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The effectiveness of growth mindset strategies on off-task time in a special education mathematics classroom

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**THE EFFECTIVENESS OF GROWTH MINDSET STRATEGIES ON OFF-TASK
TIME IN A SPECIAL EDUCATION MATHEMATICS CLASSROOM**

by

Alisa Marie Ialacci

A Thesis

Submitted to the
Department of Interdisciplinary and Inclusive Education
College of Education

In partial fulfillment of the requirement

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at

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Thesis Chair: Sydney Kuder, Ed.D.

Dedication

This thesis is dedicated to my husband, Dean Ialacci, for his patience and support throughout my graduate studies.

Acknowledgement

I would like to acknowledge and thank Dr. Sydney Kuder for his guidance and assistance throughout this research. I would like to thank my students for their participation and enthusiasm.

Abstract

Alisa Marie Ialacci

**THE EFFECTIVENESS OF GROWTH MINDSET STRATEGIES ON OFF-TASK
TIME IN A SPECIAL EDUCATION MATHEMATICS CLASSROOM**

2018-2019

Sydney Kuder, Ed.D.

Master of Arts in Special Education

The purpose of this study was to investigate the effects of growth mindset strategies on off-task time and attitude in a special education classroom. This research was done using a two-group pretest-posttest design where students with IEPs will be compared to those who do not have IEPs. Student on-task time was monitored prior to the intervention to give a pre-assessment of each students' off-task time. During the intervention, the students' behaviors were observed for signs of improvement. Growth mindset strategies were implemented during each class as needed for improving the overall mood. Overall the results showed a decrease in off-task time and a slight change in classroom attitude. The results show that growth mindset may have a positive effect on student off-task time and potentially an effect on classroom attitude.

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Chapter 1

Introduction

Students who have special learning needs, especially those with Attention Deficit Hyperactivity Disorder (ADHD), can have a difficult time focusing and remaining on-task throughout the school day. This affects their ability to learn to their fullest potential and can affect their educational success. According to the Centers for Disease Control and Prevention (CDC), 6.1 million children between the ages of 2 and 17 were reported to have ADHD in 2016. Of these 6.1 million children, 33% have Anxiety, 17% have depression, and 14% have Autism Spectrum Disorder (Centers for Disease Control and Prevention, 2018). Anxiety, depression, and Autism Spectrum Disorder also affects a student's ability to remain on-task and focused. Teachers can implement various strategies to aid these students throughout the school day.

Implementing positive psychology strategies in classrooms is becoming increasing popular in many districts. These strategies are used to improve mental health skills alongside improving academic achievement (Joaquín, 2018). Positive psychology pushes individuals to focus on the good in a situation with the purpose of improving overall happiness. Among the strategies for positive psychology is the idea of a growth mindset. A growth mindset is the idea that the mind is ever growing and can learn anything. According to Carol Dweck (2015), “students who believed their intelligence could be developed (a growth mindset) outperformed those who believed their intelligence was fixed (a fixed mindset) (p.1).” Growth mindset is a beneficial tool to use with students, especially those with exceptional learning needs.

Statement of the Problem

It can be difficult for students to remain focused and on-task throughout class which can be detrimental to their education. According to research, there is a positive relationship between on-task time and academic achievement (Cotton, 1989). Staying on-task without giving up or becoming distracted can be especially difficult for students with exceptional learning needs. Students with ADHD have an especially difficult time remaining focused on a task. Similarly, students with high anxiety from Autism, Anxiety Disorder or other causes, also have difficulty persisting on a task when the content becomes difficult.

Due to the positive relationship between academic achievement and on-task time, as well as the knowledge that students with exceptional learning needs can have difficulty remaining on-task, researchers are searching for methods of increasing on-task time in the classroom. Teachers often redirect students to their tasks and will track on-task time for students who are struggling. But teachers also have to continue to teach their lesson, maintain classroom management, and help other students make progress toward their educational goals. Students who remain on-task for longer periods of time can help reduce the number of instances where a teacher needs to redirect the students.

The research questions to be addressed in this study are:

1. Will a growth mindset increase the on-task time of students with exceptional learning needs in an in-class resource Algebra II class?
2. Will a growth mindset improve the attitude of the students involved in the study?

Positive education strategies can help improve overall student attitude which in turn improves educational success (Alzina, Paniello, & , 2017). Growth mindset allows students to focus on their personal learning goals and how much effort they have put into their own learning. Students with a growth mindset are more likely to face challenges with resilience, learn from failure, and grow to love learning (Romero, 2015). All of this helps reduce school anxiety and removes one of the factors distracting our exceptional learners.

Implementing a growth mindset in the classroom is simple. To begin I will introduce my classes to the idea of growth mindset using the YouTube video “Growth Mindset Video” (Infobundl, 2014). In the beginning, students will need to be reminded to use language that promotes a growth mindset often. This can be done using posters that offer growth mindset alternatives to fixed mindset phrases such as saying, “I can always improve” instead of “I can’t make this any better.” Students will also be reminded that making mistakes and struggling with their work will improve the connections in their brain.

Significance of the Study

The significance of this study is to research the effects of Growth Mindset on the on-task time of students with exceptional learning needs in a high school, in-class resource, mathematics class. The idea that intelligence can be developed will be taught to the students alongside Algebra II. This study will compare the on-task time of students with exceptional learning needs before and after a Growth Mindset is introduced.

Key Terms

For this study, the following terms will be defined as:

- 1. Growth Mindset:** “the belief that intelligence can be developed” (Romero, 2015).
- 2. On-task behaviors:** “refers to portions of time during which students are paying attention to a learning task and attempting to learn. This excludes time spent socializing, daydreaming, engaging in antisocial behavior, etc.” (Cotton, 1989).
- 3. Attitude:** “a summary evaluation of an object of thought. An attitude object can be anything a person discriminates or holds in mind.” (Gerd & Wanke, 2002)

Chapter 2

Literature Review

Students with special needs, especially those with anxiety, and Attention Deficit Hyperactivity Disorder (ADHD), can have a difficult time remaining engaged throughout the school day. When these students are not engaged in their education, they are not learning, and various researchers have devoted their time toward finding a solution to this engagement issue. Among these solutions are increasing on-task time through positive education and building resilience through regulating emotions.

To begin building engagement time, teachers need to find what is causing students to become off-task and implement strategies to prevent off-task behavior in future classes. One cause of lack of engagement could be a student's negative feelings toward his/her own abilities in the classroom. Positive education has been shown to reduce behavior problems, reduce/prevent anxiety, and promote overall well-being in students (Seligman, Ernst, Gillham, Reivich, & Linkins, 2009). Similarly, regulating positive emotions to use during difficult times and struggles in the classroom have been shown to reduce stress and build resilience (Tugade & Fredrickson, 2006). Growth mindset has also been shown to increase resilience in students resulting in less off-task time in the classroom (Romero, 2015).

The Inattention and Academic Performance of Students with ADHD

Students with ADHD struggle remaining attentive throughout the day and this struggle with attention may affect their education. In a synthesis of research on inattention and academic achievement, Gray, Dueck, Rogers, and Tannock (2017)

reviewed 27 studies. Of these 27 studies, 13 were cross-sectional, 10 were longitudinal, and 4 were both. All these studies gathered teacher ratings of students' inattention. The results from this synthesis showed that poor academic achievement could be predicted by teacher-rated inattention (Gray, Dueck, Rogers, & Tannock, 2017).

Using a checklist of characteristics that reduced bias, the authors chose studies that showed a low risk of bias and they categorized them "high-quality" before further reviewing their content. The high-quality studies also showed a correlation between inattention and low academic achievement in the classroom. There were 12 high-quality studies that looked at standardized test scores compared to inattention. These 12 studies showed that higher levels of inattention were related to lower scores on standardized tests. Overall, this review synthesis showed a correlation between inattention and low academic achievement on standardized tests and classroom performance (Gray et. al., 2017).

Positive Education

Seligman, Ernst, Gillham, Reivich, and Linkins (2009) investigated the effects of positive education on student well-being and implemented various exercises to help promote positive education in the classroom. The research team investigated the results of two different programs for schools. These two programs were the Penn Resiliency Program (PRP) and the Strath Haven Positive Psychology Curriculum. For PRP, the researchers used diverse samples by including students from various countries, cultural backgrounds, and community settings.

The Positive Psychology Curriculum is used to improve resilience and students' sense of purpose. This is done by using strategies that promote students' strengths. One strategy involved students naming three good things that happened each day with a short reflection for each. The other had students use their personality strengths, as identified by a survey, as much as possible throughout the day. The authors and their research group assigned 347 ninth grade students to Language Arts classes that used the positive psychology curriculum (intervention group) or did not use the curriculum (control group). The baseline, results, and follow-up were collected through parent, teacher, and student questionnaires. The intervention included 20-25 sessions that were 80-minutes in length throughout ninth grade. These intervention lessons used a discussion of positive psychology concepts and skills, a classwork, a real-world homework, and a journal entry reflecting on the skills learned. The results showed that the program did not improve depression, anxiety, character strengths, or participation in clubs/sports. This program did increase student enjoyment and engagement in class and improved social skills (Seligman, et. al., 2009).

The results from this study and other research reviewed by the authors state that PRP teaches students to be flexible and creative in the ways they approach problems and how to cope with struggling. PRP was designed to prevent and treat depression in young individuals. The findings were that PRP helps with depression, anxiety, and hopelessness, it may reduce negative behaviors, and works for all ethnic groups (Seligman, et. al., 2009).

Regulation of Positive Emotions

Positive emotions allow individuals to cope with stress and negative emotions. Most people will do this naturally, however students who become distracted easily due to anxiety may struggle with regulating their emotions. As described in an article by Barlow, Allen, and Choate (2004), an anxiety disorder could appear from a lack of emotional regulation. In this article, the authors used the commonalities found in treatments of anxiety and similar emotional disorders to choose three techniques of therapy to review and explain how they can be applied. The three techniques they chose were: changing the perspective of negative antecedents, addressing emotional issues in place of avoidance, and creating actions that are not associated with the emotion that is not being regulated. Their goal was to find a better way to treat emotional disorders. They concluded that with slight modification these three techniques could be used to treat emotional disorders effectively. The patients involved in the study could understand the similarities between them and were doing as well or better than those in other groups. (Barlow, Allen, & Choate, 2004).

Teachers can help students regulate their emotions through various strategies including meditation, relaxation techniques, and savoring the good. Using these techniques students can regulate their stress and anxiety to help build resilience. Resilience is built by adapting to stress and continuing to stay positive during a negative emotional experience (Tugade & Fredrickson, 2006).

In addition to building resilience, positive emotions can help students combat the negative effects of stress. When a student begins to become stressed, they can harness

positive emotions by utilizing behaviors and cognitions that allow them to maintain a positive emotional state. Students can add positive meaning into their everyday experiences to help keep them resilient. The benefits of regulating positive emotions are psychological and physical (Tugade & Fredrickson, 2006).

A large part of regulating positive emotions is knowing that problems have solutions and actively search for the solution. An understanding of problem solving can help individuals get through tough or stressful events. This allows them to pursue a solution as opposed to accepting the negative outcome or feelings. (Tugade & Fredrickson, 2006). The idea that problems can be solved through consistency and effort is a key component of a growth mindset. The similarities between the regulation of positive emotions and the idea of a growth mindset provides a background for using growth mindset strategies in the classroom.

Growth Mindset

Growth mindset is the idea that intelligence can be developed, and students are praised for their efforts in learning (Romero, 2015). The focus on effort versus inherited intelligence allows students to break free from a fixed mindset, the idea that a student's abilities are fixed.

In a 2015 article, Romero explains the difference between a growth and fixed mindset, why it is important to have a growth mindset and how to help promote a growth mindset in students. A growth mindset allows students to build confidence and belief in their own abilities. Knowing that the effort they put into learning can help their brain

grow can help students become resilient learners who don't give up when they struggle (Romero, 2015).

Fostering a growth mindset can allow students to see schools as a welcoming, engaging, motivating place. It allows students to understand that the focus of school is on your own learning and not on proving your ability by looking smart. Students with a growth mindset approach failure as an opportunity to try again and build more connections in the brain. Students with a fixed mindset understand failure to be the end of problem and believe effort is only for students who are not smart (Romero, 2015).

The process of learning is more important than a student's ability since practice builds the brain into a stronger muscle. To teach students to have a growth mindset, teachers can explain that neuroscience evidence shows that you can build the brain the same way you would build the other muscles in your body, through practice and exercises. Challenges cause the brain to strengthen by creating more neurotransmitters. Teachers can also build a growth mindset by changing the way praise is stated. For example, praising a student for being smart at math fosters a fixed mindset whereas praising a student for trying hard and never giving up fosters a growth mindset. By simply praising students' efforts instead of ability, teachers help students build a growth mindset and become better learners (Romero, 2015).

In an article that reviewed research on growth mindset, Boaler (2013) explains the evidence behind a growth mindset and how to communicate that within the classroom. The evidence states that students perform at a higher achievement level when they begin thinking in a growth mindset. She names multiple studies on outcome of moving toward

a growth mindset that all showed a higher rate of achievement. Also, countries that put an emphasis on the effort and time in learning as opposed to intelligence have higher success rates (Boaler, 2013).

Among the studies Boaler discusses was a study performed by J. Aronson, C.B. Fried and C. Good from 2002. This study used two groups of college students where one group received no intervention (control group) and one received a multiple intelligence growth mindset intervention. The control group showed no change in their academic achievement and the group receiving intervention showed an increase in academic achievement. The intervention group showed a large increase in achievement for the Africa-American students. (Boaler 2013).

Another study that was reviewed was a growth mindset intervention with seventh graders that was conducted by C. Good, J. Aronson, and M. Inzlich in 2003. This study also compared the intervention group to a control group. The students received a 90-minute session in November and in January as well as e-mail communication throughout the duration of the study. The control group showed no change whereas the intervention group showed a 4.5-point gain in mathematics and a 4-point gain in reading on achievement tests. The gap in achievement between genders was reduced in the intervention group and not in the control group (Boaler, 2013).

Boaler offers a diagram that shows the areas of a classroom where a growth or fixed mindset may be communicated. These areas are: the questions asked, the tasks assigned, the grading/feedback, how mistakes are treated, grouping, and normal setting. Ability grouping in mathematics is in many countries and typically begins around seventh

grade in the United States. Placing students in ability groups affects the way those students perceive their own abilities and can cause them to lower their idea of their own potential. Mistakes in mathematics should be treated as opportunities for growth and not a sign of low mathematic ability. Mistakes allow students' brains to make more connections and grow into a more intelligent learner. For a growth mindset, mistakes should be viewed as achieving a level of mathematical growth (Boaler, 2013).

Claudia Mueller and Carol Dweck (1998) conducted six studies to demonstrate the negative effects of praising student intelligence over effort. The first study had 128 fifth grade students who were praised on either their effort or their intelligence after being told they scored an 80% on a ten-question task. These students were then asked to choose a goal where three options were an ability goal and one was a learning goal. They found that the goal choice (ability versus learning) was clearly affected by the type of praise they received. Of the students who were given praise on their efforts, 92% chose a learning goal and of the students who were praised on their ability, 67% chose an ability goal (Mueller & Dweck, 1998).

Study 2 consisted of 51 fifth graders who were randomly separated into three groups: intelligence, effort, and control. This study was like the first study, but now included the students' opinions of how they would achieve in the future. The results were like study 1 with the addition of achievement levels only being affected during challenge. Study 3 was also similar, but included what students took from their failures. The question was, "did students want to know how to improve or how their classmates achieved?" Again, this study showed that students whose abilities were praised would

not seek information to improve. Studies 4, 5, and 6 also extended the previous studies with various additions. All of the students had the same outcome, praising students for ability/intelligence was detrimental to the student's motivation and performance (Mueller & Dweck, 1998).

Emotional and Behavioral Difficulties of Students with ADHD

In a study of the social and emotional difficulties of children with ADHD, Classi, Milton, Ward, Sarsour, & Johnston (2012), used a brief version of the Strength and Difficulties Questionnaire (SDQ), the National Health Interview Survey (NHIS), and parent responses to Sample Child Core to assess the likelihood of students with ADHD to have social and emotional difficulties. The main three difficulties that are examined are having at least 6 Healthcare Provider (HCP) visits, at least 2 Emergency Room (ER) visits, and missing more than two weeks of school. The 2007 NHIS included 5896 children (6-17 years old) with 432 of them having ADHD (Classi, Milton, Ward, Sarsour, & Johnston, 2012).

The results showed that 31% of students with ADHD had at least 6 HCP visits, 11% had at least 2 ER visits and 8% missed more than two weeks of school. When these children with ADHD also had anxiety, their likelihood of missing more than 2 weeks of school, having at least 6 HCP visits, and at least 2 ER visits increased significantly. This study shows that social and emotional issues in children with ADHD can increase others less than desirable situations (Classi, et. al.,2012).

Similarly, Peter Wehmeier, Alexander Schacht, and Russell Barkley (2010) reviewed the effects of social and emotional impairment in children with ADHD on the

child's life. ADHD can be linked with a social impairment with family members and peers. It can also be linked to a difficulty self-regulating emotions and other mental health disorders. As children move into adolescents the hyperactivity can become more internalized creating issues with executive functioning skills and impulse control (Wehmeier, Schacht, & Barkley, 2010).

As time passes, these difficulties can begin to affect the child's quality of life. The authors define quality of life as, "an individual's subjective perception of their situation in life as evidenced by their physical, psychological, and social functioning." The child's psycho-social difficulties can be detrimental to his quality of life and emotional, social well-being. Likewise, the child's inability to regulate emotions and stress will affect his quality of life. This decreased quality of life will be detrimental to the child's education as well as his overall happiness (Wehmeier, Schacht, & Barkley, 2010).

Summary

These studies and articles have examined difficulties of students who have ADHD, anxiety disorders and/or have difficulties regulating their emotions. They have shown the benefits of positive education and growth mindset. A growth mindset can improve the achievement of students and help create resilient learners. Through these interventions, students' education and outlook on life can be improved, they can become more comfortable with challenging themselves in class, and they can grow their own intelligence.

As teachers, it is our job to utilize the tools we are given to create the best outcomes for our students. Confidence and a focus on effort can be built alongside day-to-day education. The purpose of my study is to build upon the current research and investigate the effects of growth mindset on off-task time in an in-class resource Algebra II classroom.

Chapter 3

Methodology

Setting

School. This study took place in a central New Jersey high school. There are three schools in the district. The elementary school serves students in grades pre-kindergarten to fourth grade, the middle school is for grades five through eight, and the high school is grades nine through twelve

The 2016-2017 school performance report states enrollment as 966 students among the four grades. Approximately 50% of these students are male, 50% are female, and 11% are students with disabilities. The school is not particularly diverse with the majority (71.6%) of students being Caucasian, 20.8% Asian, 3.7% Hispanic, 3.3% African American, and 0.6% are two or more races (New Jersey Department of Education, 2016). There has not been a significant change in population since the 2016-2017 school year.

Classroom. This study was conducted in two Algebra II in-class support (ICS) classes. The classroom is also used for Advanced Placement Statistics, Precalculus, and a general education Algebra II class. There are two teachers in the classroom during both Algebra II ICS classes. The general education teacher is certified in mathematics K-12 and the special education teacher is certified in both mathematics and special education K-12. In addition to Algebra II, the general education teacher also teaches college preparation level Precalculus. The special education teacher also teaches POR Algebra II, POR Algebra III/Trigonometry, ICS Algebra III/Trigonometry, and ICS Probability

and Statistics. One of the Algebra II classes is during the 1B block which is from 7:30-8:55 with 26 students. The other is during the 4A block from 12:40-2:05 with 17 students and two instructional aides.

Participants

Of the 21 participating students in the two classes where the study took place, 6 of them have Individualized Education Programs (IEPs), 1 has a 504 plan, 2 have been referred to Interventions and Related Services (I&RS), and 1 is legally blind. Of these students 12 are female and 9 are male. There is a mixture of freshmen and sophomores in these classes. All the students with IEPs are sophomores except for the student who is legally blind, he is a freshman.

Research Design

This research was done using a two-group pretest-posttest design where students with IEPs will be compared to those who do not have IEPs. This study researched the effects of a growth mindset on off-task time as well as the effect growth mindset has on students' overall attitudes toward class. Student on-task time was monitored prior to the intervention to give a pre-assessment of each students' off-task time. Students were observed during a normal class block to assess the frequency at which they are off-task.

During the intervention, the students' behaviors were observed for signs of improvement. Growth mindset strategies were implemented during each class as needed for improving the overall mood. A post-assessment survey was given to assess the improvement in students' attitude toward mathematics class. An observation of students' on-task time was taken at the end of the intervention period.

Procedures

The students were shown a video introducing growth mindset on YouTube (Infobundl, 2014). After watching the video, we had a discussion on what a growth mindset is and how we can improve our mindsets every day. Handouts that explain the growth mindset strategies were given and referred to as often as necessary. Students were praised on their efforts frequently and were encouraged to embrace challenges. Students were also encouraged to expand their answers in a deeper and more meaningful way. When students felt that they could not understand a topic they were directed to say they can't do it "yet" and to continue to work toward success. Weekly mini-lessons on growth mindset were held for four weeks.

The post-assessment survey was given to the students via Google Forms and they used their phones or a laptop to complete. An observation form was used as the pre-assessment and post-assessment for the students' off-task time. Students will be observed during a normal 90-minute class block with a tally of how frequently they are off-task.

Materials

The animated video was 2 minutes and 31 seconds long with a male voice explaining growth mindset with illustrations. It discussed how Steve Jobs used a growth mindset to be successful in his life and build Apple. It then explained how connections in the brain are made and that they can make your brain stronger and smarter through exercise.

The survey was on Google Forms and had 5 questions. The students are asked to rate the effectiveness of each growth mindset strategy and growth mindset overall on their attitude in class. The questions have a 1-10 scale with 1 being not effective and 10 being very effective. The questions are:

- How effective was growth mindset at improving your attitude toward math class?
- How effective was watching the video on growth mindset for improving your attitude toward math class?
- How effective was being praised for your efforts in class for improving your attitude in math class?
- How effective was embracing challenges for improving your attitude in math class?
- How effective was adding "yet" into our classes at improving your attitude in math class?

The observation form was very simple. The students' names were listed and next to each name was space to tally how frequently the student became off-task during the class period. There was also a space for the date. The names are split into the two groups that are going to be used for the study. Students who have an Individualized Education Plan (IEP) were marked with an asterisk. Students who have been referred for Intervention and Related Services (I&RS) were denoted with two asterisks. After data recording, the students' names were replaced with a student number to remove all identifiable information.

Dependent Variables

On-task behavior. The students' off-task time was measured by measuring the frequency of the students' off-task behaviors. All instances where students needed to be redirected were recorded.

Student attitudes. Student attitudes toward the class were measured through a post-assessment survey that the students took in class. The survey asked, on a scale of 1-10, how effective growth mindset strategies were at improving their overall attitude in class. The survey also had the students rate each strategies effectiveness on a scale of 1-10.

Data Analysis

At the completing of this study, student's pre-assessment frequency of off-task behavior was displayed with their post assessment frequency to compare. Student survey responses were also graphed for analysis. The graphs are a visual representation of the data. Levels of success were assessed using the comparative data for each student. The mean off-task frequency for the pre-assessment will be compared to the mean off-task frequency of the post-assessment.

Chapter 4

Results

This study was completed using a two-group pretest-posttest design to evaluate the effectiveness of growth mindset strategies on student on-task time for students with IEPs as compared to students without IEPs in an in-class resource Algebra II setting. The baseline phase did not include growth mindset strategies during class. The intervention phase introduced growth mindset through a video and weekly mini-lessons. Strategies were incorporated into daily interactions with students where appropriate. Students practiced altering the way they thought about their own thinking to shift their mindset from fixed to growth. Each week, the students' off-task time was evaluated.

On-Task Time

Student on-task time was evaluated by tracking the frequency of off-task behaviors over the 85-minute class block. Each instance of off-task behavior during instructional or classroom practice time was tallied and added up at the end of the instructional time block. A trendline was calculated for each student as well as the mean, range, and variance.

Table 1 shows the mean off-task time for Group 1 and Group 2. Group 1 was students who have been identified as having disabilities and Group 2 was students who have not been identified as having disabilities.

Table 1

Mean Pre-assessment and Weekly Tracking of On-task Time – Group 1 vs. Group 2

	Pre-assessment	Intervention
Group 1	7	5.25
Group 2	3.21	2.16

Off-task time was observed and recorded at the end of each week where students received a mini-lesson on growth mindset strategies. The range of frequency off-task for Group 1 for the Pre-Assessment was 17. For the intervention phase the range for group 1 was 20. The range of frequency off-task for Group 2 for the Pre-Assessment was 13. For the intervention phase the range for group 21 was 31.

The mean recorded off-task time for the pre-assessment data was 7 for Group 1 and 3.21 for Group 2. An F-test with this data shows that it is not statistically significant ($F = 2.64$). The mean off-task time for the four weeks of intervention is 5.25 for Group 1 and 2.16 for Group 2. The F-test for this data also showed that it was not statistically significant ($F = 2.52$). That is a decrease of 1.75 for Group 1 and a decrease of 1.05 for Group 2. Finally, the F-test for this data showed that it was not statistically significant ($F = 0.01$).

Of the 7 students in Group 1, all but one student showed a decrease in mean off-task time. Student 5 went from 3 instances of being off-task to a mean of 0.75 times off-

task. That is a decrease of 2.25. Student 7 went from 4 during the pre-assessment to a mean of 2.75 which is a decrease of 1.25. Student 8 had a decrease of 1.5 with 3 during the pre-assessment and a mean of 1.5 during intervention. Student 13 went from 13 to a mean of 6.25 which is a decrease of 6.75. Student 16 went from 17 to a mean of 16.75 which is a decrease of 0.25. Student 17 had a decrease of 0.25 with a pre-assessment of 9 and a mean of 8.75 during intervention. The only student in Group 1 who did not show improvement was student 19. Student 19 consistently had 0 instances of off-task behavior during the pre-assessment and during the intervention.

There were 14 students in Group 2 with 7 of them showing a decrease in off-task behavior. Student 2 had a decrease of 3, student 4 had a decrease of 2.5, student 6 had a decrease of 3.75, student 12 had a decrease of 0.25, and student 20 had a decrease of 1.75. The two largest decreases in off-task behavior in Group 2 were student 11 and student 18. Student 11 began with 9 and had a mean of 0.25 during the intervention which is a decrease of 8.75. Student 18 began with 13 and had a mean of 7.25 during the intervention which is a decrease of 7.75. Of the 7 students who did not show a decrease in off-task behavior, 3 of them began with 0 instances and had a mean of 0 instances during the intervention. This leaves only 4 of the 14 students who had an increase in off-task behavior during the intervention.

Table 2 shows the frequency of off-task time for students in the two classes during the pre-assessment and the four weeks that data was collected. Students 1-13 were in class 1 and students 14-21 were in class 2. Students with an * have been

classified as having a disability (Group 1). Both classes received the same intervention at different times during the day.

Table 2

Pre-assessment and Weekly Tracking of On-task Time – Individual

	Pre-assessment	Intervention
Student 1	0	0
Student 2	10	7
Student 3	0	0.25
Student 4	3	0.5
Student 5*	3	0.75
Student 6	4	0.25
Student 7*	4	2.75
Student 8*	3	1.5
Student 9	0	0
Student 10	0	2.5
Student 11	9	0.25
Student 12	4	3.75
Student 13*	13	6.25
Student 14	0	0.25
Student 15	0	0
Student 16*	17	16.75
Student 17*	9	8.75
Student 18	13	7.25
Student 19*	0	0
Student 20	2	0.25
Student 21	0	8

Figures 1-7 show the frequency off-task for each individual student in Group 1 with the calculated trendline. The number “0” on the horizontal axis represents the pre-assessment and the other numbers represent the weeks that data was collected. The vertical axis for each figure ranges from 0-20 except for Student 16. Student 16 is the only student who had a frequency of off-task behavior that exceeded 20 times in the 85-minute block so the vertical axis of his figure ranges from 0-35.

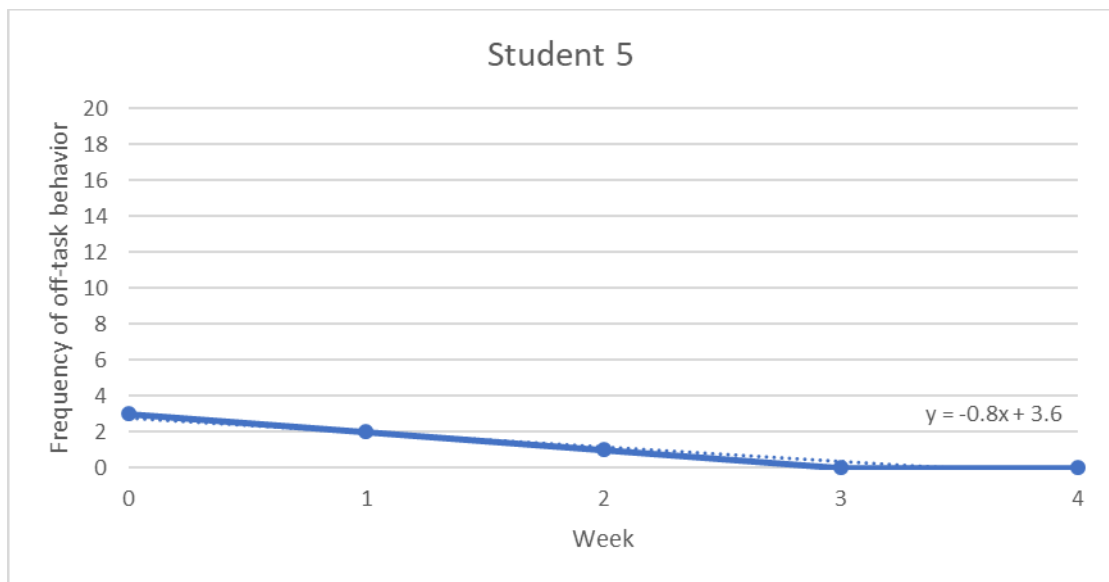


Figure 1. Student 5 Frequency Off-Task by Week

Figure 1 shows student 5’s off-task time during the pre-assessment observation and each week of data collection. During the pre-assessment, student 5 was off-task a

total of 3 times in the 85-minute class block. The equation of the trendline is displayed on Figure 1.

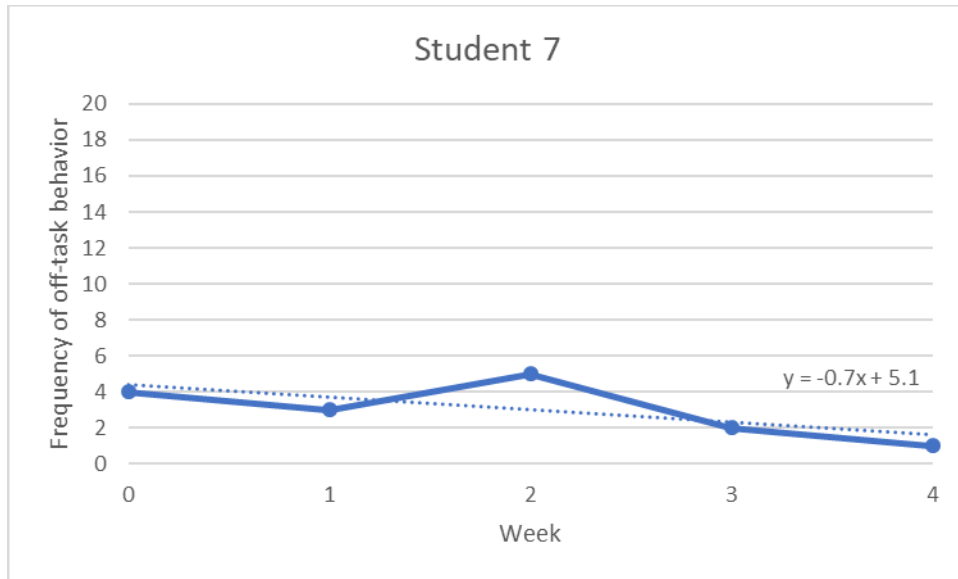


Figure 2. Student 7 Frequency Off-Task by Week

Figure 2 shows student 7's off-task time during the pre-assessment observation and each week of data collection. During the pre-assessment, student 7 was off-task a total of 4 times in the 85-minute class block. The equation of the trendline is displayed on Figure 2.

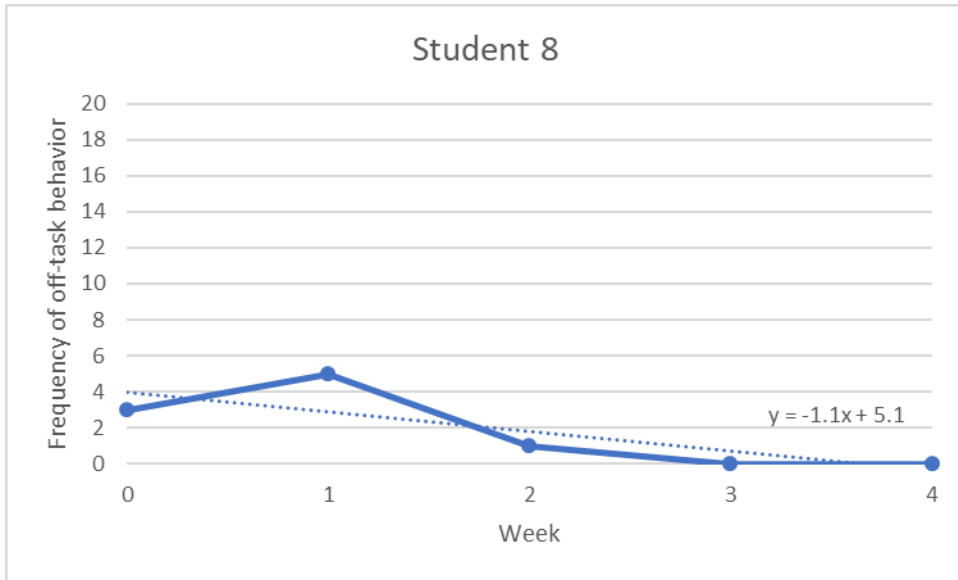


Figure 3. Student 8 Frequency Off-Task by Week

Figure 3 shows student 8’s off-task time during the pre-assessment observation and each week of data collection. During the pre-assessment, student 8 was off-task a total of 3 times in the 85-minute class block. The equation of the trendline is displayed on Figure 3.

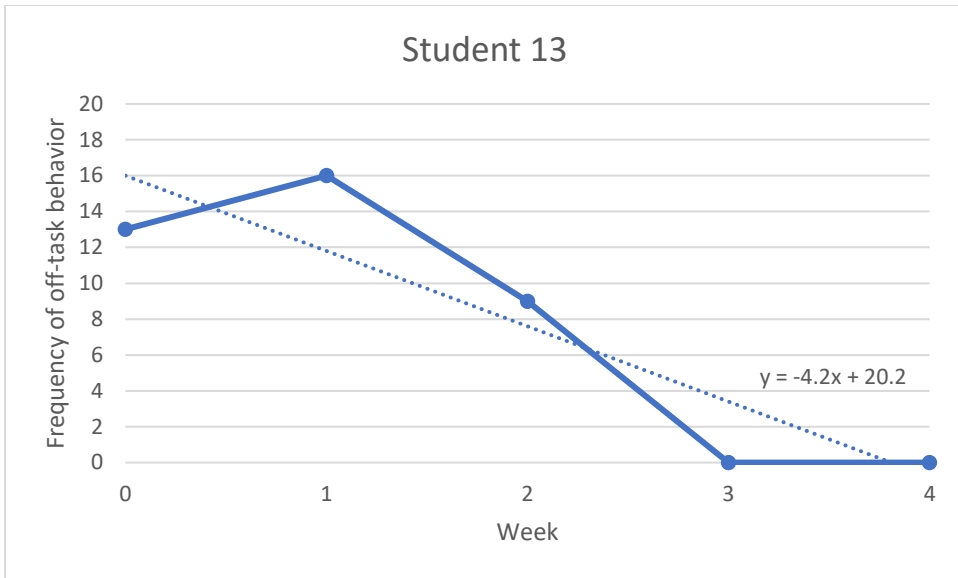


Figure 4. Student 13 Frequency Off-Task by Week

Figure 4 shows student 13’s off-task time during the pre-assessment observation and each week of data collection. During the pre-assessment, student 13 was off-task a total of 13 times in the 85-minute class block. The equation of the trendline is displayed on Figure 4.

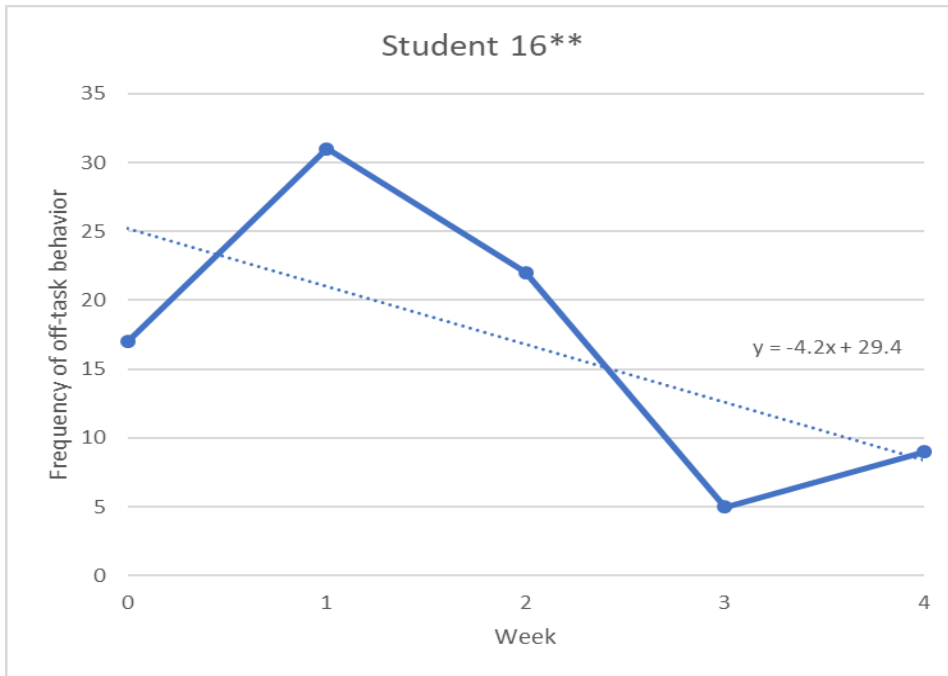


Figure 5. Student 16 Frequency Off-Task by Week

Figure 5 shows student 16's off-task time during the pre-assessment observation and each week of data collection. During the pre-assessment, student 16 was off-task a total of 17 times in the 85-minute class block. The equation of the trendline is displayed on Figure 5.

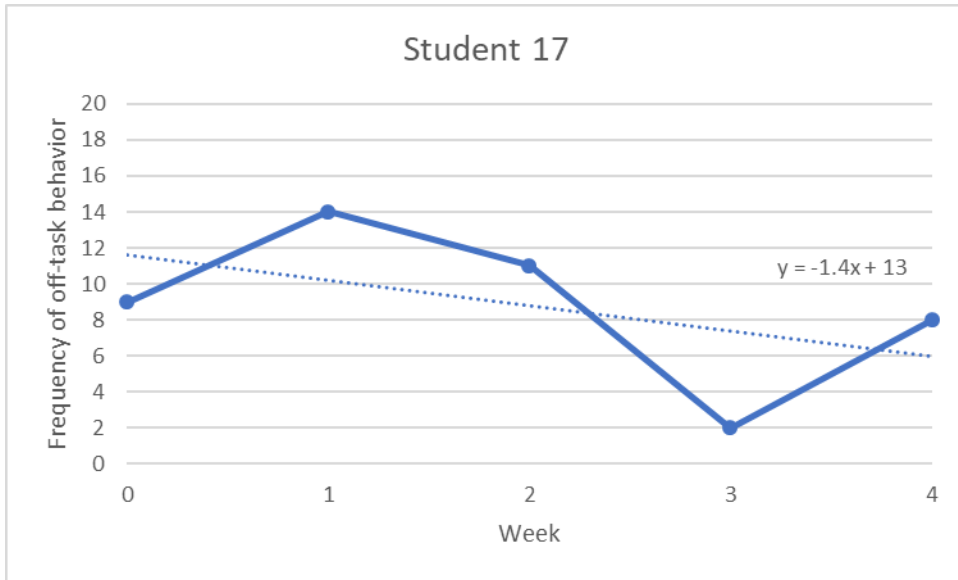


Figure 6. Student 17 Frequency Off-Task by Week

Figure 6 shows student 17's off-task time during the pre-assessment observation and each week of data collection. During the pre-assessment, student 17 was off-task a total of 9 times in the 85-minute class block. The equation of the trendline is displayed on Figure 6.

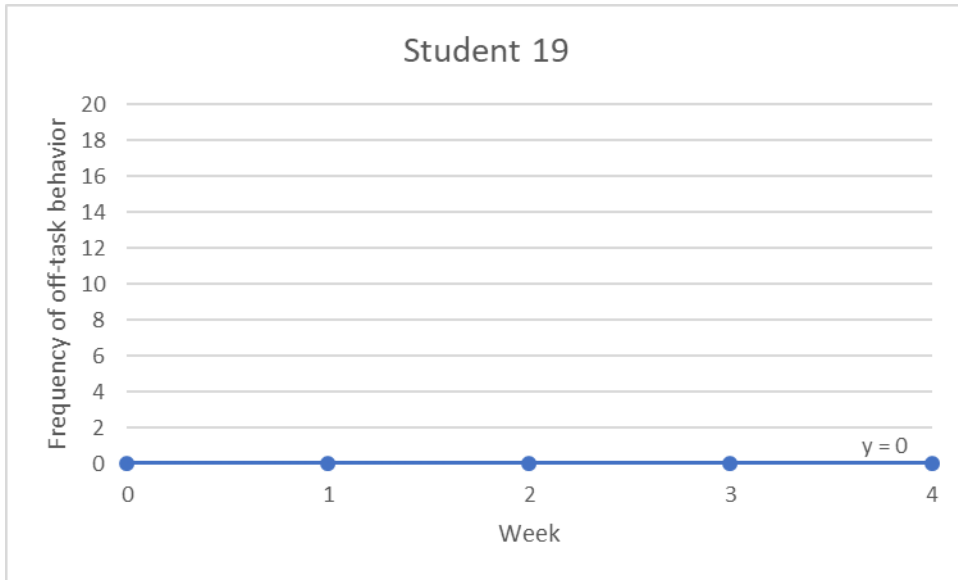


Figure 7. Student 19 Frequency Off-Task by Week

Students 19 had no instances of off-task behavior during the data collection. The equation for the trendline of the corresponding figure is $y = 0$.

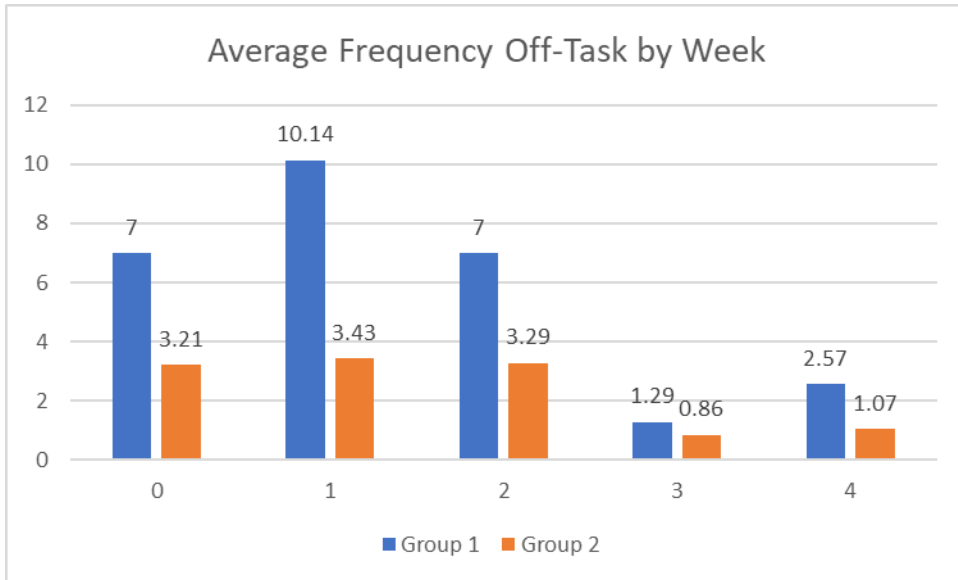


Figure 8. Average Off-Task Time by Week

Figure 8 displays the average off-task time for the population of students for the pre-assessment data collection and each week of data collection. Week 0 represents the pre-assessment data collection. The average frequency off-task during the pre-assessment was 4.48. The figure displays a decrease in off-task behavior for each group and the classes overall.

Classroom Attitude Survey

Student attitude toward mathematics and mathematics class was evaluated through a student survey. All students were asked to complete a survey about how they feel that growth mindset has affected their overall attitude in class and how each strategy has affected their attitude in class. Mean will be calculated for each strategy included in

the survey as well as for growth mindset overall. The answers to these questions are displayed in figure 9. Figure 9 displays the average answer to each survey question by group. The questions were:

1. “How effective was growth mindset at improving your attitude toward math class?”
2. “How effective was watching the video on growth mindset for improving your attitude toward math class?”
3. “How effective was being praised for your efforts in class for improving your attitude in math class?”
4. “How effective was embracing challenges for improving your attitude in math class?”
5. “How effective was adding "yet" into our classes at improving your attitude in math class?”

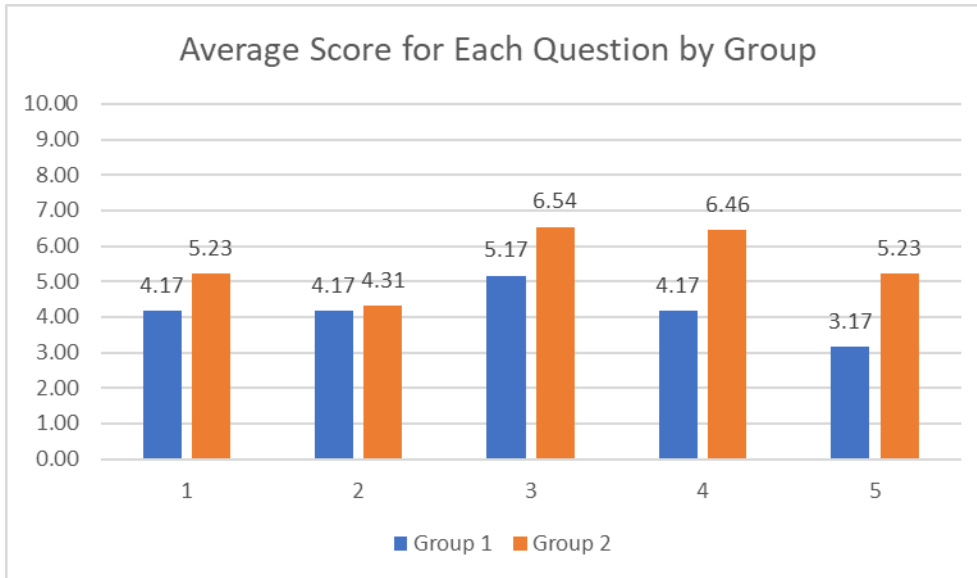


Figure 9. Average Answers to Each Survey Question by Group

The average answer for Group 2 was larger than the average answer for Group 1 for every question. The closest average was in question 2 which referred to the effectiveness of watching the video on growth mindset on student attitude. Both groups had an average answer around 4 for this question. The highest average for both groups, 5.17 for Group 1 and 6.54 for Group 2, was for question 3. Question 3 referred to students being praised for the efforts in class.

For Figures 10 – 15, the horizontal axis is students from 1 to 21 and the vertical axis is the responses from 1 to 10. Students 11 and 13 did not answer the survey.

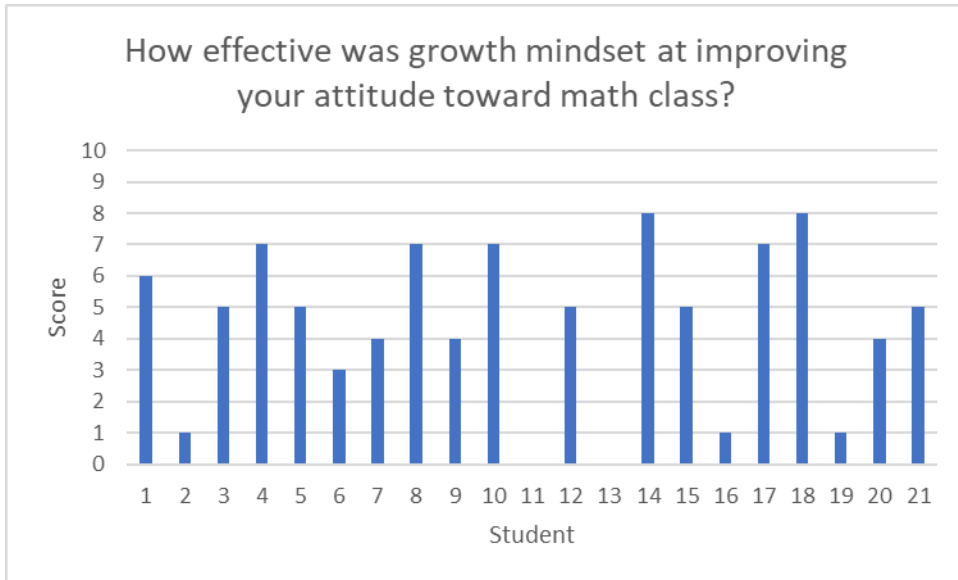


Figure 10. Student Responses to Question 1 from the Attitude Survey

Figure 10 shows the results from each student for the question “How effective was growth mindset at improving your attitude toward math class?” on a scale of 1 to 10. The lowest score for this question was a 1 and the highest was 8. The mean answer for this question was 4.89.

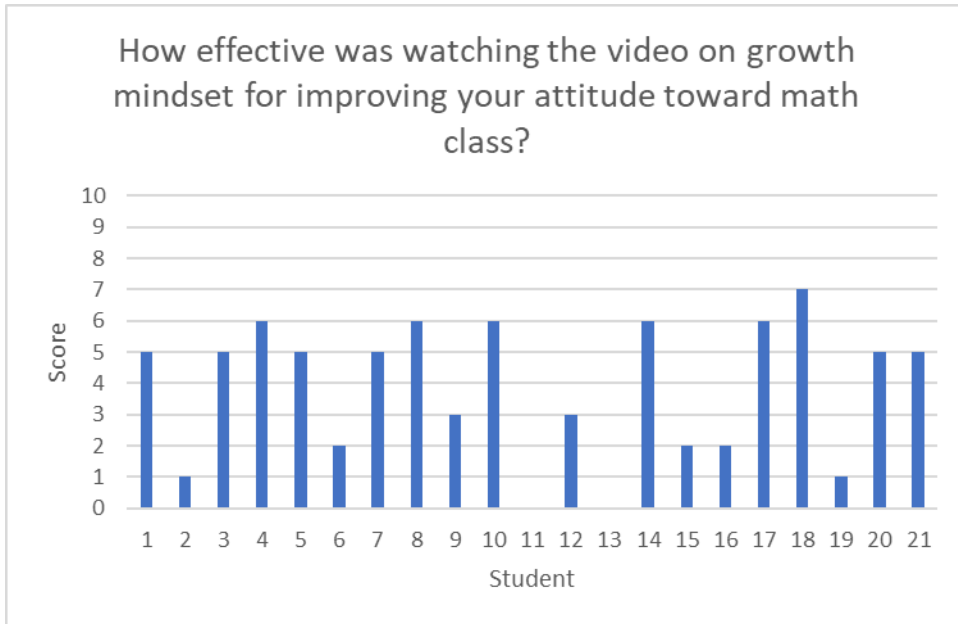


Figure 11. Student Responses to Question 2 from the Attitude Survey

Figure 11 shows the results from each student for the question “How effective was watching the video on growth mindset for improving your attitude toward math class?” on a scale of 1 to 10. The lowest score for this question was a 1 and the highest was 7. The mean answer for this question was 4.26.

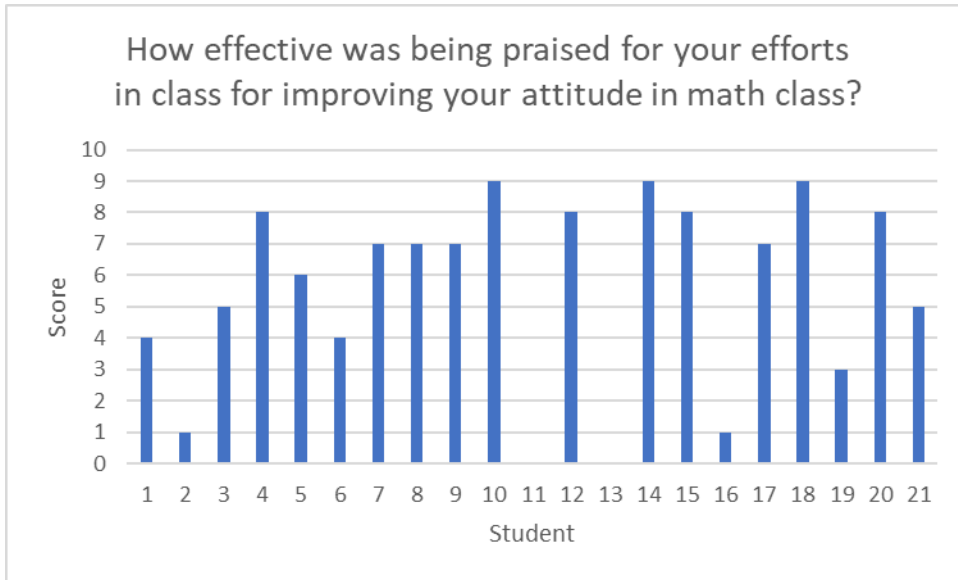


Figure 12. Student Responses to Question 3 from the Attitude Survey

Figure 12 shows the results from each student for the question “How effective was being praised for your efforts in class for improving your attitude in math class?” on a scale of 1 to 10. The lowest score for this question was a 1 and the highest was 9. The mean answer for this question was 6.11.

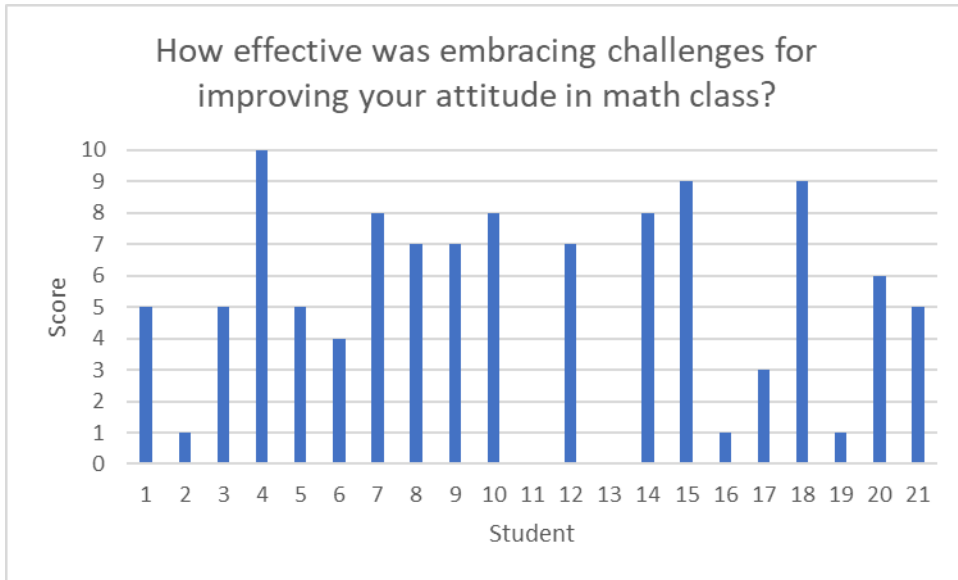


Figure 13. Student Responses to Question 4 from the Attitude Survey

Figure 13 shows the results from each student for the question “How effective was embracing challenges for improving your attitude in math class?” on a scale of 1 to 10. The lowest score for this question was a 1 and the highest was 10. The mean answer for this question was 5.74.

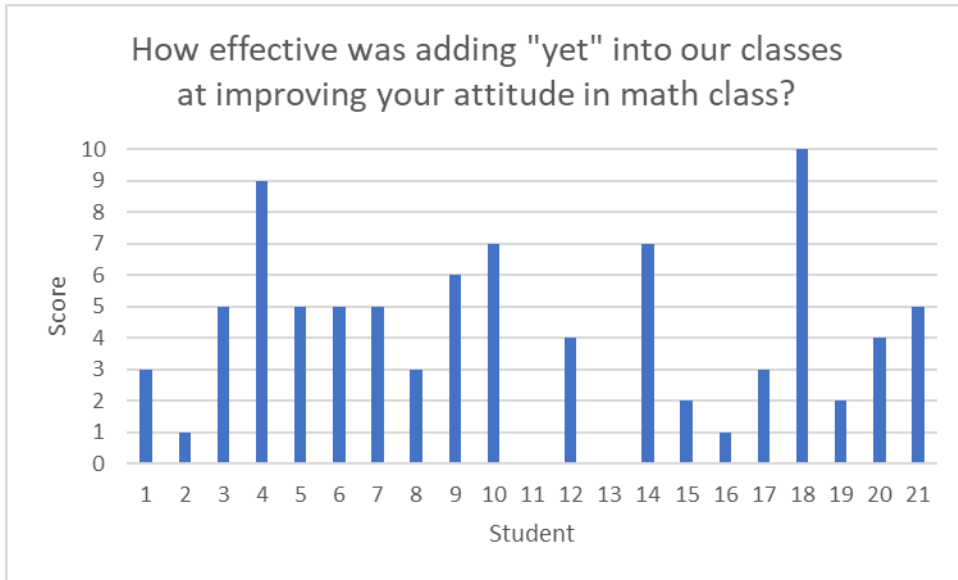


Figure 14. Student Responses to Question 5 from the Attitude Survey

Figure 14 shows the results from each student for the question “How effective was adding ‘yet’ into our classes at improving your attitude in math class?” on a scale of 1 to 10. The lowest score for this question was a 1 and the highest was 10. The mean answer for this question was 4.58.

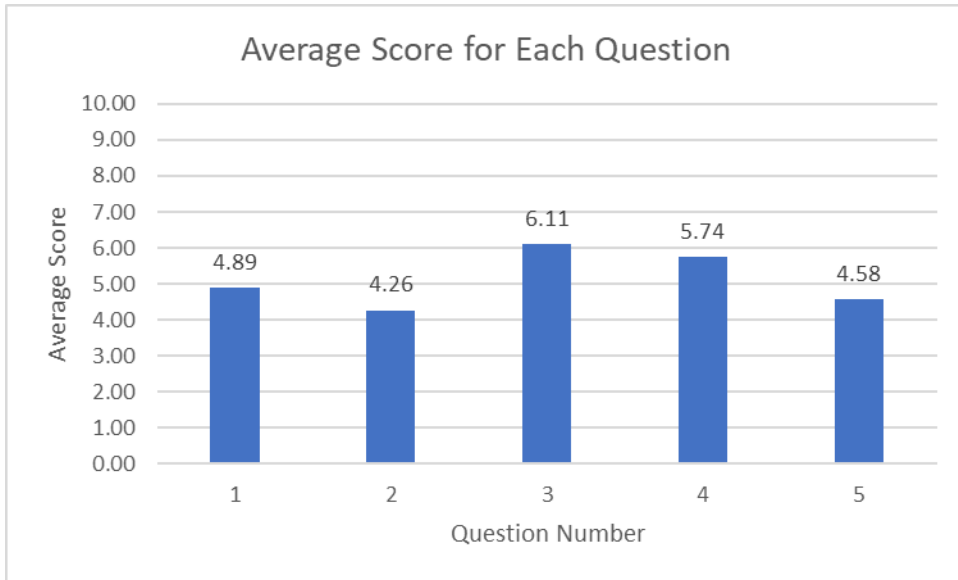


Figure 15. Average Student Responses to All 5 Questions from the Attitude Survey

Figure 14 shows the average answer to each question from the attitude survey. The vertical axis shows the average score from a scale of 1 to 10. The horizontal axis represents the question number which is the same as in Figure 9.

Chapter 5

Discussion

Review

This study implemented growth mindset strategies in two in-class resource Algebra II classes in order to observe the effects it had on off-task time and overall student attitude in class. All the students included in this study were in ninth or tenth grade and enrolled in Algebra II. Of the 21 students involved in this study, 7 had been determined eligible for special education.

The implementation of growth mindset strategies, including the power of yet, embracing struggle, and being praised for effort, resulted in a decrease in off-task behaviors for most of the students in this study. Multiple students had no off-task behaviors prior to the study and their behaviors remained consistent through the intervention. One special education student showed no off-task behavior throughout the study and the other six showed a decrease in their mean off-task behaviors during intervention. Of the 14 students who are not classified as special education: 3 showed no instances of off-task behavior throughout the study, 4 showed an increase in off-task behavior, and 7 showed a decrease in off-task behavior. Comparisons between the two groups, those with disabilities and those without disabilities, were not found to be statistically significant.

The expectations for this study were that growth mindset would decrease off-task time in the classroom by improving student overall attitude and reducing math anxiety. Student off-task time decreased for 13 of the 21 students and remained at zero for 4 of the

students. Some of the students found all the strategies used to be helpful in improving their overall attitude in mathematics class. Of the strategies, being praised for their efforts and embracing challenges were found to be the most effective at improving student attitude in class. These strategies had a mean rating of 6.11 and 5.74 respectively. The method that was found to be the least effective was watching a video on growth mindset. This strategy had a mean score of 4.26.

Previous Research

The Positive Psychology Curriculum (Seligman, et. al., 2009) found that implementing their positivity program in classrooms increased student enjoyment and engagement as well as improved social skills. Their study did not show an improvement in depression, anxiety, character strengths, or participation in clubs and sports. They showed that introducing students to positive psychology showed students creative ways to approach problems and cope with struggling.

Two studies that investigated emotional disorders in students found that teaching students to regulate their emotions through various techniques can be beneficial in treating their emotional disorders. The first study taught students to change their perspective of negative antecedents, address emotional issues in places of avoidance, and create actions that are not associated with the emotion that is not being regulated. They found success in these techniques and claimed that with modifications they could be used to treat emotional disorders (Barlow, Allen, & Choate, 2004). The second study stated that resilience is built by adapting to stress and trying to stay positive during negative

emotional experiences. Resilience allows students to combat the negative effects of stress (Barlow, Allen, & Choate, 2004).

In a 2015 article, Romero explained that growth mindset strategies can help students build resilience by building confidence and belief in their own abilities. The knowledge of helping their brain grow allows students to be resilient in their own learning (Romero, 2015).

Comparing the results of this study to the previous research shows the parallels in the abilities of a growth mindset and resilience to enhance student outcomes. Building a growth mindset can allow students to build their own resilience. This can result in more engagement and enjoyment in class and the ability to persevere when struggling. Our survey shows that some of our strategies were effective at improving students' attitude in class and our frequency tracking shows an improvement in engagement in class following the interventions.

Limitations

This study was based on a convenience sample from a single high school that is in a wealthy part of town. The results could vary depending on differences between ages, school districts, teachers, socioeconomic status, etc. The results could vary if this study is recreated with a random sampling of students in a variety of school districts.

The interventions in this study were introduced in mini-lessons once per week. A larger exposure to each intervention or a wider variety of growth mindset strategies could have been beneficial. Students may need more practice on implementing each strategy

before they are able to apply them without guidance from their teacher. The survey used to assess the effectiveness of these strategies on student attitude was simply a rating scale from 1-10. A more detailed or open-ended survey may have provided better feedback on each strategy from the students as well as recommendations on how to better implement them.

Implications for Practice

Growth mindset strategies, such as the power of yet and being praised for effort, are relatively easy to integrate into classroom culture. After an introduction to these strategies through classroom discussion or online videos, teachers and paraprofessionals can encourage the development of a growth mindset by consistently building these strategies. Reminding students that they don't understand the topics "yet" and that their brains are capable of growth and learning through practice can be a powerful tool. Following up the power of yet with praising effort versus ability shows students that continuing the work toward their goals and practice is more important than understanding new topics immediately.

Teaching students to embrace challenges can be a slightly more difficult task that becomes easier when done in combination with the other strategies. As students begin to realize their potential is built from their efforts, they'll become more accepting of challenges in learning. Through the development of a growth mindset becomes a more confident student who will hopefully begin to love learning.

A growth mindset may or may not help students to become more on-task and focused in the classroom, but there is no harm in building student resilience in hopes of

increasing on-task time. The confidence and positivity that can be built in the classroom through these simple strategies can encourage students to embrace their own learning. Patience and consistency are the most important aspects of building a growth mindset in the classroom.

Future Studies

Since this study was limited by the time frame, future studies should focus on lengthening the time to see the effectiveness. Building a growth mindset may have been more effective at decreasing off-task time if it were tracked over a longer period. It may also be beneficial to see the outcome of utilizing these strategies throughout an entire school year. The generalization of these skills outside of the classroom could benefit from a longer exposure.

This group somewhat lacked diversity and future studies could explore the outcomes with a wider variety of students and school districts. Students in a lower income school district may react differently than the students in this study. In addition to school diversity, future studies could explore these strategies in classrooms other than mathematics.

Conclusion

The purpose of this study was to answer the questions:

3. Will a growth mindset increase the on-task time of students with exceptional learning needs in an in-class resource Algebra II class?
4. Will a growth mindset improve the attitude of the students involved in the study?

In these classrooms, most of the students benefited from the strategies that were used. More than half of the students decreased in off-task time after intervention and all of the strategies were found to be at least somewhat effective at improving student attitude in class. Two of the strategies, being praised for their efforts and embracing challenges, were found to be more effective at improving attitude than the others. A longer exposure to these strategies could offer more of an improvement for on-task time.

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