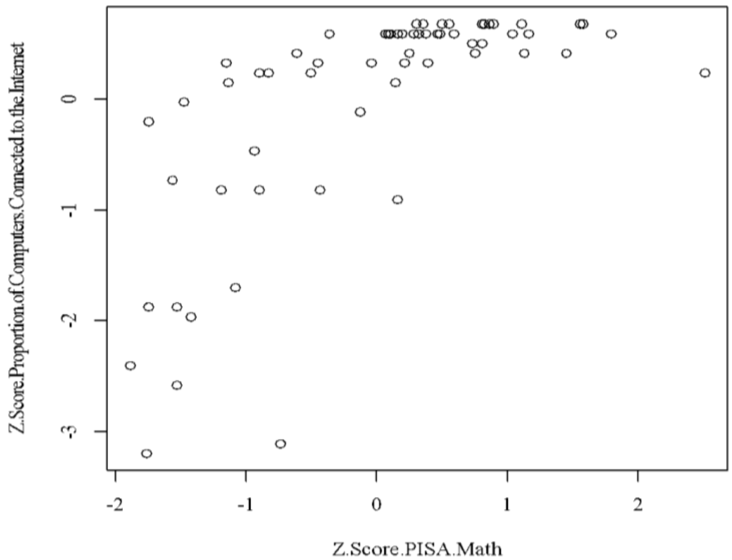


Note. Scatterplot between PISA science scores and the number of computers for educational purpose at school. Pearson correlation coefficient = 0.46. Data retrieved from "Education Spending," by OECD, 2012 (https://data.oecd.org/eduresource/education-spending.htm).

There was a significant positive correlation between PISA mathematics scores and the proportion of computers connected to the internet (r = 0.69, p < .001; see Table 2). The correlation coefficient between PISA mathematics scores and the proportion of computers connected to the internet was 0.69, indicating a large relationship (see Figure 5). As the proportion of computers connected to the internet increased, PISA mathematics scores tended to increase.

Figure 5

Mathematics and Internet Computers



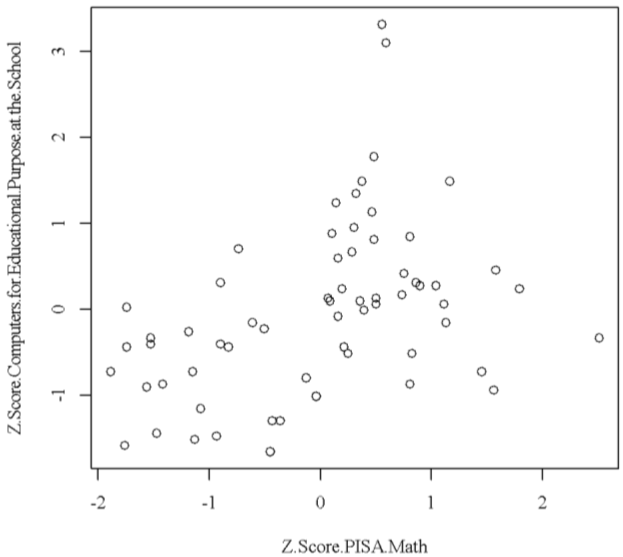
Note. Scatterplot between PISA mathematics scores and proportion of computers connected to the internet. Pearson correlation coefficient = 0.69. Data retrieved from "Education Spending," by OECD, 2012 (https://data.oecd.org/eduresource/education-spending.htm).

There was a significant positive correlation between PISA math scores and the number of computers for educational purposes at the school (r = 0.41, p < .001). The correlation coefficient between PISA math scores and the number of computers for educational purposes at the school was 0.41, indicating a moderate relationship (see Table 2). As the number of computers for educational purposes at the school increased, PISA math scores tended to increase (see Figure 6).

The data indicated a significant and strong relationship between the proportion of computers connected to the internet and mathematics and sciences scores on the PISA. In terms of the number of computers dedicated for educational purposes, the relationship with mathematics and science was significant with a moderate correlation size.

Figure 6

PISA Mathematics Scores and Computers



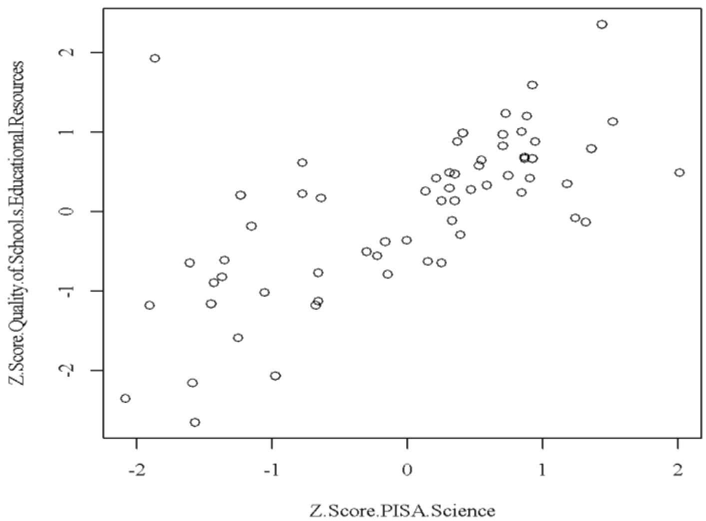
Note. Scatterplot between PISA math scores and the number of computers for educational purposes at the school. Pearson correlation coefficient = 0.41. Data retrieved from "Education Spending," by OECD, 2012 (https://data.oecd.org/eduresource/education-spending.htm).

Science and Mathematics Scores and Educational Resources

There was a significant positive correlation between PISA science scores and the quality of school educational resources (r = 0.68, p < .001; see Table 1). The correlation coefficient between PISA science scores and the quality of school's educational resources was 0.68, indicating a strong relationship. As quality of school's educational resources increased, PISA science scores tended to increase (see Figure 7).

Figure 7

Science Scores and Quality of Educational Resources

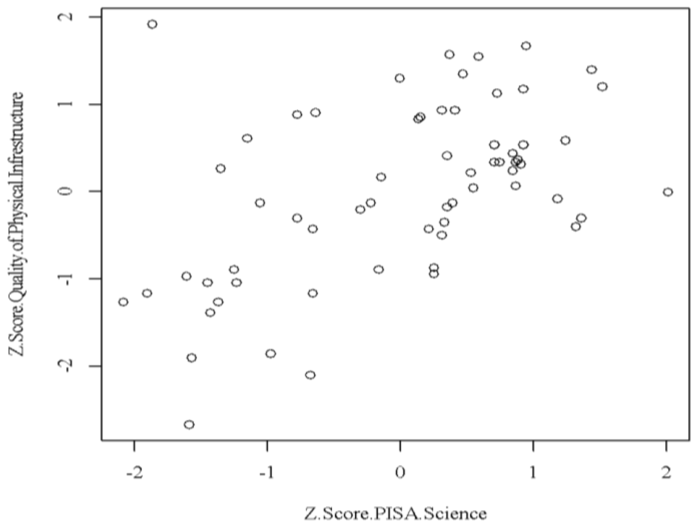


Note. Relationship between PISA science scores and the quality of schools' educational resources. Pearson correlation coefficient = 0.68. Data retrieved from "Education Spending," by OECD, 2012 (https://data.oecd.org/eduresource/education-spending.htm).

Additionally, there was a significant positive correlation between PISA science scores and the quality of physical infrastructure (*r* = 0.52, *p* < .001; see Table 1). The correlation coefficient between PISA science scores and the quality of physical infrastructure was 0.52, indicating a large relationship. As the quality of physical infrastructure increased, PISA science scores tended to increase (see Figure 8).

Figure 8

Science Scores and Physical Infrastructure

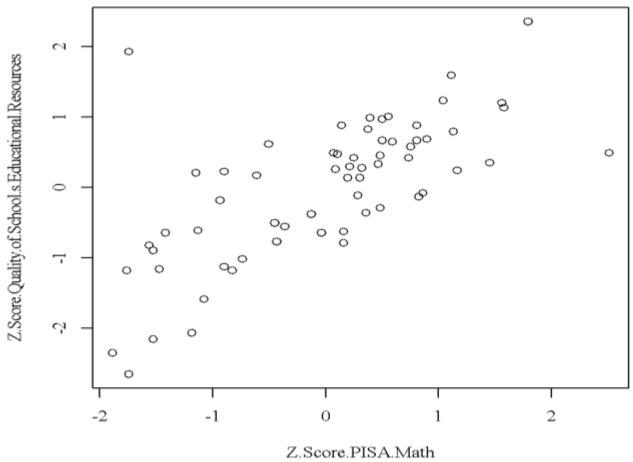


Note. Scatterplot between PISA science scores and quality of physical infrastructure. Pearson correlation coefficient = 0.52. Data retrieved from “Education Spending,” by OECD, 2012 (https://data.oecd.org/eduresource/education-spending.htm).

There was a significant positive correlation between PISA mathematics scores and the quality of school’s educational resources (r = 0.69, p < .001; see Table 2). The correlation coefficient between PISA mathematics scores and the quality of school’s educational resources was 0.69, indicating a large relationship (see Figure 9). As the quality of school’s educational resources increased, PISA mathematics scores tended to increase.

Figure 9

Mathematics Scores and Quality of Education Resources

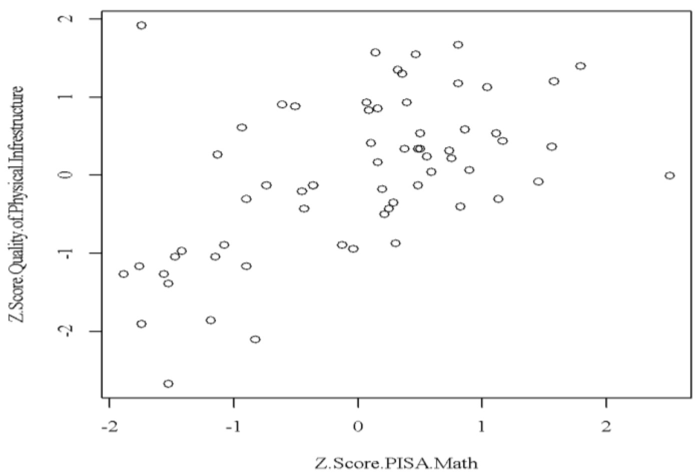


Note. Scatterplot between PISA mathematics scores and the quality of school's educational resources. Pearson correlation coefficient = 0.69. Data retrieved from "Education Spending," by OECD, 2012 (https://data.oecd.org/eduresource/education-spending.htm).

There was a significant positive correlation between PISA mathematics scores and the quality of physical infrastructure (*r* = 0.54, *p* < .001; see Table 2). The correlation coefficient between PISA mathematics scores and the quality of physical infrastructure was 0.54, indicating a large relationship (see Figure 10) As the quality of physical infrastructure increased, PISA mathematics scores tended to increase.

Figure 10

Mathematics Scores and Physical Infrastructure



Note. Scatterplot between PISA mathematics scores and the quality of physical infrastructure. Pearson correlation coefficient = 0.41. Data retrieved from "Education Spending," by OECD, 2012 (https://data.oecd.org/eduresource/education-spending.htm).

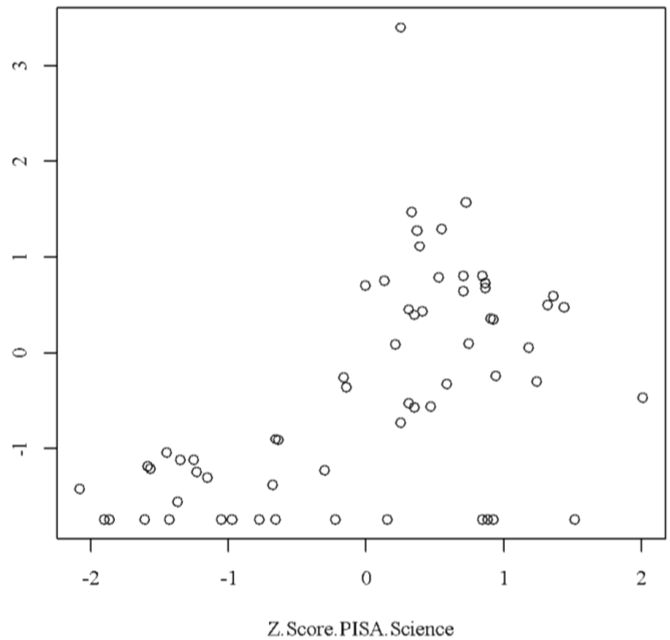
Scores indicate for both mathematics and science a significant and strong positive relationship between student PISA scores and the quality of school resources. The same was true for mathematics and sciences scores and the quality of school infrastructure.

Science and Mathematics Scores and Cumulative Expenditures

A significant positive correlation was also found between PISA science scores and cumulative expenditure ($r = 0.55$, $p < .001$; see Table 1). The correlation coefficient between PISA science scores and cumulative expenditure was 0.55, indicating a large relationship. As cumulative expenditure increased, PISA science scores tended to increase (see Figure 11).

Figure 11

Science Scores and Cumulative Expenditures

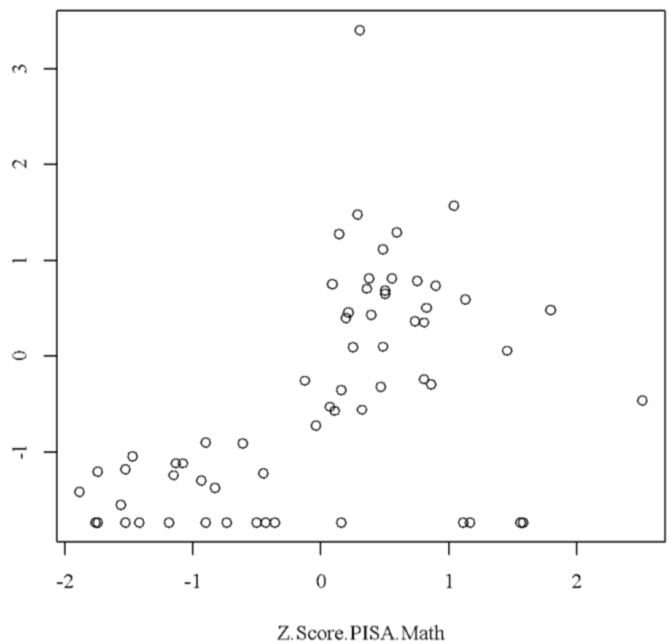


Note. Scatterplot between PISA science scores and cumulative expenditure. Pearson correlation coefficient = 0.55. Data retrieved from “Education Spending,” by OECD, 2012 (https://data.oecd.org/eduresource/education-spending.htm).

There was a significant positive correlation between PISA mathematics scores and cumulative expenditure ($r = 0.50$, $p < .001$; see Table 2). The correlation coefficient between PISA mathematics scores and cumulative expenditure was 0.50, indicating a large relationship As cumulative expenditure increased, PISA mathematics scores tended to increase (see Figure 12).

Figure 12

Mathematics Scores and Cumulative Expenditures



Note. Scatterplot between PISA mathematics scores and cumulative expenditure. Pearson correlation coefficient = 0.50. Data retrieved from "Education Spending," by OECD, 2012 (https://data.oecd.org/eduresource/education-spending.htm).

The results of this study indicate a strong positive relationship between mathematics PISA scores and cumulative expenditures. The data also indicate a positive and strong relationship between science scores and cumulative expenditures in schools.

Summary

As can be observed in Table 1, six educational resources had significant correlational relationships with science scores of the PISA. The significant correlations between science scores and educational resources included: (a) preprimary school attendance, (b) quality of physical infrastructure, (c) quality of schools' educational resources, (d) quantity of computers for educational purposes, (e) proportion of computers connected to the internet, and (f) cumulative expenditure. Items that did not have significant correlations with science scores included: (a) student learning time in school, (b) class size, (c) extracurricular activities at school, and (d) teacher salaries. The two highest effect sizes were generated by the proportion of computers connected to the internet (r = 0.74) and the quality of a school's educational resources (r = 0.68). These scores indicate how schools allocate their resources matters.

Table 1

Correlation Between Science and Educational Resources

Resource Variable	*r*	*p*
Time		
Student learning time in school	0.07	.590
Science		
Class size	-0.16	.220
Extracurricular activities at school	0.09	.480
Preprimary school attendance	0.60	< .001
Material		
Quality of physical infrastructure	0.52	< .001
Quality of schools' educational resources	0.68	< .001
Computers for educational purposes	0.46	< .001
Proportion of computers connected to the internet	0.74	< .001
Financial		
Cumulative expenditure	0.55	< .001
Teacher salaries	0.22	.090

Note. Resource table relationship with student performance on Science PISA; this table provides a summary of information.

Table 2 displays the six correlations between mathematics PISA scores and educational resources that were statistically significant. The six significant areas included: (a) preprimary school attendance, (b) quality of physical infrastructure, (c) quality of schools' educational resources, (d) computers for educational purposes, (e) proportion of computers connected to the internet, and (f) cumulative expenditure. These were the same resources that were significant between science and education resources. The highest effect sizes were also related to the science scores: proportion of computers connected to the internet and quality of schools' educational resources. The scores for mathematics and science also indicate the importance of preprimary school attendance for student achievement in mathematics and science.

Table 2

Correlation Between Mathematics and Educational Resources

Resource Variable	*r*	*p*
Time		
Student learning time in school	0.01	.940
Mathematics		
Class size	-0.10	.430
Extracurricular activities at school	0.08	.530
Preprimary school attendance	0.64	< .001
Material		
Quality of physical infrastructure	0.54	< .001
Quality of schools' educational resources	0.69	< .001
Computers for educational purposes	0.41	< .001
Proportion of computers connected to the internet	0.69	< .001
Financial		
Cumulative expenditure	0.50	< .001
Teacher salaries	0.15	.240

Note. Resource table relationship with student performance on Mathematics PISA; this table provides a summary of information.

Summary/Conclusions of Results

I found a significant positive relationship between student performance on the science and mathematics 2012 PISA and six resource variables. These variables included: (a) proportion of computers connected to the internet (mathematics *r* = 0.69, science *r* = 0.74); (b) quality of schools' educational resources (mathematics *r* = 0.69, science *r* = 0.68); (c) preprimary school attendance (mathematics *r* = 0.64, science *r* = 0.60); (d) quality of physical infrastructure (mathematics *r* = 0.54, science *r* = 0.52); (e) cumulative expenditure (mathematics *r* = 0.50, science *r* = 0.55); and (f) computers for educational purposes (mathematics *r* = 0.41, science *r* = 0.46). The scores for mathematics and science were basically consistent. These results indicate resource allocation for mathematics and science could follow along the same resource path when educators are contemplating allocation of resources that will raise achievement in mathematics and science.

Discussion

In this study, I assessed the correlation between 10 resource areas and student achievement in mathematics and science. I evaluated which of the educational resources of time, finances, and/or material had the strongest relationships with student performance in science and mathematics on the 2012 PISA. I suggest as variables such as preprimary school attendance are addressed, student performance will increase, as will the individual student's future economic and social impact. Research has shown (OECD, 2004, 2013, 2014; OECD/UNESCO, 2003; Ripley, 2013) the achievement gap and educational inequality may decrease with increased performance. The ability to be more successful in school will offer individual students opportunities for higher future earned income and greater participation in society.

Performance may increase, but individual students could have a different relationship and the result may not be constant. As student performance continues to increase, student future economic and social impact will also grow. My study attempted to identify optimal areas in which stakeholders can invest educational resources to increase student performance on the PISA, perhaps without increasing cost of education and thereby possibly reducing educational inequality.

Key Findings

My findings suggest educational resources have varying relationships with student performance in science and mathematics, but the resources that were significant were significant for both mathematics and science. Educators who are interested in advancing student achievement in both mathematics and science should seriously consider supporting resources in the following six areas: (a) proportion of computers connected to the internet, (b) quality of school educational resources, (c) preprimary school attendance, (d) quality of the physical structures, (e) cumulative spending, and (f) the number of computers used for educational purposes.

Additionally, my analysis of specific resource strands showed varying relationships within an educational resource, such as time, material, and financial support. As a result, each resource's relationship with student performance in mathematics and science should be looked at individually. By looking on the international level, researchers can analyze a broad range of policies and practices associated with educational resources and their impact on student performance. The results of this study suggest the number of computer connections to the internet for students to use, the quality of educational resources, preprimary school attendance, the physical infrastructure, cumulative expenditure, and the number of computers used for educational purposes have a significant relationship with student performance in mathematics and science. Other disciplines may have different resource needs.

Resources and Student Performance in Science and Mathematics

I found the resource of time has a limited relationship with student performance in mathematics and science. Angrist and Lavy (1997), Belinski et al. (2009), Eccles and Barber (1999), and Fisher (1981) suggested the resource of time has a positive link with student performance; however, I found no relationship between student performance and class size (mathematics r = -0.10, science r = -0.16); students' learning time in school (mathematics r = 0.01, science r = 0.07); and student participation in extracurricular activities at school (mathematics r = 0.08, science r = 0.09). My findings might be a result of looking at the resource of time through an international lens. Hanushek and Wößmann (2015) explained 1 year of schooling can be very different in each country; additionally, they stated time spent in school was not as relevant as the knowledge of the population.

The variables, in order of correlation coefficient, suggest a priority list or resources that should receive support. This might indicate school leaders seeking to increase student performance in mathematics and science should first increase the proportion of computers connected to the internet, increase the quality of schools' educational resources, and increase preprimary school attendance before decreasing class size or increasing the number of available teachers. It is important to remember these variables were compared to each other, and the results are limited to the pool of educational resources. I cannot conclude the proportion of computers connected to the internet is the most important resource because it has the highest coefficient, only that this resource has a higher correlation than the other variables to which it compared in this study.

Educational Materials. The large scale of this study suggests by adjusting the investment in educational materials to find the optimum level of investment before the allocated resources have a diminishing return in student performance, national governments will be able to most efficiently use the benefits of educational materials without continued waste of scarce resources. I found educational materials have a positive relationship with student performance. My results echo those previously found by Evans (2006), Faith (2009), and Gouda et al. (2013). However, neither the literature nor my study determines causation. Educational materials may not have a strong relationship with student performance but instead might only indicate countries with high test scores, which also have growing economies (Hanushek & Wößmann, 2015), have the means to purchase more computers, have a higher proportion of computers with internet capabilities, have the ability to construct and renovate school buildings, and have more resources. Darling-Hammond (2014) suggested child poverty, segregation, income inequality and disparities in access to educational resources will diminish if resources are distributed efficiently. Additional research needs to be conducted to determine if expenditure of educational materials causes increased student performance, or if increased student performance creates a need for more resources.

Cumulative Spending. The relationship between student performance and financial resources varies. My results showed no significant relationship between teacher salaries and student performance (mathematics 0.15, science 0.22) on the 2012 PISA. However, Gius (2013) found competitive teacher salaries and changes in teacher pay had a statistically significant, positive effect on student performance and district-level graduation rate. Other variables may have contributed to positive outcomes instead of the adjustment in teacher salaries. Hanushek and Wößmann, (2015) found teacher salaries and other pay incentives only have a positive relationship with student performance when students need to pass an external exam to graduate.

Along with the Education Commission of the States (1992), the Federal Deposit Insurance Corporation (2007), Husted (2005), Ripley (2013), and Vegas and Coffin (2015), I found cumulative spending impacts student performance (mathematics 0.50, science 0.55). According to Hanushek and Wößmann (2015), spending on education does not have a direct relationship with student performance, but they also maintain such a resource is not completely irrelevant. Cumulative spending impacts student performance only to the point that cumulative spending impacts the resources and variables that directly impact student performance (OECD, 2014). This explanation might apply to students in countries with high cumulative expenditure, such as Lichtenstein, who are being outperformed by students in Finland who receive much less spending (OECD, 2013a, 2013b, 2014; Ripley, 2013).

Preprimary School Attendance. Time spent in school, class size, and extracurricular activities might impact student performance only as far as they affect student confidence, interest in subject, and perceived relationship with the teacher or even the quality of instruction the student receives. I determined correlation, not causation, and found no relationship between student performance and class size, students' learning time in school, and student participation in extracurricular activities at school. I found a positive relationship between preprimary school attendance and student performance (mathematics 0.64, science 0.60). Angrist and Lavy (1997) and Fisher (1981) found increased time between students and teachers led to higher student performance. I found a similar relationship with preprimary school attendance but not with increased learning time in the classroom.

Research of preprimary school attendance (Fisher, 1981; OECD 2013) suggests its importance for students' future growth and success. By increasing preprimary school availability and attendance, national governments will be able to increase student performance with the most desirable rate of return for expenditure and performance. Additional research needs to be conducted to specifically identify and better define the student and teacher time together that correlates with increased student performance.

Limitations

The information collected from the OCED database originated as student or principal self-reporting and may not be as accurate, as conscious and subconscious factors may cause inaccurate self-reporting. The analysis of the correlations was limited to linear relationships between variables; even if the correlation coefficient was zero, a nonlinear relationship might exist. Additionally, the PISA items selected for each resource category are proxies and may not be the best proxies available. This study may suggest positive or negative interactions between variables; however, this study is unable to prove causation and can only suggest such a link exists. This study focused on the educational resources in terms of quantity and not the quality of resources. The distinction has no impact for the financial resource strand of cumulative spending; however, all the other resource strands have no measure of the quality of the educational resource. Given these limitations, I recommend that educational leaders should confirm my findings before adjusting policy.

Recommendations for Future Research

The results of this study suggest the need for future research in several areas. We know educational materials have a relationship with student performance, but we do not know the point of investment where educational materials yield maximum results. By understanding the investment and the return of this resource, educational leaders will be able to reach the highest potential of student performance through educational materials before the relationship dissipates. When school leaders can maximize the resources invested in educational materials, leaders have opportunities to more effectively control the cost of education. This will allow educators to become financially more transparent and more likely to develop mechanisms to effectively meet student needs .

Preprimary school attendance and availability is important because of its relationship with student performance. Educators do not know how long a student needs to attend preprimary school, what happens during this learning opportunity, and how to maximize performance efficiency. This study did not identify the ways in which resources spent on teachers and teacher professional development can best reach their maximum efficiency. The literature asserts teachers and teacher professional development has a significant relationship with student performance (Afterschool Alliance, 2007; Althauser, 2015; Hattie, 2009; Ripley, 2013; Ross & Begeny, 2014). Additional research needs to be done to determine how this study could be designed to specifically target those resources.

Final Thoughts

Ultimately, this study showed the relationship between educational resources and student performance in science and mathematics on the 2012 PISA. This study should be replicated in the subsequent PISA installments; the 2015 PISA results are now available to verify the results and expand the data set. Additional research should be done to determine the degree to which investment and preprimary school attendance increase student performance on the PISA. Additional research could confirm that increased student performance on the PISA directly improves or is correlated to students' future economic and social impact. When educational leaders consider the relationship between educational resources and student performance, and where that relationship is strongest upon allocation of those resources, the potential exists for educators to efficiently reduce the achievement gap and decrease educational inequality. A more efficiently resourced education may also be a better education.

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Asian American Student Engagement on College Campuses

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Abstract

Based on the detrimental effects of stereotypes such as the model minority myth, the purpose of this study was to examine the engagement rates of first-generation and non-first-generation Asian American students at various types of institutions compared to their peers and to explore whether the engagement rate differs depending upon institution type. The presumption of the model minority myth dismisses the fact that Asian Americans are not only extremely heterogenous in terms of race and ethnicity but also the significant variation in terms of academic achievement (Lee & Kumashiro, 2005). Although researchers have explored how racism impacts higher education attainment of Black/African American and Hispanic/Latinx students (Flores & Park, 2013; Naylor et al., 2015; Owens & Lynch, 2012; Wodtke, 2012), limited research exists on noninternational Asian American students on college campuses. The lack of research on Asian American college students contributes to the perpetual misconceptions of Asian Americans. This study identified areas where these students need support and served to validate those needs. Using descriptive and inferential statistics, I analyzed data from the Spring 2015 administration of the National Survey of Student Engagement (NSSE). Findings suggest Asian American students who participated in this study are not as engaged as their peers, there is a difference in the rates of engagement between first-generation Asian American students and non-first-generation Asian American students, and Asian American students who attend baccalaureate colleges report higher engagement levels than other types of institutions.

Keywords: Asian American, diversity, first-generation, model minority myth, NSSE, persistence, retention, student engagement

ASIAN AMERICAN STUDENT ENGAGEMENT ON COLLEGE CAMPUSES

Institutions of higher education in the United States have not been as effective in promoting academic success for students of color as they have for White students (National Center for Education Statistics [NCES], 2016). In 2013, 63% of White students attending college for the first time and pursuing their bachelor's degree full-time graduated from the same institution within 6 years, compared to 41% of Black students, 53% of Hispanic students, and 71% of Asian students (NCES, 2016). It is important to note data were for students who started and ended at the same institution; data did not account for students who started at one institution and then graduated from another, which highlight the topics of retention and persistence.

Retention focuses on the institution and is a measure of how well an institution is meeting the needs of and supporting its students (Kuh et al., 2006). These efforts can include providing remedial courses to support students academically to the amount of financial assistance available for students in need (Kuh et al., 2006). Persistence, on the other hand, focuses on the student (Renn & Reason, 2013), the activities in which they engage, and the friendships they develop during their time at school (Kuh et al., 2006). The key distinction is colleges and universities measure retention by whether students graduate from the institutions where they began, whereas students may measure their persistence based on whether they reached the goals they set out for themselves. Where students' goals do not include graduating from the institution is where retention and persistence deviate from each other. However, one strategy to increase retention is student engagement (Hu, 2010), which is integral to students' persistence (Tinto, 2000); those who are engaged in student engagement activities are more likely to persist and graduate from college (Harper, 2009; Quaye & Harper, 2015).

There are two components to student engagement: (a) the time and effort students put into educational activities, and (b) the resources and efforts colleges and universities invest to create educational opportunities for students (Kuh, 2001; Kuh et al., 2007). These educational activities are intentional interactions institutions create for the benefit of the student and can come in the form of high-impact practices (Kuh et al., 2006). Such high-impact practices allow students to engage in their studies and develop personally, and these practices motivate students to continue their time at the institution (Kuh, 2016). Students who engage in high-impact practices on their college campuses benefit greatly (Kuh, 2009; Pascarella & Terenzini, 2005), particularly students of color, first-generation students, and students who are academically underprepared (Kuh, 2009). In fact, Kuh et al. (2008) concluded engagement positively affects academic performance and persistence, and "the effects are even greater for lower ability students and students of color compared with White students" (p. 555). Such findings are critical, as the demographic landscape of higher education has shifted and schools have become increasingly diverse with a burgeoning population of students of color and more students in need of greater support (Harper & Quaye, 2009).

Furthermore, many Asian American students arrive on college campuses without the needed preparation, skills, or resources to succeed in college because the unique challenges they face in society are overlooked (Museus, 2008; Yeh, 2005). Quaye et al. (2009) posited the reason for this disparity is partly due to obstacles racial and ethnic minority students face, including: (a) racial identity development, (b) being one of few racial/ethnic minority students, (c) lack of same-race/ethnicity faculty, (d) curricular content, and (e) lack of culturally responsive pedagogy. These obstacles impact their learning, particularly where stereotypes around race and ethnicity intersect with perceived academic ability (Museus, 2008). When the Asian American population is small on college campuses compared to the rest of the student population, Asian Americans may feel undue attention and may feel they represent the entire Asian race when they speak (Iwamoto & Liu, 2010). This tremendous pressure can create a situation that may cause Asian American students to shut down (Wei et al., 2011) and not participate in class. In addition, the prevailing belief all Asians do well in school can cause fear and insecurities for those who struggle academically or who are unable to grasp a concept in class. The internal battle between the ability of the individual student and expectations of others hinders a student's willingness to seek help from others and causes them to struggle silently (Museus, 2008). In other words, the model minority stereotype has a detrimental effect on the desires of Asian American students to engage on campus (Museus, 2008), particularly in co-curricular activities (Museus & Park, 2015). It may not be surprising that researchers in at least one study found Asian Americans the least engaged student population on college campuses (Hu & McCormick, 2012). This lack of engagement is problematic, particularly as the issue relates to retention and persistence. The more students are engaged on their campus, the more they will persist in their goals, which translates to institutions retaining their students. For a population forecasted to grow in the coming decades (Ortman & Guarneri, n.d.), coupled with competing with other institutions to enroll enough students to stay operational, how institutions provide opportunities to its Asian students is critical. Certainly, the cost to recruit students is greater than the cost to retain students (Ruffalo Noel Levitz, 2016).

For Asian American students, the model minority myth presumes Asian Americans not only have a strong work ethic but also that they are innately intelligent and motivated and therefore not in need of student support services (Maramba & Palmer, 2014; Wells & Horn, 2015). This presumption attempts to dismiss systemic racism and instead focuses on individual shortcomings as the reason why people of color are unable to match their White counterparts in terms of academic achievement (Museus, 2008; Museus & Park, 2015; Wong et al., 1998). This myth also advances the notion Asian Americans do not experience racism and therefore appear to be as successful as White Americans, all the while dismissing the effort Asian American students apply to their academics (Museus & Park, 2015). However, Asian Americans are regularly subjected to subtle racism, "including members of society rejecting their interethnic differences ('all Asians look alike'), ascribing them intelligence ('you people always do well in school'), and denying their racial realities ('Asians are the new Whites and do not face discrimination')" (Museus & Park, 2015, p. 552).

Besides contending with stereotypical myths, students who are also first-generation students have an additional layer of obstacles to overcome; in the context of higher education, “first-generation status” refers to the educational attainment (or lack thereof) of the students’ parents. Specifically, the status refers to students whose parents either have less than a bachelor’s degree or less than a high school diploma (NSSE, 2018). First-generation students are less likely to persist and graduate and less engaged overall (Pike & Kuh, 2005). For first-generation Asian American students, there may be additional distinct challenges (e.g., a language barrier, their cultural upbringing) because the growth of the Asian population in the United States has two main sources—immigration and refugee resettlement (Iwamoto & Liu, 2010; Lee & Kumashiro, 2005). In both cases, English is not the primary spoken language (Lee & Kumashiro, 2005; Redondo, 2008). Therefore, language barriers are a unique challenge for Asian American students, and even more so for first-generation Asian American students because mastering the English language is added to learning the “language” of higher education (Pak et al., 2014; Yeh, 2005).

On the institutional level, this study highlights the need for colleges and universities to commit resources to support Asian Americans, along with other students of color. Asian Americans experience subtle racism on a regular basis (Museus & Park, 2015). From being viewed as a perpetual foreigner and never being established as a “true American” (Iwamoto & Liu, 2010; Museus & Park, 2015) to being regarded as high achieving, academically successful, and naturally intelligent and motivated (Maramba & Palmer, 2014), much of what Asian Americans on college campuses experience is overlooked, and their needs are not addressed. The model minority myth places Asian Americans in an unrealistic utopic state in which it is believed Asian American students are self-sufficient and able to succeed in college with minimal support. Unfortunately, such a stereotype masks the undue pressure and feelings of inferiority (Museus & Park, 2015) when the student’s reality diverges from society’s expectations. When these two perspectives collide, Asian American students typically keep their struggles to themselves, which could be due to the fear of bringing disappointment to their parents or families, fear of not meeting society's expectations, and/or fear of playing into the negative stigma of counseling (Iwamoto & Liu, 2010; Yeh, 2005). As such, the needs of Asian Americans are unique and require further understanding of their personal experiences.

By identifying such needs and exploring their rate of engagement, this study adds to the limited research on Asian American students and their levels of student engagement. Researchers have studied other students of color (Flores & Park, 2013; Naylor et al., 2015; Owens & Lynch, 2012; Wodtke, 2012), and this study serves to validate whether student engagement is a predictor of success for all students, including Asian American students. Additionally, this research is significant to extant literature on Asian American students as it further conveys how the model minority myth is detrimental to student success.

Personally, the research is significant because I have first-hand experience of being a first-generation Asian American woman in U.S. higher education. Too often, I have encountered situations in which my needs were overlooked, and I was unable to access resources, and this was also true for other Asian Americans in my community. Likely, situations like these occur because of the prevailing belief Asian Americans have already attained a high level of achievement compared to other students of color. As a result, I see the struggle of Asian American students and desire to do my part in highlighting unique challenges Asian American students face so their needs can be met.

The purpose of this study was to examine engagement rates of first-generation and non-first-generation Asian American students at various types of institutions compared to their peers.

Specifically, the questions I proposed to examine were as follows:

1. How do Asian American students compare with their peers on their rate of student engagement on college campuses?
2. Is there a difference in the rates of engagement between first-generation Asian American students and non-first-generation Asian American students?

To answer these questions, I employed a quantitative research inquiry for this study with the following null hypotheses:

1. There is no significant difference in the rate of student engagement between Asian American students and their peers at different types of institutions.
2. There is no significant difference in the rate of student engagement between first-generation Asian American students and non-first-generation Asian American students.

Literature Review

The purpose of this study was to examine engagement rates of first-generation and non-first-generation Asian American students at various types of institutions compared to their peers. To effectively conduct this study, I explored extant literature on student engagement theory and Asian American students.

Student Engagement Theory

Student engagement in and of itself is a complex area of study because of the various approaches to understanding what engagement is (Kahu, 2013). Axelson and Flick (2011) reported a lack of understanding of the relationship between engagement and student learning because the "current definitions of engagement are too abstract, the relationship between engagement and learning too poorly understood, to fully guide us" (p. 43). Thankfully, additional researchers have defined student engagement (Harper & Quaye, 2009; Hu & McCormick, 2012; Kahu, 2013; Kuh, 1995, 2001; Quaye & Harper, 2015). To define student engagement, one first must start with and acknowledge the work of Astin's (1984) student involvement theory.

Student involvement theory focuses on what students do and how they spend their time in college, or "the amount of physical and psychological energy that the student devotes to the academic experience" (Astin, 1984, p. 297). The premise has been Astin's (1993) input-environment-output (IEO) model, with the belief what students do and how they spend their time (i.e., inputs) within institutional constructs and campus opportunities (i.e., environment) will affect their outcome (i.e., outputs; Quaye & Harper, 2015; Renn & Reason, 2013). Since the initial conception of student involvement theory, researchers have conducted additional studies and distinguished between student involvement and student engagement. In this sense, the focus of engagement is not only on the output but also on student learning and the responsibility of both the students and the institutions to create these opportunities for student learning (Kuh et al., 2007; Quaye & Harper, 2015). Hayek (2001, as cited in Pike et al., 2006) found a positive correlation between retention, persistence, and graduation and the "expenditures for instruction, research, academic support, and institutional support" (p. 849). Instead of focusing solely on what students do and how they spend their time, the inputs also include who students are and experiences they bring with them to a college campus.

The environment includes the college campus, the campus culture, and educational opportunities institutions have created to enhance the student experience. These opportunities come in the form of high-impact programs and initiatives (Kuh, 2008). High-impact practices "typically demand considerable time and effort, facilitate learning outside of the classroom, require meaningful interactions with faculty and other students, encourage collaboration with diverse others, and provide frequent and substantive feedback" (National Survey of Student Engagement [NSSE], 2015a, p. 1). The outputs are student learning, student development, and persistence to graduation (Kuh, 2016; Kuh et al., 2006). Kuh (2008) identified 10 high-impact practices effective in deepening the student experience: (a) first-year seminars and experiences, (b) common intellectual experiences, (c) learning communities, (d) writing-intensive courses, (e) collaborative assignments and projects, (f) undergraduate research, (g) diversity/global learning, (h) service learning and community-based learning, (i) internships, and (j) capstone courses and projects.

National Survey of Student Engagement

The NSSE (2017a), developed in 1998 through a grant from the Pew Charitable Trusts, is an instrument used to measure student engagement in the curricular and cocurricular activities “linked to student learning” (para. 1). The survey is given to first-year and senior students and the data collected serve several purposes: (a) provide information to schools so they can focus on areas to improve when it comes to the undergraduate experience, (b) present information that can be easily understood by parents and prospective students, and (c) allow institutions to compare with other like schools to see how they fare (Kuh, 2001). To provide this information effectively, NSSE (2017b) developed five benchmarks: (a) level of academic challenge, (b) active and collaborative learning, (c) student interactions with faculty members, (d) enriching educational experiences, and (e) supportive campus environment. Researchers have concluded NSSE benchmarks of student engagement are important in contributing to student learning and development (Hu & McCormick, 2012; Kuh, 2001; Pike et al., 2011). However, in 2013, NSSE made significant changes to these benchmarks and instead created engagement indicators grouped under the following four engagement themes: (a) Academic Challenge, (b) Learning With Peers, (c) Experiences With Faculty, and (d) Campus Environment (NSSE, 2014, 2017c). Table 1 shows the engagement themes and their associated indicators.

The different questions asked in surveys connect to these engagement themes and indicators. The theme of Academic Challenge measures the amount of effort students put into their studies (i.e., how much time they spend reading, writing, and studying). The survey includes questions about the rigor of their coursework, such as the degree to which they applied theories or facts to solve problems, the opportunities they had to reflect on the impact of topics covered in class on their own lives, what their study habits are, and the frequency of analyzing numerical information from which to draw conclusions. The theme of Learning With Peers measures how students learn. The survey includes questions on whether students have worked with their peers on assignments and how often they have interacted with peers from a different background. The theme of Experiences With Faculty includes questions about conversations students have had with faculty on their career path and/or academic performance. Under this theme, students can also evaluate professors on their teaching effectiveness and evaluate whether information was communicated in a manner that was easily understood and grasped. The theme of Campus Environment highlights the quality and depth of interaction students have with those in the campus community. In addition, this theme measures how supportive students find the campus to be (NSSE, 2014; see Appendix A for a full description of the indicators and the items incorporated into the surveys to evaluate the indicators and themes).

Table 1

NSSE Engagement Themes and Indicators

Theme	Engagement Indicators
Academic Challenge	Higher Order Learning Reflective & Integrative Learning
	Learning Strategies
	Quantitative Reasoning
Learning With Peers	Collaborative Learning
	Discussions With Diverse Others
Experiences With Faculty	Student-Faculty Interaction
	Effective Teaching Practices
Campus Environment	Quality of Interactions
	Supportive Environment

Note. Adapted from “Engagement Indicators and High-Impact Practices,” by NSSE, 2015, p. 1. http://nsse.indiana.edu/pdf/EIs_and_HIPs_2015.pdf

The results of the survey include a summary of how undergraduate students are engaged in both curricular and co-curricular activities at a particular school (Kuh, 2001). Hearing what students have to say and taking note of how they are experiencing college is crucial to supporting them (American College Personnel Association [ACPA] & National Association of Student Personnel Administration [NASPA], 2004). In addition, the effort of hearing students’ voices is critical in meeting their needs, enhancing their experiences, and contributing to their learning and development (Harper & Quaye, 2015). These components help measure different aspects of student engagement, which is important particularly as more and more diverse students are attending higher education.

Asian Americans

In the United States, Asian Americans are the fastest growing racial group and represented the fastest growing population between 1990 and 2000 (U.S. Census Bureau, 2002). By 2050, the population of Asian Americans in this country is estimated to almost double, from almost 17.5 million to almost 34 million (Ortman & Guarneri, n.d.). Furthermore, the projected fall enrollment of Asian Americans in postsecondary institutions is expected to increase by 8.3%, from 1,284,000 in 2017 to 1,391,000 in 2023 (Snyder & Dillow, 2015). With more than 50 ethnic, language, religious groups within this racial category, Asian Americans are quite heterogeneous (Lee & Kumashiro, 2005). There are also categorizations of Asian American ethnic identities (e.g., East Asians, South Asians, Southeast Asians) that have been identified.

It is important to note, however, that racial groups are socially constructed, which means racial categories is a concept that people and society have created (Oxford Dictionary, 2017). The Asian American race is no exception, particularly as the term Asian has implications (i.e., geographical origin, physical characteristics, or cultural practices; Jo, 2004). In 1977, there were four main racial categories on which the federal government sought to collect data (i.e., White, Black, American Indian or Alaskan Native, and Asian or Pacific Islanders). Without explanation, the “or” in “Asian or Pacific Islanders” began being replaced by “and,” or the two conjunctions would be used interchangeably (Hall, 2015). Because federal agencies sought to place people in concise, mutually exclusive boxes by having them self-identify as White, Black, American Indian or Alaskan Native, and Asian or Pacific Islander, “Asian” and “Pacific Islander” were placed together as a category. However, the population of Pacific Islanders is quite small and “exist[s] as only 3 percent of the imagined ‘AAPI’ grouping” (Hall, 2015, p. 745). This distinction in racial categorization is important to bring up because some extant literature still combine these two racial categories (Dugan & Komives, 2010; National Education Association, 2017; Pang et al., 2011; Teranishi & Nguyen, 2012). Asians and Pacific Islanders confront different challenges and stereotypes. In fact, whereas Asians are considered the model minority, Pacific Islanders are believed to be savages and uneducated (Hall, 2015). Moreover, Pacific Islanders "are not Asian American *at all* [emphasis in original]" (Hall, 2015, p. 741). Therefore, aggregating these two identities together further masks the individual needs of the subgroups under each.

The two main sources for the growth of the Asian population in the United States are immigration and refugee resettlement (Iwamoto & Liu, 2010; Lee & Kumashiro, 2005), which underscore challenges with language and cultural differences for many within this group. Because English may not be the primary language spoken at home, proficiency in English is a challenge, not only for immigrants and refugees but also for their children (Yeh, 2005). As much as parents may value education as a means for an eventual better life for their children (Museus, 2013), these parents may have a difficult time supporting their children in school for several reasons: (a) they are working multiple jobs to provide for their families, (b) they have little education themselves, or (c) the language barrier prevents them from communicating with teachers or navigate the school system (Yeh, 2005). For refugees, the U.S. school system may be unfamiliar territory and, coupled with a language barrier, can translate into little support for the student (Museus, 2013). In addition, often, the expectation is for students to do well in school and then adhere to their Asian culture when they are home (Park, 2008). Being exposed to U.S. culture in school can conflict with family and cultural values at home. This conflict is a form of cognitive dissonance because there is a level of discomfort that motivates students to find a means to resolve inconsistencies they experience (Desai, 2015; Hoshino-Browne, 2012; Luttrell, 2016). Cognitive dissonance theory (Festinger, 1957; Festinger & Carlsmith, 1959) pertains to the idea humans value consistency and will do what they need to do to ensure their behavior matches what they believe. When these two elements do not match, a tension presents itself and motivates a change in attitude so the attitude and behavior line up (Hoshino-Browne, 2012). For Asian American students in particular, the clash in culture (i.e., culture cognitive dissonance) “impedes learning and success in U.S. educational settings, especially given that the setting refuses to adapt to the diversity of its student body” (S. Spears, personal communication, August 8, 2018).

Asian Americans extremely heterogeneous in terms of race and ethnicity, and there is also significant variation regarding academic achievement. Asian Americans make up 5.5% of the U.S. population, and about 20% of that population attends Ivy League schools (Zhou & Lee, 2017). On the other hand, according to census data reported by Reeves and Bennett (2004), 13.3% of Asian Indians, 12.7% of Filipinos, 8.9% of Japanese, 13.7% of Koreans, 53.3% of Cambodians, 59.6% of Hmong, 49.6% of Laos, and 38.1% of Vietnamese over 25 years of age have less than a high school education (p. 12). Many factors can influence such a low educational attainment; however, an important factor is stereotypes. Often, students of color must combat these presumptions to prove their academic capabilities (Quaye et al., 2015).

Some Asian American students are regularly subjected to more subtle racism (Museus & Park, 2015), while others may experience overt racism. Perhaps as a result of the model minority myth, Asian Americans have encountered barriers to accessing and receiving student support services (Maramba & Palmer, 2014; Wells & Horn, 2015). Museus and Park (2015) conveyed the following:

> [The] model minority myth negatively influences the experiences of Asian American undergraduates by fueling assumptions that they are socially inept, are naturally geared toward math and science, are genetically predisposed to excel academically, and therefore should not need or ask for help. (pp. 565–566)

Not only do Asian Americans struggle with navigating challenges of school and their families, but they also face the assumptions that come with the model minority myth. When the overarching belief is all Asians are academically inclined, but Asian American students do not view themselves living up to that standard, they can internalize the stereotype (Shen, 2015) and feel embarrassed or inadequate (Wei et al., 2011). The subtle racism Asian Americans experience creates unique challenges for these students of color, particularly as they experience higher levels of psychological distress (Liang et al., 2007; Witkow et al., 2015). They may be counted as people of color and used to help promote diversity on campus; at the same time, they may intentionally be excluded from services geared toward minority students, such as programming efforts and academic support (Pak et al., 2014). Other times, they are viewed as nonracial or not “real” minorities (Cabrera, 2014).

On the one hand, the message to Asian Americans is they matter on campus in terms of being added to the diversity count, but on the other hand, they are simply receivers of hollow words because of the lack of effort to validate them and their needs. These presumptions are problematic and impact the leadership development and self-identity of Asian American students (Chung, 2014; Kodama & Abreo, 2009; Li et al., 2014; Museus & Park, 2015). As a result, Asian American students report lower rates of satisfaction in their college experience (Ancis et al., 2000), have negative racial experiences at college (Johnston & Yeung, 2014), and are found to be the most disengaged on college campuses in at least one study related to student engagement (Hu & McCormick, 2012).

First-Generation Status

Another population in higher education that seems to be less engaged overall and less likely to persist and graduate are first-generation students (Pike & Kuh, 2005). There are unique challenges first-generation students face. First of all, first-generation status refers to the educational attainment of the student’s parents. The NSSE (2018) defined first-generation as either of the following:

- Highest level of education for either parent is less than a bachelor’s degree (parents may have some postsecondary education)

- Highest level of education for either parent is a high school diploma or less (parents have no experience in postsecondary education)

Because first-generation students may be the first in their families to go to college, they have less knowledge about every aspect of college (i.e., from enrollment to life on a college campus) and receive little to no guidance from their parents (Pascarella & Terenzini, 2005). Cultural capital, which refers to “the symbols, ideas, tastes, and preferences that can be strategically used as resources in social action” (Oxford Reference, 2018, para. 1), is, therefore, at a lower rate. They also arrive to campus with more self-doubt and lower degree aspirations, which results in lower retention rates, and they are less likely to complete a bachelor’s degree within 4 years (Ishitani, 2006). Furthermore, first-generation students may feel academically underprepared, and many choose to focus entirely on academic endeavors and do not participate in co-curricular activities (Hawkins & Larabee, 2009). The implication of this lack of engagement results in first-generation students “making less progress in their learning and intellectual development” (Pike & Kuh, 2005, p. 289).

First-Generation Asian American Students

What happens when a student is first-generation and Asian American? The challenges of intersectionality between first-generation status and race can create even more complex hardships for students. As first-generation students, they may seemingly face challenges due to low cultural capital received from their parents. As first-generation students, they may feel self-doubt in their ability to navigate a college campus—much less navigate college courses—because no other family member can tell them what to expect or provide advice about course selection, financial aid, and offices on campus that can serve as resources. This challenge is compounded if this same person is Asian American because language may be a barrier that prevents them from asking for help. For those who do not have well-educated parents, the factors that may deter first-generation Asian Americans from engaging with faculty are a lack of understanding of the school system and having other responsibilities outside of school (Chang, 2005). In addition, experiencing subtle racism and a lack of support from the campus community and having to maneuver a campus culture that is different than their upbringing as Asian Americans adds to the complexities of these two intersecting identities. First-generation immigration status can also be arduous.

Although some families immigrated to the United States, this fact does not necessarily mean the parents have not gone to college; they could have attended college in their home countries. Therefore, these students may not identify as first-generation students according to the definition of first-generation students in higher education. However, the effect of not being familiar with postsecondary education in the United States may be very similar to the effect of being a first-generation student. This study explored whether first-generation Asian American students were less likely to participate in curricular and co-curricular activities than their non-first-generation Asian American peers.

Conclusions

To adequately serve the current student body, institutions have an obligation to increase support systems for varying sets of needs and experiences these students bring with them (Quaye & Harper, 2015). Part of this effort is also because institutions recognize a diverse student body will help prepare all students to be global citizens and improve educational outcomes for all students. This effort to "uncover inequities in student success, identify effective educational practices, and build such practices organically for sustained institutional change" (Association of American Colleges & Universities, 2017, para. 2) is inclusive excellence. One way colleges initially attempted to increase the diversity on their campuses was through affirmative action practices, which favored admitting minorities or underrepresented students of color to their institution. Initially, this practice was seen as simply denying White students to make room for minorities who were less qualified to atone for past injustices (Bok, 2013). In fact, *Gratz v. Bollinger, 539 U.S. 244* was a high-profile lawsuit against University of Michigan in 2003 that "put an end to [their] point-based undergraduate admission system that automatically gave Black students points based on their race" (Allen, 2014, para. 3). However, recent practices favor minorities who are qualified, and the Supreme Court has made it clear that the use of race cannot be the sole consideration of a student's admission to an institution. Furthermore, Bok (2013) referenced what Supreme Court Justice Sandra Day O'Connor wrote about a court case, outlining advantages of admitting minorities or underrepresented students of color:

> Minority preferences benefit the society in two important ways. They contribute to the diversity of the student body by bringing different perspectives and experiences to the campus that broaden the understanding of all students and help them learn to live and work effectively with persons different from themselves. (p. 130)

College is certainly the place to live and work effectively with others who are different. In fact, "college attendance, independent of numerous other factors, promotes racial understanding and openness to diversity as well as the belief that racism remains a societal problem" (Pascarella & Terenzini, 2005, p. 581). In a global world, exposure to different viewpoints and different people is extremely important, especially given people are naturally diverse (Robinson, 2013) in race and ethnicity, cultural upbringing, religion, sexual identity, age, and so on. Exposure to people from different backgrounds is inevitable as the demographic landscape of higher education shifts and changes.

Increasingly, students are being encouraged to apply to college because of the prevailing belief one needs more than a high school diploma to succeed in the workplace (Baum et al., 2013; The Pell Institute & Penn AHEAD, 2015). Gone are the days when higher education was reserved solely for White men to be trained (Renn & Reason, 2013). Higher education in the United States broadened the demographics of eligible students when it created what are known today as historically Black colleges and universities (HBCUs). Minority-serving institutions do not simply stop with HBCUs—they also include tribal colleges and universities , Hispanic-serving institutions, and Asian American and Native American Pacific Islander-serving institutions (AANAPISIs; Renn & Reason, 2013). At the same time, however, more and more students of color and students from underserved communities are arriving on campus without the needed preparation "to succeed in college-level courses, creating difficult problems for those who must try to remedy their academic deficiencies" (Bok, 2013, p. 79). As a result, institutions are finding they need to be creative in supporting all the needs these populations present during their journey to degree completion to close the equity gap present in higher education.

Methodology

Purpose

The purpose of this study was to examine the engagement rates of first-generation and non-first-generation Asian American students at various types of institutions compared to their peers. To examine the rates of engagement, this study sought to answer the following questions:

1. How do Asian American students compare with their peers on their rate of student engagement on college campuses?
2. Is there a difference in the rates of engagement between first-generation Asian American students and non-first-generation Asian American students?

To answer these questions, this study relied on existing data from a nationally administered survey, which allowed findings from the data analysis to be generalized to the population. In addition, I used descriptive statistics and statistical inference. Descriptive statistics are an approach to formulate and present numerical data in an easy-to-read format. A descriptive design reveals measures of central tendency, which were important in answering the research questions. The use of statistical inference allowed findings from the sample to be applied to the defined population (i.e., Asian American students) to draw conclusions.

Research Design

This study was both a descriptive and inferential statistical study. For this survey design, the unit of analysis was undergraduate, first-year, and senior students at varying institutions.

The data source was the Spring 2015 NSSE administration as reported in *The College Student Report* (NSSE, 2015b).

The NSSE is a survey that allows a sample of students at participating institutions in the United State and Canada to self-report activities in which they are engaged, how they are learning, and the quality of their experiences at school. Responses from survey questions on curricular and co-curricular activities align with NSSE's 10 engagement indicators (see Appendix A for a description of indicators).

Each survey consisted of at least 111 questions (more, if an institution chose), and these questions gathered data in the following five categories: (a) participation in dozens of educationally purposeful activities, (b) institutional requirements and the challenging nature of coursework, (c) perceptions of the college environment, (d) estimates of educational and personal growth since starting college, and (e) background and demographic information (NSSE, 2017d).

There were 47 questions asked in the 2015 NSSE administration that were tied to the 10 engagement indicators—(a) Collaborative Learning, (b) Reflective and Integrative Learning, (c) Student-Faculty Interaction, (d) Higher Order Learning, (e) Effective Teaching Practices, (f) Quantitative Reasoning, (g) Discussions With Diverse Others, (h) Learning Strategies, (i) Quality of Interactions, and (j) Supportive Environments. See Appendix A for the full list of questions tied to the specific engagement indicator.

Methods

In 1998, the thought of creating a survey tool to measure undergraduate education was conceived and supported by a grant from The Pew Charitable Trusts. This survey, *The College Student Report*, was launched in 2000 after a successful pilot the year prior with about 175 schools participating (NSSE, 2017a). Since that time, NSSE has been successful at measuring the quality of the undergraduate experience, specifically "the investment that institutions make to foster proven instructional practices and the kinds of activities, experiences, and outcomes that their students receive as a result” (NSSE, 2017d, para. 2). Those who helped draft the survey instrument were Alexander Astin, Gary Barnes, Arthur Chickering, Peter Ewell, John Gardner, George Kuh, Richard Light, Ted Marchese, and C. Robert Pace. They were successful in creating a survey that:

- consists principally of items that are known to be related to important college outcomes (NSSE, 2017d, para. 8),
- is administered to students at both public and private 4-year colleges and universities (NSSE, 2017d, para. 11),
- is administered to freshman- and senior-level students who have attended the institution for at least two terms (NSSE, 2017d, para. 12),
- is administered to adequate samples at participating institutions (NSSE, 2017d, para. 13),
- is flexible (NSSE, 2017d, para. 14), and
- is administered by a credible third-party survey organization (NSSE, 2017d, para. 15).

The engagement indicators the NSSE uses have undergone rigorous testing—both quantitatively and qualitatively—through focus groups, interviews with students, and multiple years of testing and analysis. Furthermore, the NSSE has administered statistical tests to determine the validity, reliability, and stability of the surveys used.

Participants and Setting

There were 564 institutions in the United States that participated in the 2015 NSSE survey administration, which was the data used for this study. The NSSE’s sampling methodology required institutions to either provide a roster of all first-year and senior students or provide a random selection of equal proportions from these two categories of students based on the total undergraduate enrollment number. In 2015, all but four participating institutions recruited all of their first-year and senior students via email, while the other four participating institutions recruited students via standard mail. Institutions had the option of using their learning management systems or student portals to recruit students for the survey. Across all participating institutions, nearly 1.4 million students were invited to complete the survey via email with a series of reminders.

Ultimately, a total of 300,543 students accepted the invitation and responded; 43% were first-year students and 57% were seniors. The average response rate was shy of 30%. The student characteristics based on race/ethnicity for those who participated in the 2015 NSSE were as follows: African American/Black (9%), American Indian/Alaska native (1%), Asian (5%), Native Hawaiian/other Pacific Islanders (< 1%), Caucasian/White (65%), Hispanic/Latino (13%), Multiracial/Multiethnic (3%), and Foreign/Nonresident Alien (4%; NSSE, 2017d). Furthermore, 46% of the students who participated in the 2015 NSSE survey administration self-identified as first-generation college students (NSSE, 2015c).

The Center for Postsecondary Research at Indiana University's School of Education provided a dataset of core NSSE survey items and scales, institution-provided variables (i.e., sex, race/ethnicity, enrollment status, class level), and institution-level variables (i.e., Basic 2010 Carnegie type, control, enrollment size in categories). This dataset was a 20% random selection of all eligible first-year and senior U.S. students who completed NSSE in 2015, which equaled 47,306 participants. Of these participants, 36.4% (n = 17,096) were first-year students, while 52.2% (n = 24,520) were senior students. In addition, 86.7% of the survey participants (n = 41,003) indicated they were full-time students.

While some participants skipped the questions on racial/ethnic background and first-generation status, the number of participants who answered the question on racial/ethnic background was 46,904, and the number of participants who answered the question on first-generation status was 46,882. Table 2 presents frequencies and percentages of the racial/ethnic background of the participants, where each student is only represented once.

Table 2

Frequency Table for Racial/Ethnic Background of Participants

Race/Ethnicity	Frequency	Percentage
American Indian or Alaska Native	219	0.5
Asian	2929	6.2
Black or African American	3616	7.7
Hispanic or Latino	4230	9.0
Native Hawaiian or Other Pacific Islander	147	.3
White	29736	63.4
Other	736	1.6
Multiracial	3490	7.4
I prefer not to respond	1801	3.8
Total	46904	100.0

Table 3 presents the comparison of first-generation students and non-first-generation students who participated in the 2015 NSSE survey administration.

Table 3

Frequency Table for First-Generation Status of Participants

First-Generation Status	Frequency	Percentage
Non-first-generation students	25389	54.2
First-generation students	21493	45.8
Total	46882	100.0

Note. Information in the table reflects student responses. In this case, 22 students did not respond to this question on first-generation status.

Results

The purpose of this study was to examine the engagement rates of first-generation and non-first-generation Asian American students at various types of institutions compared to their peers. I used SPSS (Version 25) for data analysis and narrative interpretation. To answer the first research question of how Asian American students compare with their peers on their rate of student engagement on college campuses, I conducted a one-way between-subjects ANOVA to compare the effect of race/ethnicity on each of the items associated with the engagement indicators. To answer the second research question regarding whether there was a difference in the rates of engagement between first-generation Asian American students and non-first-generation Asian American students, I conducted independent samples *t*-tests to compare each of the engagement indicators for first-generation Asian American students with non-first-generation Asian American students. Of all 47 engagement indicators and their corresponding items, nine variables showed statistically significant differences.

Research Question 1

The following are the findings for statistically significant engagement indicators and engagement items for the first research question: How do Asian American students compare with their peers on their rate of student engagement on college campuses?

Collaborative Learning

For Collaborative Learning, the effect of race/ethnicity for all four items was statistically significant at the $p < .05$ level, with Items 2 and 4 displaying $p \leq .001$ level. The differences in means suggest Asian American students are:

- more likely than their peers to ask another student to help them understand course material (*p* scores from .002–.044),
- more likely than their Black/African American and Hispanic/Latinx peers to explain course material to one or more students ($p < .001$),
- more likely than their peers to prepare for exams by discussing or working through course material with other students (*p* scores from <.001–.010), and
- more likely than their peers to work with other students on course projects or assignments ($p < .001$).

Table B1 in Appendix B shows the one-way ANOVA post hoc comparisons of Collaboration Learning of Asian American students and the racial ethnic groups found to be statistically significant.

Reflective and Integrative Learning

For Reflective and Integrative Learning, the effect of race/ethnicity for all seven items was statistically significant at the $p < .05$ level, with Items 1, 4, and 6 displaying significance at the $p \leq .001$ level. The differences in means suggest Asian American students are:

- less likely than their White and Multiracial peers to combine ideas from different courses when completing assignments ($p < .001$),
- less likely than their peers to connect their learning to societal problems or issues (p scores from < .001–.005),
- less likely than their peers to include diverse perspectives in their course discussions or assignments (p scores from < .001–.025),
- less likely than their Black/African American and Multiracial peers to examine the strengths and weaknesses of their own views on a topic or issue ($p < .001$),
- less likely than their Black/African American, Hispanic/Latinx, and Multiracial peers to try to better understand someone else's views by imagining how an issue looks from their perspective (p scores from < .001–.008),
- less likely than their Black/African American peers to learn something that changed the way they understood an issue or concept ($p < .001$), and
- less likely than their peers to connect ideas from their courses to prior experiences and knowledge (p scores from < .001–.024).

Table B2 in Appendix B shows the one-way ANOVA post hoc comparisons of Reflective and Integrative Learning of Asian American students and the racial ethnic groups found to be statistically significant.

Student-Faculty Interaction

For Student-Faculty Interaction, the effect of race/ethnicity for all four items was statistically significant at the $p \leq .001$ level for Items 1, 2, and 4; Item 3 was statistically significant at the $p < .005$ level. The differences in means suggest Asian American students are:

- less likely than their Black/African American and White peers to talk about career path plans with a faculty member ($p \leq .001$);
- more likely than their Hispanic/Latinx, White, and Multiracial peers to have worked with a faculty member on activities other than coursework (committees, student groups, etc.)
  ($p < .001$);
- more likely than their Hispanic/Latinx peers to discuss course topics, ideas, or concepts with a faculty member outside of class ($p = .002$); and
- less likely than their Black/African American peers to discuss their academic performance with a faculty member ($p < .001$).

Table B3 in Appendix B shows the one-way ANOVA post hoc comparisons of Student-Faculty Interaction of Asian American students and the racial ethnic groups that were found to be statistically significant.

Higher Order Learning

For Higher Order Learning, the effect of race/ethnicity for two out of the four items was statistically significant with Item 3 at the $p < .001$ level and Item 4 at the $p \leq .003$ level. The differences in means suggest Asian American students are:

- less likely than their Black/African American peers ($p < .001$) to feel that their coursework emphasized evaluating a point of view, decision, or information source, and

- less likely than their Black/African American peers (*p* = .003) to feel that their coursework emphasized forming a new idea or understanding from various pieces of information.

Table B4 in Appendix B shows the one-way ANOVA post hoc comparisons of Higher Order Learning of Asian American students and the racial ethnic groups found to be statistically significant.

Effective Teaching Practices

For Effective Teaching Practices, the effect of race/ethnicity for four out of the five items was statistically significant for Item 1 at the $p \leq .05$ level and Items 2, 4, and 5 at the $p < .001$ level. The differences in means suggest Asian American students are:

- less likely than their Black/African American ($p = .005$) and Hispanic/Latinx ($p = .003$) peers to feel that instructors clearly explained course goals and requirements.
- less likely than their Black/African American, Hispanic/Latinx, and White peers to feel that instructors taught course sessions in an organized way ($p < .001$).
- less likely than their Black/African American peers ($p < .001$), but more likely than their White peers ($p < .001$) to feel that instructors provided feedback on a draft or work in progress, and
- less likely than their Black/African American peers to feel that their instructors provided prompt and detailed feedback on tests or completed assignments ($p < .001$).

Table B5 in Appendix B shows the one-way ANOVA post hoc comparisons of Effective Teaching Practices of Asian American students and the racial ethnic groups found to be statistically significant.

Quantitative Reasoning

For Quantitative Reasoning, the effect of race/ethnicity for all three items was statistically significant with Items 1 and 3 at the $p < .001$ level and Item 2 at $p < .005$ level. The differences in means suggest Asian American students are:

- more likely than their peers to reach conclusions based on their own analysis of numerical information ($p < .001$),
- more likely than their peers to use numerical information to examine a real-world problem or issue (p scores from < .001 – .003), and
- more likely than their peers to evaluate what others have concluded from numerical information ($p < .001$).

Table B6 in Appendix B shows the one-way ANOVA post hoc comparisons of Quantitative Reasoning of Asian American students and the racial ethnic groups found to be statistically significant.

Discussions With Diverse Others

For Discussions With Diverse Others, the effect of race/ethnicity for all four items was statistically significant at the $p < .05$ level, with Item 4 significant at the $p < .001$ level. The differences in means suggest Asian American students are:

- more likely than their White peers ($p < .001$) but less likely than their Black/African American ($p = .011$) and Multiracial ($p < .001$) peers to have discussions with people of a race or ethnicity other than their own,
- less likely than their Black/African American and Multiracial peers ($p < .001$) and Other peers ($p = .014$) to have discussions with people from an economic background other than their own,
- less likely to have discussions with people with religious beliefs other than their own (Other $p = .004$; Multiracial $p < .001$), and

- less likely than their peers to have discussions with people with political views other than their own (*p* < .001).

Table B7 in Appendix B shows the one-way ANOVA post hoc comparisons of Discussions with Diverse Others of Asian American students and the racial ethnic groups found to be statistically significant.

Learning Strategies

For Learning Strategies, the effect of race/ethnicity for all three items was statistically significant at the *p* < .05 level. The differences in means suggest Asian American students are:

- less likely than their peers to identify key information from reading assignments (*p* scores from < .001–.011),
- less likely than their American Indian/Alaska Native (p = .004) and Black/African American (p < .001) peers to review their notes after class, and
- less likely than their American Indian/Alaska Native = .005) and Black/African American (p < .001) peers to summarize what they learned in class or from course materials.

Table B8 in Appendix B shows the one-way ANOVA post hoc comparisons of Learning Strategies of Asian American students and the racial ethnic groups found to be statistically significant.

Quality of Interactions

For Quality of Interactions, the effect of race/ethnicity for all five items was statistically significant at the *p* < .05 level, with Items 2, 3, and 5 significant at the *p* ≤ .001 The differences in means suggest Asian American students are:

- less likely than their Hispanic/Latinx (*p* = .019), and White (*p* = .002) peers to have quality interactions with other students,

- less likely than their Black/African American ($p < .001$) and White ($p = .001$) peers to have quality interactions with academic advisors,
- less likely than their White and Multiracial peers ($p < .001$) to have quality interactions with faculty,
- less likely than their White peers ($p = .020$) to have quality interactions with student services staff, and
- less likely than their Black/African American, Hispanic/Latinx, and White peers ($p <$ *.001)* to have quality interaction with other administrative staff and offices.

Table B9 in Appendix B shows the one-way ANOVA post hoc comparisons of Quality of Interactions of Asian American students and the racial ethnic groups found to be statistically significant.

Supportive Environment

For Supportive Environment, the effect of race/ethnicity for all eight items was statistically significant at the $p < .05$ level, with Items 1, 2, 3, and 6 being significant at the $p < .001$ level. The differences in means suggest Asian American students are:

- less likely than their Black/African American, Hispanic/Latinx, and White peers to feel institutional emphasis on providing support to help students succeed academically ($p < .001$);
- less likely than their Black/African American and Hispanic/Latinx peers to feel institutional emphasis on using learning support services ($p < .001$);
- less likely than their Hispanic/Latinx peers to feel institutional emphasis on encouraging contact among students from different backgrounds ($p < .001$);
- less likely than their peers to feel institutional emphasis on providing opportunities to be involved socially (p scores from < .001–.002);

- less likely than their White (p = .002) and Multiracial (p = .025) peers to feel institutional emphasis on providing support for their overall well-being;
- more likely than their White and Multiracial peers to feel institutional emphasis on helping them manage their nonacademic responsibilities (p < .001);
- less likely than their Multiracial peers (p = .012) to feel institutional emphasis to attend campus activities and events; and
- less likely than their Black/African American (p = .034) and Hispanic/Latin (p = .043) peers to feel institutional emphasis to attend events that address important social, economic, or political issues.

Table B10 in Appendix B shows the one-way ANOVA post hoc comparisons of Support Environment of Asian American students and the racial ethnic groups found to be statistically significant.

Research Question 2

The second research question was: Is there a difference in the rates of engagement between first-generation Asian American students and non-first-generation Asian American students? The following were significant differences in the scores for each of the engagement items.

Collaborative Learning

There was a significant difference in the scores for Collaborative Learning Item 2 (i.e., explained course material to one or more students) in first-generation Asian American students (M = 2.70, SD = .814) and non-first-generation Asian American students (M = 2.84, SD = .833); [t(2877) = 4.371, p < .001; d = .111]. The difference in means suggests first-generation Asian American students are less likely than non-first-generation Asian American students to explain course material to one or more students. There was a significant difference in the scores for Collaborative Learning Item 3 (i.e., prepared for exams by discussing or working through course material with other students) in first-generation Asian American students (*M* = 2.57, *SD* = .960) and non-first-generation Asian American students (*M* = 2.67, *SD* = .919); [*t*(2654) = 2.907, *p* = .004; *d* = .107]. The difference in means suggests first-generation Asian American students are less likely than non-first-generation Asian American students to prepare for exams by discussing or working through course material with other students.

Reflective and Integrative Learning

There was significant difference in the scores for Reflective and Integrative Learning Item 7 (i.e., connected ideas from your courses to your prior experiences and knowledge) in first-generation Asian American students (*M* = 3.05, *SD* = .769) and non-first-generation Asian American students (*M* = 3.13, *SD* = .766); [*t*(2860) = 2.672, *p* = .008; *d* = .104]. The difference in means suggests first-generation Asian American students are less likely than non-first-generation Asian American students to connect ideas from their courses to their prior experiences and knowledge.

Student-Faculty Interaction

There was significant difference in the scores for Student-Faculty Interaction Item 1 (i.e., talked about career plans with a faculty member) in first-generation Asian American students (*M* = 2.28, *SD* = .932) and non-first-generation Asian American students (*M* = 2.35, *SD* = .921); [*t*(2895) = 2.064, *p* = .039; *d* = .076]. The difference in means suggests first-generation Asian American students are less likely than non-first-generation Asian American students to talk about their career plans with a faculty member. However, effect size analysis indicated there was no practical significance comparing first-generation Asian American students to non-first-generation Asian American students on this engagement indicator item.

There was significant difference in the scores for Student-Faculty Interaction Item 3 (i.e., discussed course topics, ideas, or concepts with a faculty member outside of class) in first-generation Asian American students (*M* = 2.13, *SD* = .939) and non-first-generation Asian American students (*M* = 2.24, *SD* = .928); [*t*(2886) = 3.223, *p* = .001; *d* = .118]. The difference in means suggests first-generation Asian American students are less likely than non-first-generation Asian American students to discuss course topics, ideas, or concepts with a faculty member outside of class. Furthermore, effect size analysis indicated there was small practical significance comparing first-generation Asian American students to non-first-generation Asian American students on this engagement indicator item.

Discussions With Diverse Others

There was a significant difference in the scores for Discussions With Diverse Others Item 1 (i.e., had discussions with people of a race or ethnicity other than your own) in first-generation Asian American students (M = 3.18, SD = .916) and non-first-generation Asian American students (M = 3.27, SD = .898); [$t(2900)$ = 2.595, p = .010; d = .099]. The difference in means suggests first-generation Asian American students are less likely than non-first-generation Asian American students to have discussions with people of a different race or ethnicity. However, effect size analysis indicated there was no practical significance comparing first-generation Asian American students to non-first-generation Asian American students on this engagement indicator item.

Quality of Interactions

There was significant difference in the scores for Quality of Interactions Item 3 (i.e., quality of interactions with faculty) in first-generation Asian American students (M = 5.19, SD = 1.490) and non-first-generation Asian American students (M = 5.35, SD = 1.472); [$t(2837)$ = 2.828, p = .005; d = .108]. The difference in means suggests first-generation Asian American students are less likely than non-first-generation Asian American students to have quality interactions with faculty. Furthermore, effect size analysis indicated there was small practical significance comparing first-generation Asian American students to non-first-generation Asian American students on this engagement indicator item.

Supportive Environment

There was significant difference in the scores for Supportive Environment Item 1 (i.e., institutional emphasis providing support to help students succeed academically) in first-generation Asian American students (*M* = 2.97, *SD* = .844) and non-first-generation Asian American students (*M* = 3.03, *SD* = .820); [*t*(2850) = 2.074, *p* = .038; *d* = .072]. The difference in means suggests first-generation Asian American students are less likely than non-first-generation Asian American students to feel the institution emphasized providing support to help students succeed academically. However, effect size analysis indicated there was no practical significance comparing first-generation Asian American students to non-first-generation Asian American students on this engagement indicator item.

Finally, there was significant difference in the scores for Supportive Environment Item 7 (i.e., institutional emphasis attending campus activities and events (performing arts, athletic events, etc.) in first-generation Asian American students (*M* = 2.65, *SD* = .996) and non-first-generation Asian American students (*M* = 2.79, *SD* = .926); [*t*(2579) = 3.772, *p* < .001; *d* = .146]. The difference in means suggests first-generation Asian American students are less likely than non-first-generation Asian American students to feel the institution emphasized attending campus activities and events. Furthermore, effect size analysis indicated there was small practical significance comparing first-generation Asian American students to non-first-generation Asian American students on this engagement indicator item. Table B11 in Appendix B shows the independent samples *t*-test comparisons of the engagement indicators and first-generation status of Asian American students that were found to be statistically significant.

Summary/Conclusions of Results

There were no surprises in the results of this study. The data suggested Asian American students largely were not as engaged compared to their peers, a finding acknowledged by Hu and McCormick (2012) that Asian Americans were the most disengaged on college campuses.

In this present study, Asian American students were not as engaged as it related to the NSSE (2015a) engagement indicators.

Each engagement indicator included items to determine how engaged the student was at their institution—Collaborative Learning had four items, Reflective and Integrative Learning had seven items, Student-Faculty Interaction had four items, Higher Order Learning had four items, Effective Teaching Practices had five items, Quantitative Reasoning had three items, Discussions With Diverse Others had four items, Learning Strategies had three items, Quality of Interactions had four items, and Supportive Environment had eight items (see Appendix A for a full listing of all 47 items). Of the 47 items, there were 11 items for which Asian American students were more likely than their peers to engage in the activity (see Table 3 for a list of the 11 engagement items).

Table 3

11 Engagement Items Where Asian Americans Are More Likely Than Their Peers to Engage

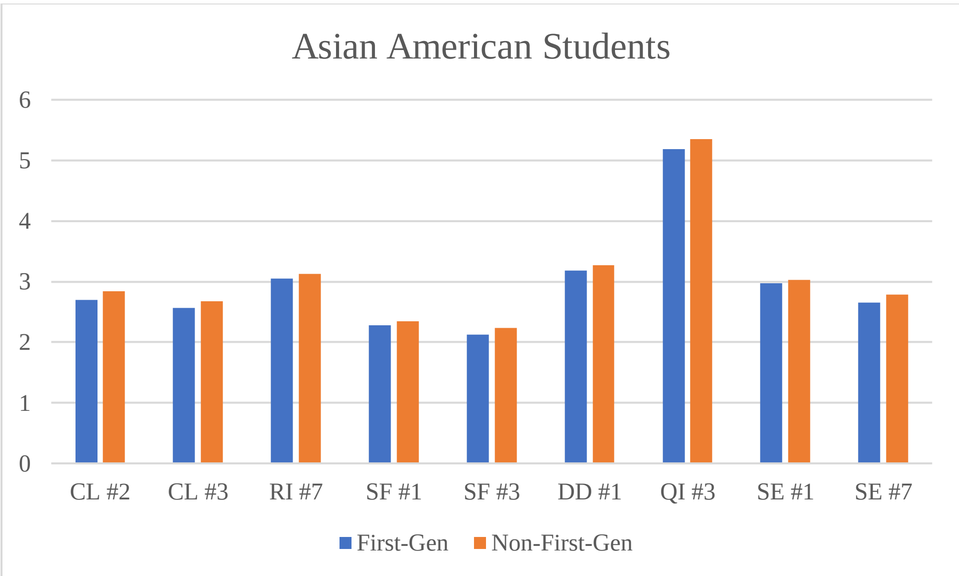
Engagement Indicator	Engagement Item
Collaborative Learning	Item 1: Asked another student to help you understand course material
Collaborative Learning	Item 2: Explained course material to one or more students
Collaborative Learning	Item 3: Prepared for exams by discussing or working through course material with other students
Collaborative Learning	Item 4: Worked with other students on course projects or assignments
Quantitative Reasoning	Item 1: Reached conclusions based on your own analysis of numerical information (numbers, graphs, statistics, etc.)
Quantitative Reasoning	Item 2: Used numerical information to examine a real-world problem or issue (unemployment, climate change, public health, etc.)
Quantitative Reasoning	Item 3: Evaluated what others have concluded from numerical information
Student-Faculty Interaction	Item 2: Worked with a faculty member on activities other than coursework (committees, student groups, etc.)
Student-Faculty Interaction	Item 3: Discussed course topics, ideas, or concepts with a faculty member outside of class

Engagement Indicator	Engagement Item
Discussions With Diverse Others	Item 1: People from a race or ethnicity other than your own
Supportive Environment	Item 6: Helping you manage your nonacademic responsibilities (work, family, etc.)

Additionally, in this study, first-generation Asian American students were less likely than non-first-generation Asian American students to be engaged on their college campuses. In every category, first-generation students were less likely than non-first-generation students to work with their peers, reflect on their experiences, interact with faculty, and feel their institution supported them. Figure 1 provides a graph of statistically significant engagement items comparing first-generation Asian American students and non-first-generation Asian American students.

Figure 1

Comparison of first-generation Asian American students and non-first-generation Asian American students



Note. This figure highlights the nine statistically significant engagement items. CL#2 = Collaborative Learning Item #2; CL #3 = Collaborative Learning Item #3; RI #7 = Reflective and Integrative Learning Item #7; SF #1 = Student-Faculty Interaction Item #1; SF #3 = Student-Faculty Interaction Item #3; DD #1 = Discussions With Diverse Others Item #1; QI #3 = Quality of Interactions Item #3; SE #1 = Supportive Environment Item #1; SE #7 = Supportive Environment Item #7. Refer to Appendix for a list of the questions associated with each engagement item.

Discussion

The results and findings from the data analysis have significant implications. The following sections provide a synthesis and implications of the findings as they relate to each of the research questions as well as to extant literature.

Asian Americans and Their Peers

Student engagement is a predictor of student success (Harper & Quaye, 2009; Kuh, 2001; Pascarella & Terenzini, 2005; Quaye & Harper, 2015). In addition, a combination of the educational activities offered by the institution and the intentional interactions students engage in motivate them to persist and graduate (Kuh, 2001; Kuh et al., 2007). Unfortunately, in this study, the data suggested Asian Americans, compared to their peers, were not as engaged, which corroborates a finding acknowledged by Hu and McCormick (2012) that Asian Americans were the most disengaged on college campuses. In this present study, Asian American students were not as engaged related to the NSSE (2015a) engagement indicators. Of the 47 items, there were 11 items for which Asian American students were more likely than their peers to engage in the activity. Seven of these 11 engagement items made up the Collaborative Learning and Quantitative Reasoning engagement indicators.

Collaborative Learning involved four engagement indicators, and the data suggested Asian American students were more likely than their peers to engage in all of these activities, which implied that reliance on and collaboration with peers were key components for them. Not only did they ask other students to help them understand course material, but their peers also relied on them to explain course material. This reliance on each other was also used to prepare for exams. This finding implied that collaborating with other peers was their mode of academic survival for many of the Asian American students and supported the cultural value of collectivism to which many Asian American groups adhere (Yeh, 2005). Collectivism refers to putting group interests before individual interests (Fu, 2010) and, in this sense, collaborating with peers was an effort toward continued academic progress.

Unlike Collaborative Learning, which emphasized working with other students, Quantitative Reasoning involved reaching conclusions based on their own analysis. The data suggested Asian American students were more likely than their peers to engage in all of these activities. Viewing this engagement indicator alone seemed to contradict Collaborative Learning. However, considering this finding through the lens of some of the Asian cultural values implied that perhaps Asian American students were interested in seeing how information impacted the larger society and how they might positively affect the larger group. This implication reinforces the cultural value of collectivism. If the two engagement items under Student-Faculty Interaction were considered along with Quantitative Reasoning, then perhaps additional cultural values such as deference to authority, filial piety, and hierarchical relationships positioned Asian American students to be more likely than their peers to work with a faculty member. These are the same cultural values that may motivate faculty to connect with Asian American students and work with them on activities other than coursework. Additionally, I speculated whether the greater likelihood of interacting with faculty to work on activities other than coursework and discuss topics, ideas, or concepts outside the classroom impacted the greater likelihood of Asian American students compared to their peers to be engaged in Quantitative Reasoning, particularly if it was research that supported a real-world issue.

Under Discussions With Diverse Others, Asian American students were more likely than their White peers, but less likely than their Black/African American and Multiracial peers, to have discussions with people of a race or ethnicity other than their own. This finding was not surprising. The Asian American population attending college is small compared to other races and ethnicities (NCES, 2016). Furthermore, the number of White faculty and administrators is significantly greater than any other race or ethnicity (Data USA, n.d.). Therefore, it is more likely Asian American students will have the opportunity to interact with people of a different race or ethnicity than White students. However, the data also suggested that Asian American students were less likely than their Black/African American and Multiracial peers to have discussions with people of another race or ethnicity than their own. This would imply that Asian American students perhaps do not or prefer not to have discussions with people of a different race or ethnicity. There can be several reasons for not engaging in discussions with others. For example, language can be a barrier for those whose primary language is not English. The way others view Asian American students can be another reason. The perpetual foreigner myth is the belief that Asian Americans will always be seen as the “other” regardless of how long they have been in this country (Murjani, 2014). Much of this stereotype comes from the belief that Asians speak poor English (Iwamoto & Liu, 2010) regardless of where they were born. Therefore, if other students perceive that Asian American students may be “foreign,” then Asian American students could be limited in their opportunity to have discussions with people of a different race or ethnicity. Another potential reason is this idea of ethnic matching that seems to have only been studied in the context of counseling (Presley & Day, 2018; Zane & Ku, 2014). Presley and Day (2018) found that ethnic matching seemed to provide a level of comfort between therapists and clients. Future research may explore the impact of ethnic matching in the context of higher education, particularly as the finding from this study implied that Asian Americans are more likely to collaborate and work with other Asian Americans.

Finally, under Supportive Environment, Asian American students were more likely than their White and Multiracial peers to perceive their institution emphasized helping them manage their nonacademic responsibilities such as work and family. This finding implies that the peer-to-peer connections and collaborations, much like Collaborative Learning, allowed Asian American students to manage their nonacademic responsibilities. In other words, Asian American students relied on each other to take notes if they could not be in class due to work, and/or they relied on each other when they had to go to class and childcare was needed or if they had other family responsibilities to tend to. Another possible implication of this finding comes in the context of thinking about how students perceive faculty, staff, and administrators. Though these are three separate employment categories, students tend not to understand the distinctions.

Instead, any type of interaction students have with an employee of the institution reflects that institution. In other words, if Asian American students have a conversation with the faculty they are connected to regarding nonacademic responsibilities, then they may perceive that the institution provided this type of support to help manage nonacademic responsibilities such as work and family.

These were the only two explanations I fathomed, particularly as Asian American students were less likely than their peers to feel institutional emphasis in the seven other engagement items under Supportive Environment. In addition, this finding confirmed that because Asian Americans are often viewed as nonracial or not “real” minorities (Cabrera, 2014), they are excluded from supportive services geared toward minority students (Pak et al., 2014), which impacted their perception of their institution providing a supportive environment. It is important to note that, in general, people of color tend to be less likely than their White counterparts to seek help (Carter & Forsyth, 2010). Additionally, Brownson et al. (2012) reported Asian American students sought “professional help over their lifetime at lower rates than other students” (p. 124) because of systemic and/or cultural barriers (Choi et al., 2009). These cultural barriers included many Asian cultural values (Choi et al., 2009; Kim, 2007; Miville & Constantine, 2009), which can prevent Asian American students from accessing support services.

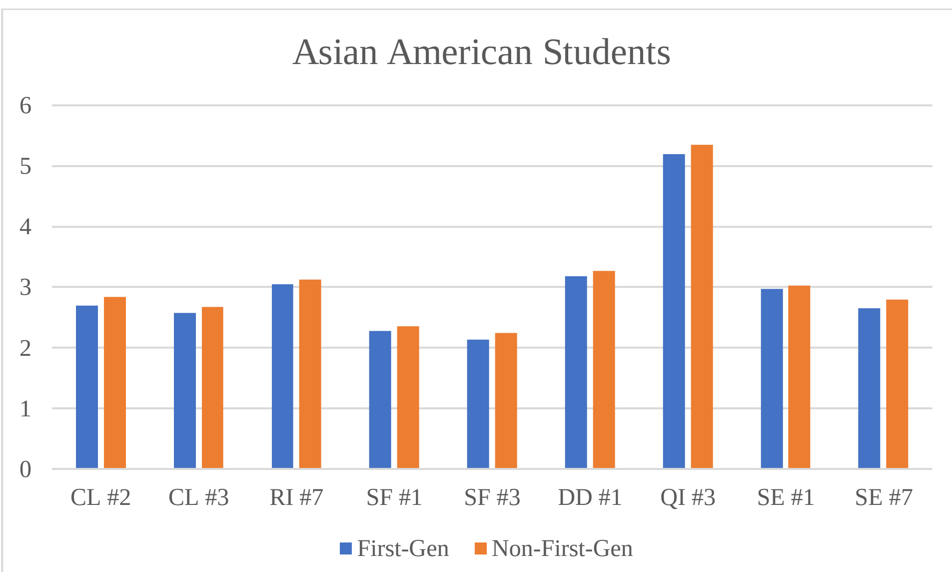
First-Generation Asian American Students v. Non-First-Generation Asian American Students

In this study, first-generation Asian American students were less likely than non-first-generation Asian American students to be engaged on their college campuses. In every category, first-generation students were less likely than non-first-generation students to work with their peers, to reflect on their experiences, to interact with faculty, and to feel their institution supported them. Figure 2 provides a graph of statistically significant engagement items comparing first-generation Asian American students and non-first-generation Asian

American students. The data confirmed what extant literature has suggested—that first-generation students are less likely to be engaged overall than non-first-generation students (Hawkins & Larabee, 2009; Pascarella & Terenzini, 2005; Pike & Kuh, 2005). Since many first-generation students feel academically underprepared, they focus entirely on academic endeavors and make it a point to participate only in academic activities (Hawkins & Larabee, 2009). This singular focus by first-generation students on their academic life may pull students away from engaging in activities that are believed to help them find a sense of belonging on their campus (Kuh et al., 2008; Wells & Horn, 2015) and deepen their experience on campus (Kuh, 2008; 2016), which in turn affects the retention, persistence, and graduation (Hayek, 2001; Kuh et al., 2008; Kuh, 2016).

Figure 2

Comparison of First-Generation Asian American Students and Non-First-Generation Asian American Students



Note. This figure highlights the nine statistically significant engagement items. CL#2 = Collaborative Learning Item #2; CL #3 = Collaborative Learning Item #3; RI #7 = Reflective and Integrative Learning Item #7; SF #1 = Student-Faculty Interaction Item #1; SF #3 = Student-Faculty Interaction Item #3; DD #1 = Discussions With Diverse Others Item #1; QI #3 = Quality of Interactions Item #3; SE #1 = Supportive Environment Item #1; SE #7 = Supportive Environment Item #7. Refer to Appendix A for a list of the questions associated with each engagement item.

As the data suggested, first-generation Asian American students were less likely to explain course material to other students and less likely to prepare for exams by discussing or working through course material with other students than their non-first-generation Asian American peers. In addition to being less connected to other students, first-generation Asian American students were also less likely to interact with faculty. If they did interact with faculty, first-generation Asian American students reported the quality they experienced through that interaction was less than that experienced by non-first-generation Asian American students. In light of the differences found between first-generation Asian American students and non-first-generation Asian American students, however, there was little to no practical significance, which meant there was not much difference between the two groups. This would therefore imply that first-generation Asian American students and non-first-generation Asian American students respond similarly. This finding was not all that surprising when viewed through the lens of cultural cognitive dissonance.

Studies comparing cultural variations of Eastern civilization and Western civilization (Hoshino-Browne et al., 2005; Markus & Kitayama, 1991, 2010; Triandis, 1989, 1996) have yielded noticeable differences in terms of how they view themselves and, in turn, how they relate to others. Those who grew up in an individualistic culture retained more of an independent self-view whereas those who grew up in a collectivist culture retained more of an interdependent self-view (Hoshino-Browne, 2012; Hoshino-Browne et al., 2005). Interdependency favors being connected to others, and “to maintain harmonious relationships, being similar to others is more important than being unique or standing out” (Hoshino-Browne, 2012, p. 130). Therefore, the Asian cultural values present distinct challenges to first-generation and non-first-generation Asian American students in the U.S. educational system where the emphasis is more individualistic (Yeh, 2005). Furthermore, the degree to which the cultural values influence the rate of engagement depends on how acculturated Asian Americans are into Western values (Hui & Lent, 2018).

The degree of acculturation is a fascinating topic considering the generation status of some Asian American students because being a first-generation student is not equal to being first-generation in the United States. Logically, Asian Americans who are considered to be the third or fourth generations in the United States would be much more acculturated than second-generation Asian Americans and certainly more acculturated than first-generation Asian Americans. Therefore, this logic begs the question of how the degree of acculturation as determined by generation status impacts the experiences and student engagement rates of first-generation Asian American students. I believe this would be an intriguing area to study in the future.

Limitations

There were six limitations of this study worth mentioning. First, the nature of the NSSE survey was voluntary, and the data was based on self-reporting. This was a limitation because each survey question was subject to individual interpretation, and students may have elected to skip questions. For example, students were given two sets of four choices to answer some questions. The four choices for one set were *never, sometimes, often,* and *very often*. The choices for another set were *very little, some, quite a bit,* and *very much*. There were also some questions that asked students to rank on a scale of 1 to 7 (1 = *poor* to 7 = *excellent*). Therefore, the answers given were highly subjective.

The second limitation was that each campus was different; thus, resources at each institution were likely different. As a result, the impact on the student experience may have skewed the data. The third limitation was that the information on Asian Americans was in aggregate, which means it was not broken down by specific ethnicities. In other words, the data gathered prevented me from accurately identifying and comparing the various ethnic identities within the Asian American identity (i.e., East Asians, Southeast Asians, and South Asians). As a result of the aggregated data, I recognized my findings were also overgeneralizing Asian

American students as one group, which did not allow me to see differences between various ethnic groups, including differences in cultural values, beliefs, or mores.

The fourth limitation was the nuance of first-generation versus non-first-generation in terms of immigration status. Asian Americans who are the first generation in their families to grow up in this country may not actually be first-generation students in postsecondary education. However, their experiences may be similar if their parents went to school in their home countries, which may skew some of the survey results. The fifth limitation was that this study used NSSE data. Therefore, it took a sample of a sample, which again may have limited its generalizability because of nonresponses in the sample depending on the data provided.

Finally, the sixth limitation was that there were different response rates from the 564 institutions that participated. The average response rate was 29%, and the highest response rate was 89% (NSSE, 2015c). Furthermore, higher response rates came from smaller institutions and those that offered incentives (NSSE, 2015c). As each institution is different, varying response rates may have skewed the data. In spite of these limitations, this quantitative study confirmed extant literature and highlighted additional areas for future research.

Recommendations for Future Research

The intent of this study was to address the dearth of research and expand on what was currently available on Asian American college students. The biggest challenge has been that data often are gathered and presented in aggregate. Aggregated data mask the needs of the individuals within the group while, at the same time, overgeneralize the needs of the group. Stemming from this study in particular, there are several recommendations I have for future areas of focus for research. The first recommendation is an exploration by future researchers into Asian American cultural values and the impact those values have on rates of student engagement.

While the findings of this study implied that Asian American students relied on their peers for academic survival, the influential extents of the belief in the model minority myth and the adherence to cultural values raised additional questions. Were Asian American students more likely than their peers to ask another student to help them understand course material because of the cultural value of deference to authority or avoidance of perceived shame if they asked their faculty? For the engagement items of explaining course material to one or more students and preparing for exams by working with other students, did the assumption of the model minority myth influence their peers to approach the Asian American students and, in turn, cause the Asian American students to be more engaged than their peers in these engagement items? The data also suggested Asian American students were more likely to work with other students on course projects or assignments than their peers. This could be connected to the cultural value of collectivism, which refers to putting group interests before individual interests (Fu, 2010). According to Hui and Lent (2018), the degree to which cultural values influence the rate of engagement depends on how acculturated and encultured Asian Americans are into Western values. This leads to the second recommendation for future research, which is to explore generation status and when Asian American students immigrated to the United States to determine if this impacts engagement and in what ways.

Many researchers have studied first-generation students and non-first-generation students (Hawkins & Larabee, 2009; Ishitani, 2006; Pascarella & Terenzini, 2005; Pike & Kuh, 2005). In this study, I was not surprised the data suggested first-generation students were less likely than their non-first-generation peers to be engaged on campus. However, the main source of the Asian American population in the United States is largely from people who have entered this country either as immigrants or as refugees. Of note, there are areas in which there are many third- and fourth-generation Asian Americans, particularly as Endo (1980) noted the Chinese and Japanese immigrated to the United States during the mid- to late-1800s. Likewise, Murjani (2014) has also reported that Japanese Americans were placed in internment camps during World War II because they were seen as a threat to the security of the nation. In light of this, the Pew Research Center (2012) stated, “It is not yet possible to make any full intergenerational accounting of the modern Asian American immigration wave; the immigrants themselves are still by far the dominant group and the second generation has only recently begun to come into adulthood in significant numbers" (para. 34). Therefore, future research could explore when these first-generation students entered the U.S. school system and how that might influence rates of student engagement.

Another recommendation is to use NSSE data to explore whether engagement in one activity impacts engagement in another activity. For example, in my study, I speculated that interacting with faculty outside the classroom may impact the finding that Asian American students are more likely than their peers to engage in the items that make up Quantitative Reasoning. In other words, because Asian American students were more likely than their peers to interact with faculty, I speculated that faculty encouraged the students to consider Quantitative Reasoning. On their own, the students may not have engaged in Quantitative Reasoning. Therefore, this could imply a correlation between Student-Faculty Interaction and Quantitative Reasoning.

Outside of recommendations for future research, I also offer three recommendations for practical application based on the implications of my findings. First, related to first-generation status, I do not believe there is any harm in providing additional support to all Asian American students as if they were all first-generation students. Given there was little to no practical significance found between first-generation Asian American students and non-first-generation Asian American students, the approach for all Asian American students can be the same. In general, first-generation students receive little guidance from their parents (Pascarella & Terenzini, 2005) and may feel academically underprepared (Hawkins & Larabee, 2009). Therefore, hosting workshops geared specifically for Asian Americans to cover topics such as financial literacy, course selections, and the importance of networking with others who are different from them would be highly beneficial.

Second, faculty and administrators could consider incorporating and encouraging more group work and peer-to-peer collaboration since data from this study suggested that Asian American students were more likely to collaborate with their peers academically. This likelihood to work with one another is already a strength among Asian American students, and it would take little effort to capitalize on this opportunity for Asian American students to be engaged. While much extant literature has pushed and will continue to push collecting disaggregated data to identify the specific needs of the Asian American student population, I do not recommend creating separate smaller work groups based on disaggregated data for institutions where the Asian American student population is quite small. According to the last U.S. census in 2010, Asian Americans make up only 5.6% of the U.S. population (U.S. Census Bureau, 2012). Therefore, it would be suitable at institutions to create Asian American peer groups for small Asian American populations for the purposes of collaboration. For institutions that have been designated as an Asian American Native American Pacific Islander-serving institution (AANAPISI), I recommend creating work groups based on disaggregated data. The AANAPISI program is a federally funded program, much like historically Black colleges and universities and Hispanic-serving institutions. For any school to be eligible for AANAPISI designation, it has to enroll at least 10% of students who identify as Asian American, Native American, or Pacific Islander. In addition, at least 50% of the students must receive federal financial assistance (AANAPISI, 2016). The areas in which these peer groups would be appropriate are living-learning communities in the residence halls, experiential or social cohorts based on interest and/or identity, and peer-to-peer mentoring specifically for Asian American students.

Third, while Asian American students are more likely to work with a faculty member on activities other than coursework and to discuss course topics, ideas, or concepts with a faculty member outside of class but less likely to talk about career plans or discuss academic performance with a faculty member, I recommend faculty members or student services professionals more purposefully develop programming in the latter two activities as Asian

American students are connecting with them about course topics and ideas or working with them on activities other than coursework. The first step I suggest for faculty is to seek out professional development opportunities to learn how to use culturally relevant pedagogy. Doing so will help frame the context for faculty to begin such conversations with Asian American students. The second step I suggest to engage Asian American students is to actively listen to the course topics and ideas or activities the students are bringing up in conversation when talking with them about their career plans and academic performance. Voicing observations based on the conversations and simply asking students how those interests are connected to their career plans is a straightforward strategy to engage Asian American students in this manner and thereby increase student-faculty interaction.

Final Thoughts

Overall, this quantitative study found that Asian American students do not engage at the same rates as their peers and first-generation Asian American students are less likely than non-first-generation Asian American students to be engaged on their campuses. While they do not engage at the same rates, there are two engagement indicators on which Asian American students are more likely to participate—Collaborative Learning (i.e., asking another student to help you understand course materials, explaining course material to one or more students, preparing for exams by discussing or working through course material with other students, and working with other students on course projects or assignments) and Quantitative Reasoning (i.e., reaching conclusions based on your own analysis of numerical information, using numerical information to examine a real-world problem or issue, and evaluating what others have concluded from numerical information). Additionally, Asian American students are more likely to work with a faculty member on activities other than coursework, such as on committees and in student groups and discuss course topics, ideas, or concepts with a faculty member outside of class. Therefore, to better support Asian American students, institutions, faculty, and practitioners ought to meet them where their strengths lie. As the population of Asian Americans is predicted to grow in the coming years (Ortman & Guarneri, n.d.), finding ways to support Asian American students is crucial. In addition, as enrollment numbers are slated to decline in the coming years for all racial groups except for Asian Americans (Bransberger & Michelau, 2016), it is in the interest of institutions to determine how best to support their Asian American students and, in turn, attract more Asian American students to help with enrollment numbers.

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Appendix A

Description of Engagement Indicators and Items

Engagement Theme: Academic Challenge

Higher Order Learning
During the current school year, how much has your coursework emphasized the following:
Item 1: Applying facts, theories, or methods to practical problems or new situations
Item 2: Analyzing an idea, experience, or line of reasoning in depth by examining its parts
Item 3: evaluating a point of view, decision, or information source
Item 4: Forming a new idea or understanding from various pieces of information

Reflective & Integrative Learning
During the current school year, how often have you:
Item 1: Combined ideas from different courses when completing assignments
Item 2: Connected your learning to societal problems or issues
Item 3: Included diverse perspectives (political, religious, racial/ethnic, gender, etc.) in course discussions or assignments
Item 4: Examined the strengths and weaknesses of your own views on a topic or issue
Item 5: Tried to better understand someone else's views by imagining how an issue looks from his or her perspective
Item 6: Learned something that changed the way you understand an issue or concept
Item 7: Connected ideas from your own courses to your prior experiences and knowledge

Learning Strategies
During the current school year, how often have you:
Item 1: Identified key information from reading assignments
Item 2: Reviewed your notes after class
Item 3: Summarized what you learned in class or from course materials

Quantitative Reasoning
During the current school year, how often have you:
Item 1: Reached conclusions based on your own analysis of numerical information (numbers, graphs, statistics, etc.)
Item 2: Used numerical information to examine a real-world problem or issue (unemployment, climate change, public health, etc.)
Item 3: Evaluated what others have concluded from numerical information

Engagement Theme: Learning with Peers

Collaborative Learning
During the current school year, how often have you:
Item 1: Asked another student to help you understand course material
Item 2: Explained course material to one or more students
Item 3: Prepared for exams by discussing or working through course material with other students

Item 4: Worked with other students on course projects or assignments

Discussions With Diverse Others
During the current school year, how often have you had discussions with people from the following groups:
Item 1: People from a race or ethnicity other than your own
Item 2: People from an economic background other than your own
Item 3: People with religious beliefs other than your own
Item 4: People with political views other than your own

Engagement Theme: Experiences With Faculty

Student-Faculty Interaction
During the current school year, how often have you:
Item 1: Talked about career plans with a faculty member
Item 2: Worked with a faculty member on activities other than coursework (committees, student groups, etc.)
Item 3: Discussed course topics, ideas, or concepts with a faculty member outside of class
Item 4: Discussed your academic performance with a faculty member

Effective Teaching Practices
During the current school year, to what extent have your instructors done the following:
Item 1: Clearly explained course goals and requirements
Item 2: Taught course sessions in an organized way
Item 3: Used examples or illustrations to explain difficult points
Item 4: Provided feedback on a draft or work in progress
Item 5: Provided prompt and detailed feedback on tests or completed assignments

Engagement Theme: Campus Environment

Quality of Interactions
Indicate the quality of your interactions with the following people at your institution:
Item 1: Students
Item 2: Academic advisors
Item 3: Faculty
Item 4: Student services staff (career services, student activities, housing, etc.)
Item 5: Other administrative staff and offices (registrar, financial aid, etc.)

Supportive Environment
How much does your institution emphasize the following?
Item 1: Providing support to help students succeed academically
Item 2: Using learning support services (tutoring services, writing center, etc.)
Item 3: Encouraging contact among students from different backgrounds (social, racial/ethnic, religious, etc.)
Item 4: Providing opportunities to be involved socially
Item 5: Providing support for your overall well-being (recreation, health care, counseling, etc.)
Item 6: Helping you manage your nonacademic responsibilities (work, family, etc.)

Item 7: Attending campus activities and events (performing arts, athletic events, etc.)
Item 8: Attending events that address important social, economic, or political issues

Note. Adapted from "Engagement Indicators and High-Impact Practices," by NSSE, 2015a. Retrieved from http://nsse.indiana.edu/pdf/EIs_and_HIPs_2015.pdf

Appendix B

Tables Associated with Research Questions

Table B1

One-Way ANOVA Post Hoc Comparisons of Collaborative Learning of Asian American Students Compared to Statistically Significant Racial Ethnic Groups

Variable	*p*	*M*	*SD*	*d*
Item 1 – Asked another student to help you understand course material				
Asian American (*n* = 2896)		2.89	.858	
Black/African American (*n* = 3558)	.007	2.80	.930	.100
Hispanic/Latino (*n* = 4190)	.044	2.82	.895	.080
White (*n* = 29537)	.002	2.82	.887	.079
Multiracial (*n* = 3462)	.002	2.80	.905	.102
Item 2 – Explained course materials to one or more students				
Asian American (*n* = 2887)		2.78	.827	
Black/African American (*n* = 3552)	< .001	2.64	.884	.163
Hispanic/Latino (*n* = 4179)	< .001	2.67	.828	.133
Item 3 – Prepared for exams by discussing or working through course material with other students				
Asian American (*n* = 2895)		2.63	.938	
Black/African American (*n* = 3561)	< .001	2.47	1.020	.163
Hispanic/Latino (*n* = 4198)	.010	2.54	.991	.093
White (*n* = 29550)	< .001	2.53	.988	.102
Item 4 – Worked with other students on course projects or assignments				
Asian American (*n* = 2900)		2.76	.871	
Black/African American (*n* = 3558)	< .001	2.47	.932	.221
Hispanic or Latino (*n* = 4177)	< .001	2.54	.871	.149
White (*n* = 29526)	< .001	2.50	.879	.194
Other (*n* = 728)	< .001	2.50	.929	.193
Multiracial (*n* = 3450)	< .001	2.55	.898	.135

Table B2

One-Way ANOVA Post Hoc Comparisons of Reflective and Integrative Learning of Asian American Students Compared to Statistically Significant Racial Ethnic Groups

Variable	*p*	*M*	*SD*	*d*
Item 1 – Combined ideas from different courses when completing assignments				
Asian American (*n* = 2905)		2.84	.834	
White (*n* = 29570)	< .001	2.93	.840	.107
Multiracial (*n* = 3454)	< .001	2.97	.855	.154
Item 2 – Connected your learning to societal problems or issues				
Asian American (*n* = 2877)		2.73	.864	
Black/African American (*n* = 3538)	< .001	2.89	.903	.181
Hispanic/Latino (*n* = 4171)	.005	2.81	.895	.091
White (*n* = 29422)	.002	2.80	.878	.080
Multiracial (*n* = 3440)	< .001	2.89	.891	.182
Item 3 – Included diverse perspectives (political, religious, racial/ethnic, gender, etc.) in course discussions or assignments				
Asian American (*n* = 2892)		2.62	.902	
Black/African Americans (*n* = 3555)	< .001	2.81	.932	.207
Hispanic/Latino (*n* = 4182)	.002	2.70	.935	.087
White (*n* = 29462)	.025	2.68	.907	.066
Other (*n* = 727)	.003	2.76	.944	.154
Multiracial (*n* = 3452)	< .001	2.80	.935	.196
Item 4 – Examined the strengths and weaknesses of your own views on a topic or issue				
Asian American (*n* = 2884)		2.82	.802	
Black/African Americans (*n* = 3551)	< .001	2.96	.845	.169
Multiracial (*n* = 3444)	< .001	2.95	.838	.158
Item 5 – Tried to better understand someone else's views by imagining how an issue looks from his or her perspective				
Asian American (*n* = 2888)		2.92	.810	
Black/African American (*n* = 3544)	< .001	3.06	.803	.174
Hispanic/Latino (*n* = 4186)	.008	3.00	.824	.098

Variable	*p*	*M*	*SD*	*d*
Multiracial (*n* = 3439)	< .001	3.06	.825	.171
Item 6 – Learned something that changed the way you understood an issue or concept				
Asian American (*n* = 2892)		2.95	.782	
Black/African American (*n* = 3535)	< .001	3.04	.807	.113
Item 7 – Connected ideas from your courses to your prior experiences and knowledge				
Asian American (*n* = 2870)		3.10	.768	
American Indian/Alaska Native (*n* = 217)	.007	3.29	2.51	.191
Black/African American (*n* = 3535)	< .001	3.23	.771	.169
Hispanic/Latino (*n* = 4168)	< .001	3.19	.756	.118
White (*n* = 29370)	< .001	3.22	.738	.162
Other (*n* = 723)	.024	3.20	.761	.130
Multiracial (*n* = 3418)	< .001	3.27	.745	.225

Table B3

One-Way ANOVA Post Hoc Comparisons of Student-Faculty Interaction of Asian American Students Compared to Statistically Significant Racial Ethnic Groups

Variable	*p*	*M*	*SD*	*d*
Item 1 – Talked about career plans with a faculty member				
Asian American (*n* = 2904)		2.32	.928	
Black/African American (*n* = 3558)	< .001	2.44	.997	.124
White (*n* = 29492)	.001	2.40	.954	.084
Item 2 – Worked with a faculty member or activities other than coursework (committees, student groups, etc.)				
Asian American (*n* = 2892)		2.01	.986	
Hispanic/Latino (*n* = 4174)	< .001	1.89	1.013	.120
White (*n* = 29419)	< .001	1.89	.994	.121
Multiracial (*n* = 3454)	< .001	1.90	1.002	.111
Item 3 – Discussed course topics, ideas, or concepts with a faculty member outside of class				
Asian American (*n* = 2894)		2.19	.934	
Hispanic/Latino (*n* = 4169)	.002	2.10	.986	.093
Item 4 – Discussed your academic performance with a faculty member				
Asian American (*n* = 2889)		2.22	.913	
Black/African American (*n* = 3543)	< .001	2.39	.965	.180

Table B4

One-Way ANOVA Post Hoc Comparisons of Higher Order Learning of Asian American Students Compared to Statistically Significant Racial Ethnic Groups

Variable	*p*	*M*	*SD*	*d*
Item 3 – Coursework emphasized: Evaluating a point of view, decision, or information source				
Asian American (*n* = 2883)		3.02	.821	
Black/African American (*n* = 3547)	< .001	3.13	.834	.133
Item 4 – Coursework emphasized: Forming a new idea or understanding from various pieces of information				
Asian American (*n* = 2877)		3.00	.823	
Black/African American (*n* = 3531)	.003	3.08	.850	.095

Table B5

One-Way ANOVA Post Hoc Comparisons of Effective Teaching Practices of Asian American Students Compared to Statistically Significant Racial Ethnic Groups

Variable	*p*	*M*	*SD*	*d*
Item 1 – Instructors: Clearly explained course goals and requirements				
Asian American (*n* = 2912)		3.18	.749	
Black/African American (*n* = 3568)	.005	3.25	.815	.089
Hispanic/Latino (*n* = 4207)	.003	3.25	.773	.092
Item 2 – Instructors: Taught course sessions in an organized way				
Asian American (*n* = 2900)		3.08	.795	
Black/African American (*n* = 3559)	< .001	3.18	.854	.121
Hispanic/Latino (*n* = 4189)	< .001	3.17	.810	.112
White (*n* = 29541)	< .001	3.15	.759	.092
Item 4 – Instructors: Provided feedback on a draft or work in progress				
Asian American (*n* = 2900)		2.93	.890	
Black/African American (*n* = 3547)	< .001	3.03	.962	.107
White (*n* = 29463)	< .001	2.82	.945	.117
Item 5 – Instructors: Provided prompt and detailed feedback on tests or completed assignments				
Asian American (*n* = 2885)		2.90	.878	
Black/African American (*n* = 3537)	< .001	3.01	.938	.121

Table B6

One-Way ANOVA Post Hoc Comparisons of Quantitative Reasoning of Asian American Students Compared to Statistically Significant Racial Ethnic Groups

Variable	*p*	*M*	*SD*	*d*
Item 1 – Reached conclusions based on your own analysis of numerical information (numbers, graphs, statistics, etc.)				
Asian American (*n* = 2915)		2.75	.892	
Black/African American (*n* = 3580)	< .001	2.63	.976	.128
Hispanic/Latino (*n* = 4202)	< .001	2.64	.964	.118
White (*n* = 29613)	< .001	2.60	.956	.158
Multiracial (*n* = 3475)	< .001	2.63	.972	.128
Item 2 – Used numerical information to examine a real-world problem or issue (unemployment, climate change, public health, etc.)				
Asian American (*n* = 2912)		2.53	.936	
Black/African American (*n* = 3577)	.003	2.43	1.002	.103
Hispanic/Latino (*n* = 4199)	.001	2.43	.995	.103
White (*n* = 29553)	< .001	2.36	.966	.176
Multiracial (*n* = 3472)	< .001	2.40	.991	.135
Item 3 – Evaluated what others have concluded from numerical information				
Asian American (*n* = 2899)		2.52	.901	
Black/African American (*n* = 3563)	< .001	2.38	.992	.147
Hispanic/Latino (*n* = 4182)	< .001	2.36	.983	.168
White (*n* = 29476)	< .001	2.37	.941	.160
Multiracial (*n* = 3459)	< .001	2.41	.966	.117

Table B7

One-Way ANOVA Post Hoc Comparisons of Discussions With Diverse Others of Asian American Students Compared to Statistically Significant Racial Ethnic Groups

Variable	*p*	*M*	*SD*	*d*
Item 1 – Had discussions with people of a race or ethnicity other than your own				
Asian American (*n* = 2910)		3.23	.908	
Black/African American (*n* = 3588)	.011	3.31	.887	.089
White (*n* = 29596)	< .001	3.05	.909	.198
Multiracial (*n* = 3472)	< .001	3.36	.840	.149
Item 2 – Had discussions with people from an economic background other than your own				
Asian American (*n* = 2907)		3.05	.926	
Black/African American (*n* = 3571)	< .001	3.19	.912	.152
Other (*n* = 723)	.014	3.18	.906	.141
Multiracial (*n* = 3464)	< .001	3.28	.840	.261
Item 3 – Had discussions with people with religious beliefs other than your own				
Asian American (*n* = 2903)		3.01	.981	
Other (*n* = 721)	.004	3.16	.941	.154
Multiracial (*n* = 3465)	< .001	3.15	.924	.147
Item 4 – Had discussions with people with political views other than your own				
Asian American (*n* = 2883)		2.83	.999	
Black/African American (*n* = 3557)	< .001	2.98	.984	.151
Hispanic/Latino (*n* = 4182)	< .001	2.99	.981	.162
White (*n* = 29423)	< .001	3.03	.903	.219
Other (*n* = 721)	< .001	3.04	.986	.211
Multiracial (*n* = 3452)	< .001	3.11	.932	.291

Table B8

One-Way ANOVA Post Hoc Comparisons of Learning Strategies of Asian American Students Compared to Statistically Significant Racial Ethnic Groups

Variable	*p*	*M*	*SD*	*d*
Item 1 – Identified key information from reading assignments				
Asian American (*n* = 2893)		3.17	.754	
Black/African American (*n* = 3579)	< .001	3.34	.735	.229
Hispanic/Latino (*n* = 4201)	.011	3.24	.768	.092
White (*n* = 29557)	.006	3.23	.775	.078
Multiracial (*n* = 3461)	.011	3.24	.783	.091
Item 2 – Reviewed your notes after class				
Asian American (*n* = 2885)		2.91	.896	
American Indian/Alaska Native (*n* = 218)	.004	3.16	.841	.280
Black/African American (*n* = 3554)	< .001	3.07	.890	.179
Item 3 – Summarized what you learned in class or from course materials				
Asian American (*n* = 2865)		2.88	.885	
American Indian/Alaska Native (*n* = 213)	.005	3.13	.889	.282
Black/African American (*n* = 3519)	< .001	3.04	.891	.180

Table B9

One-Way ANOVA Post Hoc Comparisons of Quality of Interactions of Asian American Students Compared to Statistically Significant Racial Ethnic Groups

Variable	*p*	*M*	*SD*	*d*
Item 1 – Quality of interactions with students				
Asian American (*n* = 2897)		5.58	1.342	
Hispanic/Latino (*n* = 4179)	.019	5.69	1.373	.081
White (*n* = 29408)	.002	5.68	1.278	.078
Item 2 – Quality of interactions with Academic Advisors				
Asian American (*n* = 2844)		5.12	1.693	
Black/African American (*n* = 3541)	< .001	5.31	1.737	.111
White (*n* = 29138)	.001	5.26	1.704	.082
Item 3 – Quality of interactions with faculty				
Asian American (*n* = 2847)		5.28	1.482	
White (*n* = 29185)	< .001	5.57	1.309	.219
Multiracial (*n* = 3414)	< .001	5.43	1.413	.104
Item 4 – Quality of interactions with student services staff				
Asian American (*n* = 2626)		4.88	1.687	
White (*n* = 25176)	.020	5.00	1.655	.072
Item 5 – Quality of interactions with other administrative staff and offices				
Asian American (*n* = 2740)		4.72	1.729	
Black/African American (*n* = 3456)	< .001	4.92	1.820	.112
Hispanic/Latino (*n* = 4037)	< .001	4.92	1.798	.113
White (*n* = 27691)	< .001	4.94	1.668	.131

Table B10

One-Way ANOVA Post Hoc Comparisons of Supportive Environment of Asian American Students Compared to Statistically Significant Racial Ethnic Groups

Variable	*p*	*M*	*SD*	*d*
Item 1 – Institutional emphasis: Providing support to help students succeed academically				
Asian American (*n* = 2859)		3.00	.830	
Black/African American (*n* = 3515)	< .001	3.12	.892	.139
Hispanic/Latino (*n* = 4141)	< .001	3.11	.853	.130
White (*n* = 29329)	< .001	3.07	.824	.085
Item 2 – Institutional emphasis: Using learning support services (tutoring services, writing center, etc.)				
Asian American (*n* = 2868)		2.96	.926	
Black/African American (*n* = 3521)	< .001	3.16	.921	.217
Hispanic/Latino (*n* = 4155)	< .001	3.09	.926	.140
Item 3 – Institutional emphasis: Encouraging contact among students from different backgrounds (social, racial/ethnic, religious, etc.)				
Asian American (*n* = 2862)		2.72	.966	
Hispanic/Latino (*n* = 4163)	< .001	2.83	1.002	.111
Item 4 – Institutional emphasis: Providing opportunities to be involved socially				
Asian American (*n* = 2872)		2.87	.905	
Black/African American (*n* = 3529)	< .001	2.99	.950	.129
Hispanic/Latino (*n* = 4159)	.001	2.96	.934	.098
White (*n* = 29346)	< .001	2.97	.896	.112
Multiracial (*n* = 3446)	.002	2.96	.909	.099
Item 5 – Institutional emphasis: Providing support for your overall well-being (recreation, health care, counseling, etc.)				
Asian American (*n* = 2864)		2.82	.919	
White (*n* = 29324)	.002	2.89	.930	.075
Multiracial (*n* = 3442)	.025	2.90	.948	.086
Item 6 – Institutional emphasis: Helping you manage your non-academic responsibilities (work, family, etc.)				
Asian American (*n* = 2861)		2.39	.998	
White (*n* = 29316)	< .001	2.22	.988	.172

Variable	*p*	*M*	*SD*	*d*
Multiracial (*n* = 3442)	< .001	2.22	1.016	.169
Item 7 – Institutional emphasis: Attending campus activities and events (performing arts, athletic events, etc.)				
Asian American (*n* = 2862)		2.73	.960	
Multiracial (*n* = 3430)	.012	2.82	.979	.093
Item 8 – Institutional emphasis: Attending events that address important social, economic, or political issues				
Asian American (*n* = 2850)		2.51	.975	
Black/African American (*n* = 3504)	.034	2.59	1.058	.078
Hispanic/Latino (*n* = 4133)	.043	2.59	1.046	.079

Table B11

Significant Independent Samples t *Test Comparing Engagement Indicators and First-Generation Status of Asian American Students*

Variable	*p*	*M*	*SD*	*d*
Collaborative Learning Item 2: Explained course material to one or more students	< .001			.170
First-generation (*n* = 1260)		2.70	.814	
Non-first-generation (*n* = 1619)		2.84	.833	
Collaborative Learning Item 3: Prepared for exams by discussing or working through course material with other students	.004			.107
First-generation (*n* = 1263)		2.57	.960	
Non-first-generation (*n* = 1624)		2.67	.919	
Reflective & Integrative Learning Item 7: Connected ideas from your courses to your prior experiences and knowledge	.008			.104
First-generation (*n* = 1257)		3.05	.769	
Non-first-generation (*n* = 1605)		3.13	.766	
Student-Faculty Interaction Item 1: Talked about career plans with a faculty member	.039			.076
First-generation (*n* = 1267)		2.28	.932	
Non-first-generation (*n* = 1630)		2.35	.921	
Student-Faculty Interaction Item 3: Discussed course topics, ideas, or concepts with a faculty member outside of class	.001			.118
First-generation (*n* = 1262)		2.13	.939	
Non-first-generation (*n* = 1626)		2.24	.928	
Discussions With Diverse Others Item 1: Had discussions with people of a race or ethnicity other than your own	.010			.099
First-generation (*n* = 1271)		3.18	.916	
Non-first-generation (*n* = 1631)		3.27	.898	
Quality of Interactions Item 3: Quality of interactions with faculty	.005			.108
First-generation (*n* = 1234)		5.19	1.490	
Non-first-generation (*n* = 1605)		5.35	1.472	
Supportive Environment Item 1: Institutional emphasis providing support to help students succeed academically	.038			.072
First-generation (*n* = 1247)		2.97	.844	
Non-first-generation (*n* = 1605)		3.03	.820	

Variable	*p*	*M*	*SD*	*d*
Supportive Environment Item 7: Institutional emphasis attending campus activities and events (performing arts, athletic events, etc.)	< .001			.146
First-generation (*n* = 1248)		2.65	.996	
Non-first-generation (*n* = 1607)		2.79	.926	

Exploring Persistence in Student Affairs

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Abstract

The student affairs profession suffers a high turnover rate, and Marshall et al. (2016) reported 50%–60% of student affairs practitioners leave the field in the first 5 years of their careers. To explore why some student affairs practitioners have persisted more than 16 years in the profession, I conducted a qualitative, phenomenological study of the influences of career persistence using the research question: What personal and professional experiences influence seasoned student affairs practitioners' decision to stay in the profession? I interviewed four current student affairs professionals in North America who hold various social identities and have persisted in the field for more than 16 years to represent some staff who have experienced this phenomenon. The student affairs professionals interviewed in this study cited three positive influences of their decisions to persist in the profession: a strong sense of (a) *why*: purpose and impact, (b) *how*: relationships with others, and (c) *what*: entrenchment. Beyond these larger themes, participants described the deep essences of advocating toward an equitable world (why), being in community (how), and investing deeply in this chosen vocation (what) as interacting with the characteristics, experiences, contexts, and environments toward persistence. This study informs the field about increasing staff engagement and persistence in higher education and student affairs by promoting opportunities for vocational growth and development, fostering supportive networks, and enabling deep reflection on a sense of purpose.

Keywords: student affairs, purpose, impact, relationships, entrenchment, persistence

Exploring Persistence in Student Affairs

Student affairs practitioners on college and university campuses support students and foster holistic development outside of the classroom. The functional areas comprising student affairs varies by campus but span the collegiate environment including residential life, student conduct, diversity and inclusion, student activities, career advancement, and others. Staff must continue to remain motivated and resilient through adversity to persist in the profession, as the very nature of student affairs work often includes high-stress environments, crisis management, hierarchy and political bureaucracy, increasing workloads, and declining resources (Marshall et al., 2016). Exploring longevity in the student affairs profession may inform future student affairs leaders on staff engagement and persistence in higher education and student affairs. This study drew inspiration from the conceptual framework adapted by Reason (2009) as a comprehensive model of influences on student learning and persistence.

Literature Review

This study highlights why student affairs staff choose to stay in the field of higher education and contributes to the body of educational knowledge and literature for the next generation of student affairs practitioners. I identified persistence, career commitment, and entrenchment as frameworks connected to my study.

Persistence

Researchers have studied the career persistence of working professionals in various career fields, but little is known about higher education and student affairs. Reason (2009) provided a comprehensive model of influences on student learning and persistence that can be adapted for staff in this study. The model identified four sets of constructs that interact to influence students' persistence. These included (a) student precollege characteristics and experiences (e.g., sociodemographic traits, academic preparation and performance, and student dispositions); (b) organizational context (e.g., the behavior, culture, and climate of the institution); (c) the student peer environment (e.g., the student body, and the dominant system of beliefs, values, expectations, and attitudes); and (d) the individual student experience, both in and outside of the classroom, and experiences contributing to students' learning. The organizational context and peer environment are co-located in students' college experience. In the model, each of the four constructs interacted and influenced student persistence. Reason (2009) concluded one must approach the study and practice of student persistence as a multidimensional problem by addressing the multiple forces operating in multiple settings influencing persistence. Similar to Reason's (2009) model of student persistence, this study centers why individuals persist, not how institutions retain staff. I believe the approaches to persistence for student affairs staff should also be viewed as a multidimensional issue, beginning with their personal and professional identity as inputs into their career environment. Understanding organizational health and behavior along with peer environments and networks can provide context for individuals' influential experiences of persistence in the profession throughout their career.

Career Commitment

Based on London's (1983) theory of career motivation, the two components of career commitment are career resilience and career identity. Colarelli and Bishop (1990) defined career identity as the component embodying one's emotions. Lydon and Zanna (1990) defined career resilience as the persistence component of commitment used to tap commitment in the face of adversity. These definitions, built upon one another, created a scaffold for my interview questions as they related to the emotional connections to the student affairs profession, planning and career goals, and the resilience to persist over time.

Career Entrenchment

Osherson (1980) stated some staff are simply entrenched in their careers, perhaps unable to or not wanting to pursue other options. Career entrenchment, as defined by Carson et al. (1995), is the perspective that employees remain in an occupation because of extrinsic rewards associated with a career and losses incurred when leaving. Carson et al. argued skills become more career-specific over time, which limits the available career alternatives. In other words, career entrenchment increases over time and opportunities may go unnoticed if one is maintaining their investments and minimizing emotional costs. Wilson et al. (2016) found "career contentment was related to two commitment subscales (identity and resilience) and two entrenchment subscales (investments and emotional costs)" (p. 568). The researchers also suggested "a qualitative study with cohorts of midlevel professionals of similar age may better identify what is salient to professional identity across a career and help generate strategies for fostering satisfaction and retention in the field" (Wilson et al., 2016, p. 568). This suggestion was the foundation for my qualitative study, as there was not previous research on seasoned student affairs professionals related to reflection on their longevity or persistence.

Conclusions

The framework for this study, adapted from Reason's (2009) persistence framework for student persistence, generated a conceptual framework to organize the data for my study of student affairs professionals and their reasons to persist in their jobs. The four constructs for the student affairs personnel framework include: (a) pre-career characteristics, (b) organizational context, (c) peer environment, and (d) individual experiences. I hypothesized all four constructs play a role in persistence on the job of student affairs professionals.

Researchers (London's,1983; Lydon and Zanna, 1990; Wilson et al., 2016) have studied career motivation, commitment, and entrenchment of working professionals in various fields, but little is known about higher education and student affairs. I explored persistence via career commitment through (a) career identity, the emotional association with one's career; (b) career planning, determining one's developmental needs and setting career goals; and (c) career resilience, resisting career disruption in the face of adversity. These factors fell into the pre-career characteristics and experiences domain of the adapted conceptual framework for this study. Additionally, I explored career entrenchment through (a) career investments, accumulated investments in one's career; (b) emotional costs, anticipated emotional costs associated with pursuing a new career; and (c) limited career alternatives, perceived lack of available options for pursuing a new career. These were components of both the organizational context and peer environment constructs of the framework. I drew inspiration from Wilson et al. (2016), who called for a qualitative study to complement their findings of midlevel professionals. The purpose of this study was to assess my hypothesis that all four constructs of the conceptual framework influenced one's retention and persistence in the profession over time with particular attention to peer environments and individual experiences.

Methodology

This study allowed several seasoned student affairs practitioners to reflect on experiences that have influenced their career longevity in higher education. To explore why some student affairs practitioners have persisted more than 16 years in the profession, I addressed the research question: What personal and professional experiences influence seasoned student affairs practitioners' decision to stay in the profession?

Purpose

Exploring longevity in the student affairs profession may inform future student affairs leaders on staff engagement and persistence in higher education and student affairs. This research design allowed seasoned student affairs practitioners to reflect on experiences that have affected their career longevity in higher education.

Research Design

To understand the persistence of a few individuals in student affairs, I conducted a phenomenological study to capture the lived experiences of participants as they made meaning of persistence in the profession. I selected phenomenology as it is the best qualitative approach to understand the essence of persistence across multiple subjects with common experiences. This approach provided an in-depth understanding of how a collective group has experienced longevity through participants' descriptions of influences on their personal and professional lives. Creswell and Poth (2018) explained, “Phenomenologists focus on describing what all participants have in common as they experience a phenomenon” (p. 75).

Methods

A qualitative study was the best approach to understand the essence of this phenomenon, as dialogue allowed me to capture the detailed stories of persistence that would not be collected via a quantitative design. Creswell and Poth (2018) explained qualitative research can provide a complex, detailed understanding of the issue by “talking directly with people, going to their homes or places of work, and allowing them to tell stories unencumbered by what we expect to find or what we have read in the literature” (p. 45). Qualitative research provides opportunities for storytelling, in-depth inquiry with a small sample size, and allows for an open-ended question design to capture the descriptive experiences of participants (Creswell & Poth, 2018).

With this phenomenological approach, I conducted and recorded a face-to-face, 60- to 90-minute interview with each participant. While interviewing, I used prompts to establish rapport and solicited honest answers in dialogue, leading to storytelling epiphanies and influential experiences of persistence. I asked participants about their career history and any salient dimensions or experiences that have contributed to persistence. I wrote my thoughts in a researcher’s journal as I interviewed participants and reviewed each transcript to be sure the interviews captured the data necessary to answer the research question with saturated themes. Common themes surfaced across participants, and I reached saturation of these data, as no new information was given across participant interviews.

Participants and Setting

This study was approved by the New England College Institutional Review Board in October 2018. As the sample size for phenomenology suggested by Creswell and Poth (2018) typically varies in size fewer than 15, I began with four participants for manageable interview data collection. Initial data collection was conducted in person, with the exception of one international participant interview, which was conducted via an online Zoom interview. Conducting the interviews in person and via Zoom allowed participants to be in a space of their choice and provided a sense of comfort. Selected participants were current student affairs staff members at colleges or universities in North America who met the longevity criteria, varied in social identities, and were willing to complete the research process so as to capture themes across diverse personal and professional experiences.

Four seasoned student affairs professionals participated in this study and described their lived experiences influencing their persistence in the profession. All have worked in student affairs for more than 15 years, with a range of 16–32 years across the four participants. Two identify as cisgender women, two as cisgender men, one as Black, and three as White. Two are married, and three are parents. All four had earned a master's degree, three from a higher education and student affairs program. Additionally, one had earned a doctorate, and two had completed some doctoral courses. All four participants worked at institutions with more than 10,000 students; three worked at 4–year private institutions in the United States and one at a 4–year public institution in Canada. Previously, two participants worked at both public and private institutions. Participants' titles ranged from associate director to assistant vice president, and their aggregate current functional areas included orientation, diversity, equity, and inclusion, undergraduate and graduate student support services, mentorship, student involvement, clubs and organizations, leadership education, student centers, international affairs, sexual misconduct prevention, and Title IX. In an effort to protect participants' identity, each provided a pseudonym and brief bio for the reader to contextualize their quotes (see Table 1).

Sara (she/her/hers) has worked in student affairs for the past 16 years in a wide variety of roles, including academic advising, student organization advising, event planning, orientation, commencement, registration and records, disciplinary affairs, crisis management, and mental health, financial, and academic advocacy. She has worked at five private institutions and has focused on being a generalist in the field of student affairs. She has completed both her master's and doctorate in higher education.

Table 1

Participant Demographics at a Glance

Name	Race	Gender	Sexual Orientation	Parent	First Gen	Highest Degree	# Years
Sara	White	Cis Woman	Heterosexual	Yes	Yes	EdD	17
Lloyd	White	Cis Man	Gay	Yes	No	Master's	32
Nate	White	Cis Man	Queer	No	No	Master's	16
Cherisse	Black	Cis Woman	Heterosexual	Yes	Yes	Master's	22

Note. To protect identity, participants provided a pseudonym.

Lloyd (he/him/his) has worked in student affairs for over 32 years, mostly in the area of cocurricular programming and support and graduate student academic support. He has predominantly worked at private, highly selective institutions. These position titles included assistant director, director, executive director, assistant dean of students, acting dean of students, and assistant vice president. Lloyd completed his master's degree in higher education.

Nate (he/him/his) has more than 15 years of practical experience in the field of student affairs, entirely on university campuses in Ontario, Canada. He has worked at four different universities in the areas of residence life, community engaged-learning and civic engagement, first-year experience, first-generation student support, academic learning and leadership education, student clubs and leadership development, and mentorship and peer programs. He completed his master's degree in student affairs and is currently pursuing a PhD in higher education.

Cherisse (she/her/hers) has been in the student affairs profession for more than 20 years. She has worked at four institutions, including one public and three private and predominantly White institutions. Throughout her career, Cherisse has worked in both housing and student activities. She completed her master's degree in urban development and is considering higher education doctoral programs.

Results

Using the Stevick-Colaizzi-Keen method, I first answered the interview questions from my own career timeline and perspective, as Creswell and Poth (2018) suggested, "To fully describe how participants view the phenomenon, researchers must bracket out, as much as possible, their own experiences" (p. 79). I needed to explore my career timeline and influences as a researcher who has also experienced the phenomenon of persistence in the profession to distance myself before I heard participants' experiences. Creswell and Poth (2018), who outlined the process, wrote, "Analyzing the data for themes, using different approaches to examine the information, and considering the guides for reflection should yield an explicit structure of the meaning of the lived experience" (p. 202).

Second, I sent each audio-recorded interview for initial transcription using the software feature included with a Rev.com membership. I then checked each transcription for accuracy and manually edited each. The next step was horizonalization of the data, where I reread each interview transcript to highlight significant statements of equal weight and documented memos for each statement to later assign codes to my interpretation.

Third, I typed up each code into an Excel spreadsheet and printed the enlarged pages to physically cut and sort the codes into clusters of meaning, as Creswell and Poth (2018) described. From the 483 codes, 12 themes emerged that I then grouped into larger units based on the conceptual framework. I then sorted each coded quote to the theme to capture the direct words from participants and summarized my interpretation of the lived experience. I shared themes from each individual participant's transcript and the aggregate larger unit themes with each respective participant to ensure the essence of their lived experience was described with integrity.

Participants in this study self-reported influential experiences, context, and environments related to their individual persistence, helping readers further understand the phenomenon of persistence in student affairs. Data were presented as what participants experienced, how they experienced it, and how those aspects interact to reveal the essence of why they persist. Based on the conceptual framework for this study, I grouped the cluster themes from codes into three larger units: (a) what: the path, (b) how: the relationships, and (c) why: the purpose. From my interpretation, I used the analysis described by Moustakas (1994) to provide a textual description of what participants experienced and a structural description of how they experienced it and then combined these to convey the why, the essence of the collective experiences. Ultimately, the essences of the path, the people, and the purpose interact to influence why student affairs practitioners persist in the profession.

What: The Path

The theme of the path, conceptualized as the idea that one is entrenched in the career as a vocation, emerged as an influence on student affairs practitioners' career persistence. As their portfolios have expanded, responsibilities have grown, and supervision responsibilities have increased, participants have aligned personal interests and values with professional opportunities. The path is *what* participants have experienced along their career, resembling a map with multiple jobs in different locations but all in the student affairs career. Two subthemes related to the path theme arose from the data: undergraduate socialization experiences and career trajectory.

Participants have stayed in the profession because they were committed to their positions, found new opportunities or promotion at their institutions, or sought new opportunities at other institutions. These reflections of their experiences and moves throughout their career were promotions and growth opportunities that helped them make sense of their work in new or deeper ways. Each participant spoke about their own undergraduate experience, how someone identified or "tapped" them to consider student affairs as a profession, and how those became reference points for their career trajectories. Sara shared, “I really had a great [overall] experience as an undergrad. And I wanted to be able to provide to students that same type of [out-of-classroom] experience.” Lloyd shared, “One of those moments where someone said, ‘Have you ever thought about doing this for a career?’ I’m like, ‘You can get paid to do this?’” Student affairs professionals seek to create conditions where students can thrive. As a result, staff experience congruence with their previous experiences and their chosen vocation, which reflects and affects staff persistence and thriving as well. The intersections of undergraduate, graduate, and career experiences crystallized participants’ intent to stay in the career of student affairs. Their collective socialization served as a gateway to the profession, complemented by a community of mentors discussed in the next section.

How: The Relationships

Another theme that emerged from the interviews was how participants have stayed in the profession through a supportive network of relationships with self, students, peers, and mentors. Meaningful and influential relationships with others have positively impacted participants’ careers. Unlike many other careers, student affairs is a profession where identity is explicitly explored, discussed, validated, and supported. The people in this profession often share this common bond, which helped participants feel like they could be seen, be heard, be visible, and be affirmed.

Student affairs is an international community of scholars, a social circle of peers, and an interconnected network of mentors. Seasoned student affairs practitioners have relationships with themselves and others that positively influence their persistence based on the subthemes: (a) identity, (b) traits, (c) peers and mentors, (d) overcoming comparison and negativity, (e) benefits, and (f) balance. Beyond *what* participants experienced, these factors impact *how* participants have persisted in the profession in that they have developed traits, cultivated relationships, and learned how to navigate collegiate environments. The theme of extrinsic motivation surfaced as participants talked about their relationships with peers, students, and their communities, resulting in their unwillingness to leave the profession. Cherisse captured her experience with peers and mentorship in her interview:

> My supervisor there is still my mentor, a great mentor, really taught me a lot about raising children and having a career in the profession of student affairs. I think, again it goes back to having really good mentors who really instilled in me, clearly you don't do this for the paycheck. You find passion in what you do. I think, for me, I'm like, "Okay, is this still passionate? Is this the passion?" And the answer is yes. I get influenced by seeing good mentors who are bold enough to say, "I'm in this job and I don't have passion." Brave enough to walk away and do something differently. That influences me. When I see folx who aren't afraid to step outside of what is the traditional, the norm, and do something different and follow their passion. Not necessarily be worried about jumping up and climbing that ladder of success.

These staff were passionate and dedicated to student success; they not only felt the need to stay in the profession but also compelled to continue the work. Several mentioned their ability to overcome adversity and continue to work in student affairs to support students with similar identities. Surrounding oneself with people who also believe in the power of education may be different motivation than for staff in other sectors. Thus, the meaning and purpose of development of students is not only fulfilling but also supports the identity development of staff.

Why: The Purpose

The profound concept of purpose, including the interconnectedness of passion, motivation, students, and the value of higher education's pursuit of equity, was the third theme that emerged from participant interviews. Cherisse shared her passion for education mirrored in a student interview: "Meeting with the students during my interviews and seeing the passion they had for what they do here made me realize that I, too, wanted to be here." Nate reflected on the purpose of higher education and his passion for working with college-aged students: "I think about the teaching and the training and the learning." Lloyd declared, "I can't imagine doing anything else," which was indicative he had such passion for the industry that he couldn't find the words or the thoughts of leaving the field. All four participants spoke to their deep connection to the higher calling of the profession as the value of education and its pursuit of justice. Nate reflected:

> I believe in the power of what our institutions accomplish like I believe in the power of higher education. I believe that it is good for our society to have educated people who have a chance to make positive differences and it sounds really, kind of, utopian but that's the kind of world I want to live in.

This sense of purpose anchored the professionals in a way that cemented their career persistence with such clarity they could not even imagine doing anything else.

Higher education student affairs is a profession in which one can pursue challenging systems toward equity in the campus environment and beyond. These seasoned student affairs practitioners anchored their persistence in their *why*, a deep sense of purpose and its connections to: (a) passion, (b) motivation, (c) students, and (d) equity. Specifically, higher education is a profession that articulates its values, intentions, and mission, and all four participants spoke to their calling to higher education and its pursuit of justice as a direct result of congruence with these values and mission. Participants were reflective of their motivation toward the pursuit of equity by supporting students' learning and growth. Lloyd said he persists in the profession because he makes a difference in students' lives and ultimately contributes to making the world better:

> We don't do this for the money. I probably could stay in this job, I mean I could stay at this level and as long as the work is meaningful for me, and for the people who are on the other side of that, great. I'm the guy who still takes the crosswalks, but the people who are willing to kind of challenge convention and that's what we're teaching people to do. That's the only way that the world is going to get better. So, you know, if you're having some role in that, good lord, why would you leave? It's better being an

> investment banker or being a frickin' lawyer. I feel like I'm influencing people and the choices that they make, so that's . . . why in the world? I wouldn't want to give that up. You know, we're here to stir the pot for them too and make them think. Part of it is you . . . I think you get to a place where . . . ever heard of the movie, I think it was *Sister Act II*? When Whoopi Goldberg and Lauryn Hill were chatting, and Lauryn Hill wanted to sing but her mother didn't want her to sing. Whoopi Goldberg goes like, "If you're supposed to sing, sing." That's kind of the way I am about how I look at . . . I'm supposed to be doing what I'm doing and maybe not here [at this institution], and maybe not with this same portfolio [of reporting units], but if I'm supposed to be making a difference in students' lives and their experience then there it is.

This clarity allowed participants to pivot from their own undergraduate major, pursue student affairs, and commit so deeply that, over time, they could not imagine doing anything else.

Essences

The findings of this study are not mutually exclusive, and the dimensions interact between the *what*, the *how*, and the *why* to provide the essences undergirding the phenomenon of persistence. Persistence in student affairs is a phenomenon by which participants believe the work is not yet done and stay in the profession because student affairs is a genuinely meaningful career, where they are helping other people find their value. The three interacting essences are investment in the profession, being in community, and advocating for equity. The power of centering *why* they believe in higher education helped participants persist in student affairs. This purpose is far beyond *what* they did in their functional roles or their previous experiences and far beyond *how* they persist with their supportive networks of colleagues.

From my interpretation of the interviews, this phenomenon was a deeply rooted commitment to the impact they believe they can have on student learning and development, as evidenced in the data. Student affairs practitioners can impact the lives of many individuals, often planting initial seeds that will not bear immediate fruit. Participants spoke to impactful moments and the gratitude they have received from former students. Cherisse shared a powerful, personal story about her impact on a student:

> And it's rewarding. I have a book over there on my bookshelf. Quick story I gotta to tell you. I had a young woman who came in as a freshman. Very awkward. She said, "Oh, I need a job." I don't know. It was something about her, I saw something in her. I hired her as an office assistant and then eventually one of my RAs. She worked the entire 4 years, decided to go into the field. I knew that I had kind of impacted her but not so deeply, I did not realize. Until she, I want to say 3 years ago, I got a package in the mail. It was a book. It was her dissertation. It's on my shelf there. It was a card and it was bookmarked and she wrote a page about me and wrote about how I inspired her to be in student affairs and how I took a chance on her and really, you know, mentored her. I was very struck by that. I think that's why I stay in student affairs. Because you never know how and what capacity you touch somebody. I was like, "Wow, that's amazing."

Student affairs practitioners assess learning, programs, initiatives, spaces, and services, and they have data to prove where and how students learn and develop. Student affairs fosters education and assessment beyond the classroom, with evidence demonstrating the impact of the work. Shaping and honing students' life skills through experiential learning helps sharpen their ways of knowing and reinforces the collective power of higher education and student affairs.

Along participants' trajectories, they have made decisions to move institutions or positions but not leave the field, as this career is their long-term invested vocation. They shared they have experienced increased responsibilities such as unit oversight and supervision, shifts in functional areas, and upward progression in job title. There are often good employment benefits and positive interactions with peers, students, and mentors throughout one's career. The flow and natural turnover of staff and cycle of new students promotes an iterative, ever-changing environment that presents a spark of the unknown. Furthermore, there is not always a specific guidebook for the work as educators outside of the classroom, creating endless opportunities and possibilities for autonomy, creativity, design, collaboration, and sharing knowledge across institutions. Participants said these constructs all interacted to lead to increased satisfaction, a sense of expertise, and motivating validation, which positively influenced their decision to stay in student affairs.

Participants noted not feeling alone as another reason they have stayed. No one in this study entered college with the aspiration to work in student affairs and only realized the profession and their potential through someone else, an advisor or mentor. As a result of feeling enabled, participants felt valued; consequently, they found leaving hard to imagine, which I interpreted as the essence of a natural sense of feeling connected, needed, and purposeful. I also interpreted this as the notion there is a special, common bond between student affairs professionals, no matter if strangers or close colleagues. Each practitioner in this study found lifelong mentors, friends, and former students who created a supportive community and built connections across the field. Sara shared:

> My colleagues, my support network was just so important and I’m still friends with those individuals today. Those are the people that I stick around for, if you’re gonna be anyplace and away from your family, that’s what you do.

She continued: “My colleague in that [former] role is one of my best friends to this day. So, again, kind of finding that social network within . . . you’re spending so much time with these people.” They have overcome comparison, negativity, and judgment from other peers by focusing on their purpose and continued impact and legacy. This network resulted in their inability to imagine doing anything else as a career, thus positively affecting their persistence.

Moreover, participants in this study surfaced the idea staff can use their voice both individually and collectively toward the pursuit of equity and advocate through the student affairs profession. I interpreted participants’ stay in the profession as a commitment to educate the next generation of leaders and scholars. Supporting and educating student development through encouraging critical thinking and self-efficacy while challenging historical, dominant narratives is an example of promoting an equitable learning environment. The pursuit of equity requires actively challenging the historical foundation upon which universities were established to educate the white elite and interrogates to disrupt white supremacy culture. Nate spoke to his role as a White person in creating a more equitable world, starting with leadership roles on college campuses:

> One of the things that I think about a lot is does our university need more White senior level managers. So, I start thinking about that is my goal but is that what the world needs. Especially in our universities, which are so dominated by Whiteness in our upper level. So, I just think about, even if it isn't a goal, the world is telling me my whole life that I deserve every goal I ever want but that's not the case for all of our students and all of our colleagues, so do I need to temper that a little bit. I really am grounded in this notion of what is a kind of world that I want us to be living in and how are we creating these rungs in the ladder so we have a diverse pool of folks to pull from.

The staff spoke with such depth and intentional purpose toward helping shape students' sense of self, particularly students with minoritized and marginalized identities. Through research and scholarship, the profession has evolved technologies and collective understanding of student development, which contributes to our common goal of positive change. All of the participants had a mindset or simple reminders to keep their values intentionally present, positively contributing to their persistence. The staff felt they could contribute to something greater through student affairs, shaping young minds and planting seeds of justice for the present and future.

Overall, participants felt called to continue doing the work, improving campus environments, supporting student learning and development, all while interacting in a community of educators. I believe student affairs practitioners have a pivotal role in human development, and staff feel a calling and a sense of urgency to shape young minds. One person, making one change, sees the ripple effect by believing in the power of exponential impact, in this large, interconnected, and relational profession. When educators do not feel alone and isolated, they are reminded and empowered by the power of the collective reach and global impact.

Summary/Conclusions of Results

My analysis of the data revealed detailed the personal and professional experiences influencing persistence: (a) the what, the path; (b) the how, the relationships; and (c) the why, the purpose. I defined the path as *what* participants experienced through their career entrenchment, from undergraduate socialization and trajectory. I then defined *how* participants have persisted from support systems through relationships with identity, traits, peers and mentors, benefits, overcoming negativity, and finding balance. Last, and arguably most important, was participants' *why*, or their sense of purpose. The purpose included a deep passion and motivation to support students and their development, all toward higher education's pursuit of equity. The interacting essences that undergird these influences are investing in this chosen vocation, being in community, and advocating toward equity.

Discussion

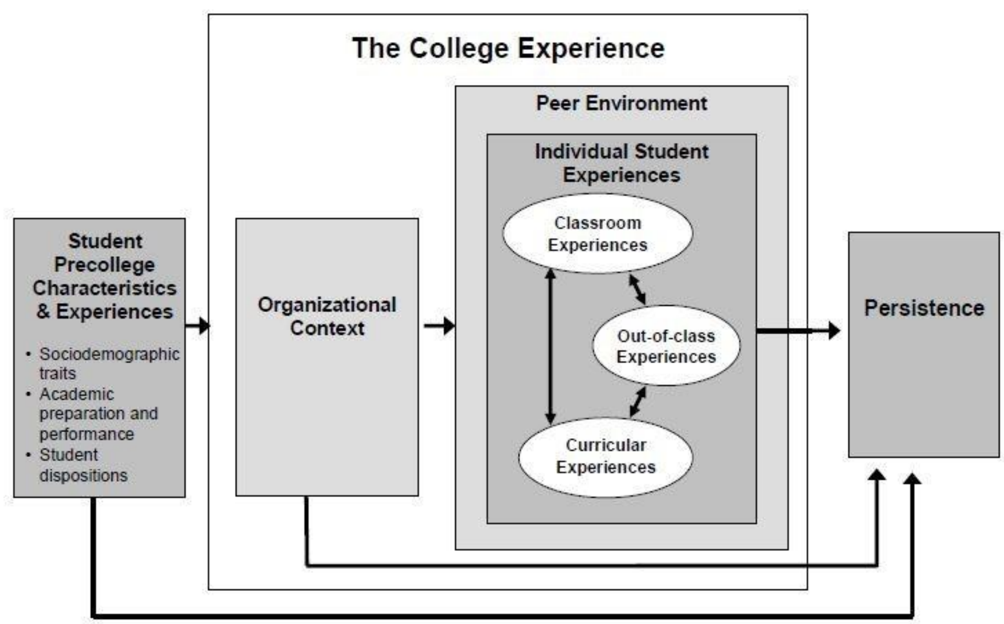
Applying the findings to this conceptual framework, I found seasoned student affairs practitioners also come to persist in their career through these four constructs. First, student affairs staff have a range of personal and social background characteristics, values, and experiences. Participants in this study spoke to career commitment to the field, personal and professional values alignment and congruence, and investments they are unwilling to return. Thus, this study found the dimensions of professional identity (commitment, congruence, and investment) to be true of seasoned student affairs practitioners. Second, the organizational context affects how staff navigated jobs along their career path. Participants' lived experiences related to their undergraduate socialization experiences and career trajectory defined the path. Participants spoke to overcoming adversity and continuing to work in student affairs to support students with similar identities. Specifically, Sara named being first-generation and its impact on her persistence in the profession as a result of being a connecting point for students navigating a university: “I was a first-gen student. So, I have made it my job to connect with people in student activities, and registrars, and financial aid to make sure I’ve got those pathways to connect those students that way.” This identity also led to her persistence in the profession; she was so deeply entrenched in her financial investments, she could not leave the field. Environments must allow staff to bring their full authentic selves to work. This includes opportunities to engage in self-reflection identity development and skill development and characteristics and traits that influence one’s persistence in the profession. Staff spoke to investing in this profession and changing roles and institution to achieve values congruence. Third, the peer environment extends beyond a single campus, and being in community with one another was an essence under the thematic findings of this study. Relationships with students, peers, and mentors may or may not support a healthy career in student affairs. Fourth, the individual staff member’s overall experience both on and off campus interacts with the above three constructs as one persists over time, guided by their sense of purpose. The themes of passion, motivation, students, and the value of higher education’s pursuit of equity aligned to the influence of purpose. The staff I interviewed all referenced students as the reason they entered and persist in student affairs and their unwavering commitment to higher education.

Reflecting on the bigger picture of the value of higher education and the perspective of what really matters daily helped participants persist. This study found it is harder for one to pick up and go and start anew when they feel rooted and connected in their current situation. Specifically, when one is involved beyond their role on campus, in professional organizations, and in their communities, the perceived and real losses incurred inhibit one’s departure from student affairs. Career investment and entrenchment is also related to the idea that staff simply do not want to leave their career. They do not want to give up, and they have done this work for so long in the profession, they cannot imagine what else they would (or could) do. Each of the participants expressed being unable to imagine themselves doing anything else, which spoke to passion and may also be rooted in the unknown, or fear. They have committed their lives to this work and spoke about feeling entrenched; they have traveled so far down their career path, they are unsure what else they could do. They also spoke of a feeling of letting down themselves or someone who believes in them. Blau (2003) speculated the greater the accumulated costs and investments, the greater sense of obligation or responsibility to one's occupation over time. This was corroborated when staff spoke to their intrinsic and extrinsic motivation, passion, investment, and fulfillment as they have persisted over time.

As I compared the findings of this study on seasoned student affairs practitioners to Reason's (2009) conceptual framework on students (see Figure 1), I created an adapted model of interacting influences on seasoned student affairs staff persistence (see Figure 2).

Figure 1

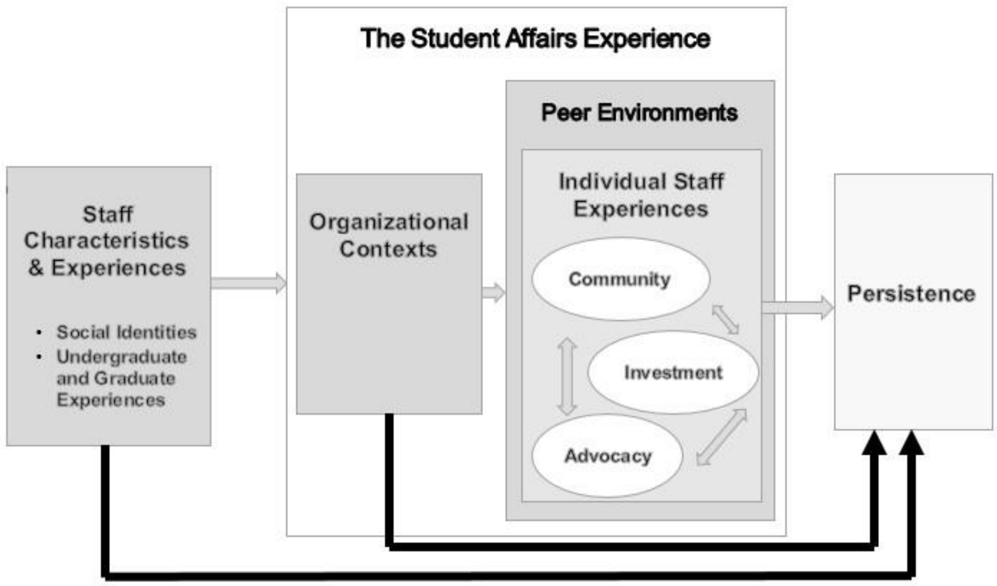
Model for Student Persistence



Note. A comprehensive model of influences on student learning and persistence. From "An Examination of Persistence Research Through the Lens of a Comprehensive Conceptual Framework," by R. D. Reason, 2009, *Journal of College Student Development, 50*(6), p. 661. https://doi.org/10.1353/csd.0.0098

Figure 2

Model for Student Affairs Staff Persistence



Note. An adapted conceptual framework of interacting influences on seasoned student affairs practice. Adapted from "An Examination of Persistence Research Through the Lens of a Comprehensive Conceptual Framework," by R. D. Reason, 2009, *Journal of College Student Development, 50*(6), p. 661. https://doi.org/10.1353/csd.0.0098

This study explored the influential personal and professional experiences contributing to staff persistence. The findings of this study can inform professional associations to lead conversations about attrition and persistence. Staff must continue to remain motivated and resilient through adversity to persist in the profession. The high turnover rate resulting from high stress, low morale, and job dissatisfaction might be preventable if researchers continue to identify positive aspects of the profession and influences of why staff persist over time. The findings from this study suggest strategies for implementation throughout socialization experiences in graduate preparation programs, employee orientation and development, and professional associations and networks to ultimately further persistence. These implications will also contribute to the organizational wellbeing of colleges and universities. Ideally, these findings will have positive persistence implications to challenge the burnout rate among newer and seasoned professionals.

Recommendations for Student Affairs Staff

Based on the data from this study, I found student affairs staff who persist maintain some related behaviors and attitudes. From the essences of the findings in this study, I suggest three considerations for practical application: (a) find community, (b) celebrate investment, and (c) advocate.

Find Community

Student affairs is a relational profession, and staff cannot work in isolation. A community is one foundation for persistence in higher education and seemingly more accessible and perhaps easier to maintain with evolving digital social media platforms like Facebook and LinkedIn. Participants named their supportive network of meaningful and influential relationships with self, students, peers, and mentors as positive impacts on their careers.

Professional development opportunities must not only focus on learning and skill development but also include vocational, identity, and mentor development. Student affairs practitioners can learn from the environments and conditions they try to create for students and apply those contextually for staff as well. Many professional development opportunities are available for free or at low cost and not dependent on institutional financial resources. Seeking development also helps staff embrace the notion they are all teachers and learners in a global network of co-constructors of knowledge and practice.

University campuses have opportunities for experiences beyond specific and often limiting job responsibilities. Participants spoke to their investments and responsibilities on committees and in their outside-of-work communities, which instill a sense of community and obligation to stay in the profession. Due to the nature of student affairs work, staff must find ways to strive for balance to reduce stress.

Celebrate Investment

Staff are meaningful educators contributing to the creation of a just society; the data from this study indicates the importance of celebrating their efforts at the college/university and in the greater community. Finding balance with commitments outside of work helped participants calibrate their overall perspective. It is crucial staff understand how to navigate political and stressful work environments to minimize any negative impact. Participants also encouraged peers to discover what and what not to tolerate. Additionally, people noted how keeping physical and emotional reminders of why staff do this work can inspire them to keep going. Participants discussed prioritizing self-care, mindfulness, and/or wellness are also tools to center perspective.

I believe it is important staff discover ways to focus on the student experience and keep reminders of the contributions and impact through reflections or artifacts. The student affairs profession is a meaningful vocational choice but also a difficult occupation. Remembering the learning and programmatic outcomes staff hope students achieve can provide inspiration to continue creating those conditions. I believe from my analysis of the data that positioning oneself to keep a strong sense of purpose focused on students and student learning will far outweigh the negative attributes of the work.

Staff in this study who have committed to the profession have worked in several jobs, functional roles, and regions. Many have overcome doubt and wonder if the “grass is greener” outside of the profession. As one matures and progresses in the field, they may find many avenues to pivot to without leaving the higher education sector. I assert there seems to be a tipping point where once a staff member has persisted this far, they will continue and see satisfaction, perks, and fulfillment in the work.

Advocate

From my experience, many new or younger professionals cite long hours, including nights and weekends, as contributing to their burnout in the profession. Student affairs professionals must be honest and diligent in socializing new professionals and adapting collegiate environments to meet the needs of Generation Z and Millennial staff. Engaging in flexible work arrangements will help student affairs become a healthy and long-term professional career choice while enabling them to meet the needs of their students. Professional associations setting vision and promoting bold, radical change, such as the ACPA Strategic Imperative on Racial Justice and Decolonization, inspire staff to contribute to a common goal.

Authenticity means different things to different people, identities, and systems. Staff must find their voice and live their truth as they are able and find community and work environments that promote holistic wellbeing. For example, I have asked my staff to try to bring their whole selves to work and not their work into their whole selves. In other words, it is okay to be holistic in our work environment, and, conversely, one does not need to take their work into their life outside of work. Striking this healthy balance is important and necessary to persist in this field.

Limitations

Each professional has a unique journey. I inquired into the descriptive experiences of four seasoned student affairs practitioners who have experienced the phenomenon of persistence in the profession. Creswell and Poth (2018) stated, “The more diverse the characteristics of the individuals, the more difficult it will be for the researcher to find common experiences, themes, and the overall essence of the experience for all participants” (p. 153). However, I wanted to seek the essence of persistence across diverse participants to intentionally reflect the population of the student affairs profession.

I have experienced the hierarchy of the profession result in an organic exodus due to the limited number of jobs available as one advances, limiting the participant pool. Also, soliciting participants via membership in a professional association potentially indicated deeper career commitment, as I believe professional development is often related to professional identity and persistence. Additionally, participants who volunteered for this study may have had an increased willingness to share their professional journey more than staff who did not want to be interviewed.

The conceptual framework suggests one has experiences and characteristics influencing persistence, resulting in a scope that seeks to understand the phenomenon. These interviews captured a snapshot into the experiences, intersections between them, and the essence beneath the description rather than an exhaustive account of the influences.

Participants may not have felt comfortable offering honest or negative details on career entrenchment that impact why they stay, such as feeling trapped, fear of the unknown in another profession, lack of clarity in their future, etc. Participants may have also feared offering critical narratives, such as combating institutional systems including racism, the promotion of white supremacy culture, and colonization, if they suspected any identifiable information may be released to come back to harm them in their current role or in the future. Based on the academic time of year in which the interviews were conducted (Winter 2019), participants may have had various salient identities and affinities to their work, which may have affected their attitude toward persistence in that specific, seasonal moment in time. In other words, mid-academic year and seasonal factors, including weather and minimal sunlight, may have hindered a participant's interview responses.

Another limitation is my interpretations during memoing and coding the data were unique to this study and inherently biased based on my salient identities and lenses. My interpretations were based on my own lived experiences in higher education, particularly since I have persisted as well. However, I managed my interpretation bias by reviewing the transcripts rigorously to be confident participants were listened to and offered their own lived experiences in response to the questions I asked. Adhering to the strict coding method and being in community with participants by soliciting feedback and member checking was imperative to establish credibility.

Another limitation is study repeatability. By using purposeful sampling and semi-structured interviews, repeating this exact study is simply not possible. These results are a deep interpretation of the interacting themes and essences undergirding the phenomenon of persistence lived by several seasoned student affairs practitioners.

Recommendations for Future Research

Future researchers must look at why staff continue to stay in the profession and suggest innovative ways to retain talent. Professionals in our field must reflect on how student affairs is or is not evolving and evaluate the needs of staff on college and university campuses. As I conducted this study, I documented ideas for future study as they arose, beginning with the need to seek to understand the persistence of particular demographics, such as staff of color, first-generation college graduates, and LGBTQIA+ staff. Researchers could explore specific undergraduate experiences (or lack of), various functional areas and roles, titles and affiliated involvement, and institution types. Researchers could explore the impact of supervisors on persistence, or family obligations that may result in greater commitment or entrenchment. One could interview staff who are not in student affairs, such as dining service, facilities, and library services, to discern what about college environments and cultures contribute to career persistence. Another demographic to explore are staff who do not work on college campuses, including sorority/fraternity headquarters staff, consulting organizations, and professional associations. Future researchers could study a comparison of higher education with other helping professions to see if the phenomenon of persistence is similar or different. Researchers could seek to understand resilience, trauma-informed practices, and overcoming burnout. Further studies could offer insight into any incentivized staff persistence compared to the academic tenure process, as faculty retention is structured quite differently and may offer insights into persistence in the field.

Some potential questions for future study include:

- Is there a generational difference on persistence in the profession depending on when one entered the field?

- Do certain undergraduate experiences or functional roles result in longer persistence or earlier burnout?
- For staff who exit, what would have made them stay longer?
- Is persistence related to career satisfaction?
- How do staff develop a sense of belonging?
- Is an individual's intent to persist affected by institutional staff retention efforts?
- What role does identity play in vocation?
- Is there a tipping point or threshold number of years where staff choose to stay and will not depart?
- Why do the most senior student affairs officers stay in the profession?

These are several options for future research studies that could positively effect change in the student affairs profession, which is an important topic to continue to understand.

Final Thoughts

Colleges and universities employ talented staff to educate and support students. The seasoned student affairs professionals interviewed in this study have persisted for years, citing their strong sense of (a) why (i.e., purpose and impact); (b) how (i.e., relationships with others); and (c) what (i.e., entrenchment) as three positive influences of their decisions to persist in the profession. Beyond these larger themes are the deep essences of (a) why: advocating toward an equitable world; (b) how: being in community; and (c) what: investing deeply in this chosen vocation, interacting with characteristics, experiences, contexts, and environments toward persistence. The findings from this study suggest strategies for implementation throughout socialization experiences in graduate preparation programs, employee orientation and development, and professional associations and networks to ultimately further persistence. Applicable considerations include finding community through support networks and professional development; celebrating investments by centering perspective and recognizing impact; and advocating by challenging norms, being whole, and educating for change. This study informs the field about increasing staff engagement and persistence in higher education and student affairs by promoting opportunities for vocational growth and development, fostering supportive networks, and enabling deep reflection on a sense of purpose.

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The New Rites of Passage: Regulation and Relationships

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Abstract

Teenagers face many factors that impact their brains. Factors ranging from technology to trauma physiologically alter the teenage brain. For educators to support their students, they require a foundational understanding of how technology and trauma impact the teen brain. Teenage students report record high levels of stress in their young lives. Students report stress levels equal to those of their parents and other adults. Teachers are trying to work with classes in which a majority of students report they have had to deal with trauma and other kinds of stress in school and online. To mitigate these issues, teachers must assist students by fostering self-regulation skills. Further, teachers must help students by buffering the effects of trauma and stress by nurturing strong and caring relationships with students. When teachers understand the interrelationship between regulation and strong relationships, they will be able to provide students with vital skills needed for their success. As foundational skills, regulation and relationships are the new rites of passage for today's teenagers. This paper examines current research literature associated with the brain, self-regulation, and relationships.

Keywords: brain development, relationships, self-regulation, teen brains, trauma, allostasis

THE NEW RITES OF PASSAGE: REGULATION AND RELATIONSHIPS

In the 20th century, the teenage years were marked with familiar rites of passage: attending a first school dance, starting high school, getting a driver's license, and applying to college, military, or a first job. In addition to the typical rites of passage, 21st century teens face tremendous stressors—academic, social, and emotional—both inside and outside the classroom (Rideout & Robb, 2018). The author espouses, in agreement with other educators, that to be successful, teens require a substantive school support system that engages all adults—teachers, paraprofessionals, tutors, social workers, school counselors, psychologists, cafeteria staff, and administrators (Holmes et al., 2015; Lane, 2006; Souers & Hall, 2016; Sousa, 2017). Teens in the 21st century require new rites of passage to effectively navigate adolescence; I believe students need regulation skills and strong relationships with school staff (Souers & Hall, 2019). These elements can ultimately foster teens' development into thriving young adults. To help their teenaged students, educators require a foundational and comprehensive understanding of how trauma and stress affect the teenage brain (Schwartz-Henderson, 2016; Zacarian et. al., 2017).

The Current Teenage Brain

Rewired

Currently, teens are extensively exposed to various technologies, with far-reaching impacts (Sousa, 2016). Teens access technology with ease; however, they risk overexposure and overuse (Rideout and Robb, 2018). Rideout and Robb's survey results revealed 89% of teens, ages 13–17, have a smartphone, an increase from 41% in 2012. Seventy percent of teens reported using social media daily, reflecting a 36% increase from 2012; teens identified texting as their preferred communication method. Adults working with teenaged students must examine technology's impact on teen brains, given technology's pervasive daily influence (Rideout and Robb, 2018; Sousa, 2016).

As a direct result of technology overexposure at young ages, teenagers' brains experience "rewiring" (Sousa, 2016, p. 23). Research has indicated the brain can reshape its circuits based on environmental input; this concept of neuroplasticity allows people to continue to learn throughout their lives (Sousa, 2016). Teenagers' continual exposure to technology divides their attention (Sousa, 2017) and negatively impacts their social interaction skills (Sousa, 2016). As highlighted by Sousa (2016, 2017) technology's drawbacks have begun to overwhelm and negatively affect teens, both physiologically and socially. Additionally, many teens' brains are further affected by trauma's pervasive impact (Burke Harris, 2018; Sitler, 2009).

Trauma-Affected

Throughout research literature, childhood trauma is pervasive (Burke Harris, 2018; Crosby, 2015; Jennings, 2019; Tough, 2016). Trauma among school-aged children is considered "a public health epidemic" (Craig, 2016, p. 28). In fact, more than 25% of children experience physical, sexual, or emotional trauma (Crosby, 2015). Overall, in their research, McInerney and McKlindon (2014) found one half to two thirds of children have experienced trauma. In North Carolina, 68% of 16-year-old students had experienced trauma, with 37% experiencing two or more incidents (McInerney & McKlindon, 2014). The National Survey of Children's Health in 2011–2012 indicated nearly 35 million U.S. children experienced at least one type of childhood trauma (Souers & Hall, 2016). According to Nealy-Oparah and Scruggs-Hussein (2018), 60% of students have experienced 3–4 adverse childhood experiences. Based on my reading of the research and my experiences as a teacher, I believe it is important for school personnel to respond to trauma's prevalence so students feel supported.

Childhood trauma, which negatively impacts brains, has been explored by researchers (Felitti et al.,1998; Jennings, 2019; Souers and Hall, 2016). Felitti et al. (1998) and Burke Harris (2018) categorized trauma as abuse, neglect, and household dysfunction, connecting childhood trauma exposure with significant negative health outcomes, including heart disease, obesity, ADHD, asthma, and diabetes, and early death. Their research has depicted trauma's prevalence in young people, and there is growing evidence that the effects of childhood adversity continue far beyond childhood to have negative psychological, social, and medical effects on people throughout their lives (Burke Harris, 2018; Souers & Hall, 2016).

Given the prevalence of adverse childhood experiences, understanding how trauma alters teen brains is important (van der Kolk, 2014; Sousa, 2016, 2017). Trauma physiologically changes a teen's brain; first, trauma exposure affects the prefrontal cortex's ability to filter out unrelated information. Information enters the thalamus and moves to the amygdala and the frontal lobes. When reaching the amygdala, the received information is assessed to determine its level of threat to survival. If information is (mis)perceived as a threat, the brain emits cortisol and adrenaline, causing a whole-body response to follow—before teens can consciously evaluate the threat's validity (van der Kolk, 2014). Reactions to classroom environmental factors within trauma-affected teens often result in a fight, flight, and/or freeze response (Souers & Hall, 2016). Given the overwhelming influence over the brain and body reactions, a teen's "emotional brain" (van der Kolk, 2014, p. 57) often trumps their focus on academics.

Exposure to stress can result in physiological brain reactions, particularly with the prefrontal cortex and the amygdala (Sousa, 2017; van der Kolk, 2014). A process of maintaining balance in the human brain is called allostasis. According to McEwen and Wingfield (2007), "Allostasis is the active process that leads to adaptation to a stressor, and mediators of allostasis include stress hormones as well as the autonomic nervous systems and pro-inflammatory cytokines and metabolic hormones" (Abstract). Under constant or severe traumatic pressure, the allostatic process becomes overloaded. Consequences of allostatic overload include many of the common diseases of modern life (e.g., obesity, cancer, heart disease, ADHD, asthma, diabetes) (Burke Harris, 2018; McEwen & Wingfield, 2007).

Although adverse childhood experiences and trauma increase difficulties for children to respond to changes in life in a regulated manner, allostasis provides the brain stability to adjust responses (Karatoreos & McEwen, 2013). Teachers can help students by using the natural systems of the brain (Caine, 2018). Understanding how the brain works when under stress can help teachers create experiences that foster the allostasis process through helping students become effective and efficient in using their self-regulation skills (Caine, 2018, Jennings, 2019)). Thus, I contend, and Sousa (2016) agrees, that adults working with teens need to understand how teen brains react to technology and trauma so teens can be supported.

The Brain, Self-Regulation, and Relationships

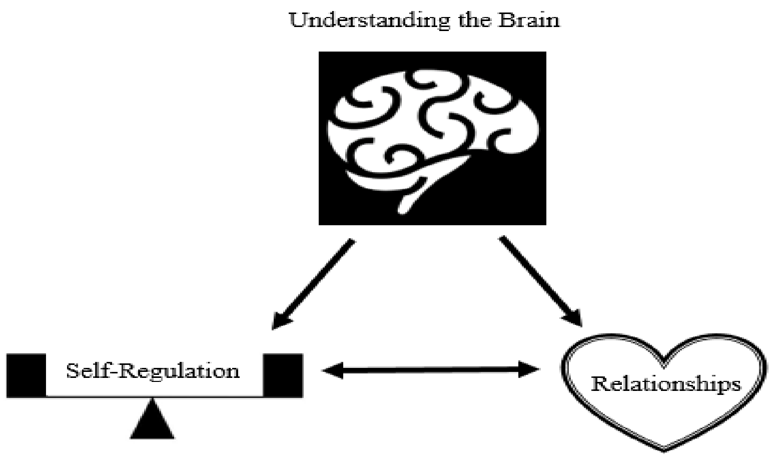
Schools can play an important role providing safety and stability to trauma-affected students (Jennings, 2019; McInerney & McKlindon, 2014). Often, trauma “masks itself in classroom behaviors that can easily be interpreted erroneously” (Sitler, 2009, p. 120). Research has revealed childhood trauma affects students’ stress regulation and results in students’ attention focusing on survival, as opposed to content instruction (Craig, 2016). Stress causes the body to generate cortisol, produces an adrenaline rush, and increases the heart rate (Schwartz-Henderson, 2016). Supportive adult responses can buffer such physiological responses (Burke Harris, 2018; Schwartz-Henderson, 2016). I believe that school-based adult supports can create adult buffers for students who have experienced trauma.

Tough (2016) outlined research demonstrating biological changes in children’s growing brains; these changes “impair the development of an important set of mental capacities that help children regulate their thoughts and feelings” (p. 4). As teachers move from acknowledging to comprehending root causes of students’ behaviors (i.e., they are biological responses and not active choices), they may fundamentally understand many students’ “misbehaviors” are physiological stress responses (Schwartz-Henderson, 2016). These responses often present as fight, flight, or freeze (Souers & Hall, 2016). I agree with people like Burke Harris (2018) and Jennings (2019), that instead of facing disciplinary actions, students need understanding and assistance from the school. Educators can positively impact students affected by trauma.

To support teens, educators must recognize that understanding the brain, fostering self-regulation, and nurturing strong teacher-student relationships interrelate, as demonstrated by my visual depicted in Figure 1.

Figure 1

Brain, Self-Regulation, and Relationships Interrelate as Visualized by Dr. Kimberly Hellerich



As visualized by Figure 1, educators' understanding of how a teen's brain reacts (the top visual) associates with an awareness of self-regulation strategies (lower left hand visual). Relatedly, I espouse that educators have or gain the abilities to instruct and implement self-regulation strategies, which is represented by the balance in Figure 1. If teachers help students develop self-regulation skills, stronger student-teacher relationships will be fostered, as represented by the lower right hand visual in Figure 1. I contend this interrelationship among understanding the brain, fostering self-regulation, and developing strong, positive relationships will offer students opportunities to gain essential strategies that apply beyond adolescence.

I believe, in order for educators to effectively establish the interrelationships depicted in Figure 1, trauma-sensitive strategy integration should influence educators' approaches (Jennings, 2019; Souers & Hall, 2019; Zacarian, 2017). After all, "our brains were wired to survive—not thrive" (Souers & Hall, 2019, p. 153; Sousa, 2017). Comprehending how teens are likely to respond and react affords teachers opportunities to plan educational approaches proactively. Students can be taught how to be attuned to their personal reactions (Souers & Hall, 2019). Further, teachers can select strategies, including affective statements and questions, conferences, or restorative circles (Watchel, 2016) as ways to shape students' actions and reactions. Additional trauma-sensitive strategies include teaching with student strengths in mind (Zacarian et al., 2017) so students may successfully connect with content. Further, teachers can provide students with sensory-based activities (Craig, 2016), such as playing catch (Souers & Hall, 2019), which can assist with regulation. Finally, teachers can view lesson elements through a trauma lens and create ways to support students (Schwartz-Henderson, 2016). I believe that incorporating trauma-sensitive strategies can yield stronger relationships with all students—extending beyond trauma-affected students. Specifically, self-regulation can serve as a significant trauma-sensitive skill that can bolster student-teacher relationships (Brunzell et al.,2015; Craig, 2016; McInerney & McKlindon, 2014; Sousa, 2017)..

From my experience in the classroom, I have found self-regulation skills can mutually influence nurtured, strong relationships; I believe if educators model self-monitoring skills and explicitly teach self-regulation skills, educators' compassion can emerge. Established student-teacher relationships serve as relationship models; teachers demonstrate how relationships can endure, especially while managing challenging emotions presented by students (Craig, 2016). Teaching and modeling self-regulation skills further nurture strong student-teacher relationships.

Ultimately, teens need adults in their lives who thoroughly understand actions and behaviors may result as trauma-affected (Burke Harris, 2018; Crosby, 2015). Understanding the physiological nature of the brain's reactions to trauma provides educators with a comprehensive lens, absent of the often (mis)perceived belief that teens' reactions are their voluntary choice (Cole et al., 2005; Sousa, 2016). Although teens need to be responsible for their (re)actions, a supportive and understanding approach through self-regulation and relationships will assist teen students in the development their abilities to critically think and take more responsibility for their lives.

Self-Regulation

Most educators can remember a time when a student reacted unexpectedly. Perhaps the student presented an emotional outburst that disrupted the classroom, abruptly barged out of the classroom, or even threw a punch. Regulation can be defined as “the ability to take in stimuli and manage emotional and behavioral responses accordingly” (Souers & Hall, 2019, p. 66). When students are unable to manage their reactions, they act in a dysregulated manner (Souers & Hall, 2016). I believe that dysregulated students can benefit from self-regulation strategies (Souers & Hall, 2019).

Teaching self-regulation strategies so students can self-modulate their emotions is a vital predictor of academic and social success (Cole et al., 2005). Trauma’s impact on student brains affects students’ abilities to regulate their emotional reactions. With an associated physiological response to stress, the brain response produces cortisol, activating the amygdala; this interferes with students’ abilities to attend to lessons (Holmes et al., 2015). Schwartz-Henderson (2016) stated toxic stress limits self-control and self-regulation development, negatively impacting these important skills. As a result, self-regulation skills are imperative.

Self-regulation strategies allow teens’ bodies to “organize sensory input, modulate arousal levels, and mediate responses to sensations” (Brunzell et al., 2015, p. 4). One important system of helping students is mindfulness; these activities can include music, yoga, deep breaths, songs, circle games, short bursts of exercise (Brunzell et al., 2015). Based on this information, I believe that mindfulness activities can result in increased emotional self-regulation, resulting in more focused learners. Further, establishing self-regulation opportunities allows adults to model responses for teens, which further bolsters strong teacher-student relationships.

Relationships

Strong relationships can support trauma-affected students (Crosby, 2015). These established relationships benefit *all* students, especially trauma-affected teens. As synthesized by Tough (2013), researchers in Minnesota contended that relationships change throughout childhood. I agree that dependable, reliable relationships can be beneficial when both students and educators actively engage, and I believe teens need teachers and staff to be willing and able to establish personal relationships with them.

Recently, Souers and Hall (2019) defined relationship as “a meaningful connection with another human being—in particular, a student’s healthy-enough, safe-enough relationship with a teacher” (p. 66). According to Walberg et al. (2004), establishing meaningful connections, especially between students and teachers, can also influence students’ abilities to thrive as learners. Walberg et al. stated, “Caring relations between teachers and students foster a desire to learn and a connection to school” (p. 210). Thus, establishing meaningful relationships with teachers can benefit students both as individuals and as learners.

Research also has indicated “relationships [are] the key” (Lane, 2006, p. 44) to unlocking student success. Strong classroom relationships require empathy, genuineness (Brunzell et al., 2015), and unconditional positive regard (Brunzell et al., 2015; Crosby, 2015) despite behaviors students may present in the moment. Further, teachers demonstrate they value their students by holding students to high yet realistic expectations and offering them active roles within the classroom (Crosby, 2015). Lane (2006) outlined restoring student/teacher relationships through language; her study indicated relationships “were a critical factor” (p. 43) in student success.

When students establish a strong relationship with a caring adult, I have found that they perform better (Mirsky, 2003). When the SaferSanerSchools trauma-sensitive restorative pilot program (Mirsky, 2003) was implemented, a school leader stated, “You cannot separate behavior from academics. When students feel good and safe and have solid relationships with teachers, their academic performance improves" (p. 3). Strong relationships benefit students' social, emotional, and academic needs.

Students profit from classroom environments where they feel safe and cared about by teachers (Sousa, 2017). Tough (2016) referenced evidence that the best "lever" to improve children's lives involves "the behaviors and attitudes of adults those children encounter every day" (p. 26). Relatedly, teachers' approaches with students may have vital, direct influence on students' progress. Viewing students with care and compassion allows the emphasis to be placed on, "'What happened to this student?' rather than 'What's wrong with this student?'" (Nealy-Oparah & Scruggs-Hussein, 2018, p. 12). Forging strong relationships provides all students a chance to meaningfully connect with an adult with whom they will interact throughout an entire year (at least).

What Is Still Needed

Trauma's extensive prevalence indicates, as educators, we *all* interact with trauma-affected students daily, despite not knowing exactly who they are. In reality, we do not need to know who they are; all students will benefit from self-regulation opportunities and strong, nurtured teacher-student relationships. Because trauma "masks itself" (Sitler, 2009, p. 120), teaching in supportive ways supports *all* students—regardless of whether they have experienced trauma (yet). Reframing approaches with students can assist teachers when striving to meet students' physical and emotional needs (Sitler, 2009).

I believe that teens anxiously await for educators to understand how the teen brain functions (Sousa, 2016, 2017). I agree with people like Jennings, 2019, Mirsky, 2003, Nealy-Oparah and Scruggs-Hussein, 2018, and Sousa, 2017, all educators—teachers, paraprofessionals, tutors, administrators, social workers, school counselors—must be willing to be open minded, learn about teen brains, and be willing to try new activities (e.g., mindfulness, brain breaks) that benefit students, and show honest compassion toward their students.

When these elements are integrated within each classroom, students will feel supported in safe learning environments; then, teachers can move students toward emphasizing content. Until teens' social and emotional needs are addressed, content must wait (Sousa, 2017). Yet, content cannot wait for too long. Regulation and relationships, simply put, must be accepted and embraced as all teenagers' new rites of passage.

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English Language Learners Does Not Equal Special Education

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Abstract

This article aims to highlight the challenges faced by schools when addressing a wide range of learning needs—specifically those of English language learners (ELL) and students with exceptionalities. Both populations of students have a history of being isolated rather than included with same-age peers due to nontraditional learning profiles. Many educators are overwhelmed with the idea of providing services to diverse learners and have limited knowledge of ways to include all learners with brain-based research practices. Both ELLs and students with exceptionalities can benefit from teaching that promotes learning that lends itself to using the whole brain and triggering transfer of knowledge from short- to long-term memory. This article highlights issues faced by ELL educators, special educators, and classroom teachers and provides concrete teaching strategies that support and include all learners.

Keywords: English language learner (ELL), special education, brain research, language, inclusionary practices

English Language Learner Does Not Equal Special Education

Public school education and educators are consistently in the spotlight. With a significant emphasis placed on high stakes testing scores and graduation rates, the need for understanding how to teach all learners is increasingly important (Sousa, 2017; Tarbutton, 2018; Zhao, 2009). Tarbutton (2018) emphasized the importance of providing a more diverse classroom to increase student success, with student-centered learning, integrating technology, and setting high expectations for all learners of particular importance. The pressures of society have placed a great deal of pressure on teachers to address the emotional and social aspects of learning (Burke Harris, 2019). Transfer, “the ability to learn in one situation and then use that learning, possibly in a modified or generalized form, in another situation” (Sousa, 2017, p. 153), has long been recognized as fundamental in brain research, but are educators placing enough emphasis on its relevance for student learning? This article focuses on two specific groups of learners who are being identified more frequently in our public schools as needing more support: English language learners (ELLs) and students with special education needs.

According to the U.S. Department of Education (2018), an ELL is “a national-origin-minority student who is limited-English-proficient. This term is often preferred over limited-English-proficient (LEP) as it highlights accomplishments rather than deficits” (p.1). Dual-language proficiency or progress toward proficiency should be seen as a strength instead of a weakness, yet Harklau (2000) found ELL students’ sense of belonging in school is directly connected to their perceptions of how peers, teachers, and administrators view them. Shapiro (2014) documented how students engaged in public protest over what they experienced as deficit discourse at school and in the community.

Special education is a broad umbrella including students with specific learning disabilities (e.g., dyslexia, dysgraphia), emotional disabilities, hearing and vision impairments, autism, and more severe cognitive delays (Butrymowics & Mader, 2018). When considering neuroscience research, one must consider the brains of students with disabilities process information differently and teaching practices must take the different ways students with special education needs process information into account (Butrymowics & Mader, 2018).

Although the United States has come a long way since the passing of the Individuals With Disabilities Education Act (IDEA) of 1975, students identified with special education needs continue to struggle in public schools and beyond (Butrymowics & Mader, 2018). In 1997, the reauthorization of IDEA set the stage for schools: " lawmakers made their intent clear: Students are presumed to be educated in a general education class unless their disability prevents that" (Constantinescu & Samuels, 2016, p.10). The law supports special education students' placement in the least restricted environment, and the law proposes that 90% of students should be able to graduate from high school meeting the same standards as general education students (Butrymowics & Mader, 2018); yet, students in special education are less likely to go to and complete college, and they earn nearly $4 less per hour than former general education students in the workforce (Sanford et al., 2011).

Many schools continue to struggle with what is best for all students when it comes to addressing unique learning and behavioral needs (Armstrong, 2011). Zhao (2009) explained, "All children should be accepted and be provided with equal opportunity to help realize their potential" (p. 47), but helping all students reach their potential can be a difficult goal to achieve. The 7 million students in special education should be served with the same respect as those in general education, through innovative practices meeting their unique learning needs. As regular education has embraced new ways of thinking about neuroplasticity, such as growth mindset (Dweck, 2016) and other innovations, special education has remained stagnantly focused on diagnostic categories and remedial and corrective approaches (Armstrong, 2011).

Inclusive Practices

Inclusive practices are one way to enrich the learning environment for all students. Aside from helping challenged learners to rise to higher standards, the school culture can be positively affected (Boaler & LaMar, 2019). Student experiences in inclusive schools have pointed out the positive aspects of the arrangement, including being able to help their peers academically, receiving more help themselves, and learning to socialize with others different from themselves (Shogren et al., 2015). The research from Shogren et al. (2015) supports the idea that inclusion must be considered as a critical piece of building positive school experiences for all students.

This idea of inclusive practices extends not only to special education students but also to emergent bilingual students. In many U.S. public schools, English proficiency is considered a prerequisite for accessing rigorous academic content (Shapiro, 2014). This belief that proficiency in English is required prior to accessing content knowledge has led to what Valdés (2001) referred to as linguistic isolation, which can lead to academic and linguistic stagnation (Callahan, 2005). Ultimately, I believe the goal for all educators should be to include all students in the school learning community while simultaneously challenging them academically and socially. Educators can achieve equity for all learners through continual collaboration among mainstream, ELL specialists, and special educators with students and parents/guardians (Boaler & LaMar, 2018).

A 2019 report noted ELLs are among the fastest growing population of students in America's public schools (English Language Learners in Public Schools, 2019). Under the Every Student Succeeds Act (ESSA) of 2015, an ELL who has been in the United States for less than 1 year needs to take standard assessments with their English-speaking peers, but the test scores do not count toward the school's rating. In the 2nd year, the scores are publicly reported, and by the 3rd year in the country, all ELLs' assessment results in both math and English are treated like their native-born peers' results (Klein, 2019). As of 2017, Latino students represent the second largest population of students within the United States, with 26.7% of the population in American public schools (Riser-Kostisky, 2020). Although reading performance of Latino students improved between 1992 and 2009, the gap between Latino and White students has remained constant (McFarland, 2019, p.5). Development in a student's first language (L1) can impact the development of students' second language (L2) (Cummins, 1979).

Transfer

Researchers (Cummins, 1979; Gibbons, 2015; Vygotsky, 1986) have demonstrated that students “transfer” language skills from their L1 into their L2, but this transfer does not occur automatically. According to Cummins’s (1979) developmental interdependence hypothesis, students’ ability to develop competence in L2 depends on their competency in their L1 at the time of exposure to L2. Effectively, transfer will only occur if students’ have had sufficient exposure to their L1 prior to exposure to L2. Building upon this idea, Cardenas-Hagan et al. (2007) determined Spanish-speaking students with a strong foundation in letter name and sound identification in their L1 performed better at transferring that recognition into English or L2. Providing explicit instruction in phonological awareness and oral language skills in a student’s L1 could help the student transfer their reading skills in (L2) (Cardenas-Hagan et al., 2007, p. 256).

Transfer is both essential for students to apply new learning and extremely challenging to achieve (Sousa, 2017). Failure of transfer can present in a number of ways, and teachers might have difficulty identifying the root of the problem (Sousa, 2017). ELL students and students with learning disabilities can share characteristics, including weak oral language skills, poor motivation, and low self-esteem (Ortiz et al., 2006). These similarities can often lead to ELLs disproportionately represented in special education programs (Linan-Thompson et al., 2006). Although a student with a learning disability in reading may have difficulty with reading comprehension and literacy skills due to a language processing issue, ELLs typically can learn to read in their native language but lack exposure to spoken and written English, which can adversely affect their development of English literacy skills (Perras, 2017). These differences require teachers to look deeper into the learning issues students present. Rather than focusing on deficits, teachers servicing students with language needs must be open to new findings in the field of neuroscience (Armstrong, 2011). Brain research suggests, rather than working around areas of learning weaknesses, educational practices should aim to strengthen pathways to potentially change the brain processes of learners (Boaler & LaMar, 2019).

Ultimately, recommendations made for ELL students or students with special education needs (e.g., presentation of content in a variety of ways, engaging in multiple methods and media, avoiding disconnecting facts, and finding ways to connect learning) must be considered as best practices rather than specialized teaching approaches (Boaler & LaMar, 2019). Other brain-researched teaching approaches to consider include (a) explicitly teaching content-specific vocabulary in context; (b) using direct and explicit reading comprehension strategies (e.g., making predictions, monitoring and asking questions as they read, and summarizing after reading); (c) increasing exposure to print resources, including oral readings and discussion; and (d) increasing focused academic discourse (Francis et al., 2006). By refocusing efforts on teaching all students inclusively using effective classroom strategies, educators can help guide all learners to achieve academic success in U.S. public schools (Willis, 2007).

Kaplan (2019) described six strategies for teaching ELL students gathered from interviewing experienced teachers of ELL students. Kaplan suggested teachers should (a) cultivate relationships and be culturally responsive, (b) teach language skills across the curriculum, (c) emphasize productive language, (d) speak slowly and increase wait time, (e) differentiate and use multiple modalities, and (f) incorporate students' native languages and not be afraid of using technology). Using these six strategies, teachers will ultimately create an environment conducive of supporting all learners across the spectrum in a culturally responsive way. Hammond (2015) argued that when a teacher provides a space that the brain perceives as safe and nurturing, students can relax and be more apt to learn, leading to better outcomes for all.

Conclusion

Creating a learning environment that is both emotionally and physically safe is probably more important than ever for the health of the overall child (Boaler & LaMar, 2019; Sousa, 2017). Thankfully, the strategies included in this article are good for all students. Implementation of these and similar strategies is crucial for students who are frequently marginalized by the current public-school structures (McLeod, 2019). Although the focus of this article has been on ELLs and those who have special education needs, the ideas here are based on an anti-racist and inclusionary philosophy (Belle, 2019). Lack of equity in our public schools has been an issue for too long and without overcoming this issue, society as a whole will suffer (Belle, 2019). The world can no longer afford to have students fail, underachieve, or be isolated Robinson 2017). The world is seeing firsthand what happens when schools are not allowed to fully educate students. Our nation is at a crossroads, and education and equity must progress hand in hand. Teachers, principals, parents, and community members must demand and assure, to the greatest extent possible, that all students will be successful in school. There are no legitimate excuses for anything less.

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