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Eighth Grade Mathematics Intervention: Improving Student Self-Esteem and Content Knowledge of Targeted Mathematic Skills

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Eighth Grade Mathematics Intervention: Improving Student Self-Esteem and Content
Knowledge of Targeted Mathematic Skills

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Submitted in Partial Fulfillment of the Requirements for the Degree
Master of Science in Education

School of Education and Counseling Psychology

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Abstract

By eighth grade some students believe they are “not good” and never will be successful at mathematics. Discouraged by poor grades, negative feedback from teachers or demoralized by repeated academic failure, these students disengage from their mathematics classwork. In some cases, mathematics intervention classes are a last chance to get them back on track to qualify for Algebra I in 9th grade. The purpose of this study is to identify strategies to reengage students by increasing their academic content knowledge in mathematics and boosting their self-esteem and sense of belonging in the school setting. The review of the literature identifies elements that students need, such as a nurturing environment, a positive psychology and an intellectual growth mindset, but revealed little as far as a successfully implementable strategy that could be applied to an in-school day intervention class curriculum. The sample of convenience is a small class of 11 students in a suburban school setting. This is an action research study using a mixed methods approach analyzing both qualitative and quantitative data. Intervention students learn primarily through a computer-based mathematics program (Ascend) and teacher led instruction. Students are concurrently enrolled in a traditional 8th grade mathematics course. Results indicate that within the intervention class, student academic achievement in remediated skills improved through teaching strategies aimed at increasing emotional well being and the use the individualized computer-based mathematics program. The increase was more substantial when students were given the freedom to control certain aspects of their learning experience. The happier they were in class and the more they believed success was possible, the better they performed. However, this mindset and performance did not carry over into their traditional 8th grade math classes. Students showed no improvement in grades from the start of the year through the end of the year in traditional classes.

Keywords: Mathematics, Intervention, Maslow’s Hierarchy, Growth Mindset, Positive Psychology, 8th Grade, Algebra I, Well being, Self-Confidence, Self-Esteem, Academic Improvement

Chapter 1 Eighth Grade Mathematics Intervention

Eleven students from an 8th grade mathematics intervention class were asked what their least favorite thing about school was and six of them replied “math.” These same students were asked to describe their feelings about math and the responses included, “Math is horrible,” “It’s hard to understand,” and “I’m not good.” The students in this class had given up on math. They had failed in their regular math classes and they saw no point in trying to do better because they believed they could not possibly succeed.

Mathematics teachers at the school site had for a number of years recommended in-school day intervention classes to best advance these types of struggling students. Thanks to available district funding and collaboration with new administration, the intervention class for these 8th graders and another for 7th graders were established. The intervention classes were to provide support for these students; filling the gaps in their basic mathematical skills, facilitating acquisition of current grade level content, and qualifying and preparing them for success in Algebra I as 9th graders. Placement in the class was determined by multiple measures of assessment and evaluations by previous teachers.

I was assigned to teach the 8th grade intervention class primarily because I asked for the opportunity, but also because my educational philosophy is that all students want to succeed and feel good about their work. If students are not succeeding, I am empathetic and I seek out the entire story of the individual to determine the reasons why they struggle. I get to know my students personally and make strong connections with them. As a teacher I am supportive, positive, persistent and patient. I am also not tied to convention and am open with my instructional methods, willing to experiment and redirect teaching strategies according to the

level of progress I see made by my students. There was no specific blueprint in place for how this class would be run, so I had some latitude to construct the program as my colleagues and I deemed appropriate. Throughout the year I collected data and recorded which strategies worked and which did not as I developed the curriculum, always keeping sight the ultimate goals; increasing student academic achievement and emotional well being.

Statement of Problem

Traditional mathematics content standards often expect students to acquire conceptual knowledge at a pace that is not manageable for some to achieve, forcing these students over time into a seemingly insurmountable deficit of learning and intensifying self-doubt. The state standards demand that certain content must be taught within a given year. To reach this standard, teachers often continue to move from one concept to the next even when some students in their classes do not have a clear understanding of the material. Because mathematics is foundational, one concept building upon the next with increasing complexity, these students tend to fall farther and farther behind. They often shut down and grow a disdain for mathematics, believing it is too hard and they are just “not good at math.” By the 8th grade, students may have experienced several years of failure and their chance of succeeding at the high school level without additional assistance is very slim.

This study is critical to address the needs of these identified students because, as a practice in this district, students are not retained from year to year regardless of failing marks. Intervening in the eighth grade allows students a last chance to reverse their academic course

before freshman year of high school when individual student support may be more limited and student GPAs become part of their permanent academic record.

Purpose Statement

The purpose of this study is to identify strategies and a course curriculum for reengaging failing 8th grade mathematics students by developing their emotional well being and also increasing their academic content knowledge to better prepare them for success in high school and beyond. The approach must incorporate both goals because these goals are inextricably bound. Students who are unhappy at school and do not believe they are smart enough to learn gain little if any content knowledge. Students who do not gain content knowledge suffer a loss of self-confidence in their intelligence and ability to succeed in school. They are often less happy with school overall. A soundly devised intervention strategy should aim to accomplish both academic proficiency and increased emotional well being simultaneously.

Research Question

How can an eighth grade mathematics intervention course be designed to most effectively reengage failing students, increase self-esteem in the classroom and make grade level content accessible? What would be the best instructional model to meet the highly individualized needs of struggling students? How large a role does the teacher/student relationship play in student motivation and success? What should the student/teacher relationship look like? What should the teacher/student ratio be? Should the class structure follow a traditional mathematics course or is a departure from traditional structure required to engage these students?

Definition of Terms

In this study, mathematics intervention is an in-day class period dedicated to mathematical remediation through content instruction and social and emotional support. Instruction is highly individualized through a combination of online learning and one-on-one teacher/student interactions.

The traditional mathematics course is the grade level, regular math class that all of the participants in the study take in addition to their intervention class. Traditional classes usually have a ratio of 30 students to 1 teacher and are run through a combination of direct instruction, class discussion, group work and individual work.

Emotional well being is the level of belonging and self esteem students experience. Belonging and self-esteem are two components within Maslow's Hierarchy of Needs (Maslow, 1943). Belonging in the educational setting I define as sensing that one has a secure place in the classroom and positive relationships with peers and teachers. Self-esteem in the educational setting is having self-confidence and feeling respect for oneself and from others both personally and academically.

Theoretical Rationale

The pressing need presented in this study is to find a way to reach students who have been demoralized and frustrated by their mathematics classroom experiences. They have lost the belief that they are capable of learning the content. They are resistant to instruction, especially traditional pedagogical methods because they have not felt success in that environment for quite

sometime. Often as a means of ego self-defense they claim to not care about math or legitimately grow a dislike of math because it makes them feel bad about themselves. Their self-esteem suffers and many times these students then misbehave or act out negatively in class. So how do we go about redirecting these students? What kind of instruction do they require?

Maslow's Hierarchy of Needs

Maslow's Hierarchy of Needs (Maslow, 1943) is a theory of human motivation, which contends that people are motivated by their individual needs. These needs generally fit into five categories and are prepotent. His five-stage model is diagrammed as a pyramid with baser needs on the bottom. Baser needs, such as physiological demands for food and shelter, must be satisfied before humans are motivated to strive further for higher order needs. Following physiological needs are safety needs such as concerns for health and freedom from external dangers. Emerging after physiological and safety needs are satisfied is a desire for belonging. For the purposes of this research paper, this is the level of need that most of the participants at the start of the study were struggling to meet in a classroom setting. This struggle unsurprisingly presented as disengagement, a poor attitude, and inappropriate social interactions or defiance in some students. As Maslow pointed out in his research, "In our society the thwarting of these needs is the most commonly found core in cases of maladjustment," (Maslow, 1943, p. 381). People able to gratify their needs for belonging will next find they desire esteem marked by self-confidence, respect from others and personal achievement. This level of need is also a central area of focus for the participants in this study. Maslow points out that meeting these needs generates feelings of confidence, capability and usefulness while ignoring these needs creates sentiments of helplessness and inadequacy (Maslow, 1943). The final level of need is self-actualization, which

is a desire for reaching one's potential and finding self-fulfillment. Cognitive needs, the desire to learn and understand, would fit into this category. The first 4 needs are motivated by deficiency meaning that a lack in any of those areas compels people to focus on and act in a way to fill those voids and satisfy those needs. The highest order need, self-actualization, is a growth motivator in that people are motivated by continued self-development and moving beyond what they know to deeper levels of understanding.

It is not uncommon to find that students performing poorly in school are not having their lower order needs met at home and/or at school. According to Maslow's theory, it would then be unreasonable to expect these students to be motivated to learn or strive for cognitive development, which is a component of self-actualization, the highest order need. To intervene on behalf of these students, attention must be first paid to satisfying the lower order needs, especially needs for safety, belongingness and esteem. Educators can help meet the safety needs of their students through classroom management, but belongingness and esteem are more difficult to cultivate.

Cultivating a Sense of Belonging and Esteem

Positive Psychology

Achor (2012) is a researcher and an advocate of positive psychology. While he works primarily with corporations and graduate school programs, his research can be applied to educational practices at all levels. Through his research, Achor found that contrary to common assumption, success does not precede lasting happiness. In fact, it is the other way around. When people are happy or have a positive mindset, they are better able to overcome challenges and

demonstrate greater levels of success in reaching goals despite adversity. What is more, Achor postulates that happiness is not an inherent trait. People are not immovably happy or unhappy based on their personality but can instead choose through practices of habituation to cultivate happiness.

Achor has identified specific activities that can effect a positive change in a person's level of happiness including; "jot down three things they are grateful for, write a positive message to someone in their social support network, meditate at their desk for two minutes, exercise for 10 minutes, [and] take two minutes to describe in a journal the most meaningful experience of the past 24 hours," (Achor, 2012, p. 101). Using both a control and a variable group, Achor had the variable group partake in one of the abovementioned activities every day over a three-week timeframe. Both groups were evaluated several days after the completion of the activities and in every metric the experimental group scored higher in sense of well being than the control group. Even four months later, when both groups were surveyed again, the experimental group significantly outscored the control group in life-satisfaction and optimism. As Achor (2012, p. 101) stated. "Happiness had become habitual." Achor further identified that fostering a strong support network through positive engagement correlated most strongly with positive outcomes. This included both receiving, but also giving support to peers.

In his work with corporate organizations, Achor found two prevalent reasons that impeded happiness in a work setting. The first was that existing cultural norms eroded positive behavior. Often work environments (and classrooms for that matter) focus solely on a "get the job done" mentality and neglect the fostering of a positive psychology. Secondly, managers in organizations felt pressure to meet deadlines and quotas (much as teachers must meet curriculum

requirements and test scores) and felt unable to dedicate time to positive psychology. A priority shift towards long-term thinking is necessary in which, “Management at all levels must understand the benefits of happiness in the workplace often take time,” (Achor, 2015, p. 112). Correcting social scripts that undermine positivity and projecting to your workers (or students) that their happiness matters were the key ways to foster a culture conducive to happiness. Based on Achor’s findings, working to cultivate a positive psychology in students should better equip them to face challenges as they strive to meet their needs for belongingness, esteem and cognitive development.

Growth Mindset

Blackwell, Dweck and Trzesniewski (2007) are pioneers of growth mindset or the belief that intelligence is not an inherent trait people are born with but rather a product of believing in one’s ability to learn through dedication of time and effort. Whereas Achor suggested that a person’s level of happiness could be improved through practice, Blackwell, et al. (2007) observed that a person’s intellectual capacity was also not predetermined but instead flexible depending upon the individual’s adopted mindset. People with a fixed mindset believe they are naturally not good at some things, like mathematics for example. Through their research, Blackwell, et al. (2007) countered this notion and demonstrated that people with a growth mindset believe they can always improve their intelligence through hard-work and persistence.

Blackwell, Dweck, & Trzesniewski (2007) conducted two studies on 7th grade students in a middle school in New York City. The researchers examined two theoretical approaches to intelligence. One approach was incremental theory, the belief that intelligence is flexible and that a student can influence academic success through positive thinking and effort. The other

approach was entity theory, that intelligence is fixed and determined at birth. Depending upon how a student perceives intelligence, either as malleable or as fixed, greatly impacts motivation, participation and persistence in an academic setting. Those that adhere to incremental theory believe they can learn anything eventually if they work hard, practice and dedicate enough time to their efforts. Those that believe in entity theory tend to disengage from academic endeavors when they self-determine the material is beyond what they were born with the skills to understand.

The first study examined the impact of incremental theory on student achievement in a treatment group against a control group of students who believed their mindset was fixed as determined by a questionnaire filled out by the students. The study was longitudinal over 4 different cohorts of students entering 7th grade. The researchers examined student beliefs and achievement outcomes and the causal relationship between the two. The 373 students from four successive 7th grade classes, 198 female and 175 male, were from an NYC secondary public school. Because the sample size was small, the researchers collapsed the cohorts into one group for evaluation. The ethnic breakdown of the group was 55% African American, 27% Asian, 15% Hispanic, 3% East Asian and European and 53% qualified for free lunch. The student scores from the prior academic year averaged in the 75th percentile against a national standard. The study lasted for 5 years with each cohort followed for two years. They were administered scales that were designed to measure their implicit views of intelligence by a questionnaire. A *t*-test charted data on the waves in their beliefs and it was found that the students that believed they could improve their grades through effort showed an upward trajectory in grades. For students

that believed intelligence is determined by birth and fixed, their scores showed a flat or downward movement in their grades over time.

The second study had a population of lower-achieving students compared to the first one. The strategy in place was to make students aware of their thinking. They were directly taught to recognize incremental theory and have a growth mindset. The total population was 99 students, 49 female 50 males from a 7th grade public school in NYC. These students, 52% African American, 45% Latino, 3% White/Asian, showed relatively low academic achievement. They held 6th grade math scores in the 35 percentile nationally. In that group 79% were eligible for free lunch. The experimental group showed a decline in grades until the intervention point when they received explicit instruction on growth mindset. From that point on, the results indicated a positive trend in achievement. The control group who received no treatment showed a consistent downward spiral in grades.

Assumptions

The evolving design of the mathematics intervention course is grounded in several assumptions. It is assumed that all the students in the class want to succeed but are hindered by a self-defeating psychology brought about by circumstances or previous experiences. It is assumed that by reversing the psychology through increasing academic and personal self-confidence students will believe they are capable in mathematics and the students will experience academic improvement. It is assumed that a strong, positive and supportive teacher/student relationship is necessary to improve student self-confidence. It is assumed that these students require boundaries and structure, but also must have a say in their classroom environment. They have felt shut out of

traditional math classes. To feel safe and buy-in to the intervention model, they must be able to express and advocate for their needs from a teacher and take ownership of their education by being part of its design. At the onset, grades are not the focus, but rather small victories. Small victories build confidence and the grades will follow. Even though these students may have a history of poor classroom behavior, not studying or not turning in assignments, they must be trusted to make choices and decisions for themselves. For lasting change, they cannot be motivated by fear of punishment for poor performance from parents or teachers, but instead they must make good decisions because they know they want what is best for themselves and they have the self-confidence to know they deserve the best.

Background and Need

Students who fail mathematics classes in middle school face a higher risk of failing mathematics in high school, missing out on educational and extra-curricular opportunities dependent upon academic performance, and in the worst case are more likely to drop out of high school than students who pass their mathematics classes. The 2007 longitudinal study by Balfanz, Herzog and Mac Ivor followed 13,000 6th grade students from high-poverty, urban Philadelphia middle schools between 1996 through 2004 in attempts to identify potential predictive indicators of high-school student drop-outs. Failure in 6th grade mathematics, as determined through spring semester final course grades, was one of four predictive indicators analyzed. The study found that “fourteen percent of the sixth-graders [followed] failed mathematics, and only 19% of these students ultimately graduated from high-school. Failing math had a 21% yield, identifying 1,459 of the 6,888 future nongraduates,” (Balfanz et al, 2007, p. 228). The study also speculated that

unsatisfactory student behavior, observed through behavior marks and suspensions, would be a predictive indicator of nongraduation. While the study did not necessarily focus on the correlation between predictive factors, the researchers did find that, “77% of the students failing math... also had unsatisfactory behavior,” (Balfanz et al, 2007, p. 228). What is more, “of the sixth graders who failed math *and* had poor behavior, 87% failed to graduate,” (Balfanz et al, 2007, p. 228).

Summary

Students struggling in 8th grade mathematics courses are often demoralized by repeated experiences of classroom failure. They need remediation on missed academic content but they tend to lack the motivation to engage with the work because they do not believe they can succeed. They feel they do not belong with other, “smarter,” more successful students in math class and their self-esteem suffers. Coupling the application of positive psychology (Achor, 2015) and growth mindset (Blackwell, et al., 2007) in a mathematics intervention curriculum could help to meet student needs for belongingness and esteem (Maslow, 1943). As these needs are satisfied students can move up in Maslow’s hierarchy (Maslow, 1943) and more effectively pursue cognitive development and self-actualization through academic achievement with greater likelihood of success.

Chapter 2 Review of the Literature

Introduction

This section is an examination of the peer-reviewed research literature on enhancing mathematics instruction for struggling learners. Information was gathered from academic library searches using online resources. Research information is organized in the following categories: Historical Context and a Review of the Academic Research as subdivided by substantiating a Need for Safety, Belonging and Esteem and Strategies for Meeting Student Needs and Improving Academic Achievement.

Historical Context

Enabling Academic Success in Mathematics

Student success in mathematics has been a subject of investigation for a number of years. Several studies detailed in this review of literature address research findings related to student emotional well being and acquisition of academic knowledge. Student psychology, relationships with teachers and peers, nurturing classroom environments and other components have been analyzed in various contexts as indicators of and/or contributors to mathematical academic success or failure. My study will expand the literature by compiling the findings and re-framing them within Maslow's Needs for safety, belonging and esteem (Maslow, 1943) to create a research-based, in-school day mathematics intervention curriculum. The main objective of the curriculum is to enhance student well being and academic improvement through the understanding that

positive psychology (Achor, 2012) and intellectual mindset (Blackwell, et al., 2007) are malleable and can be improved through belief and effort.

Review of Academic Research

Need for Safety, Belonging and Esteem

Researchers Berger, Alcalay, Torretti, and Milicic (2011) explored the association between factors of socio-emotional well being and academic achievement, contending that focusing solely on academics in school is not enough. The two factors must work in tandem for optimal student success. The researchers were inspired by an emerging framework called socio-emotional learning (SEL). Citing a meta-analysis of over 300 studies on SEL programs conducted by The Collaborative for Academic, Social and Emotional Learning (Payton et al., 2008, as cited in Berger, et al., 2011), the researchers noted SEL programs not only resulted in significantly improved academic outcomes but also “improved social and emotional skills in students, modified attitudes about the self and others, fostered a sense of school belonging, and were associated with an increase in pro-social behaviors and a decrease in internalizing and externalizing problems” (Berger et al., 2011, p. 345). The researchers also noted the importance of not just focusing on individual socio-emotional well being, but also in creating a positive socio-emotional environment in which learning is to take place. Supportive and nurturing student to teacher and student to peer relationships are critical.

This study explored the link between socio-emotional well being on both an individual level and an environmental level and the impact of those on academic achievement. Cross-sectional data was taken from a larger, longitudinal study. Participants included 654 3rd and 4th

grade students from five elementary schools in Santiago, Chile. There was roughly an even distribution of girls and boys. Students self-evaluated through a survey various aspects of their socio-emotional well being including their self-esteem, perceived classroom environment and social networks. Additionally, teachers evaluated student self-esteem and academic reports were collected. Results indicated that girls scored higher than boys on their personal socio-emotional well being and their view of the classroom social environment. Girls also received higher grades and were rated higher by their teachers for self-esteem. While there were some differences to be noted among the genders, significant correlations were found in all students between academic achievement and socio-emotional well being. One finding was that teacher estimation of student self-esteem was not as important of a factor when the classroom environment and social climate were strong. Not surprisingly, however, highest academic success was reached when students felt safe and supported both with teachers and peers. This study was limited in that it could not draw causal relationships.

Agirdag, Van Houtte, and Van Avermaet (2012) used a multilevel analysis to study 2,845 Belgian students aged 10 to 12 across 68 schools from urban areas for one academic year to examine the effects of school segregation on student self-esteem. While this analysis explored various effects on self-esteem for native and immigrant populations of students, including social comparison, one overriding result from the study was that both groups of students experienced increased self-esteem from positive and supportive teacher relationships. The researchers defined *teacher support* as “the extent to which students believe teachers value and establish personal relationships with them” (Ryan & Patrick, 2001, p. 440, as cited in Agirdag, Van Houtte, Van Avermaet, 2012). The researchers also speculated that beyond the individual level of the teacher-

pupil relationship, the *teacher support culture* as defined by “the average level of perceived teacher support that is shared by a peer group within a school” (Agirdag, et al., 2012, p. 1141) affects student self-esteem.

The study used hierarchical linear modeling of cluster samples of students to collect data. To assess global self-esteem at the individual pupil level, the Rosenberg Self-Concept Scale from Rosenberg & Simmons (1972) (as cited in Agirdag, Van Houtte, Van Avermaet, 2012) was used. The researchers created a teacher support scale inspired by Brutsaert (2001) and Goodenow (1993) (as cited in Agirdag, Van Houtte, Van Avermaet, 2012). The study found that any negative impacts on immigrant pupil self-esteem derived from desegregated student populations were suppressed by perceived positive teacher-student relationships. While native student self-esteem either increased or did not suffer from heterogeneous ethnic school composition, self-esteem did increase for these students further when they experienced positive and supportive relationships with their teachers. Overall, the teacher-student relationship was credited with having a positive impact on increasing student self-esteem.

Schwinger, Lemmer, Wirthwein, and Steinmayr (2014) completed a meta-analysis of 36 studies that examined the impact of self-handicapping conditions on student academic achievement. Results indicated that student academic success does not merely involve teaching academic content. Teachers need to also impart strategies to reduce self-sabotaging behavior brought about by a lack of self-esteem.

Self-handicapping has been defined as protecting perceived competence and self-esteem through the creation of obstacles to achievement (Berglas & Jones, 1978, as cited in Schwinger,

Lemmer, Wirthwein and Steinmayr 2014.) such as procrastination, lack of effort or feigning illness or test anxiety (Urdan & Midgley, 2001, as cited in Schwinger, Lemmer, Wirthwein and Steinmayr 2014.). The intention of the meta-analysis was to provide an empirical link between self-handicapping behaviors and academic achievement. The study found evidence that the correlation between self-handicapping and academic achievement was negative for students ranging in ages from elementary through middle school.

In a longitudinal, mixed-methods study, Booth (2001) examined the impact of middle school on student variables such as behavior, academic proficiency and self-esteem. 103 K-8 and middle school students from Cleveland, Ohio were followed over 3 years with data compiled through surveys and other measures of gathering quantitative information. Interviews were conducted as informal conversations with 22 of the students. It was found that students appreciated the opportunity to share their opinions. The topics of discussion revealed in the interviews informed the research. In regard to feeling esteemed, 6th graders perceived new found respect connected to the nature of the middle school environment, such as being trusted to walk alone to classes, compared to elementary school. However, by 8th grade, students perceived school rules were overly strict and associated punishments were excessive. Common student complaints about rules were related to tardiness and dress code. They felt teachers did not understand that occasional incidents of tardiness were unavoidable. They viewed subsequent punishments for lateness as unreasonable. Similarly, dress code standards represented diminished freedom of choice and expression. In both cases, students felt disrespected in that teachers did not trust students with their new middle school freedoms and responsibilities. Equally frustrating for students was the belief that teachers did not respect their opinions. When students did speak

up for themselves they felt teachers did not hear or value their opinions. Booth noted the contradictions in student statements such as enjoying more freedom in middle school walking to classes but then resenting teachers for imposing consequences for tardiness. In the literature review, Booth (2011) referenced the 2007 work of Alberts, Elkind, and Ginsberg noting the rise of adolescent egocentrism as a possible explanation for the inconsistencies and hypocrisy in student thinking. To counter adolescent egocentrism, Booth speculates that engaging students in the process of creating classroom norms and policies encourages self-discipline and potentially alleviates student misattribution of adult actions towards them as signs of disrespect.

Booth's study supports the theoretical rationale of the present study that student self-esteem and self-worth are important factors that may also influence potential for academic achievement. While the Booth study is important in building an understanding of student perceptions of their own self-worth possibly related to academic success, the limitations of this study include factors of restricted geography and a small sample size. Overall, the study recognized how students need to feel their opinions are valued. Students are empowered when they make their own choices and take ownership for their own learning.

Strategies for Meeting Student Needs and Improving Academic Achievement

Much work has been done on finding strategies to meet student needs for emotional well being and academic achievement. A major commonality identified in the research for inspiring student motivation and self-awareness was the utilization of goal setting approaches. Another commonality found was for teachers to establish a strong caregiver role and in some cases model

mentor relationships with their students to cultivate nurturing environments and meet individual student needs.

Rusk and Rothbaum (2010) combined Attachment Theory and Goal Orientation Theory strategies to combat stress through constructive rather than defensive responses. Attachment Theory postulates that in times of stress, people need comfort of a caregiver. Goal Orientation Theory focuses on the psychological motivators for achievement. Both theories describe two different strategies to deal with stress. One strategy is to make a goal dependent on improving perception of self-worth through reassurance of a caregiver or outcomes and the other is to make a reaching a goal dependent on exploring the environment or the process of learning. Secure viewpoints from each perspective include feeling supported in times of need for Attachment Theory and knowing hard work and persistence result in increased skill for Goal Orientation Theory. In the absence of secure viewpoints, people develop defensive strategies to protect their self-worth as was noted by Schwinger, et al. (2014) in their research on self-handicapping. Emphasizing that failure is a pathway to learning and not an indicator of self-worth could limit student reliance on self-handicapping, which falls in-line with the Incremental Theory work done by Blackwell, Dweck and Trzesniewski (2007). In both goals, an openness to new information benefits learning and adapting to stressful circumstances. Having cognitive openness and a learning oriented approach versus being motivated by protecting self-worth benefits people in many aspects of life including school and work achievement, general adaptability to stressful circumstances and quality of personal connections with other people. People with insecure views and self-validation goals are less likely to be persistent in problem solving. These people are also

reluctant to ask for help in times of emotional need in the case of Attachment Theory or with intervention in the case of Goal Oriented Theory.

In order to encourage secure views and mastery learning goals, both Attachment Theory and Goal Oriented Theory have tested strategies for remediation that can be used in tandem. Providing a caring support giver who is responsive and sensitive helps with enforcing a secure view. Instilling a belief that success is based on hard work and not a fixed level of ability helps to encourage goals based on learning and not self-worth. Both approaches aim to reprogram internalized belief systems and require time and repeated priming with positive visualization and positive outcomes.

As cited by Hock, et al. (2001, p. 198), The American Psychological Association underscored the vital role that motivation plays on learning in its 1997 document entitled *Learner-Centered Psychological Principles: A Framework for School Redesign and Reform* by highlighting two areas of particular importance in the learning process that have emerged through research on motivation. “First, motivation to learn is influenced by the individual’s emotional stress, beliefs, interests, goals, and habits of thinking...Second, acquisition of complex knowledge and skills requires extended learner effort and guided practice.” Motivation is increased when students see a definite link between working hard and practical, purposeful results. The researchers developed a program called the Possible Selves Program to provide a mechanism by which teachers could boost student motivation to engage in learning. Some interventions suggested in the research included using positive reinforcement, establishing high expectations, acknowledging student improvement, ensuring instruction is interesting, nurturing self-advocacy and student hopefulness, setting specific goals, and enhancing success through

teaching cognitive and metacognitive learning strategies. (Hock, et al., 2001). “Based upon the body of knowledge about goal theory, educators need to recognize that students are motivated by personal goals and that having hope involves three critical elements. First, students must identify individual goals that are valued and attractive to them. Second, they must believe that goals are attainable with reasonable effort. Finally, they must develop specific plans that lead to attainment of the goals,” (Levine, 2002; Seifert, 1995, p. 201, as cited by Hock, et al., 2001).

Adhering to a successful trend towards positive psychological interventions for adults through the constructs of gratitude and best possible self, Owens and Patterson (2013) sought to identify ways to modify these interventions to suit the needs of elementary aged children. The researchers cited Emmons & McCullough (2003) in defining gratitude “as an emotion that arises from experiencing a positive outcome,” (Owens & Patterson, 2013, p.404). Having an ability to express gratitude allows people to feel greater satisfaction with life circumstances, remain positive in the face of adverse conditions and better avoid negative mindsets and emotions. Gratitude interventions most often include keeping journals documenting things for which people are grateful or writing a letter of gratitude to someone in particular. When defining possible selves, Owens and Patterson cite the work of Markus & Nurius (1986), “possible selves are views of the self that are not presently true, but might be so in the future; individuals may have a number of possible selves, including those that are desired or hoped for and those that are undesired or feared,” (Owens & Patterson, 2013, p.406). As with gratitude, possible selves interventions are most commonly two-fold. The first strategy is for an individual to focus on possible outcomes, both positive and negative, and then strategize how to achieve the positive. The second is for an individual to only focus on best possible selves.

Researchers Bell and Pape (2014) focused on identifying mathematical instructional practices that include imparting mathematical content knowledge, teaching self-regulated learning (SRL), and providing socially interactive classroom environments that are conducive to developing student skills. The researchers emphasize the need for teachers to scaffold student learning for acquiring necessary regulatory skills. Bell and Pape cite Zimmerman (1994, 1998, 2000) in recognizing forethought, performance and self-reflection as the phases of self-regulation. “Self-regulated learners have the knowledge, skills, and dispositions to accomplish academic goals they set for themselves,” (Bell & Pape, 2014, p. 24). Bell and Pape (2014) also cite Schunk and Zimmerman (1997) in identifying four levels through which students gain SRL competence: observational, imitative, self-controlled and self-regulated. SRL ultimately is a belief that students control their own academic outcomes through their choices of planning, behavior, reflection and adjustment of strategy if necessary. One recommended instructional approach in the research was that students graph the results of their behaviors so that students could concretely link success to appropriate strategy implementation and vice versa. Overall, Bell and Pape (2014) cite Cleary and Zimmerman (2004) in suggesting that instruction of SRL includes modeling SRL actions, giving feedback to students on their behaviors, providing strategy suggestions for students and practice.

Through a yearlong action research study, 7th grade students in an urban setting were given strategies to develop skills in solving problems and SRL. Classes were recorded and notes were taken on observations of recordings. Weekly reflections of observations informed adjustments to instructional strategies. In each lesson plan, SRL processes were as much part of the learning objective as the academic content. Researchers had students complete a “Strategy

Observation Tool” which required students to observe their academic behaviors daily, reflect on the outcomes achieved through quiz results and modify behaviors as necessary to achieve optimal academic results. Additionally, class discussions were held often so that students could share out study strategies and learn new approaches from each other. This also forced students to be more explicit in their strategies during discussions than they were on their “Strategy Observation Tools.” Scaffolded math talks, which valued thinking processes over correct answers, were also used in the development of SRL. “During the first two months of using the Strategy Observation Tool, some students wrote about taking notes, paying attention, asking questions, doing homework, showing patterns in their work, and reviewing materials. While these behaviors were not described as explicitly as we would have liked, these students were providing evidence of their thinking about study behaviors,” (Bell & Pape, 2014, p. 28).

In a study by Marques, Lopez, and Ribeiro (2009), thirty-one middle school students took part in a hope-based intervention to examine whether such an intervention could positively impact aspects of their well-being including “hope, life-satisfaction, self-worth, mental health and academic achievement,” (Marques, et al., 2009, p. 139). A closely matched control group of 31 additional students who received no hope-based intervention was also studied. All students were Caucasian ranging in age from 10 to 12. Seventy-one percent were female. The intervention was after school for an hour once a week and lasted five weeks. Each intervention class had between 8 and 12 students. Students were pre-assessed and post-assessed through questionnaires and scaled surveys. Academic achievement reports from the schools were collected for data. There were two follow-up assessments, one after 6 months and then again 18 months later. The researchers cited Snyder’s Hope Theory, (1997) (as cited by Marques, et al., 2009) which

defined having hope in terms of the ability to develop goals, to strategize means for meeting goals, and to employ motivation and persistence in working towards goals.

The five week intervention was purposely created to leverage the dynamics of a group environment to teach 1) goal creation, 2) how to invent a variety of strategies for reaching goals, 3) development of motivation and fortitude for achieving goals, and 4) how to perceive obstacles as challenges to be undertaken and not impossible feats. The sequencing of the lessons was to introduce students to Snyder's Hope Theory, (1997) (as cited by Marques, et al., 2009) learn how to identify and set goals, enhance goals to be more specific and workable, employ a positive and hopeful vocabulary around goals, and finally review and plan for future applications of their learning. While the results indicated an upward shift in students' hopefulness, self-worth, and psychological well being, the changes were not significant compared to the control group. As the sample of students was small, relatively heterogeneous, and comprised of students already largely successful academically, researchers deemed it would be worthwhile to test the implementation of hope theory in others. For example, a comparison group of struggling students who suffer from a pessimistic view at the onset of a Hope Theory intervention program to see if that might yield different results. Also, the timeframe of five weeks may have been too short to effect desired changes.

The study by Alcazar-Bejerano, Kyunghye, Tae, and Mi Jung (2015) followed 23 elementary students, 12 boys and 11 girls, in grades 4 to 6 from low socio-economic standing through an online mentoring program, which lasted 20 weeks. The intent was to improve student self-esteem through access to high quality, trained mentors. This study was inspired by the

findings of Rhodes (2005) (as cited by Alcazar-Bejerano, et al., 2015) who believed mentoring reaches struggling students on three levels: 1) promoting positive emotional wellness and social relationships, 2) instructing students in academic and cognitive skills, and 3) providing an advocate and role model for students through which a positive student identity is developed.

Mentoring is defined by Freedman (1999) (as cited by Alcazar-Bejerano, et al., 2015) as a one-on-one relationship between an older, more experienced individual and an unrelated younger individual in need of support with character and cognitive development. Mentors were trained prior to the beginning of the program. The 20 sessions were broken into “an orientation phase, rapport building between the mentor and mentee, primary interaction, problem solving, and a termination phase” (Alcazar-Beherano et al, 2015, p. 1200). Self-esteem of the participants was measured with the Rosenberg’s Self-Esteem Scale (1965) (as cited by Alcazar-Bejerano, et al., 2015) and the Coopersmith’s Self-Esteem Inventory (1968) (as cited by Alcazar-Bejerano, et al., 2015) three times through the study; at the onset, at 10 weeks and at the end of the program.

The results of the study found that over the 20 weeks there was a positive effect on student family esteem and social esteem. The students developed a caring, respectful and supportive interpersonal relationship with their mentors, which carried over into their interactions with family and peers. Contrary to researcher expectations, however, little correlation was found between participation in the mentor program and an increase in student general self-esteem. The researchers speculated that the short duration of the program and lack of frequency and consistency in mentor-student contact prohibited a strong enough relationship between mentor and mentee from developing. Based on their findings both from other

researchers and their own results, they advocated for longer and more consistent time with mentees and also a stronger relationship between mentors, teachers and parents. This finding supports the intention of the current study that allowing teachers within an intervention setting to take on more of a mentor relationship with a small group of struggling students could potentially have the greatest impact on both increasing self-esteem and cognitive development.

Mac Iver, Young, and Washburn (2001) presented data from their own research and a collective body of findings from other studies about which instructional practices might be most likely to positively affect motivation and attitude among middle grade students. While the researchers focused primarily on the subject of science, they sought to identify practices that could work across all disciplines. Researchers found that deemphasizing ability grouping and competitive classroom situations could lessen the degree to which some students suffered motivationally. Focusing on mastery of learning rather than performance and recognizing students based on individual growth and not comparative achievement led to greater self-efficacy for learning (Roeser, Midgley & Urdan, 1996, as cited by Mac Iver, Young, Washburn, 2001). Caring and meaningful relationships between teachers and students also helped positively affect student motivational beliefs.

A study by Middleton (2013) aimed to make a correlation between motivation and academic achievement. The researcher selected a few significant motivational factors as variables for a structural equations model to analyze the interrelationship, both direct and indirect, between the factors and mathematic academic success. One motivational factor studied was the level of student interest in pursuing mathematics. Interest was viewed as how much a student

identified and directed attention to an individual, object or activity. Interest can be situational which is an important consideration in classroom lesson design. Interest can also be personal. If instruction is designed in a stable and predictable format, over time students who succeed within this format tend to think they are “good at math” while students who struggle assume they are “bad at math” when it may be that not enough has been done to consider peaking the interests of the struggling learners.

Summary

The research has revealed several mechanisms teachers can use to help struggling mathematics students improve their emotional well being and academic achievement. Teachers must work to create classrooms that provide safe and nurturing social and educational environments. Engaging students in the process of creating the structure of their learning environment empowers students and can help foster an ownership of learning. To help enhance a sense of belonging and self-esteem in students, teachers must also establish supportive, caring relationships with their students. Individualized, mentor-like relationships with teachers can help students feel more secure, improve self-esteem and also can reduce aberrant conduct. Strategies, such as goal setting, self-reflection, and metacognition can be taught to combat self-sabotaging student behavior and habituate positive attitudes, self-confidence and a belief that academic success is based on hard work and persistence.

This study implements many of the findings of the research to create a structured mathematics intervention curriculum to meet student needs. The results of this study are evaluated based on student self-concept, academic success and school behavior.

Chapter 3 Method

Research Approach

This participatory action research study (PAR) (Creswell, 2012) utilized a mixed methods approach involving both qualitative and quantitative data. I was the participatory teacher of record, hereafter referred to as researcher, for an 8th grade mathematics intervention class in an affluent suburban area north of San Francisco. The action in the study was developing an intervention curriculum, teaching and remediating students to prepare them to advance to Algebra I in 9th grade. This process involved getting to know the students individually to identify their specific needs, both academic and affective, and how best to motivate each to learn. The design of the course was flexible throughout the year and dependent upon my reflective consideration of both student engagement and analyzed data I collected regarding student academic progress and student self-esteem. My intent was to not only have students acquire content knowledge but also to improve their confidence and self-efficacy in the learning environment. It was a small class of 11 students allowing time for one-on-one work between the researcher and students. At the end of the first semester and start of the second semester, six additional students were added to the class. While information relevant to the study was gathered from all participants, analysis of the quantitative data only included the original 11 students who participated in the class for the entire year. Relevant qualitative data was incorporated as appropriate from all of the 17 students.

Ethical Standards

This paper adheres to the ethical standards for protection of human subjects of the American Psychological Association (2010). This research involved evaluating teaching practices as part of the researcher's responsibilities as instructor of record for 8th grade students. Additionally, a proposal was developed and reviewed by my faculty advisor and approved. This study involved evaluating classroom practices, teacher strategies and student learning for the purpose of improving one's practice.

Sample and Site

At the start of this research process the class was comprised of 11 students, 6 boys and 5 girls aged between 13 and 14. Although, 6 additional students were added to the class at the semester, they were not included in the quantitative data as they were not present for the entire year of the course. Some qualitative data on the additional 6 students was included in this study as applicable. Five of the sampled eleven students were Hispanic, five Caucasian and one was African American. The home language for four of the students was Spanish and of those four students, two students were English Learners who were redesignated after 2013. Six of the eleven students were categorized as socio-economically disadvantaged. The highest level of education achieved by parents of the students was no high school for one, high school for three, some college for five, college graduate for two and graduate school for one of the students. Since 6th grade, none of the students received a grade higher than a C+ in their traditional math classes and six of the eleven received an F in mathematics in 6th grade, 7th grade or both. Five of the

students received behavioral referrals in the 7th grade and three of the students had received a school suspension at some point during middle school.

The middle school was a 6th grade through 8th grade school in a middle- to high-income suburban setting serving 880 students. There were 36 teachers and the student to teacher ratio was approximately 25:1. The enrollment by student group was 60% Caucasian, 25.6% Hispanic, 6.4% two or more races, 4.6% Asian, 1.6% Black or African American, 1% Filipino, 0.6% American Indian or Native Alaskan and 0.3% Native Hawaiian or Pacific Islander. 25.8% of students were socioeconomically disadvantaged and 8.5% of students were English Learners (School Accountability Report Card, 2016).

Access and Permissions

I was the teacher of record in this public school classroom. I completed a teacher credential program with a license to teach in California, single subject in mathematics. During the time of this study, I was a second year teacher having taught at the same site for both years and was set to clear my credential through the BTSA program the following June. My principal was informed that I was conducting a study that was part of my normal teaching practice and part of my responsibility as a teacher.

Data Gathering Procedures

As the daily teacher of record, I took observational notes throughout the year on student well being and academic improvement as they related to curriculum content and strategies. I also conducted informal interviews to gather data. Students completed various forms providing

written feedback. At the beginning of the year students filled out a “Mathography” (see Appendix A, Mathography), which entailed sharing personal information such as student access to the Internet, languages spoken, interests outside of school, perceptions of school and their place in it, views on math and future goals. Students submitted Weekly Goal Sheets (see Appendix B, Weekly Goal Sheet) every Monday throughout the year detailing their overall area of focus (Academic, Behavioral or Personal), one short-term and one long-term goal. Students occasionally took online surveys through Google Forms including a Mid-year Reflection Survey (see Appendix C, Mid-year Reflection Survey) and a Subjective Happiness Scale (Lyubomirsky, et al., 1999) (see Appendix D, Happiness Survey). Academic progress was quantified through analysis of Ascend data as well as test scores and homework completion in their traditional math classes.

Data Analysis Approach

A variety of teaching strategies were implemented in the intervention class. The strategies included co-creating class norms and grading, fostering teacher/student one-on-one time, goal setting, establishing a reward system and journaling. The effectiveness of these strategies was recorded through researcher observation and conversations with participant students.

A researcher created Mathography (see Appendix A, Mathography) and a Subjective Happiness Scale survey (Lyubomirsky, S., & Lepper, H., 1999) (see Appendix D, Subjective Happiness Scale) were administered to participants to collect information on participant well being at the start of the year and at the start of the second semester. Mathography written responses were recorded and a comparative score from 1-7 was given to each student based on

the Happiness Survey results. Quantitative data on student behavior was recorded in a table listing the number of referrals received by students and the number of days absent from school in the current year. Quantitative data was also gathered in different tables detailing academic improvement through student grades in traditional math classes, total student time spent on the Ascend online intervention program and student grade level progress in Ascend.

Chapter 4 Findings

The primary research question of this study was: What would be the best instructional model to meet the highly individualized needs of struggling students in an in-day mathematics intervention class? Accepting Maslow's Hierarchy (Maslow, 1943), it is assumed that student needs fall along an ordered continuum including needs for safety, belonging, esteem and cognitive development. Research has shown that employing instructional techniques, which develop a positive psychology (Achor, 2012) and an academic growth mindset (Blackwell, et al., 2007) helps to satisfy these needs. The results of this study show through narrative summaries and data analysis the effectiveness with which specific teaching mechanisms meet student needs as exemplified by student well being, academic achievement and school behavior.

Description of Individuals

There were eleven 8th grade students at the start of the year in the mathematics intervention class. While six more students were added to the class at the semester, only the original eleven were included in the data analysis since they had participated in the research project from the start. All of the students were placed in the intervention class by determination of school administration based on prior traditional mathematics course grades, teacher recommendation and other standardized assessment measures. The intervention class was an elective class and all students were concurrently enrolled in a traditional grade level mathematics class during the school day.

Teaching Strategies to Enhance Safety, Belonging, Esteem and Cognitive Development*Co-created Class Rules and Grading*

As a class we decided on the appropriate grading structure for the course. Student needs for belonging and esteem were addressed in this way because students knew they were a valued part of the learning process and their input mattered. In the first semester, we settled on completing at least 2 hours per week of their online math program, Ascend, which allowed for some flexibility in case they had late assignments to complete or wanted to study for tests. As spring came, the students started to lose their motivation. They were burning out on Ascend and were frustrated by slow progress. It became increasingly difficult to keep them on task during class time as they procrastinated knowing they only had to have the hours completed by the end of the week. Also, in their boredom, they began to abuse some privileges we agreed upon as a class like the use of personal devices for music. Subsequently, personal device privileges were taken away.

Interestingly, the students were not upset by the revoked privileges because they understood it was a consequence of their behavior. I believe this was a benefit of having them co-create class rules and consequences. We discussed as a class changing the grading system to a daily Ascend requirement of 20 minutes as opposed to a weekly 2 hour requirement to motivate students to stay on task more in each class. The changes were accepted by the students and appeared to reinvigorate many, making objectives more incrementally tangible and increasing student accountability. Two weeks after the changes, two more students passed grade levels in Ascend and all but two students of the entire class met the 20 minute per day requirement.

One-on-One Time (Weekly Goal Review, Ascend Help)

At the beginning of the year, I established a Weekly Goal Sheet (see Appendix B, Weekly Goal Sheet) as a recurring Monday assignment. Students identified both short-term and the long-term goals, the strategies required to meet the goals and what completing the goals would look like. On Tuesdays, after reviewing each submission, I would sit one-on-one with students to discuss their goals and provide feedback. I found that beyond helping them establish goals, this was a valuable opportunity for me to bond with the students, learn about them, show them I care and earn their respect. I also was most effectively able to guide them in self-reflection, strategies for accomplishing goals, and directed metacognition of an academic growth mindset (Blackwell, et al., 2007).

When we met to discuss Weekly Goal Sheets, I also reviewed with students their Ascend statistics from the prior week: how much time they spent on the program and how many objectives they had completed. We discussed areas of content that were difficult for them. I had noticed at the beginning of the year that many of the students in the class had a tendency to initially overestimate their comprehension of content. They would shrug off offers for help insisting they knew what they were doing. As the year progressed and the teacher/student relationships grew stronger, students became much more open to asking for teacher assistance. I believe this was a development in both self-esteem and academic growth mindset (Blackwell, et al., 2007). Students were no longer embarrassed by or hiding what they didn't know. They trusted they would be assisted without judgment and with help and practice they could succeed. When Ascend progress was slow and student persistence waivered, the most effective way to re-motivate them was to spend one-on-one time with them teaching them the concepts.

Reward System

The students in this class had experienced mostly low grades in math even when they tried everything they knew how to do. Determining success or failure in terms of their traditional 8th grade math class grade could make them feel hopeless and set them up for defeat, especially when grades did not improve quickly or at all. Remediation was a slow process especially when eight of the eleven students in the sample began the intervention course with deficits of learning from fourth grade math standards or below. Other goals and smaller victories needed to be celebrated to provide students with the motivation and momentum they needed for academic improvement. Instead of establishing goals for earning specific letter grades, student goal creation took on an academic growth mindset (Blackwell, et al., 200) where hard work and persistence were the objectives and the grades would naturally follow.

The Ascend program was broken into grade levels. Within each level were units, which were subdivided by objectives. Passing levels were major accomplishments that could require passing dozens of objectives and units first. The Ascend program awarded “flags” for each objective, but we decided as a class to also reward each objective or flag achieved with a Jolly Rancher candy. Having the students co-establish the reward system helped with buy-in from the students. Often there were several objectives achieved by different students throughout a given class period. Students would shout out happily, “I got a flag!” They were prideful of their achievements and enjoyed announcing it to the entire class. It had become a shared experience for all which lead to a sense of community and celebration for each other. Another interesting side note about the candy was that some of the students had actually taken it upon themselves to donate bags of Jolly Ranchers to the class when they saw we were running low without me

having asked anyone to do so. I found it demonstrated how much they enjoyed this reward system and it also showed that they were thinking collectively of the entire class, of me as their teacher, and how we could support each other.

Another reward bestowed in class was a place on the recognition wall. When students passed an entire grade level in Ascend, I drew the students' names in a personalized style of their choosing and hung the picture up on the wall to mark their accomplishment. I did not expect 8th graders to be too impressed by this and in fact the first name I put up was not really meant as a reward so much as a demonstration of my pride in the student. However, that first student loved it and was visibly proud to have their name up. The other students excitedly remarked they wanted their names up on the wall as well. They started brainstorming what images they would want me to draw for them. In fact, at one point when I was behind on completing their pictures, the students awaiting their drawings would ask me impatiently when I was going to finish. By student suggestion, we began to add drawings of stars to their names for each additional level they passed because students wanted something to visibly show their additional accomplishments in a public way. Another interesting and unintended benefit of the recognition wall was that students celebrated and congratulated each other when they made it onto the wall. The students were always interested to see what design their classmates got and they congratulated them. This reward had helped to build collective pride and community.

In addition to a picture on the recognition wall, students also earned a pizza when they passed a grade level in Ascend. This was a reward we all decided on jointly at the same time that we created the Jolly Rancher reward. It was a huge accomplishment for students to pass an entire Ascend grade level so we thought they deserved a pizza party to share with the whole class to

collectively mark the occasion. Students usually chose to wait until three students had passed levels so there would be enough food for everyone in the class to have a full lunch. In addition to building a sense of belonging and community, our pizza parties were an opportunity to model positivity and etiquette. The students rearranged the desks into a large table and we all ate together family style to celebrate the accomplishments of their classmates. In fact, we called it “family lunch.” Many of the students in the class had big, boisterous personalities and a tendency to talk loudly over one another, while others were terribly shy and quiet. Through the family style lunch, we practiced listening to one another, communicating respectfully in a group setting and appreciating each other for our distinct personalities.

Journaling

Three of my female students had severe self-esteem and belongingness issues that often interfered with their learning. For these students, I provided individual journals. Based on the findings of Achor (2012), I asked them to write 2 things they liked about themselves and 1 thing they were proud of when they were having off or down days as a means of habituating a more positive psychology. They could write in their journals whenever they wanted, but I did require them to write when I saw the students were going through a tough time and needed to boost their self-esteem, gratitude and/or self-control over their reactions to external circumstances. If the students were really low, they usually initially resisted writing, but I made it a graded requirement for the day. I was very happy with the effectiveness of journaling to help students improve or regain a positive psychology. Also, the students and I often revisited their writings, reflecting and recounting how it felt to think about all of their strengths and reasons to be proud of themselves.

Emotional Well Being Data

Mathography

I created a Mathography (see Appendix A, Mathography) for students to complete the first day of school. Below are responses to three of the 17 questions on the Mathography that related to student perceptions of themselves, their mathematic ability and their long-term goals. When students were asked how they believed teachers viewed them, all but one of the eleven students described themselves with negative characteristics. When students were asked how they felt about math 6 of the 11 showed a fixed mindset and said they were not good at math. The other 5 all mentioned that math was difficult to understand. When asked about where they saw themselves in 10 years, 6 mentioned either in college or a specific job occupation. Three of the students did not have goals or a vision of something positive for themselves. Some information was blocked out to protect student privacy.

Mathography Responses

Students	If you talked to your teachers last year, what would they say about you? What kind of student are you?	How do you feel about math? Rate yourself from 1 to 5 (1 = Hate It and 5 = Love it)	Where do you see yourself in 10 years?
1	They would ask me how I'm doing and if I stopped talking.	3 I gave myself this number because I'm not great but I do get stuff about math	I see myself as a successful athlete.
2	A kind of student that doesn't really like getting called on; not showing any participation. I'm willing to change that.	3 Well I'm not really good at math. I struggle with some parts of math	I see myself being a [REDACTED] (occupation provided)
3	I like to talk.	1 Because there's nothing to do	At home.

4	I'm a good student but get off task easily.	1 I gave math a 1 because it's hard to understand.	Being a [REDACTED] (occupation provided)
5	I am a student that is 50/50 good and sometimes a bad student. P.S. Don't talk to Ms. [REDACTED]	3 Sometimes fun and sometimes not	I want to go to [REDACTED] or [REDACTED] University.
6	Quiet person	1 Because I'm not good	A good student
7	Slack off, not paying attention	1 Math is not my thing. I really don't like it.	I honestly don't know yet.
8	They would say I'm loud, annoying, a little out of hand, and lazy, and don't listen.	1 Math is horrible!	Being a great parent.
9	Nice, good kid.	2 Because it's hard and I only know some things.	Out of college and have a job.
10	They would say I was very troublesome, loud, annoying, lazy, allergic to homework, mentally/physically and emotionally unstable. I am the kind of student that pretends they are happy.	1 I don't like it, but I think it's really important in life. I'm not really good at math.	Nowhere...
11	I don't talk a lot.	3 In 6 th grade I was a good student and tests were B, B+, C+, but in 7 th grade I got an F but I give it a 3. I like math, but I'm not good.	In the university.

Happiness Survey

At the start of the second semester, I had students complete a Subjective Happiness Scale (Lyubomirsky & Lepper, H.,1999) (see Appendix D, Subjective Happiness Scale) in order to take a measurement of their positive psychology at the mid-point of the year. Average happiness scores for this scale range from about 4.5 to 6.6 out of 7. Ten students completed the survey and eight students fell close to this range or above. Two students presented low on happiness with scores of 1.25 and 1.75 out of 7.

Students	1	2	3	4	5	6	7	8	9	10	11
In general I consider myself:	7	7	7	5	7	7	1	6	5	1	NA
Compared with most of my peers, I consider myself:	7	5	5	4	7	6	2	6	5	4	NA
Some people are generally very happy. They enjoy life regardless of what is going on, getting the most out of everything. To what extent does this characterization describe you?	5	6	5	5	7	7	1	7	5	1	NA
Some people are generally not very happy. Although they are not depressed, they never seem as happy as they might be. To what extent does this characterization describe you?	7	7	6	4	7	1	1	7	7	1	NA
MEAN SCORE	6.5	6.25	5.75	4.5	7	5.25	1.25	6.5	5.5	1.75	NA

Behavior Data

Referrals

Five of the 11 students in the class had behavior issues at school. The number of referrals a student receives in a year is one measure of misbehavior. All five of the students showed a dramatic improvement in behavior from 7th grade to 8th grade. In our intervention class many of these students often chose to make behavior improvements a goal on their Weekly Goal Sheets. They were aware that they did not always make the best choices when it came to school behavior and they expressed many times through their goal setting that this was something they wanted to

change. I also talked with them one-on-one about how well they were doing and I asked them to reflect on what strategies helped them when they faced difficult situations. It was not possible to make a causal connection between our work in class and improved student behavior, especially as students had so many other outside factors such as parental discipline or fear of losing 8th grade privileges for misbehavior, however the dramatic improvement was worth noting.

Student	3	5	8	10	11
Referrals	7 in 7 th 1 in 8 th	21 in 7 th 6 in 8 th	11 in 7 th 5 in 8 th	4 in 7 th 0 in 8 th	4 in 7 th 0 in 8 th

Attendance

Student attendance impacts student learning and in some cases can be an indicator of student well being at school. The chart below identifies the students who missed more than 10 days of school. Four of the eleven students in the class fit this category. Of interest is that both students who scored low on the Subjective Happiness Survey were in this group. Also of interest is that on their Mathographies, all four of these students did not see themselves in college or an occupation in 10 years. And, all three of the students who did not envision a positive future for themselves in their Mathographies were included in this group of chronically absent students.

Student	3	7	8	10
Days Absent (as of 4/10/16)	13	17	16	12

Academic Achievement Data***Regular Math Class Grades***

Every single student saw a decrease or no change in their regular math course grades from the 1st semester to the 2nd. Grades in traditional classes did not go up. Kids did not want to work on this material in intervention class. Most often they resisted when I tried to teach them concepts or they would tell me they knew everything already and were ready for the tests. Note that 3 of the 4 F's are from the students with absence issues and 2 of the 4 F's were the low scorers on the happiness survey. Also note that those with F's had the most outstanding missing assignments. When I worked with these students one-on-one and tried to motivate them to do the missing assignments, they invariably told me they would work on them. I would then check back with them and usually found they had not actually done the work. When I questioned them as to why they did not make-up the work, they provided excuses like they did not have enough time, they forgot or that they believed there was no point because they would still fail the test anyway. The excuses mostly seemed to fall within the self-sabotaging behavior described by Schwinger, Lemmer, Wirthwein and Steinmayr (2014).

Students	1	2	3	4	5	6	7	8	9	10	11
1 st Semester Grade	C-	C+	D-	C	D+	F	F	D+	D+	D-	C+
Grade as of April 10, 2016	D+	C+	F	C-	D+	F	F	D-	D+	F	D-
Current number of Missing Assignments	1	1	40	8	6	47	11	5	0	12	11

Time on Ascend

All of the students increased their time on Ascend from the 1st semester to the 2nd semester, which was actually 41 days shorter at the time results were gathered. Students were motivated to improve based on past successes. It might have been their needs for safety, belonging and esteem were being met, which allowed them to self-regulate and work independently towards their learning. Note that 5 students advanced at least 2 levels in Ascend Two of those students were students who had F’s in their traditional class, had no long-term goals, and had high absences. One was a student who also scored low on happiness. The table below records the improvement in Ascend levels and time spent on Ascend between the 1st semester and the 2nd semester.

Student	Ascend Level 8/20/15	Ascend Level 4/10/16	Progress in Ascend Level	Total Hours Worked 8/20/15 – 12/31/15 (142 Days)	Total Hours Worked 1/1/16 – 4/10/16 (101 Days)	Difference in Hours on Ascend between 1 st and 2 nd Semester
1	Level 6	Level 6	+0	26:03:24	46:56:24	+20:53:00
2	Level 8	Level 8	+0 (Completed Ascend)	37:38:30	30:16:02	N.A. (Completed Ascend)
3	Level 4	Level 6	+2	33:27:24	45:40:39	+12:13:15
4	Level 5	Level 6	+1	25:44:36	46:34:35	+20:49:57
5	Level 4	Level 7	+3	49:30:19	54:10:02	+4:39:43
6	Level 3	Level 4	+1	27:53:07	29:46:42	+1:53:35
7	Level 4	Level 5	+1	25:09:44	30:15:51	+5:06:06
8	Level 3	Level 5	+2	05:33:38	32:44:13	+27:10:35
9	Level 3	Level 6	+3	50:57:06	64:48:55	+13:51:49
10	Level 4	Level 6	+2	36:22:24	40:47:41	+4:25:17
11	Level 3	Level 4	+1	26:32:06	33:10:17	+6:38:11

Ascend Level Progress

This table records the percent of questions students answered correctly on Ascend Pre-Assessment tests and their subsequent scores on their Post-Assessment tests. Post-Assessment

tests were taken after students reviewed a study guide, watched a tutorial video and completed a series of practice problems on Ascend to become familiar with the academic content. The overall gain in student scores between the Pre-Assessment results and the Post-Assessment results are also provided.

Name	Level	Avg. Pre Assessment Result (%)	Avg. Post Assessment Result (%)	Gain in Score (%)	Number of Prescribed Objectives	Number of Objectives Completed	Start Date	Completion Date
1	6	50.2	90.2	39.9	52	51	08/20/15	-
2	8	52.4	84.2	31.8	38	38	08/20/15	-
3	4	49.7	92.9	43.2	48	48	08/20/15	01/14/16
	5	70.2	91.5	21.3	33	33	01/14/16	03/07/16
	6	76	84	8	12	10	03/07/16	-
4	5	41.5	92.8	51.3	50	50	08/20/15	03/15/16
	6	55	91.1	36.1	14	9	03/15/16	-
5	4	66.7	93.5	26.9	34	34	08/20/15	10/05/15
	5	52	87.9	35.9	43	43	10/05/15	12/07/15
	6	55.2	86.5	31.3	49	49	12/07/15	02/26/16
	7	69.5	85.7	16.2	26	21	02/26/16	-
6	3	67.9	87.1	19.2	28	28	08/20/15	12/15/15
	4	60	91	31	33	31	12/15/15	-
7	4	78	87.8	9.9	25	23	08/20/15	3/31/16
	5	81.5	90	8.5	5	2	3/31/16	-
8	3	78.6	89.1	10.5	22	22	11/30/15	01/14/16
	4	78.8	91.1	12.3	19	18	01/14/16	3/29/16
	5	73.1	93.3	20.2	15	12	3/29/16	-
9	3	73	92	19	25	25	08/20/15	10/29/15
	4	76.5	86.7	10.2	24	24	10/29/15	12/14/15
	5	76.6	86	9.4	30	30	12/14/15	02/11/16
	6	73.9	86.4	12.5	27	25	02/11/16	-
10	4	83.9	86.7	2.8	18	18	08/20/15	12/02/15
	5	82.5	90	7.5	22	22	12/02/15	02/02/16
	6	61.9	80	18.1	9	4	02/02/16	-
11	3	44.4	92.2	47.8	42	41	08/27/15	12/11/15
	4	23.7	93.8	70.1	59	58	12/11/15	-

9th Grade Mathematics Course Placement

As of April 10th, 2016, seven of the eleven students were deemed eligible by the school district to advance to Algebra I in 9th grade. Eligibility was based on achieving an Ascend level of grade 6 or higher with the assumption that students would continue to show Ascend progress between

April and the end of the school year in June. Grades in their traditional math classes were not the overriding qualifiers for Algebra I placement. Of the seven moving on to Algebra I, two were at C's, 3 were at D's and 2 were at F's in their current traditional math classes as of April 10th. The other four students were slated to enroll in a course called Math Fundamentals in 9th grade that would allow for further remediation of skills and a path to Algebra I in 10th grade. Two of those students were receiving D's and two were receiving F's in their traditional math classes.

Of the additional six students who joined the class at the start of the second semester, only one qualified for Algebra I in 9th grade. The other five would be in the Math Fundamentals class and continued intervention. It is difficult to pinpoint exactly why the latecomers were not as successful in advancing as the original eleven, but possible reasons include but are not limited to: not enough time with the material, not enough time bonding with the teacher and class, and not enough time with the teaching strategies designed to improve well being and an academic growth mindset.

Summary

Several teaching strategies implemented in the curriculum positively enhanced student well being and academic improvement. Critically important from the start of the class was to provide a nurturing teaching environment and to develop strong teacher/student relationships. This was achieved best through significant one-on-one time with students. Meeting student needs for safety and belonging minimized the initial embarrassment many students felt from being in intervention and mitigated self-sabotaging behavior (Schwinger, Lemmer, Wirthwein and

Steinmayr, 2014). It also helped to eliminate student reluctance to ask for assistance when needed and be persistent even when coursework was challenging and they felt unsuccessful.

Student self-esteem was built up through strategies that focused on habituating positive psychology (Achor, 2012) and academic growth mindset (Blackwell, Dweck, & Trzesniewski, 2007). Inviting students to co-create classroom structure and grading systems showed the respect and trust the teacher held for them. This was important because many students perceived that historically teachers had often viewed them negatively. Students wrote and reflected upon personal goals weekly. They took ownership of their learning and through reflection observed that continued practice and effort led to successes. A reward system was built in to the course by student design, which made progress more frequent, more tangible and less grade focused. This helped to increase student motivation, perseverance and a belief in their learning capabilities. Finally, for students with lower levels of happiness, journaling helped to improve positive psychology even when utilized on a limited basis.

The quantitative data on emotional well being indicated a possible correlation between having ambitious long-term goals and happiness levels. Student behavior data showed a dramatic drop in referrals for students with behavior issues in the prior year. The data also suggested a possible link between excessive absences and both lower levels of happiness and lower academic achievement in traditional math classes. There appeared to be no link between absences and academic achievement in the intervention class. Results on academic achievement revealed zero improvement in student grades for students in traditional math classes. However, overall there was a substantial improvement in remediated skills from prior grades in the intervention class.

Chapter 5 Discussion /Analysis

This study was designed to research the best instructional model and curriculum for an in-day 8th grade mathematics class to meet the highly individualized needs of struggling students. Student needs included reengagement with content and coursework, remediation of missing mathematic skills from prior grade levels and improvement in traditional mathematics class performance.

The intervention approach implemented in the study showed growth in reengaging students and remediation; however, no progress was made in traditional mathematics class proficiency as measured by course grades.

Major Findings

Students demonstrated improvement in the intervention class with regards to positive psychology and growth mindset (Blackwell, et al., 2007). Positive psychology was enhanced through teaching strategies which met student needs for belonging and esteem (Maslow, 1943) including creation of a safe learning environment, student co-created class structure, goal setting and reflection, one-on-one teacher/student time and journaling. Growth mindset (Blackwell, et al., 2007) improved through goal setting and one-on-one time and was further enhanced through esteem building mechanisms like individualized academic pacing and a reward system that celebrated persistence and effort over grades. Another notable achievement marker, not initially considered in the research, was a significant reduction in disciplinary referrals for all students who had received referrals in the prior 7th grade year. While causality is uncertain, goal setting and one-on-one time may have contributed to the improved student behavior.

Students made appreciable gains in academic content knowledge of remediated skills. Nearly half of the class advanced 2 or more grade levels by halfway through the second semester, including students who continued to show little motivation and effort in their traditional math classes. Allowing students to co-create the grading structure for the class heightened their accountability and ambition. The student designed reward system also increased motivation and contributed to meeting esteem needs and growth mindset (Blackwell, et al., 2007) by creating opportunities to collectively celebrate individual incremental progress on a daily basis and large-scale progress when it occurred.

While students did show gains in various markers in the intervention class, no improvement was made in their traditional math classes as indicated by overall course grade. The bulk of the intervention class curriculum was dedicated to skill remediation. Were we doing something ineffective in the intervention class to not achieve both? Current content from the traditional course was not taught in intervention unless students asked for individual help or as a class we reviewed material to study for tests. Students did not ask for help with that material very often and when the teacher offered, they usually declined indicating they knew the material and did not need assistance. They may have truly believed they comprehended the material and did not need further study or they may have been engaging in self-sabotaging behavior, but either way, this could imply that esteem and growth mindset gains made in intervention class did not carry over into the traditional mathematics class.

Comparison of Findings to the Literature

Research of the literature identified meeting student needs for safety, belonging and esteem in an educational setting as critical to reaching highest academic potential. Belonging and safety can be established through a nurturing class environment and supportive, caring teacher/student relationships. They can be further enhanced through development of positive psychology, which according to Achor (2012) can be habituated through practice. Research also identified goal setting as a means of strengthening student motivation, resolve and esteem [(Hock, et al., 2001), (Marques, et al., 2009), (Owens & Patterson, 2013) & (Rusk & Rothbaum, 2010)]. Writing goals weekly had a positive impact on student behavior in school and progress in remediated skills, but showed no impact in helping students overcome obstacles to learning in traditional math classes. Setting up reward systems based on individual mastery learning (Mac Iver, Young, Washburn, 2001) supported growth mindset (Blackwell, et al., 2007) through tangible proof that time and practice resulted in academic achievement. Unlike in traditional classes, where student grades were based primarily on a limited number of chapter/unit assessments, intervention class marked progress by standards. Students had as much time as they needed individually to learn concepts and could make mistakes without penalty to their grades. Students stayed motivated and engaged in the intervention class, but many continued to feel hopeless and disengaged in their traditional classes.

Limitations/Gaps in the Research

Several limitations were recognized in the course of the research. This study was limited in its small sample size so making generalizations from the results was not possible. Teaching strategies were implemented in a flexible and fluid way based on researcher observation and feedback from students. More formalized and regulated use of intervention strategies and follow up surveys could have lead to more plausible identification of causal relationships between strategies and results. The class size altered in the middle of the research. Adding six new students to the class at the 2nd semester did change the class dynamic and created setbacks in safety, belonging and esteem for the sample set due to personality conflicts and resurfacing insecurities. As the teacher of record, the results could be attributable to teaching ability and therefore included an inherent teacher/researcher bias. Teacher bias might have affected results also through the nature of academic assessments. A student bias was also inherent as narrative data was collected through surveys and conversations with the researcher so student responses may have been filtered or misleading. Outside student influences, such as family, friends and unidentifiable personal circumstances could have impacted results. Finally, while student results in many ways were good, there was no comparative control group in this study to monitor if students would have done as well or better in a differently structured environment.

Implications for Future Research

The research was confined to observations made in a single, small class. Future research should observe a larger sample set including multiple teachers. Replicating outcomes from teaching

strategies formally implemented across several intervention classrooms could substantiate or invalidate results. Future research could include a longitudinal aspect to observe any long-term impact experienced by students in regard to well being and academic achievement. In this research, much focus was given to the teacher/student relationship, but further research could explore the effect of student/student relationships in the context of an intervention class on well being and academic achievement. One other avenue to explore could be whether training teachers in mentoring or coaching skills could improve teacher/student relationships and academic achievement in an intervention setting.

Overall Significance of the Study

Identification and intervention for students needing support in mathematics should not wait until 8th grade, but should instead start the first year of middle school. Students in this study were unable to close the gap between their deficits in learning from prior grades and simultaneously keep up with math content from their current grade level course. Several students needed remediated skills from 3rd grade onward. If intervention had begun for these students in 6th grade instead of 8th, remediation skills required and current content would have been more closely aligned and students would have had less ground to cover to catch up. Also, preventing or reversing fixed mindsets in students would be easier to accomplish starting in 6th grade rather than waiting until 8th grade. Beginning intervention at the start of middle grades would require strong intradistrict communication and coordination between elementary and middle schools.

Alternative class and grading structures could be a better option for struggling or failing students. Student participants in the study did not show improvement in their traditional math

classes where content was delivered at a set pace. Students fell into insurmountable grade deficits when they did not learn material fast enough to pass formative unit assessments. However, even the students failing their traditional classes showed motivation, persistence and academic improvement in remediation through standards based grading and an individually paced intervention course geared towards mastery learning over time.

About the Author

Stephanie Hart is a second year middle school mathematics teacher. She graduated from University of California at Davis with a double major in Economics and Communications. After working in finance for a number of years she opened an art studio and began teaching painting and drawing classes to kids and teens. Along with teaching art, she tutored students in all levels of mathematics with a primary focus on Algebra 1 through Calculus. Stephanie went on to earn her California Single Subject Mathematics Teaching Credential from Dominican University of California. She is a dedicated professional, committed to guiding students academically, fostering student well being and encouraging within students and intrinsic motivation to learn.

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Appendix A

Mathography

1. Your name:
2. Preferred nickname:
3. Do you have access to the Internet after school? **YES** or **NO**
Check ALL that apply:
 - Computer with internet access
 - Smartphone
 - Cell phone
 - iPad or other tablet
4. Your birthdate:
5. Your school last year:
6. What languages do you speak fluently?
7. What are your interests outside of school?
8. Tell me something of which you are proud.
9. If I talked to your teachers last year, what would they say about you? What kind of student are you?
10. Describe the most interesting activity you ever did in school.
11. Tell me your least favorite thing about school.

(Mathography, cont.)

12. How do you feel about math? Rate yourself from 1 to 5 (1 = Hate It and 5 = Love It) and explain why you gave yourself that number.

13. What experiences in math have you enjoyed? Why?

14. I learn the most when the teacher...

15. Imagine it is next June and you are completing this class, what would you like to say looking back on the year?

16. Where do you see yourself in 10 years?

17. Is there anything else you would like to tell me? How can I help you be successful in this class?

Appendix B

Weekly Goal Sheet

Weekly Goal Sheet

Name: _____

Week: _____

Identified Areas of Focus (Academic, Behavioral, Personal):

Short-Term Goal #1: _____

Plan/Strategy/Timeline to reach goal: _____

Progress/Evidence/Results: _____

Long-Term Goal #2: _____

Plan/Strategy/Timeline to reach goal: _____

Progress/Evidence/Results: _____

Appendix C

Mid-Year Reflection

* Required

- 1. Identify the things you like about how our class is set up. What things in class help you the most? *

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.....
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- 2. Identify the things you would change in our class set up. What thing would you change or what would you add to help you learn better? *

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- 3. Write about something that made you proud during the first semester of 8th grade. *

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- 4. How do you feel about math? Rate yourself from 1 to 5 (1 = Hate it, 5 = Love it) and explain why you gave yourself that number. *

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- 5. Imagine it is June and you are completing this class, what would you like to say looking back on the year? *

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.....

Appendix D

Subjective Happiness Scale (Lyubomirsky, S., & Lepper, H.,1999)

For each of the following statements and/or questions, please circle the point on the scale that you feel is most appropriate in describing you.

1. In general, I consider myself:

1	2	3	4	5	6	7
not a very happy person						a very happy person

2. Compared with most of my peers, I consider myself:

1	2	3	4	5	6	7
less happy						more happy

3. Some people are generally very happy. They enjoy life regardless of what is going on, getting the most out of everything. To what extent does this characterization describe you?

1	2	3	4	5	6	7
not at all						a great deal

4. Some people are generally not very happy. Although they are not depressed, they never seem as happy as they might be. To what extent does this characterization describe you?

1	2	3	4	5	6	7
not at all						a great deal