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## Mindfulness & Mindset: The Winning Combination? The Exploration of The unSTUCK Method® on Developmental Math Students: A Mixed Methods Study

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EXPLORATION OF THE UNSTUCK METHOD®

**Mindfulness & Mindset: The Winning Combination?**  
**The Exploration of The unSTUCK Method® on Developmental Math Students:**  
**A Mixed Methods Study**  
**Arcadia University**  
**Ed.D. Program in Educational Leadership**

**Edite L. Birnbaum**

**A DISSERTATION**  
**IN**  
**EDUCATION**

**Presented to the Faculty of Arcadia University in Partial Fulfillment of the Requirements**  
**for the Degree of Doctor of Education**

**2021**

### Abstract

Many students enter colleges having to take non-credit-bearing courses, and many do not pass these courses due to numerous factors, including anxiety and stress, especially in mathematics. Current literature shows how mindfulness-based interventions (Bamber, & Schneider, 2016; Dvořáková et al., 2017; Hidman, 2013; Miller et al. 2019; Regehr et al., 2013) and a growth mindset (Blackwell et al., 2007; Boaler et al., 2018; May, 2009) have a positive effect on student stress, anxiety, and academic success. This mixed-method study focused on the unSTUCK strategy's impact, a mindfulness-inspired tool, on foundation math students. The unSTUCK strategy is a mindfulness-inspired program. The study included two weekly discussions, one focused on mathematical mindset videos and the other centered on the unSTUCK strategy. The unSTUCK strategy included 1-5 minutes of a mindfulness-inspired practice followed by a brief moment of reflection on thoughts and working through different perspectives that may help change mindsets surrounding emotional moments in the students' lives. This mixed-methods study aims to implement the unSTUCK strategy in the Elementary Algebra foundational mathematics courses at a local community college to increase student academic success and retention, ergo, improving graduation rates and overall student well-being. Few studies combine mindfulness and its effects on reducing student anxiety in conjunction with changing students' math perspective, mindset, and their combined effect on students' academic success. This mixed-method study focused on: Does changing a student's mindset and decreasing anxiety through a mindfully-inspired tool, help students become more successful in their foundational math courses? This study aspires to fill the gap in research to determine if a mindfulness-inspired intervention will affect students' anxiety and mindset, and subsequently

increase the academic success of foundational math students, and in turn, increase passing rates and student retention.

The results from this study revealed that over 90% of the students found the unSTUCK strategy beneficial and more than 66% transferred the tools they learned with the strategy to other areas of their lives. Additionally, the findings showed a 4% decrease in general anxiety levels, a 7% increase in pass rates, an 11% increase in final exam grades, and a 4% increase in final course grades as compared to previous years' data. However, no conclusions could be drawn surrounding the unSTUCK strategy and its effect on students' mindset.

*Keywords: academic outcomes, academic achievement, anxiety, college student, developmental math, foundational math, growth mindset, math, mathematics, mindfulness, mindfulness informed, mindfulness based intervention, mindset, mixed methods, pass rates, remedial math, student retention*

**Signature Page**

Approved and recommended for acceptance as a dissertation in partial fulfillment of the requirements of Doctor of Education.

May 13, 2021

Special committee directing the doctoral work of

*Edite Birnbaum*

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*Dr. Christina Ager, Chair*

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*Dr. Mary Anne Celenza, Committee Member*

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*Dr. Albert Morales, Committee Member*

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### **Dedication**

Earning a doctorate degree and completing a dissertation is a long, arduous process - it takes sacrifice, compromise, understanding, teamwork and most importantly love. It is not something that can be done alone, it is a team effort. I dedicate this dissertation to the best team ever, my family. My husband, Mark, son, Zachary and daughter, Eliana, for putting up with an absentee wife and mother for the past four years.

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*Victor Frankel: "Between stimulus and response there is a space, in that space lies our freedom and power to choose our response; in our response lies our growth and freedom."*

*(Man's Search For Meaning)*

## Chapter 1

### Background of Study

Today, over 20 million students in the U.S. are enrolled in public and private colleges, of which 4.25 million are entering as freshman, and approximately 1.7 million are required to take some sort of remediation in math and writing (Completercollege.org, 2020; Duffin, 2019; Jones et al., 2012). This is important because these classes are non-credit-bearing courses. Additionally, they are a tremendous barrier for students pursuing STEM, business, health, or professional fields (Frost & Dreher, 2017). According to Bettinger et al., 2013, "the total cost of delivering remediation nationwide during the 2007–08 school year was \$3.6 billion in the form of direct costs both to students (for example, tuition) and to institutions (for example, instructional costs)" (p. 96). Moreover, "students who start in remedial coursework often do not complete a baccalaureate degree, citing extra courses, time, and money as reasons contributing to non-completion" (Tierney & Garcia, 2008, p. 2).

To address the country's stagnated rate of college completion, President Obama introduced the American Graduation Initiative in 2009 "to provide a 10-year \$12 billion investment in community colleges in order to boost enrollment and graduation" (Castro, Bragg, Khan, Baber, & Common, 2010, p. 1). In addition, federal, state, and local legislators,

philanthropic individuals, and foundations continue to research ways to minimize the causes of students being placed into developmental courses at the college level.

At the secondary level (grades 6 -12), P-16 (preschool - bachelor's degree) initiatives were started in many states to help smooth the transition between different levels of education, including the transition from high school to college and the workforce (Chamberlin & Plucker, 2008). These initiatives were designed to help smooth students' transition from preschool through college completion. Part of the P-16 initiatives related to higher education help expedite students to college-level credit-bearing classes, including compressed classes, paired courses, curricular redesign, boot camps, summer bridge programs, and mainstreaming (Edgecombe, 2011). Unfortunately, these initiatives were insufficient. More students are being placed in developmental courses today than in previous years, approximately 30% of freshmen enrolled in remedial courses in 1989 (NCES, 1995) compared to 43% in 2014 (NCES, 2018).

Many factors contribute to students being ready and successful in college, especially in mathematics. According to Conley (2007), "college readiness is a multi-faceted concept comprising numerous variables that include factors both internal and external to the school environment" (p. 12). Conley (2007) argues that there are four critical interconnected components to college readiness: habits of mind, key content, academic behaviors, and contextual skills and awareness. Most of the higher education initiatives described above address students' key content knowledge; however, they do not address the students' habits of mind, mindset, anxiety levels, or external obstacles students face, which could contribute to the students' lack of success.

A problem that exists is students entering colleges and universities having to take non-credit-bearing courses, and many do not pass due to numerous factors, including anxiety, stress, and other obstacles. It was reported as early as 1972 that “mathematics anxiety may prevent a student from passing fundamental mathematics courses or prevent his pursuing advanced courses in mathematics or the sciences” (Richardson & Suinn, 1972, p. 551).

### *Anxiety/Math Anxiety/Stress*

The American Psychology Association defines anxiety as “an emotion characterized by feelings of tension, worried thoughts, and physical changes like increased blood pressure. People with anxiety disorders usually have recurring intrusive thoughts or concerns. They may avoid certain situations out of worry” (APA Search Results, 2020). Math and test anxiety are just two subcategories of anxiety that affect students’ performance in math class. According to Richardson & Suinn (1972), this anxiety “involves feelings of tension and anxiety that interfere with the manipulation of numbers and the solving of mathematical problems in a wide variety of ordinary life and academic situations” (p. 551). Brady, 2018, defines test anxiety as “feelings of heightened physiological arousal or emotional activation” that occurs involving testing situations (Brady et al., 2018, p. 396).

According to the Center for Collegiate Mental Health 2019 annual report, between fall 2009 and spring 2016, the counseling center usage “increased by an average of 30-40%, while enrollment increased by only 5%” (p. 4). Additionally, over the past eight years, average rates of anxiety and depression have increased, and generalized anxiety, depression, and stress continue to be of top concern among students. It is prudent for universities to implement “preventative interventions that have the potential to reach larger groups of students and not merely rely on individual counseling services to meet student needs” due to the increased number of stress and

other mental health problems that are occurring in colleges (Regeher et al., 2013, p. 2). The impact of these additional interventions that help to reduce student stress and anxiety will benefit “not only individual students but have the potential to provide wide-spread benefits to universities in terms of both enhancing student experience and reducing health service costs resulting from student mental health problems” (p. 10).

Colleges are also struggling with student retention, especially of students enrolled in developmental math courses. A majority of those students must take these courses more than once, which interferes with their ability to complete the required course to graduate and affects their financial situation. Ashcraft & Krause (2007) propose that “math anxiety leads to a global avoidance pattern—whenever possible, students avoid taking math classes and avoid situations in which math will be necessary, including career paths” (p. 247). Benken et al. (2015) proposed that “math anxiety taxes and competes with resources that are normally used for working memory” (p. 16). They also contend, “student self-perception, confidence, attitudes, and beliefs, and anxiety are linked to persistence and motivation to study mathematics” (Benken et al., 2015, p. 15). This concept is reinforced by a study conducted by Ashcraft and Kirk (2001). They found that mathematics anxiety reduces “working memory capacity, ” which affects students’ math performance (p. 235).

### ***Growth Mindset***

Carol Dweck explains mindsets are “just beliefs...something in your mind” (Dweck, 2016). She continues to explain how people can have two different mindsets, especially surrounding intelligence and abilities, a growth or a fixed mindset. People with fixed mindsets believe that their traits are ‘fixed’ and can not be changed. People with a growth mindset (meaning they believe intelligence can be developed) understand that their abilities are malleable



and can be developed through effort. Numerous studies were conducted demonstrating the power of a growth mindset and its effect on student achievement. Students who have a growth mindset perform better academically (Blackwell et al., 2007). Boaler added to the body of literature regarding a growth mindset by showing how changing students' mathematical mindset helps in decreasing fears of math (Boaler et al., 2018). In Dana May's 2009 dissertation, she states that "the most severe consequence of mathematics anxiety is a decreased level of achievement" (p. 9).

Because instructors are instrumental in supporting their students, they should use pedagogy that helps students gain "a growth mindset and positive views toward learning mathematics" (Benken et al., 2015, p. 21). This will help students change their beliefs about their abilities and subsequently change their failures to successes (Dweck, 2006).

### ***Mindfulness & Mindfulness-Based Interventions***

Since early 2000, mindfulness research has grown exponentially; in fact, according to the American Mindfulness Research Association (AMRA), 842 articles related to mindfulness were published in 2018 alone. A plethora of studies and two key meta-analyses have been conducted that support how mindfulness interventions effectively reduce stress in students (Regehr et al., 2013; González-Valero et al., 2019). As defined by Jon Kabat-Zinn, mindfulness is "paying attention in a particular way: on purpose, in the present moment, and non-judgmentally" (Kabat-Zinn, 2009, p. 4). Most mindfulness research is based on Kabat-Zinn's Mindfulness-Based Stress Reduction (MBSR) intervention or Mindfulness Meditation (MM), both of which include a forty-five-minute or longer mindfulness intervention, a more formal form of mindfulness practice. Shapiro (2009) also suggests that it is essential that researchers consider "not only quantity of practice time but also the quality of time spent in meditation" (p. 519).

**The unSTUCK Method®**

Mindfulness-based interventions (MBI) were found to help address student mindset, anxiety levels and better control emotions regarding students' external obstacles (Dvořáková, 2017, Langer, 2000, Regehr et al., 2013, Shapiro, 2011).

The unSTUCK Method®, a self-help tool created by Shira Gura in 2014, is a simple, step-by-step self-help tool that guides people to cope with and get through emotionally challenging situations. In 2016 Gura wrote, *Getting unSTUCK: 5 Simple Steps to Emotional Well-Being* (winner of the 2017 International Book Award in self-help). She is the host of the weekly *Living Deliberately Together* podcast, which has over 4000 downloads per month from listeners around the world. Gura is a well-being coach offering workshops, training, and retreats in the U.S. and Israel. For this study, The unSTUCK Method® will be referred to as the unSTUCK strategy.

It is the researchers' belief that the unSTUCK strategy is capable of what Shapiro et al. (2011) reported about MBIs that it could “provide students with additional skills for managing the stresses and challenges that students typically face, including the often competing demands of school and work, peer and family relationship issues, and existential questions related to identity formation and future life choices” (p. 516). The goal of the unSTUCK strategy is to increase academic success and student retention by introducing a brief MBI technique so that students may better manage stressful anxiety-inducing situations, change their mindset and perspective while encouraging the learning process in a nurturing, cohort environment (Dvořáková et al., 2017).

The unSTUCK strategy is a mindfulness-inspired program. The strategy includes 1-5 minutes of the mindfulness-inspired asynchronous video-led practice (which includes focusing on the breath and body scanning) followed by a brief moment of reflection on thoughts and working through different perspectives that may help change mindsets.

The study applied the definition of mindfulness by Kabat-Zinn in which he describes being present in the moment. This concept underlies Langer's Mindfulness theoretical framework, which refers to an “active process of noticing new things about the current context, other people, and the self” (Bercovitz et al., 2017, p. 194). Being present is essential to being able to notice new things. The unSTUCK strategy combines the beneficial effects of mindfulness with the positive effects of encouraging a growth mindset to help reduce student anxiety and increase their overall academic performance. This study's objective was to implement the unSTUCK strategy in the foundational or first-year mathematics courses at a local community college (MEZ) to increase student academic success and retention, ergo, increasing graduation rates and overall student well-being.

Few studies combine mindfulness and its effects on reducing student anxiety in conjunction with changing students' math perspective (mindset) and their combined effect on students' academic success. This mixed-method study focused on that missing piece: does changing a student's mindset and decreasing anxiety help students become more successful in their foundational math (FNMT) courses? The unSTUCK strategy uses mindfulness as a tool to help students change their mathematical mindset in order to impact their academic success.

The unSTUCK strategy was not intended to replicate or replace any mindfulness informed programs or MBI currently in use in schools and colleges. Instead, it is intended to

provide educators with a practical tool to help guide their students through frustrating and anxiety-producing moments to a place where the students can calmly look at new opportunities to succeed.

Due to the size and duration of the study, the results are not generalizable. Moreover, possible bias may exist as the study was conducted by the researcher, who believed the strategy would be effective. Reliability and variability may be reduced because there was a defined sample from one school and one instructor, and the survey used did not have established valid and reliable psychometric measures, which limited conclusions that could be drawn. Additional research would need to be conducted to determine whether the unSTUCK strategy affected students' grades and pass rates.

### **Definition of Terms**

As part of this study, the term foundational course was used to refer to the prerequisite courses students must take to register for college-level courses. Other terms for foundational are developmental or remedial courses; however, this study used the term foundational to refer to these classes. Student success was equated to student pass rates and final course grades. The students' student pass rate was determined by the students who earned a minimum of 50% on the final exam and whose overall final course score was greater than or equal to 70%. The unSTUCK Strategy was used in lieu of The unSTUCK Method® since the term method was used to refer to the study's methodology and to limit any confusion. The Cambridge Dictionary defines the term perception as “a belief or opinion, often held by many people and based on how things seem” (perception, 2021). For this study, perception refers to students' thoughts and feelings surrounding unSTUCK strategy.

## **Research Design**

The added value to conducting this mixed-method interventional study was the complementary and enhancement of data, and such an effort “enhances validity (of the study) by using different kinds of data to measure the same phenomenon” (Creamer, 2016, p. 29). The researcher hypothesized that the focus group would confirm and elaborate survey findings with respect to the students’ use of the strategies presented in the course and add additional information about reductions in anxiety levels as a result of the unSTUCK strategy. The focus group would also be used to gain additional and a more nuanced understanding of the students’ perception of the mindfulness-inspired strategies used in the course. Moreover, the focus group expanded on how the unSTUCK strategy affected student’s mindset in relation to students’ grades and retention. Both the qualitative and quantitative strands are interdependent, yet merging the findings from the focus group, and the results from all added a broader, more in-depth understanding of the impact the unSTUCK strategy may have had on MEZ College’s foundational students’ overall academic success.

## **Research Problem**

The current literature on the benefits of MBI on stress, anxiety, and academic performance of students supports the use of mindfulness-inspired interventions. Teaching students various mindfulness-inspired practices have demonstrated improved focus, decreased anxiety and stress, and increased academic performance. This phenomenon is prevalent in community colleges across the country. At MEZ college, more than 75% of students are placed in foundational, non-credited math classes. Currently, the passing rate for students enrolled in these classes was approximately 60%, which means less than half can not continue to the next level, requiring additional monies and time and affecting students’ potential of earning a degree.

This is a problem for the students and the college, and there is a great interest among faculty and administration at community colleges to find ways to increase student retention and student success.

May (2009) asserts “little research has been conducted to show how college mathematics instructors can effectively provide positive mastery experiences in order to successfully raise their students’ mathematics self-efficacy” (p 58). She attests that “by studying and validating intervention techniques, researchers can provide instructors with effective methods to increase students’ learning and achievement in college mathematics courses” (p. 58).

This study aspired to fill the gap in research to determine if a mindfulness-inspired intervention would affect students’ anxiety and mindset and subsequently increase the academic success of foundational math students and, in turn, increase passing rates and student retention.

### **Context Study**

The study took place at a northeastern inner-city community college, where the researcher teaches foundational math courses.

### ***Setting***

The setting for the study was the main campus of a community college located in an urban mid-Atlantic region of the United States. Approximately 23,000 students enroll in the college annually, of which approximately 80% are minority students (Community College Website 2020). The college employs approximately 400 full-time and 800 part-time faculty members (R. Miller, personal communication, June 1, 2020). The foundational math department consists of 82 part-time and 12 full-time instructors. The Foundational Math (FNMT) department

has three levels of classes; Arithmetic (016), Elementary Algebra (017), and Intermediate Algebra (118).

### ***Participants***

Students enrolled in the researchers' six online sections of Arithmetic (016) Fall 2020 classes. These foundational mathematics classes included approximately 90 students in total. Over 60% were female, approximately 80% were minority students, and the median age was 23.

### ***Sampling/Data Analysis***

The data analysis portion of the study is sequential explanatory (QUAN → qual) using nested data. Analysis of data occurred at multiple levels of the study. First, the quantitative data from surveys were used to assess the overall change in students' anxiety levels and mindset. Baseline comparison of the researchers' previous years of grades and pass rate data were analyzed quantitatively to examine the effect of the unSTUCK strategy on student academic success. These results helped answer the first research question: How does the unSTUCK strategy affect students' feelings of anxiety and their mindset about math and course outcomes?

### **Research Design**

This pragmatic, mixed-methods study used an Enhancement/Complementarity design. The sample is a purposeful sample of convenience. By conducting a pragmatic mixed-method study, interpreting the data quantitatively and qualitatively, the researcher hoped to gain insights into the quality of the intervention, students' perceptions of the effect the unSTUCK strategy had on reducing their stress and anxiety, and its impact on their academic performance. The researcher hypothesized that at the end of the semester, there would be an advancement of student academic success and overall student well-being of foundational math students.

### **Rationale for and Significance of the Study**

The purpose of this mixed-methods study was to investigate the impact and perceptions of the unSTUCK strategy on pass rates of foundational math students (FNMT) at MEZ college. Through the study, the researcher hoped to discover how the unSTUCK strategy affected MEZ college foundational students' math success by lowering student math anxiety and changing students' math mindset through the use of a mindfulness-inspired tool. Numerous mindfulness-based intervention (MBI) studies, including meta-analyses and syntheses, have shown how MBI aid in the reduction of stress and anxiety and how it helps increase self-regulation skills and overall well-being (Dvořáková et al., 2017; Bamber & Schneider, 2016; Hindman, 2013; Miller et al. 2019; Regehr et al., 2013). Even with this data, little research has been conducted on MBI and its influence on students' academic performance (Bóo et al., 2019; Hall, 1999; Lin & Mai, 2018).

This study hoped to add to the growing body of academic literature demonstrating the positive effect MBI can have on student achievement and determine if the unSTUCK strategy aids in reducing student anxiety and stress. More importantly, the objective of the study was to determine whether the intervention helped increase student grades and pass rates in foundational math courses. The unSTUCK strategy is a mindfulness-inspired tool that helps students become aware of their emotional challenges and offers students alternative perspectives that may support their academic success and well-being through pausing and considering alternative perspectives. The researcher also hoped to ascertain when and how students would apply the strategy to other classes and other areas of their lives to increase student overall well-being, academic success, and retention. This integration was used to answer the final two mixed-method research questions:



The two mixed-method research questions are as follows:

1. How does the unSTUCK strategy affect students' feelings of anxiety and their mindset about math and course outcomes? (survey and focus group)
  - a. What are the students' perceptions of the unSTUCK strategy and its usefulness?
2. How does the use of the unSTUCK strategy affect pass rates and grades?
  - a. Does changing a student's mindset and decreasing anxiety help students become more successful in their foundational math (FNMT) courses?

## **Conclusion**

In summary, since we know that MBI and growth mindsets positively impact student academic success, the researcher proposed conducting a mix-method study focusing on the impact of the unSTUCK strategy, mindfulness-inspired intervention, on foundation math students.

## Chapter 2 - Literature Review

According to the Community College Research Center at Columbia University, in the fall of 2017, 34% of undergraduate students attended 2-year colleges in the United States. This equates to approximately 5.8 million students. Furthermore, “68 percent of those starting at public 2-year institutions ... took at least one remedial course during their enrollment between 2003 and 2009” (Chen, 2016, p. 5). Approximately half of all students who take remedial math courses in community colleges complete all necessary coursework—which means half do not graduate (Chen, 2016). In addition, there is a growing concern regarding the increase in mental health issues among students, which has adverse effects on students’ well-being and academic success (Miller, Borsatto & Al-Salom, 2019; Dvořáková, 2017; Galante et al., 2018; Parcover, 2018). This study focused on students’ use of the unSTUCK strategy, a mindfulness-inspired tool, to help reduce student stressors, anxieties, and worries over math performance, improving mindset, and increasing academic performance.

Many initiatives have been implemented to try to expedite students through these foundation courses. Some examples include compressed classes, paired courses, curricular redesign, boot camps, summer bridge programs, and mainstreaming (Edgecombe, 2011). Even with the various initiatives discussed above, there are many attributes associated with students completing coursework successfully. A meta-analysis conducted by Hattie 2015, shows that the most significant effect on student learning “is a function of what the student brings to the lecture room” (p. 87; which incorporates their knowledge, motivation, study habits, and purpose for learning. These attributes exemplify the current need for “specific skills [that are] fundamental to the learning process, e.g., concentration, attention, and open-mindedness,” all of which are developed through mindfulness (Shapiro et al., 2011, p.494). Hence, there has been a

tremendous interest in mindfulness-based interventions to help aid in students' "personal growth and well-being by cultivating awareness and insights" (Dvořáková et al., 2017, p. 259). Most importantly, there is the "urgent need for cost-efficient, short-term interventions at university and college counseling centers" (Parcover et al., 2018, p.312). According to Yusufov et al. (2019), there is a recent trend in education employing mindfulness techniques to help students manage stress and anxiety, aligning with the previously mentioned studies.

Kabat-Zinn (1990) contends that formal meditation practices (6 weeks or longer with mindfulness meditation that last between 45 minutes to 2 hours, with guided practice) are important to maintain the continued benefits of living mindfully: however, "if time spent formally meditating does not influence outcomes, mindfulness interventions could reduce the recommended practice time and thus potentially attract and retain individuals who might not be willing to meditate for 45 minutes daily" (Hindman, 2013, p.55). Although most mindfulness intervention research were based on formal interventions (45 minutes to 2 hours with guided practice), few have investigated shorter session times (Miller et al., 2019; Dvořáková et al., 2017; Regehr et al., 2013). Furthermore, Miller et al., 2019, found that smaller increments may be possible. They state:

Although some universities are now offering full courses in mindfulness and may provide access to students into time-intensive mindfulness-based interventions, adding small segments of content on mindfulness-based practices within pre-existing courses might also help students develop better and healthier coping strategies while they are taking required and elective courses. (p. 840)

Their study showed that with brief meditation interventions (of three minutes each session), students "reported increases in their positive emotionality and decreases in mind wandering and distractibility" (p. 844). However, the study also discusses that it is still uncertain whether these brief mindfulness practices are effective (Miller et al., 2019; Hindman, 2013; Hall, 1999).

### **College Students Anxiety & Stress**

The 2018 survey conducted by The Association for University and College Counseling Center Directors found that, of the 571 counseling center directors surveyed, the most common concern for students was anxiety (58.9%), followed by depression (48.0%) then stress (46.9%) (AUCCCD, 2016). Research has found that anxiety (Ashcraft & Moore, 2009; Gerwing, 2015; Hembree, 1990; May, 2009; Núñez-Peña, 2013) and stress (Mahfouz, 2018) negatively impact student academic performance.

#### ***Anxiety***

At times anxiety can be beneficial, as “anxiety is a normal reaction to stress” (American Psychiatric Association, 2020). However, anxiety becomes an issue when the individual experiences “persistent and excessive worry about a number of different things” (Anxiety and Depression Association of America, 2020). In a seminal study conducted by Eysenck et al., 2007, the negative effects of anxiety on working memory and performance were confirmed. It affects more than 25 million Americans (American Psychiatric Association, 2020), especially college students (AUCCCD, 2016). Although there are different types of anxiety that students can experience in the classroom, this paper focused on test anxiety and most specifically math anxiety.

#### **Test Anxiety**

Test anxiety is when an individual experiences “an unpleasant emotional state...which is manifest[ed] during formal evaluative situations” (Wren & Benson, 2004, p. 230). Test anxiety consists of two separate yet recognizable responses, “worry and emotionality” (Keogh et al., 2006). Test anxiety includes both worrying about performance and thoughts irrelevant to the test

(Wren & Benson, 2004). Emotionally, test anxiety refers to “feelings of heightened physiological arousal or emotional activation” (Brady et al., 2018). In a study conducted by Gerwing et al. (2015), approximately 40% of undergraduate students reported suffering from test anxiety and, interestingly, even quizzes (pop-quizzes) weighing as little as 1% of the student’s overall grade may cause detrimental anxiety (Khanna, 2015). According to a study conducted by Brady et al. (2018), worrying about achievement is what impacts academic performance, not the “bodily feeling of anxiety [emotionality]” (p. 395). These studies discuss how anxiety affects working memory and concentration to negatively impact student performance, and it may correlate to increased dropout rates among college students (Bamber, & Schneider, 2016; Beddoe & Murphy, 2004; Brady et al., 2018; Gerwing et al., 2015; Khanna, 2015).

### **Math Anxiety**

Ashcraft & Ridley (2005) define math anxiety as “a negative reaction to math and to mathematical situations” (p. 315). Math anxiety “involves feelings of tension and anxiety that interfere with the manipulation of numbers and the solving of mathematical problems in a wide variety of ordinary life and academic situations” (Richardson & Suinn, 1972, p. 551). The study also contends that “mathematics anxiety may prevent a student from passing fundamental mathematics courses or prevent his pursuing advanced courses in mathematics or the sciences” (Richardson & Suinn, 1972, p. 551). Ashcraft and Krause (2007) found that students with math anxiety “have a poor attitude about math” (p. 319), avoid taking math courses, “which ultimately undercuts their math competence and forecloses important career paths” (Ashcraft, 2002, p. 181) and avoid dealing with situations where math is needed. One of the reasons math anxiety affects students’ academic success is it “compromises the functioning of working memory when people do arithmetic and math” (Ashcraft & Krause, 2007, p. 243). Ashcraft & Krause (2007) also

found that “the higher one’s math anxiety, the lower one’s math learning, mastery, and motivation” (p. 245). Hembree (1990) found that math anxiety was at the highest level for foundational math students. Studies have shown students’ math anxiety and test anxiety contribute to their attitude towards math and their self-efficacy, which negatively impacts students’ achievement (Hembree, 1990; Higbee & Thomas, 1999; Khng, 2017; May, 2009).

### *Stress*

Many college students face numerous stressors such as grades, money issues, loneliness, hopelessness, relationships, and parental problems (Furr et al., 2011). Perhaps these stressors attribute to the high levels of health issues, “risk-taking behaviors and depression” (Hughes, 2005, p. 21). Furr (2011) goes on further to state:

Stress contributes to anxiety, which can, in turn, interfere with students' academic performance (by leading to the development of poor coping skills), mental health (by its association with depression, low self-esteem, and burnout), physical health (by running down the immune system and heightening blood pressure), health behavior (by rewarding short-term relief as opposed to long-term self-care), and interpersonal development (by impeding the development of intimate social relations). (p. 22)

Heightened stress and anxiety caused by educational experiences are known as academic stress (Stankovska, 2016). Furthermore, Keogh (2016) found that, although a “stress Management Intervention improved examination performance and general mental health, it did not affect test anxiety levels” (p. 353).

## **Mindfulness**

Mindfulness is becoming a global initiative. “In 2012, the Collaborative for Academic, Social and Emotional Learning in the USA allocated \$7 million to the development of a curriculum that promotes social-emotional learning” (Wickelgren, 2012). Waters et al. (2015) indicated that “over the past 10 years, youth-meditation programs have been developed in countries such as England (Mindfulness in Schools Project, DotB), United States (Learning2Breathe, Mindful Schools and MindUp), Canada (Mindful Education), Israel (The Mindfulness Language) and India (The Alice Project)” (p. 104). Therefore mindfulness programs are expected to continue to increase in schools (Walters et al., 2015). Additionally, there has been an increase in studies implementing online mindfulness-based interventions’ effects on student well-being, stress, and engagement (Dunn, 2019; Spijkerman et al., 2015).

Mindfulness is grounded in Buddhist meditation (Brown & Ryan, 2003; Lomas et al., 2017; Kabat-Zinn, 2003). Mindfulness was brought to North America through the work of Kabat-Zinn, “who harnessed it for an innovative ‘mindfulness-based stress reduction’ (MBSR) program...which was successfully used to treat chronic pain” (Lomas et al., 2017, p. 133). Issues arose with how the term mindfulness is being used. Lomas et al. (2017) states, “the term ‘mindfulness’ is frequently used to refer to both: “(1) a state or quality of mind; and (2) a form of meditation that enables one to cultivate this particular state/quality” (p. 133). Where most researchers would agree with mindfulness being a state of mind and an awareness of the present moment (Brown & Ryan, 2003, Lomas et al., 2017, Kabat-Zinn, 2003, Shapiro, 2013), the disagreement occurs with mindfulness being a form of meditation or whether meditation is the key practice needed to achieve mindfulness. Proponents of Kabat-Zinn agree that “self-discipline and regular practice are vital to developing the power of mindfulness” (Santorelli,

2014, p. 18). In contrast, Langer's work focuses on achieving mindfulness without using meditation in a process that notices new things in order to be present (Mindfulness Research | The Langer Mindfulness Institute, 2020). As stated by Shapiro et al. (2013), mindfulness "is more than meditation" (p. 374). Meditation is just one practice that helps someone live mindfully. Meditation encompasses or incorporates a "particular kind(s) of scaffolding to invite cultivation and sustaining of attention in a particular way(s)" (Kabat-Zinn, 2003, p.147).

As noted earlier, with the plethora of new research being conducted every day, there is controversy surrounding the use of mindfulness-based intervention. In order to maintain the fidelity and integrity of the intervention, "there is a need to re-clarify the core ingredients of mindfulness-based programs (MBP)" (Crane et al., 2017, p. 2). According to Crane et al., the following are the five essential elements that shape MBPs:

1. MBP is rooted in Buddhist psychology and is "grounded...evidence-based practice across a range of disciplines" (p. 3). The "original MBP (MBSR), was developed within a medical framework" (p. 3) and was developed to help "people with chronic health problems and those suffering from the mounting demands associated with psychological and emotional stress" (p. 3).
2. MPB helps alleviate stress and support mental well-being (Kabat-Zinn, 2013).
3. MBP aims to educate people "to recognize habitual, conditioned modes of reacting and make a radical shift in their relationship to their thoughts" (p. 4).
4. "Supports the development of greater attentional, emotional and behavioral self-regulation, as well as positive qualities such as compassion, wisdom, equanimity" (p. 5)
5. Finally, MBP engages in a formal practice of mindfulness. Although it may vary in duration of sessions and time commitments, formal practice averages about 8-week



sessions, where sessions range from 40 minutes to 2.5 hours. Additionally, “MBPs typically include mindfulness training via three formal mindfulness meditation practices – the body scan, mindful movement and sitting meditation” (p. 6).

Even though the unSTUCK strategy incorporates components two, three, and four, of the essential elements of MBP, by reducing stress, encouraging students to shift their focus, and investigate different perspectives to promote overall well-being, it is not based on science, nor does it engage in formal mindfulness practice. The researcher thereby acknowledges these differences along with the influence of mindfulness on the unSTUCK strategy itself.

Mindfulness-based interventions follow Kabat-Zinn’s model, which includes a minimum of 45 minutes of meditation. Since the strategy used in this study only employed a very brief form of meditation, the researcher determined it would be beneficial to categorize the unSTUCK strategy as a mindfulness-inspired intervention. Therefore, due to the variability and controversy surrounding the ways the label “mindfulness-based intervention” has been used and implemented, the researcher has decided to coin the unSTUCK strategy as a mindfulness-inspired intervention. One reason the label of mindfulness-inspired intervention is important to note is that in various meta-analyses, such as one conducted by Lomas et al. (2107), it was difficult to ascertain validity due to the range of psychometric scales, implementations of MBI, and length of interventions used across the studies tested. Bamber & Schneider, 2016, stated in their meta-analysis that “due to the limitations of these studies, these findings should be interpreted with caution” (p.6). An additional reason for utilizing this definition is that the researcher hopes to start delineating between MBI (where meditation is the core of the intervention) and similar strategies that are actually informed by the construct of mindfulness.

Researchers express how these differences can also be a benefit since “diversity of measures does allow us to discern nuances in the development of mindfulness” (Lomas, 2017, p. 135). It is equally important to note that all studies reviewed found positive effects of various mindfulness interventions on well-being (Galante et al., 2018), cognitive capacities (Lomas et al., 2017; Zenner et al., 2014), stress and anxiety (Bamber, & Schneider, 2016; Borquist-Conlon et al., 2019; Regehr, 2013) and academic outcomes (Boo et al., 2019).

### **Conceptual Framework**

This study will apply Kabat-Zinn’s definition of mindfulness in which the student “is paying attention on purpose, in the present moment, non-judgmentally” (Kabat-Zinn, 2013, p. 586), while applying Langer’s mindfulness theoretical framework. Langer’s mindfulness theory is less focused on meditation but rather argues that mindfulness is a change of perspective. She posits that this change in perspective helps students become more engaged in the task at hand, and encourages “the possibility and benefits of discerning alternative interpretations” (Langer & Moldoveanu, 2000, p. 14). Langer & Moldoveanu (2000) describe mindfulness as “drawing novel distinctions” that are new to the viewer (p. 1). Through Langer’s mindfulness lens, this process of “drawing novel distinctions” can lead to many outcomes including; (1) greater sensitivity to one’s environment, (2) more openness to new information, (3) the creation of new categories for structuring perception, and (4) enhanced awareness of multiple perspectives in problem-solving (p. 2).

In conjunction with Kabat-Zinn’s definition of mindfulness, this mindfulness framework is the foundation for the unSTUCK strategy. Langer found that whether someone intends to learn to play a new sport, an instrument, or an academic subject, mindfulness opens people up to new perspectives instead of holding on to mindsets that could hinder their learning. Langer’s

studies focus on the different effects of mindfulness versus mindlessness. She explains that when we act mindlessly, “we are stuck in a single, rigid perspective, and we are oblivious to alternative ways of knowing” (Langer, 2000, p. 1). In contrast, when we are engaged in mindful learning, we are actively “noticing new things and sensitive to context” (p. 1). Similarly, Kabat-Zinn states that “mindfulness provides a simple but powerful route for getting ourselves unstuck, [and] back into touch with our own wisdom & vitality” (Kabat-Zinn, 2009, p. 5).

### ***Benefits of Mindfulness***

Bennett et al. (2018) commented that “progression and retention of students in higher education are key outcome indicators and have important implications for both institutions and students” (p. 78). As noted earlier, mindfulness techniques have been shown to improve students well-being (Galante et al., 2018; Lomas et al., 2017), cognitive capacities (Zenner et al., 2014), stress, and anxiety (Bamber, & Schneider, 2016; Borquist-Conlon et al., 2019; Regehr et al., 2013) and academic outcomes (Boo et al., 2019; Walters et al., 2015). Therefore, mindfulness intervention may aid in the progression and retention of students. Furthermore, findings from this study add to the various options of interventions used by higher education faculty members. However, few studies implemented mindfulness intervention as part of the course curriculum. For many, it was an added time commitment for the students and their current class load. This additional time becomes an added burden for many students. The current strategy is meant to be executed as part of the course itself and can be added to any class regardless of the subject matter.

Walters et al. (2015) investigated different types of meditations that were used in schools and found:

Interventions with lower durations (<6 weeks) had a lower percentage of significant findings (10%; n=10) compared to interventions that lasted between 6 and 24 weeks (77%; n=9). Daily meditation sessions had a higher percentage of significant findings (55%; n=9) compared with weekly practice (12.5%; n=8). A larger number of significant effects were found on emotion regulation for middle-school students (71%; n=7) compared to high school students (10%; n=10). Studies with teacher-led meditation reported a higher percentage of significant improvements (66%; n=6) on emotion regulation compared to meditation run by external instructors (30%; n=13). (p. 128)

Bamber & Schneider's 2016 synthesis of 57 mindfulness-based interventions on college students' stress and anxiety levels found that "73% of the studies showed significant reductions in overall stress ... (that is) in reducing perceived stress in college students" (p. 6). The study also noted how mindfulness-based interventions could be used to aid in college transition and learning, especially since attrition is related to academic difficulties that are magnified by stress (Bamber & Schneider, 2016). Even though many studies have focused on the formal practice of mindfulness, the effectiveness of brief interventions, such as 5-minute breathing exercises, has also shown promising results with stress reduction (Hindman, 2013). As previously noted, various mindfulness intervention studies, including meta-analyses and syntheses, have shown how mindfulness-based interventions aid in the reductions of stress, anxiety and help increase self-regulation skills and overall well-being (Dvořáková et al., 2017; Bamber & Schneider, 2016; Hindman, 2013; Miller et al., 2019; Regehr et al., 2013). Most importantly, mindfulness was found to positively influence students' academic performance, through both interviews and statistical analysis (Bóo et al., 2019; Hall, 1999; Lin, & Mai, 2018). Shapiro et al. (2017) noticed that building on the three attributes of mindfulness (intention, attention, and non-judgmental awareness) "leads to a significant shift in perspective" or 'reperceiving' (p. 377). The process of reperceiving is key to the unSTUCK strategy.

## Mathematical Mindset

A mindset, simply put, is just a belief (Dweck, 2006). Self-efficacy beliefs (mindsets) “determine how people feel, think, motivate themselves, and behave” (Bandura, 1994, p. 1). Bandura (1994) explains that people with higher levels of self-efficacy “approach difficult tasks as challenges to be mastered” (p. 1), which is what Dweck (2006) coined a growth mindset. Dweck continues to explain how students have either a fixed mindset (believe skills are predetermined) or a growth mindset (believe skills can grow or change with effort) regarding specific abilities (subjects). This is reminiscent of the aforementioned ‘math anxiety’ students can develop when struggling with mathematical concepts, which is evidence of a fixed mindset. When students with a growth mindset do not succeed, they understand they need to put forth more effort and see their failure as an opportunity for growth (Bandura, 1994; Dweck, 2006). Bandura (1994) contends that higher self-efficacy “produces personal accomplishments, reduces stress and lowers vulnerability to depression” (p. 1). Dweck (2006) argues, students with little self-efficacy avoid difficult tasks and easily fall victim to stress and depression because “they view insufficient performance as deficient aptitude” (p. 1). Similarly, students with a fixed mindset avoid difficult tasks because they fear failure (Dweck, 2009). A groundbreaking study conducted by Blackwell et al. (2007) showed how students with a growth mindset outperformed students with a fixed mindset. Students learn best when they believe in themselves (Boaler, 2015).

Mathematical self-efficacy can be defined as “individuals’ beliefs or perceptions regarding their abilities in mathematics” (May, 2009, p. 1) or a mathematical mindset (Boaler, 2015). This self-efficacy is associated with students' mathematical success (May, 2009). Boaler (2002c) and Sun (2015) found that traditionally marginalized populations (e.g., low

socioeconomic status, females, African Americans) may be more susceptible to having a fixed mindset regarding their mathematical abilities; therefore, creating a growth mindset may be especially important. A study conducted by Altendroff (2012) revealed that females and lower-performing students have less confidence in their abilities and more of a fixed mindset than their male peers. In conjunction, African American academic success is at times negatively impacted by the negative effects of stereotypes (Steele & Aronson, 1995).

Several studies exist that exemplify the benefits of growth mindset interventions on student achievement. Aronson et al. (2002) contends that encouraging students to see their intelligence as malleable (growth mindset) had a positive effect on academic performance, engagement, and enjoyment in African American students more so than their White cohorts. A 2003 study by Good et al. researched the effects of “the expandable nature of intelligence” (p. 651) and “the tendency for all students to initially experience difficulty but then bounce back” in a rural middle school comprised predominantly low-income minority students. The results from this study showed “that females in both experimental conditions earned significantly higher math standardized test scores than females in the control condition. Similarly, the students—who were largely minority and low-income adolescents—in the experimental conditions earned significantly higher reading standardized test scores than students in the control condition” (p. 651).

Another study conducted by Blackwell et al. (2007), showed the effects of a mindset intervention on “relatively low-achieving” students whose math test scores were at the 35<sup>th</sup> percentile nationally, and 79% were eligible for free lunch. The study results not only showed an increase in math scores for the students in the experimental group, but also 27% of those students

expressed a positive change in motivation compared to only 9% of the students in the control group.

To summarize, “there is very compelling evidence that what a student thinks about intelligence can have a powerful effect on his or her achievement.” (Aronson et al., 2002, p. 115). That is, the positive effects of a growth mindset on student achievement are undeniable, and crucial to academic success for students of all ages, especially for students of marginalized groups.

### **unSTUCK**

The unSTUCK strategy was created by Shira Gura in 2014 to help individuals cope with and process through emotionally challenging situations. She later published her book, and her goal was to give people a step-by-step, easy-to-remember tool to help them readily implement the process in their lives (the mnemonic).

In many countries and in numerous schools, mindfulness-inspired programs have been implemented to increase students’ well-being, mental health, and academic success. However, few incorporate a structured program that combines mindfulness with a process that encourages a change in mindset. The unSTUCK strategy uses the mnemonic ‘STUCK’ to help students recall the steps needed to help guide them through the process of coping with thoughts and emotions when they are feeling ‘stuck’ (frustrated, anxious, disappointed, etc.) in a situation. The simple steps are as follows;

#### ***Stop***

The mini mindfulness-inspired moment when students can use various mindfulness-inspired techniques to help them refocus their attention to something in the present moment,

rather than staying stuck in the past or future story in their mind. They can use either breathing or listening mindfully or a body scan to help them regroup. Gura (personal communication, May 18, 2020) suggests redirecting one's attention to the breath is an efficient way to take a 'stop'.

### ***Tell***

This process enables the student to access and identify their emotions. It uses self-referencing that allows the student to shift their emotion off of themselves onto their feelings, such as changing their verbiage from, "I am so frustrated" to "I am stuck on frustration".

This (self-referencing) enables individuals to be more disengaged observers of their own selves, which fosters a greater sense of choice and regulation over thoughts, emotions, and behaviors with beneficial consequences for well-being and according to the perceptions of five of the students in this study, academic performance. (Boo, 2019, p. 11)

According to Meyers-Levy (1996), "research suggests that this process of relating information to oneself, known as self-reference, can have several salutary effects" such as improvement in working memory (p. 408).

### ***Uncover***

This step allows the student to identify their thoughts, analyze them, and any misconceptions they have regarding their emotions or thoughts. This step helps the students recognize how they are thinking and investigate whether their thinking is serving them or not. It also helps students uncover any limiting beliefs and misconceptions they may have about themselves, others, or circumstances outside of them (S. Gura, personal communication, May 18, 2020). Gura (personal communication, May 18, 2020) encourages people to phrase their



thinking by starting each sentence with, "I believe..." as a way to keep the mind open to the fact that what they are thinking maybe a belief and not necessarily a truth. For each uncovered belief, the student investigates whether or not that belief is beneficial and productive.

### ***Consider***

This step is where the change in mindset occurs. Here is where the student starts ‘considering’ alternate ideas and beliefs. Gura (personal communication, May 18, 2020) encourages the student to rephrase their thinking by starting off each new alternative idea with, "I can consider..." This phrasing helps the student stay open to what exists in the realm of possibility- if they cannot understand a math concept now, the student can consider the possibility that in time they will. "I can consider I do not understand this concept, yet!"

### ***Kindness***

This final step permits students the opportunity to show self-compassion by “being kind and understanding toward oneself in instances of pain or failure” (Shapiro et al., 2011, P. 509). Shapiro et al. (2011), continues to discuss the importance of self-compassion on “positive psychological features, including wisdom, personal initiative, curiosity and exploration, happiness, optimism” (p. 509).

Gura’s approach integrates the benefits of mindfulness-inspired techniques with the positive effects of a change of mindset. The more students master various mindfulness techniques, the greater the results. However, regardless of their daily practice, using the unSTUCK strategy offers a quick and easy tool to help students challenge unproductive beliefs and become more fully realized in numerous aspects of their lives, including but not limited to their mathematical mindset.

## Conclusion

Research shows “seventy-five percent of new students enrolling in two-year colleges must take one or more developmental mathematics courses, and approximately half of them do not pass each course they attempt” (Noel-Levitz Inc, 2006, p. 3). According to the National Center of Educational Statistics, in 2006-2007, approximately 6.2 million (or 35%) of all United States higher education students attended community colleges (Provasnik & Planty, 2008).

Several studies suggest that stress and anxiety adversely affect academic performance due to their effect on memory, concentration, and problem-solving (ACHANCHA, 2018; Bamber & Schneider, 2016; Beddoe & Murphy, 2004; Kang, 2009). Foundational math students have higher levels of anxiety (Hembree, 1990), and less than half of the students pass their foundational math courses (Noel-Levitz Inc, 2006). It has been shown that “higher mathematics anxiety [has] consistently related to lower math performance (Hembree, 1990, p. 38). Moreover, there is an inverse correlation between student anxiety and academic performance, as evidenced by student grades (Godbey & Courage, 1994). More importantly, “progression and retention of students in higher education are key outcome indicators [of a successful student body] and have important implications for both institutions and students” (Bennett et al., 2018, p. 78). Results from Khng, 2017, “suggest that taking deep breaths before a test can help reduce feelings of anxiety and enhance (math) performance” (p.1508). Furthermore, mindfulness programs produced the greatest reduction in students' stress and anxiety (González-Valero et al., 2019). Similarly, “incorporating mindfulness meditation into students' routines could...be a practical method of reducing levels of stress and anxiety to improving academic performance” (Bennett et al., 2018, p. 76). According to Baer (2019), “many describe mindfulness as a form of present-moment attention” (p. 42) “and, therefore, has the capacity to assist information recall

and working memory” (Bennett, 2018, p. 77). Bennett (2018) also established that “mindfulness improved academic performance and is purely a product of (i) cognitive enhancement (i.e., working memory, information recall, and attention) and (ii) personality and individual differences (such as resiliency and mindfulness)” (p. 76). Moreover, Shapiro et al. (2011) suggests that “mindfulness-based training may enhance students’ capacities to tolerate the stresses of higher education, reflected in self-reported decreases in stress, negative emotion, and other psychological symptoms” (p. 505). Research suggests that “mindfulness meditation may contribute to qualities that produce ‘well-rounded’ persons” (p. 509) since the practices focus on students changing their relationship with “contents of awareness (e.g., thoughts, feelings, sensations) rather than attempting to change or control the content itself” (p. 516). In a similar manner, numerous studies reveal the advantages of students adopting a growth mindset (Blackwell et al., 2007; Dweck, 2006). A mathematical growth mindset would emphasize connections that form when students make mistakes and discuss that speed is not important in math and how some of the greatest mathematicians were slow and deep thinkers (Baoler, 2015).

These findings lay the foundation that supports the hypothesis that the unSTUCK strategy will reduce student anxiety and stress for foundational math students’ consequently improving student performance. Emotions and stress are intermingled with most of our emotions auto responsive to our environment and subconsciously triggered by different events that occur during our day-to-day transactions (Eckman, 2014). We continually scan our environments for anything out of the ordinary and what we may perceive as harmful or dangerous. We make immediate, usually unconscious appraisals of the situation and at times become overly emotional and react in a way we may later regret. To lessen our emotional reaction, we must ‘stop’ and appraise our situation (‘tell’- the ‘T’ of unSTUCK), then reappraise it to determine if our emotional response

is appropriate ('consider' - the 'C' of unSTUCK). Finally, it is important to act in kindness, forgive ourselves if we were unable to reappraise our emotional reaction in a timely manner, and therefore regret our reactions (Shapiro, 2011).

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### Chapter 3 - Research Design/Methodology

This study focused on helping foundational math students (FNMT) reduce their math anxiety and stress through the use of the unSTUCK strategy. The unSTUCK strategy, which is grounded in mindfulness, uses a brief mindfulness technique to help students change their mindset centered around their unproductive behaviors and thoughts in hopes of increasing their academic success and overall well-being. The study employed Langer's (1989) theoretical framework of mindfulness theory while utilizing Jon Kabat-Zinn's definition of mindfulness. The researcher hoped to help retain FNMT students at a community college by incorporating the unSTUCK strategy into their foundational math courses; this process used mindfulness to help reduce students' stress and math anxiety and assist them in transitioning from a fixed mindset to a growth mindset.

The added value to conducting this mixed-method interventional study is the triangulation and enhancement of the data. Such an effort "enhances validity (of the study) by using different kinds of data to measure the same phenomenon" (Creamer, 2017, p. 29). The researcher surmised that the focus group would confirm and elaborate survey findings with respect to the students' anxiety level. Additionally, the focus group expanded on how the unSTUCK strategy affected students' mindsets in relation to students' grades and retention. Both strands of research were interdependent, yet merging the findings added a broader, more in-depth understanding of the impact of the unSTUCK strategy on MEZ's FNMT students' overall academic success.

The two mixed-method research questions are as follows:

- 1) How does the unSTUCK strategy affect students' feelings of anxiety and their mindset about math and course outcomes? (survey and focus group)
  - i) What are the students' perceptions of the unSTUCK strategy and its usefulness?
- 2) How does the use of the unSTUCK strategy affect pass rates and grades?
  - i) Does changing a student's mindset and decreasing anxiety help students become more successful in their foundational math (FNMT) courses?

## **Methodology**

In *An Introduction to Fully Integrated Mixed Methods Research*, Creamer (2017) explains fully integrated mixed-method studies "weave together qualitative and quantitative strategies throughout each of the five phases or stages of a study," referring to the design of the study, data collection, sampling, analysis and "drawing inferences"(p. 12 ). The inferences are the overall conclusions derived from analysis from all data gathered. The researcher will elaborate on how this mixed-methods study endeavored to accomplish full integration below.

This study took a pragmatic mixed-method approach to help determine if the mindfulness-inspired unSTUCK strategy can help increase the pass rates and retention of foundational math students in an inner-city community college. The hallmark of a mixed-method design is "that the discussion of the results and conclusions...are highly intertwined" (Creamer, 2017, p. 183).

**Paradigm**

The philosophical assumption driving this study is that a pragmatic study intends to produce “something that will be both practical and useful” (Creamer, 2017, p. 46). This pragmatic study applied the paradigm of dialectical pluralism, which values multiple data and perspectives that includes data from surveys, focus groups, grades, and pass rates (Creamer, 2017). According to Creswell (2013), pragmatic studies are practical, and the research reflects on “both deductive and inductive evidence” (p. 37). It values both the researchers’ and participants’ viewpoints and incorporates multiple data sources as part of the analysis. The study aimed to examine the effect of the unSTUCK strategy, which is grounded in mindfulness and cognitive-behavioral practices, on students’ math anxiety, stress, and math mindset to increase their academic success.

**Purpose/Rationale**

The purpose of this study was to investigate the reduction of anxiety, create a growth mindset, and improve academic performance in college Foundational math students as a result of using the unSTUCK strategy, a mindfulness-inspired technique. The unSTUCK strategy provided a tool for students to use when they felt anxious or overwhelmed. unSTUCK was introduced during the foundational mathematics classes at an urban community college. The researcher hoped that students would not only use the unSTUCK strategy in their math course, reducing anxiety, changing mindset, and improving academic performance, but would also incorporate it into other settings, academic subjects, or stressful life situations. The desire was for students to reap positive benefits and learn to generalize the results.

## **Research Design**

The design of a study “refers to a thoughtfully constructed link between the purpose of the study and the strategies used to implement it” (Creamer, 2017, p. 59). As Creamer describes, the design encompasses the priority of the study and the timing of data collection. The design of this study was a sequential explanatory one, with priority given to the quantitative strand.

## ***Mixed-Method***

The hallmark of a mixed-method design is “that the discussion of the results and conclusions...are highly intertwined” (Creamer, 2017, p. 183). The quantitative analysis of the surveys “aim[s] to predict wide patterns and changes in... phenomena” (Mason, 2006, p. 16), while the qualitative focus groups add a “richness and nuance [to the] data and understanding” of the results (Mason, 2006, p. 22). Hence, the study aimed not only to determine if the unSTUCK strategy helps reduce student anxiety and increase student success rates but also to ascertain when and how students applied it to other classes and other areas of their lives. This integration will be used to answer the two mixed-method research questions are as follows:

- 1) How does the unSTUCK strategy affect students’ feelings of anxiety and their mindset about math and course outcomes? (survey and focus groups)
  - a) What are the students’ perceptions of the unSTUCK strategy and its usefulness?
- 2) How does the use of the unSTUCK strategy affect pass rates and grades?
  - a) Does changing a student’s mindset and decreasing anxiety help students become more successful in their foundational math (FNMT) courses?



**Setting**

The study took place in a large urban community college located in the United States' north-eastern region. More than 27,000 students take both credit and non-credit classes at the community college, and at least 60% are age 24 or older. The student body comprised a diverse group of students--40% African-American, 20% White, 15%, Hispanic/Latino, 10% Asian/Pacific Islander, and 10% Other (Community College Key Facts website, 2020).

The community college was selected for convenience to save the researcher time and effort (Marshal & Rossman, 2011), since it is where the researcher is currently employed as a Foundational Math Associate Professor. This study included six of the Arithmetic classes. These courses were taught online due to the current Covid-19 situation.

**Participant Selection*****Student Participants***

Of 112 students only 50 students completed both the pre- & post-survey and the unTSUCK survey. The researcher referred to these students as 'student participants'. Responses from the 50 students that completed the unSTUCK survey, were not necessarily the same 50 students who completed the pre- and post-survey.

***Class Participants***

By the end of the semester, the researcher had a total of 93 students in her Arithmetic classes. The researcher referred to these students as 'class participants'

***Study Participants***

The consent email was sent out to all students (n=112) who enrolled in the researchers' Fall 2020 Arithmetic classes. Of the 112 students, 9% (n=10) students responded to the consent

email. Four students did not complete either the consent form or the surveys, and two students were under the age of 18. Thus, these six participants were excluded, and the remaining four students' data was incorporated into the study analysis. The researcher referred to these students as 'study participants'. Only three (3%) of the students joined the focus group, referred to as the focus group participants.

### **Consent and Confidentiality**

An invitation to participate in the study was emailed to all of the researchers' students at the end of the semester after grades had been posted (Appendix B). The invitation included the details and explanation of the study, participant's rights, and information on how to contact the researcher. The invitation included an invitation to participate in the focus group. The students were also told that they may terminate participation at any time, without any repercussions. Students were asked to verify their age (that they are 18 years or older), their student number, and consent to have their data included in the study for: 1) pre and post surveys; 2) the unSTUCK survey, and 3) grades. Students who are not 18 or older were thanked for their willingness and exited from the invitation.

During the course of the semester, the students were prompted to give their student J-numbers for each assignment that was intended to be used as data. Each designated assignment was inserted into the Canvas course using a Qualtrics link provided by Arcadia University. Any student who did not consent to their data being used or that was not 18 years old, did NOT have their data included for analysis purposes.

The researcher did not capture names during focus groups or use any names in her reports, therefore confidentiality will be maintained. The researcher notified all participants that all data will be anonymous and confidential and that she does intend to publish her findings and

share her findings with the college faculty and administration to share the efficacy of the unSTUCK strategy.

IRB approval was obtained from both MEZ and Arcadia's IRB committees before the study was conducted.

### **Methods of the Study**

This study's theoretical framework was partially based on Kabat-Zinn's (Mindfulness-Based Stress Reduction) MBSR intervention. The unSTUCK strategy encourages a brief stop to minimize time spent on material outside of the content area, unlike the formal mindfulness-based interventions followed by Kabat-Zinn's model, which includes a minimum of 45 minutes of meditation. Since the classes were online, the students decided how much time they wished to allocate to the strategy. Additionally, a separate mindfulness module was added that included a brief mindfulness audio, video, or phone app for students to utilize at their discretion to enhance their 'stop' and increase the validity of the mindfulness portion of the unSTUCK tool.

The first week's module contained a video overview of the strategy. It explained the benefits of the various mindfulness techniques students would be expected to do throughout the course and an eight-minute video by Dr. Boaler summarizing mathematical mindset. The researcher hoped the videos would increase student buy-in for the intervention. Week 2 through week 6 contained weekly discussions audio files focusing on each step of the unSTUCK strategy. This procedure allowed students to easily download the brief guide for easy accessibility, in addition to a weekly YouTube mindset video by Dr. Boaler, which focused on one mathematical mindset concept (such as, mindset & practice, speed, brain crossings, patterns, and mistakes). Weeks 7 -13 contained weekly discussion boards where the students could complete either the unSTUCK worksheet (a step-by-step guide through the practice) or a

FlipGrid (where students record a video of themselves going through the process). The discussion boards worksheet and FlipGrid were used as fidelity checks to ensure that the students utilized the strategy. An audio example created by the author of the strategy on how to work through the process was included to increase the process's validity and reliability. Each assignment (pre and post surveys, weekly unSTUCK worksheets, unSTUCK survey, unSTUCK discussions, and mindset discussions) was worth 10 points, graded for completion only. Cumulatively, all the points were included in the student's participation grade, which was 5% of their total grade.

Students completed the *Tell Me About Yourself* (pre-survey) during the first week of the course. During week 13, they completed the *How Are You Doing Now?* (post-survey) and finally, in week 14, they completed the *unSTUCK Survey*. All surveys were incorporated into the course shell and were a part of their weekly tasks. After all, grades were submitted at the end of the semester, an email was sent out to students for permission to use their surveys and grades for the study. Furthermore, the email asked if they would be interested in participating in focus groups to help the researcher gain a deeper understanding of the benefits or lack thereof of the unSTUCK tool used throughout the semester. A reminder text was sent a week after the initial email, and a final reminder was sent two weeks later. The recruitment email contained the consent language within it (Appendix B) and a place at the end for students to sign and provide consent. It was explained to them that their participation is entirely voluntary but was greatly appreciated.

## **Data Collection**

Greene et al. (1989) characterized five purposes for conducting a mixed-method design study; triangulation, complementarity, development, initiation, and expansion. The motives for conducting this mixed-methods study were; triangulation, enhancement of data, and evaluation (which was not included in Greene's typology), as noted in Creamer (2017).

First, triangulation of the data enhances validity by "using different types of data to measure the same phenomenon" (Creamer, 2017, p. 29). Second, the researcher hoped that the qualitative (focus groups) would compliment and enhance the finding from the quantitative data (surveys). As explained by Greene (1989), "in a complementarity mixed-methods study, qualitative and quantitative methods are used to measure overlapping but also different facets of a phenomenon, yielding an enriched, elaborated understanding of that phenomenon. This differs from the triangulation intent in that the logic of convergence requires that the different methods assess the same conceptual phenomenon" (p. 258).

### ***Timing for data collection***

This was a multi-phase study in which data was collected during phase one and phase two. After consultation with the Dean and researcher on the effectiveness of altering math mindset, it was decided this researcher would add pre-and post-surveys to measure math anxiety and mindset and to include mindfulness-inspired practices within the Foundational math curriculum. Initial assessment of students' mindset began in Spring 2018 and continued through Summer 2020. The inclusion of the mindfulness-inspired practices began in the Fall of 2020. If the study results were positive, the goal would be to encourage other instructors to add mindfulness and mindset into all Foundational mathematics courses across the department and

college. During phase one (Fall 2020), data from (Fall 2020) the unSTUCK intervention was administered to students, and comparison data of final exam grades and pass rates from the spring semester were collected and analyzed. The initial intention was to use pass rates and grades as a comparison. However, due to the Covid-19 situation and upon reflecting on the skewed grades and pass rates of the Spring 2020 semester, the researcher determined that using the mean of final course grades and pass rates from her previous years teaching would be a preferable baseline comparison than the Spring 2020 grades and pass rates.

During phase two, which was conducted in December 2020 after grades had been posted and the semester ended, pre- and post-surveys (quantitative) examining students' math anxiety levels and mindset were collected. Phase two had hoped to incorporate nested data sampling; however, due to the low number of participants, that was impossible. The researcher intended to have four targeted focus groups (qualitative), however, due to the low response rate, all students who agreed to participate in the focus group were included in the focus group. The intention of this focus group was to further expand on the impact of adding the unSTUCK strategy into the course curriculum. The focus group considered the different steps of the unSTUCK strategy and the impact of each step. One rationale for conducting a mixed-method study, as noted previously, according to Collins, Onwuegbuzie, & Sutton (2006), is to enhance the interpretation of the quantitative data, what they coined "significance enhancement", which was an objective of this study. One of the fundamental goals of this mixed-methods study was to evaluate the unSTUCK strategy and its effect on FNMT students' anxiety, mathematical mindset, and academic performance by gaining an understanding of students' perceptions and thoughts of the process.

Phase three, the final phase of the study, was conducted during January 2021. Final data analysis was conducted during that time; final exam grades, pass rates, and the pre and post-surveys were analyzed quantitatively. Focus groups and the unSTUCK survey were examined and analyzed. Finally, a synthesis of the results from both the qualitative and quantitative data was explained.

### ***Quantitative Data Collection***

As stated previously, qualitative data were collected using the *Tell Me About Yourself* (pre-survey), *How are you doing Now?* (post-surveys), which were administered the first week of class, and the *unSTUCK Feedback* survey, which was administered during the thirteenth week of class. Each survey was part of one of that week's assignments.

### ***Qualitative Data Collection***

The researcher conducted a semi-structured focus group following the established protocol. All students were invited to participate in the focus groups, however, ten students responded to the consent email. Four students did not complete either the consent form or the surveys, and two students were under the age of 18. Thus, these six participants were excluded, and the remaining four students' data was incorporated into the analysis.

The focus group was conducted via a Zoom meeting room approximately a week after grades were posted. In the proposed design, a \$25 gift card was intended to be raffled off to one participant in each class as an incentive to aid in increasing the number of participants. One \$25 gift card was intended to be offered for each of the six Arithmetic classes taught in Fall 2020; hence there was a total of 6 gift cards offered. The students were notified of their probability of winning in the video email sent to them after the semester was over. However, since only four

students participated in the focus group a \$25 Amazon gift certificate was sent to each participant. In order to limit perceived pressure students might feel with regard to whether their answers would potentially affect grading, the analysis did not begin until after the course had concluded and grades were posted. Students were invited to participate by email in a Zoom focus group. The Zoom meeting was recorded onto the researchers' personal computer, which is password protected.

### **Instruments**

In this study, five data collection instruments were used: (1) The *Tell Me About Yourself-pre* survey, (2) the *How Are You Doing Now?-post* (Appendix D) survey, (3) the unSTUCK survey, (4) focus group results, and (5) document reviews (final exam grades, course grades and pass-rates). Question one was answered by merging the data collected from the quantitative (pre- and post-survey) and qualitative (focus group) instruments. Question two was answered by examining the final exam grades, course grades, and pass-rates from the researchers Fall 2020 Arithmetic classes and comparing them with the researcher's past final exam grades, course grades, and pass-rates.

### ***Quantitative.***

To help answer research question one, two slightly different Likert scale surveys were administered at the beginning and end of each semester. The *Tell Me About Yourself-pre* survey and *How Are You Doing Now?-post* (Appendix D) surveys were created by the researcher. Both surveys also included a couple of open-ended questions. If a student submitted two of the same survey, the researcher only included the student's last survey as part of the analysis. An example of the difference between the two surveys is as follows:



***Tell Me About Yourself-pre***

*“I have a certain amount of intelligence, and I can't do much to change it.”*

*“I get nervous when I have to use mathematics outside of school.”*

***How are you doing now?-post***

*“Do you still hate mathematics?”*

*“I still get nervous when I have to use mathematics outside of school.”*

*“I have a certain amount of intelligence, and I still believe I can't do much to change it.”*

In addition, an unSTUCK survey (Appendix F) that was assigned during phase two of the study (after the unSTUCK strategy was introduced)

*“I have been more successful in this course since I used the unSTUCK strategy”*

*“The unSTUCK strategy help reduce my anxiety around math”*

*“The most helpful step in the unSTUCK strategy is...” Why?*

Even though these surveys lacked established valid and reliable psychometric measures, the researcher previously administered the survey to more than 100 students for feedback to help increase their validity. The surveys' questions were created by the researcher, and some of the questions were taken from the following sources:

- May, D. K. (2009). Mathematics self-efficacy and anxiety survey (Doctoral dissertation, University of Georgia).

- Johnston-Wilder, S., Brindley, J., & Dent, P. (2014). A survey of Mathematics Anxiety and Mathematical Resilience among existing apprentices. London: The Gatsby Foundation.
- Do You Have Math Anxiety? a self-test <http://www.mathpower.com/anxtest.htm>

### *Qualitative*

The qualitative data were collected via focus groups. There were only three students who participated in the focus group.

A focus group protocol (Appendix B) was developed and reviewed prior to conducting the focus groups. The researcher conducted a semi-structured focus group to allow for the flexibility of questions and additional questions to be added being conditional on the participants' responses. The researcher had specific questions to start but then followed up with additional questions to clarify or explore perceptions or themes that arose during the discussion. Focus groups enhanced the results from the surveys and allowed for greater insight as to what aspects or steps of the unSTUCK strategy were most beneficial and helped expand on the qualitative research question:

- What are foundational math students' perceptions of the effect of the unSTUCK strategy on their math anxiety levels and overall well-being?
- Which steps of the unSTUCK strategy were most impactful?
- How was the strategy used outside of students' math class?

## Data Analysis

This study incorporated blending and meta-inferences to enrich the findings. Creamer (2017) describes each of these terms as follows:

- Blending occurs when a theme “from one type of analysis is tested using another type of data” (p. 104).
  - Blending occurred after the quantitative results were analyzed and the focus group was conducted.
- Meta-inferences are inferences that link the inferences from both the qualitative and quantitative strands.
  - Linking the results from surveys, focus groups, and students’ grades enabled the researcher to evaluate the unSTUCK strategy's impact on students’ anxiety, mindset, and academic success.

The quantitative analysis of the surveys “aim[ed] to predict wide patterns and changes in... phenomena” (Mason, 2006, p. 16), while the qualitative focus group added a “richness and nuance [to the] data and understanding” of the results (Mason, 2006, p. 22).

## Role of the Researcher

According to research conducted by the U.S. Department of Education, approximately 34% of incoming Community College first-year students require some sort of remedial or developmental math course. As indicated earlier, at MEZ, more than three-fourths of students are placed in Foundational Math classes, and passing rates for those students average about

60%. Faculty and administration are constantly looking for ways of increasing student retention and success.

The researcher is a current faculty member at MEZ's Foundational Math Department and has been employed as an instructor for more than three years. She has also worked with developmental math students for over 15 years while working as an adjunct instructor for a university and community college in the greater Philadelphia area. Additionally, she has taught local Community College developmental math courses while working as a high school math teacher through their dual credit program. The researcher's experience reaffirms what research has already proven, that more than half of incoming first-year students require some sort of math remediation (National Center of Educational Statistics, 2004).

Conducting the study at MEZ was a setting of convenience, which provided easy access to the Foundational Math students needed for the study. First, being a faculty member awards the researcher easy access to the college. Second, as a Foundational Math assistant professor, the researcher was intrinsically interested in making students successful in these classes. The hope was to gain some knowledge that can be shared with colleagues, administration, and students to help more students complete the required non-credit courses more efficiently and effectively so they can concentrate on the courses they need for their major and graduate sooner. The drawback to researching her students is that the researcher carried predisposed biases. The researcher is "an instrument...using his or her personal experience in making interpretations" (Stake, 2010, p. 20). Hence, since the researcher practiced mindfulness and used the unSTUCK method, there is a preexisting inherent bias that the strategy would positively affect the students. To counteract these biases, the researcher was conscientious to maintain objectivity regarding any effects the intervention would have.

**Issues of Validity/Reliability (quantitative)**

As explained previously, the researcher constructed all surveys, and therefore the surveys do not have established valid and reliable psychometric measures, which limit conclusions that can be drawn. However, to increase validity and reliability, the researcher has administered the surveys to her fall 2019 and spring 2020 students, requested feedback, and made adjustments accordingly.

**Trustworthiness Criteria (Qualitative)**

The focus groups were recorded and transcribed through Zoom, analyzed, color-coded, and summarized. Subsequently, only the highlighted items were downloaded to a Word document and saved on the researchers' password-protected computer. No names were referred to when summarizing the data. To increase trustworthiness, the researcher used the following strategies outlined by Creswell (2009):

1. The researcher will triangulate themes from the focus groups with findings from the surveys
2. The researcher will use peer review and debriefing of the consent form and findings. The researcher recruited six former students to review and critique the consent email and video. Additionally, a member of her doctoral cohort will review her findings to corroborate her conclusions.
3. The researcher will present negative and discrepant information.
4. The researcher will clarify any possible bias she may have.

**Limitations of the Study**

Since the study was run at one site, analyzing one discipline and over one semester, results can not be generalized; however, they may be hypothesized to other disciplines or other locations. Moreover, given that the researcher conducted the review, who is the instructor of the course, possible bias may exist. The survey that was used was created by the researcher and will not have established valid and reliable psychometric measures, which limits conclusions that can be drawn.

**Summary**

The present study took a mixed-methods approach to answer the research questions; what are the effects and perspectives of the unSTUCK strategy on Foundational Math students' academic success and well-being. The study consisted of two parts, one analyzing quantitatively grades and pass-rates, followed by a qualitative exploration of perceptions of the intervention conducted via focus groups. The design of a study "refers to a thoughtfully constructed link between the purpose of the study and the strategies used to implement it" (Creamer, 2017, p. 59). As Creamer describes, the design encompassed the priority of the study and the timing of data collection.

The researcher conducted a multiphase mixed-method study with quantitative priority. The researcher used her previous year's Arithmetic courses as the comparison group. The same classes were taught during the Fall 2020 semester while the unSTUCK strategy was delivered. Qualitative data was collected from both the comparison and research study-group. Pre- and post-course surveys, to gain the level of student anxiety, stress, and mathematical mindset, were administered at the beginning and end of each semester. Priority

was given to the quantitative strand of this study (student grades, pass-rates, and surveys). The qualitative strand (focus group) was used to help triangulate data and enhance findings.

## Chapter 4 - Results

This chapter contains the results of a mixed-method study examining the relationship between the unSTUCK strategy and students' academic achievement in foundational math courses at MEZ college. The focus of this chapter is to answer the following mixed-method research questions:

1. How does the unSTUCK strategy affect students' feelings of anxiety and their mindset about math? (survey and focus groups)
  - a. What are the students' perceptions of the unSTUCK strategy and its usefulness?
2. Does changing a student's mindset and decreasing anxiety help students become more successful in their foundational math (FNMT) courses?
  - a. How does the use of the unSTUCK strategy affect pass rates and grades?

As indicated in Chapter Two, foundational math courses are required for students to earn their degrees if they do not test out of them. Unfortunately, many students who are placed in these non-credited courses suffer from math anxiety and low self-efficacy and struggle to pass their math courses. Mindfulness-based tools are shown to help in reducing student stress and anxiety and help to increase self-regulation skills and overall well-being (Bamber & Schneider, 2016; Dvořáková et al., 2017; Hindman, 2013; Miller et al., 2019; Regehr et al., 2013). Additionally, having a growth mindset helps increase academic success (Dweck, 2006).



The purpose of this mixed-method study was to investigate the impact and perceptions of the unSTUCK strategy on pass rates of foundational math students and its impact on students' anxiety and their mindset.

As part of the quantitative study, the researcher compared pre- and post-surveys that focused on student math anxiety and mindset. The *Tell Me About Yourself* pre-survey (Appendix D) was to be completed the first week of class, and the *How Are You Doing Now?* Post-survey (Appendix E) was completed during the final two weeks of the course. The answers were compared and analyzed, and summarized below.

## **Participants**

### ***Student Participants***

As part of the course assignments, 112 students were asked to participate in the pre- and post-surveys. Ninety-seven students completed the pre-survey, fifty-four students completed the post-survey, and of the students who completed the surveys, only 50 students completed both the pre- & post-survey. Only the students who completed both the pre- and post-survey were used for study analysis of class participants to answer research question one, *How does the unSTUCK strategy affect students' feelings of anxiety and their mindset about math?* To answer research question 1a, *What are the students' perceptions of the unSTUCK strategy and its usefulness?* The researcher used the responses from the 50 students that completed the unSTUCK survey, which were not necessarily the same 50 students who completed the pre- and post-survey.

### ***Class Participants***

For the pass rate and grade analysis, the researcher used the combined data from all six of the classes taught. By the end of the semester, the researcher had a total of 93 students in her Arithmetic classes.

### ***Study Participants***

The consent email was sent out to all students (n=112) who enrolled in the researchers' Fall 2020 Arithmetic classes. Of the 112 students, 9% (n=10) students responded to the consent email. Four students did not complete either the consent form or the surveys, and two students were under the age of 18. Thus, these six participants were excluded, and the remaining four students' data was incorporated into the study analysis.

### ***Focus Group Participants***

Three out of the four students who consented to participate in the study joined the focus group.

### **Research Question #1**

*How does the unSTUCK strategy affect students' feelings of anxiety and their mindset about math?* According to the data, the unSTUCK strategy lowered student anxiety and increased pass-rates, while students' mindsets were not shown to be affected. The researcher theorized that the lack of change in mindset was due to the timing of the pre-survey. Most students completed the pre-survey after they watched the introductory video on student mindset. The researcher speculates that watching the video prior to completing the survey may have impacted the students' answers to the mindset questions.

The researcher analyzed the unSTUCK survey and triangulated the data from the focus group (qualitative) and pre- and post-surveys (quantitative) to answer the first question. As part

of the student Week 1 coursework, 97 students completed the Tell Me About Yourself pre-survey. Fifty of the completed surveys met the criteria for analysis.

The 18-Item survey asked several questions relating to the students' mathematical mindset and their anxiety/feelings towards math. Responses were measured on a five-point Likert-scale from *strongly agree* (1) to *strongly disagree* (5). For each item, a mean and mode scale score was calculated. The survey items relating to student anxiety are presented first in Figure 4, followed by survey items relating to students' mindset.

### ***Students' Perceptions of the unSTUCK Strategy and Its Usefulness***

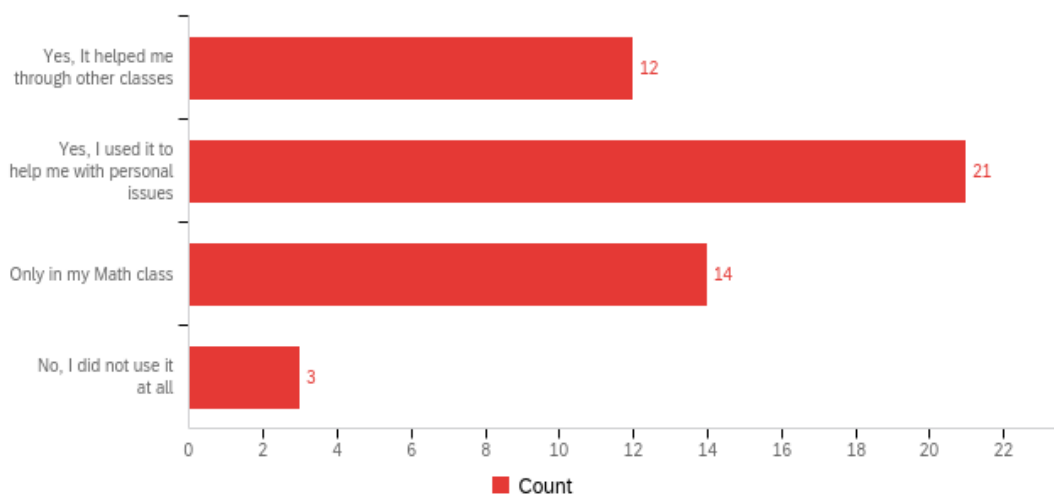
As reported by the results of the unSTUCK survey, over 90% (n=45) of students found the unSTUCK strategy beneficial (See Table 1). As represented in Figure 1, 66% (n=33) of the students used the strategy in other areas of their lives. This corroborates the findings from Table 1 that showed many of the students found the unSTUCK strategy beneficial. One of the focus group participant stated, "Yes, I feel less anxious, but at the beginning, I (just) felt confident", in response to item #16, which asked, *Do you feel less anxious now? Do you feel you learned to use tools to help you decrease your anxiety and stress in your Math class? Which tools did you find most helpful?* Consistent with the results from the student participants, the study participants expressed that the unSTUCK strategy was beneficial to their performance in the class and that they used it in other areas of their lives. The goal of the focus groups was to uncover student perceptions of the usefulness of the unSTUCK strategy for the purpose of triangulation (i.e., potential confirmation and enhancement of survey responses). These responses helped illuminate the answer to the research question, *What are the students' perceptions of the unSTUCK strategy and its usefulness?*

**Table 1***Question #4: Did You Feel The unSTUCK Strategy Was Beneficial?*

Answer	%	Count
Yes, very much so	32%	16
Yes a little	28%	14
Somewhat	30%	15
Not really	8%	4
Not at all	2%	1
Total	100%	50

**Figure 1**

*Item #5: Did You Use The unSTUCK Strategy In Other Areas Of Your Life Or In Other Courses?*



**Thoughts of the unSTUCK Method.** The researcher's first question during the focus group was, *What are your thoughts of the unSTUCK Method?* Mark shared, “I think it's amazing. Yeah, I use it with my kids, to be honest with you” (Mark, personal communication, January 5, 2021). Eli said, “Yes. I like it a lot, to be honest with you. And it's really, really helpful, especially with other class(es)... in my opinion, this strategy unSTUCK is very helpful. It helped me on ALEKS work” (Eli, personal communication, January 5, 2021). Lastly, Zach replied, “I think it was effective to an extent..and I didn't really use it in everyday life. I more so used to it and just like the math aspect of it. I think my favorite part of it was the considered part of the unSTUCK strategy... It helped me by just keeping me calm” (Zach, personal communication, January 5, 2021).

**Mindset Videos.** In response to the question, *Did you find the mindset videos helpful?* The students found the mindset videos helpful. One student commented that in one of the videos, Dr. Boaler discussed how some mathematicians were slow in math and eventually

earned doctoral degrees. This is reflected in Mark's response, "So I think, yeah, it's helpful because I think I trust myself and like (trust) a lot of like doctors or professor. They are really bad at math. And after that, they will be professors or something. So yeah, I think it's really helpful" (Mark, personal communication, January 5, 2021). Eli answered, "I constantly think about a problem, my brain gets bigger" (Eli, personal communication, January 5, 2021). This statement is from one of the mindset videos that discussed brain plasticity. Finally, Zach shared, "I did, they were interesting. I actually went back and looked at Google, some of the research behind them" (Mark, personal communication, January 5, 2021).

**Recommendation of the unSTUCK Method.** In response to the question, *Would you recommend the unSTUCK strategy to other people and why?* Zach answered, "I actually recommend it to somebody, honestly, someone at my job I recommended it to them because they have like anxiety and stuff so I've recommended it to her recommended the book" (Zach, personal communication, January 5, 2021).

### ***Students Feeling About Math, Decreasing Anxiety and Changing Student Mindset***

The researcher compared and analyzed anxiety level and student mindset from the pre-and post-surveys, to answer the first overarching research question, *How does the unSTUCK strategy affect students' feelings of anxiety and mindset?* Comparing the results of the pre and post-surveys provided insight into student self-reported anxiety and mathematical mindset.

This section will present the data from the pre-and post-surveys, followed by an analytical comparison of the two surveys to determine whether or not there was a change in student mindset towards math and student anxiety. The researcher used frequencies and descriptive statistics to describe the data and to explain the significance of the responses.

**Students Feeling About Math.** The question *How do you feel about math?* concentrated on students' feelings surrounding mathematics at the onset of the semester. Students selected a value from one to six on a Likert scale. The responses are listed below:

- 1- I hate it with every fiber of my being!
- 2 -I don't like it because I have struggled with math
- 3 -I'm indifferent towards math
- 4 -I like math
- 5- I LOVE MATH!!!
- 6- I'd rather not say

As indicated in Table 2, the pre-survey results showed 42% of the student participants selected they did not like math (2) at the beginning of the semester as opposed to the 34% who specified they liked (4) or loved math (5). Nevertheless, post-survey results showed 18% (n=9) of the student participants indicated they did not like math (2) at the end of the semester, which is a 57% decrease in students' negative feelings about math. Additionally, 46% of the student participants said they liked or loved math at the end of the semester, which is a 35% increase from the beginning of the semester.

**Table 2***How Do You Feel About Math? Student Participant Frequency Analysis*

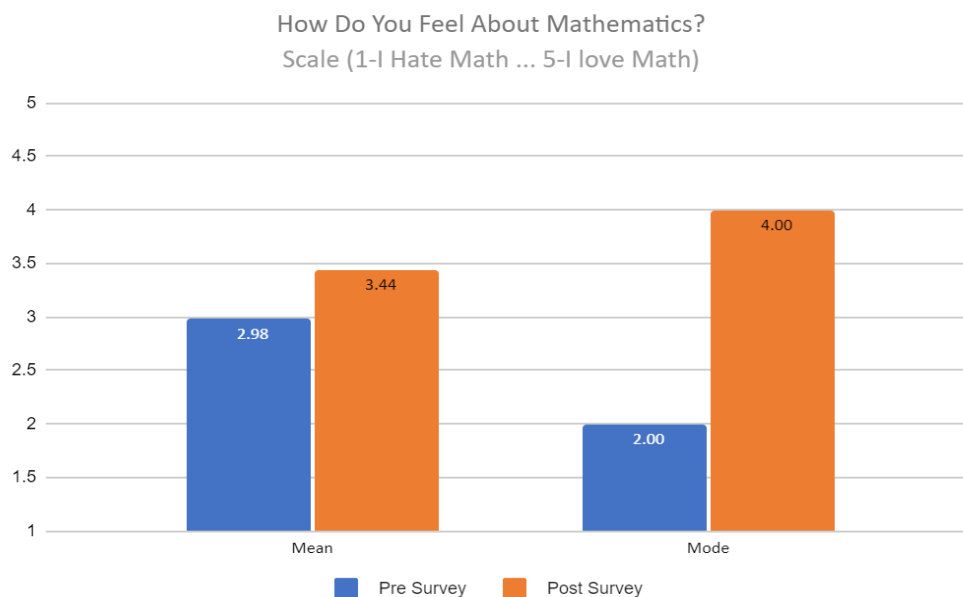
	Pre-Survey	Post-Survey		
	n	%	n	%
1- I hate it with every fiber of my being!	0	0%	0	0%
2 -I don't like it because I have struggled with math	21	42%	9	18%
3 -I'm indifferent towards math	12	24%	17	34%
4 -I like math	14	28%	18	36%
5- I LOVE MATH!!!	3	6%	5	10%
6- I'd rather not say	0	0	1	2%
Total	50	100%	50	100%

This can be further seen by comparing the mean of the modes from the pre- and post-survey for this question. Figure 2 summarizes the mean and mode of the student participants responses to this question and indicates the findings, showing how students' positive feelings around math grew over the course of the semester, where the mode changed from a two (I do not like math) to a four (I like math) by the end of the course. Unlike their classmates, study participant's feelings about math stayed consistent and did not change. Both the mean and the mode of the question, *How do you feel about math?* was a four, which indicates they liked math.



**Figure 2**

*Question #1: How Do You Feel About Mathematics? Student Participant Analysis*



**Student Anxiety.** Five items in the pre and post surveys focused on student anxiety:

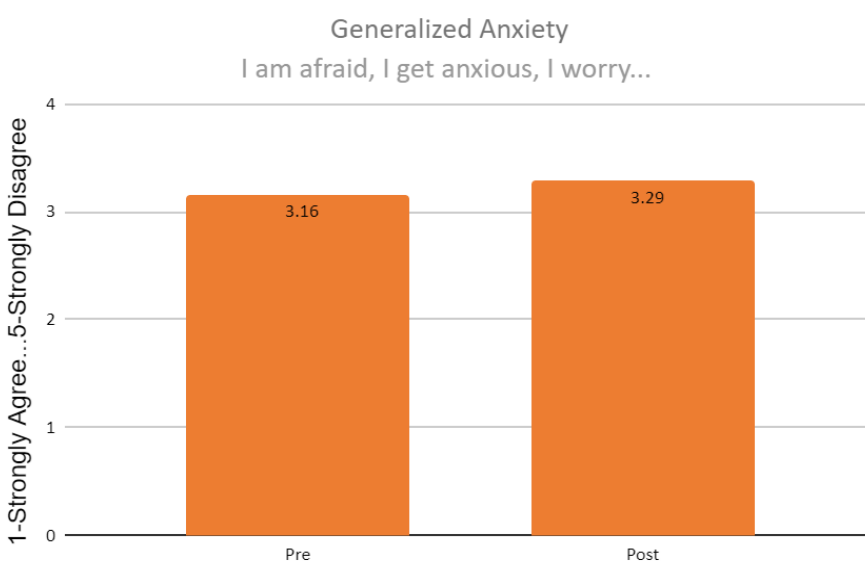
- I am afraid to ask questions in my math class
- I am anxious when mathematics instructors are lecturing.
- I get nervous when I have to use mathematics outside of school.
- I worry that I will have to use mathematics in my future career
- I usually don't worry about my ability to solve math problems

All items were answered using a 5-point Likert scale (1=strongly agree to 5= strongly disagree, 3 being neutral). It is important to note that the scale for item number five, *I usually don't worry about my ability to solve math problems*, is the opposite of the other three questions, therefore, it was hypothesized that the results would be inversely related. It is also important to note that the items were worded in such a way that affirms students' potential anxiety, therefore an increase in the results on the Likert scale would actually represent a decrease in anxiety.

A generalized anxiety score was calculated by adding the total responses from all five items, which directly focused on student anxiety, and dividing by the total data points. Figure 3 shows a 4% increase in the generalized anxiety for the student participants, which means that more students experienced a decrease in anxiety regarding math.

### Figure 3

#### *Student Participant Comparison of Generalized Anxiety Scores*



Note: Higher score reflects a decrease in anxiety.

These results corroborate the findings from Figure 4, which show a decrease in the mean scores of the student participants' anxiety levels for the different items. Three of the four items corroborated the decrease in student anxiety by showing an increase in the mean score. The results from the fifth item, *I don't worry about my ability to solve math problems*, show a decrease in the mean, which signifies that more students agreed with the statement, and therefore their anxiety level decreased. Only one item, *I am afraid to ask questions in my math class*, showed a decrease in the mean score, which denotes more students were afraid to ask questions

in their math class at the end of the semester. The decrease was likely due to something else and then codified through their responses. The three-student change is a 6% change in results, which the researcher contends is practically insignificant.

#### Figure 4

##### *Student Participants Anxiety Mean Analysis*

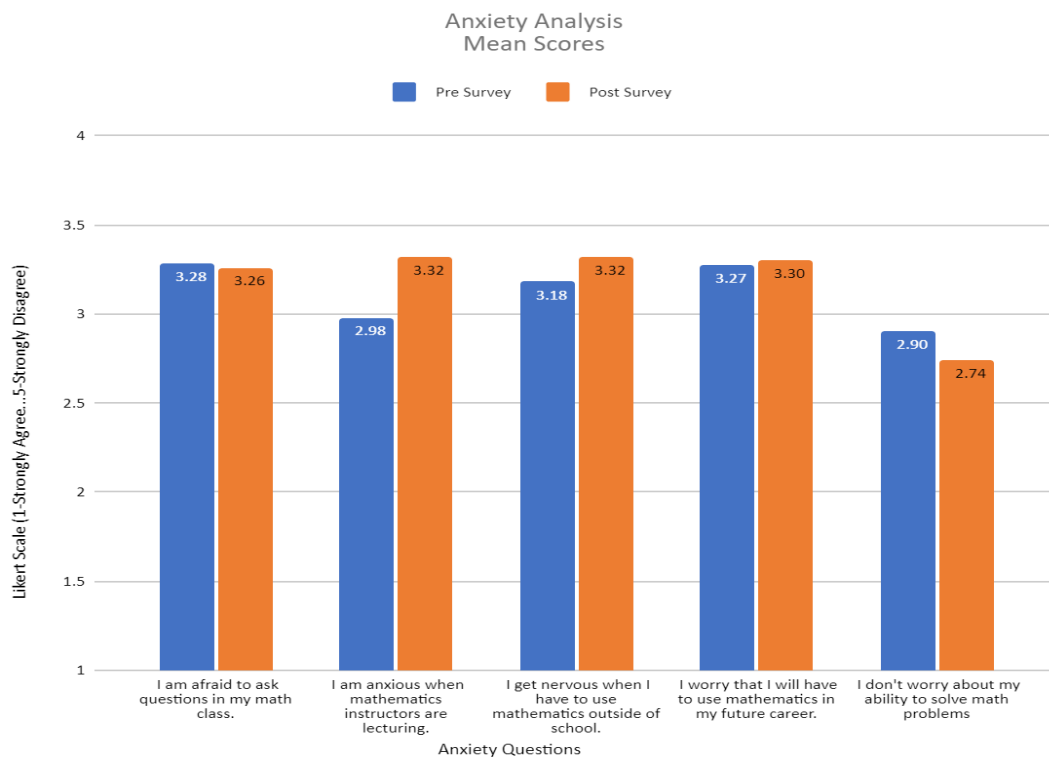


Figure 5 shows the study participants' detailed analysis for each anxiety item. A more detailed analysis will be described below. The generalized anxiety score for the four study participants increased from 3.45 at the beginning of the semester to 3.85 by the end of the semester. This increase reflects a reduction in their anxiety, as they disagreed with the statements that they 'worry' about math items. This finding was consistent with the class scores collected at the end of the semester.

In response to the item, “Is taking math courses affecting which major you choose?”, two students responded “Not at all” (4) one responded, “I never thought about it” (3), and the last student responded, it definitely did” (2). The student who responded, “It definitely did and still does” earned the top grade in the class. Additionally, this student expressed how much the unSTUCK strategy helped her and eliminated her math fears. During the focus group, she expressed how she now loves math.

### Figure 5

#### *Study Participant Anxiety Mean Analysis*

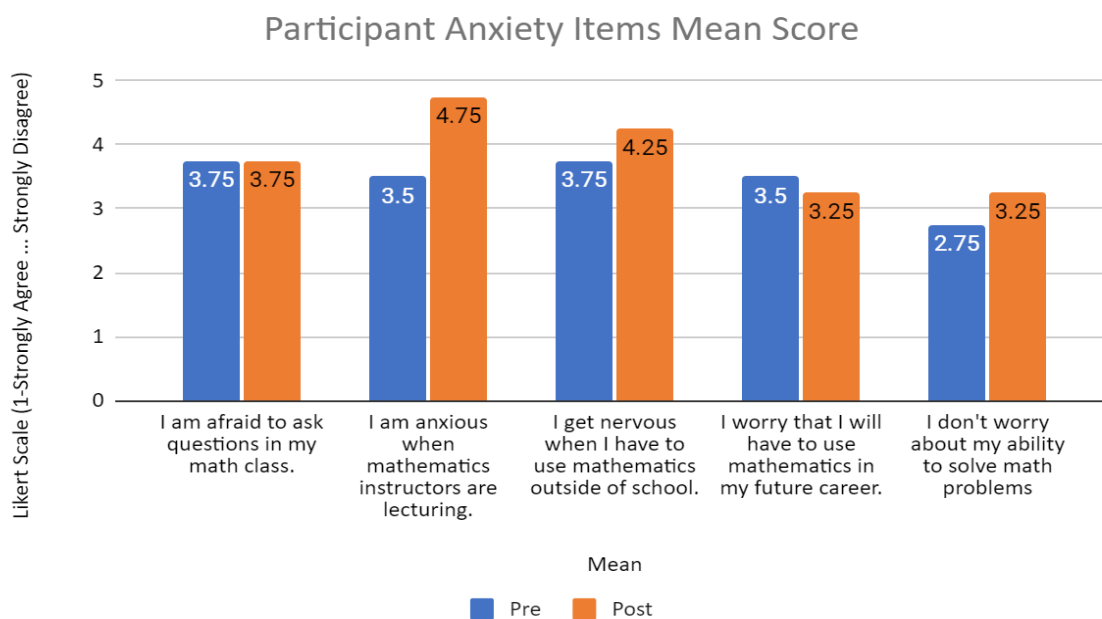


Figure 6 represents the mode for each item from the student participants' pre and post-surveys and Figure 7 represents the mode for each item for the study participants. Three out of the five items indicated most students' anxiety levels around math were unchanged and stayed fairly neutral. The other two had inconsistent results. Item three showed that more students expressed a decrease in anxiety around having to use math outside of school. However, item four showed that more student anxiety increases when thinking about using math in the future. Here more students indicated they felt less nervous about using math outside of school; yet, more students worried about using math in their future careers. The researcher interpreted the change in the results of item 4, *I worry that I will have to use math in my future career*, to students thinking more about their career choices at the end of the semester. Since this course is the first math course for students, at the beginning of the semester, most students have not thought about math and its impact on their future. This hypothesis is supported by the results from question 17, which asks, "Is taking math courses affecting which major you choose?" (Figure 8) Students' response options were as follows:

1. Yes, it did before, but now I am considering changing my major
2. Yes, it definitely did and still does
3. I never thought about it
4. Not at all

As seen in Figure 6, a majority of students answered "Not at all" (4), and the mean of the question was response selection #3, "I never thought about it".

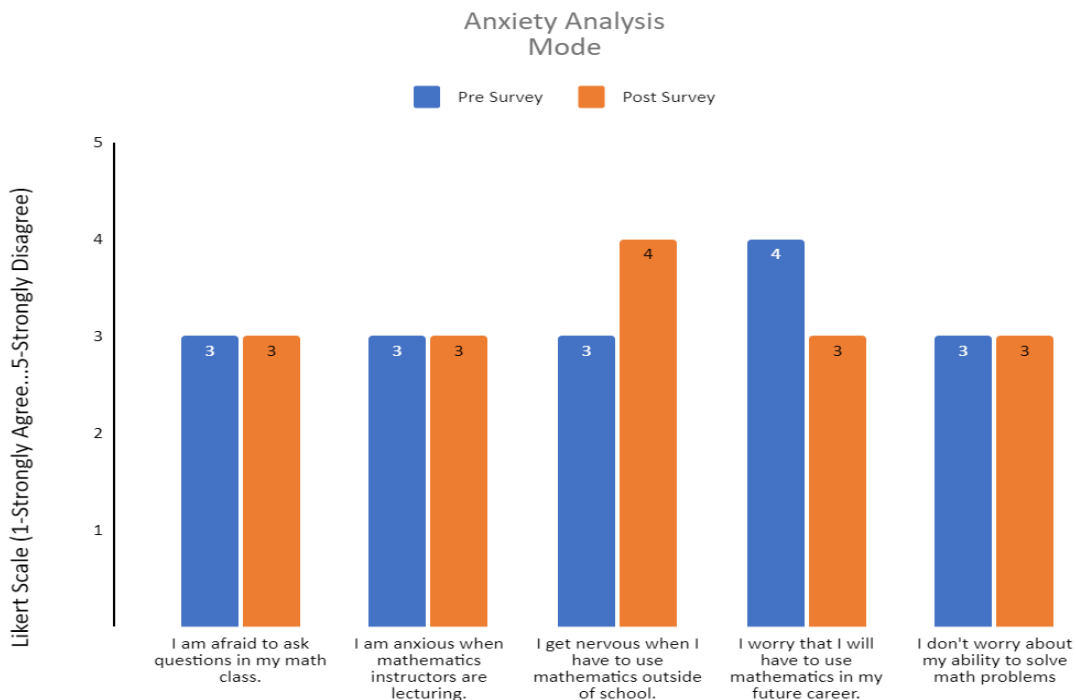
In comparison, the study participants' mean anxiety scores increased for *I am anxious when mathematics instructors are lecturing*, and *I get nervous when I have to use mathematics*

*outside of school*, which signifies that they disagreed with the statement, hence their anxiety levels decreased (Figure 4). Additionally, for the final item, *I don't worry about my ability to solve math problems*, the participants showed a decrease in the mean, which signifies their anxiety decreased. The only item that appeared to express an inverse result was the fourth item which stated, *I worry that I will have to use mathematics in my future career*. Similarly, as exhibited within the class results, the researcher believes this is due to the survey being administered toward the end of the semester when students begin to think more about their career choices instead of the start of the semester.

In addition, a comparison of the modes from the items for the study participants indicated, more students answered that they 'disagree' with the statement, "I am afraid to ask questions in my math class" in the post-survey as opposed to them feeling neutral when the semester started, as indicated in Figure 8, in contrast to their anxiety about solving math problems, where their anxiety increased. The researcher can not conclude as to why the increase in anxiety around solving math problems.

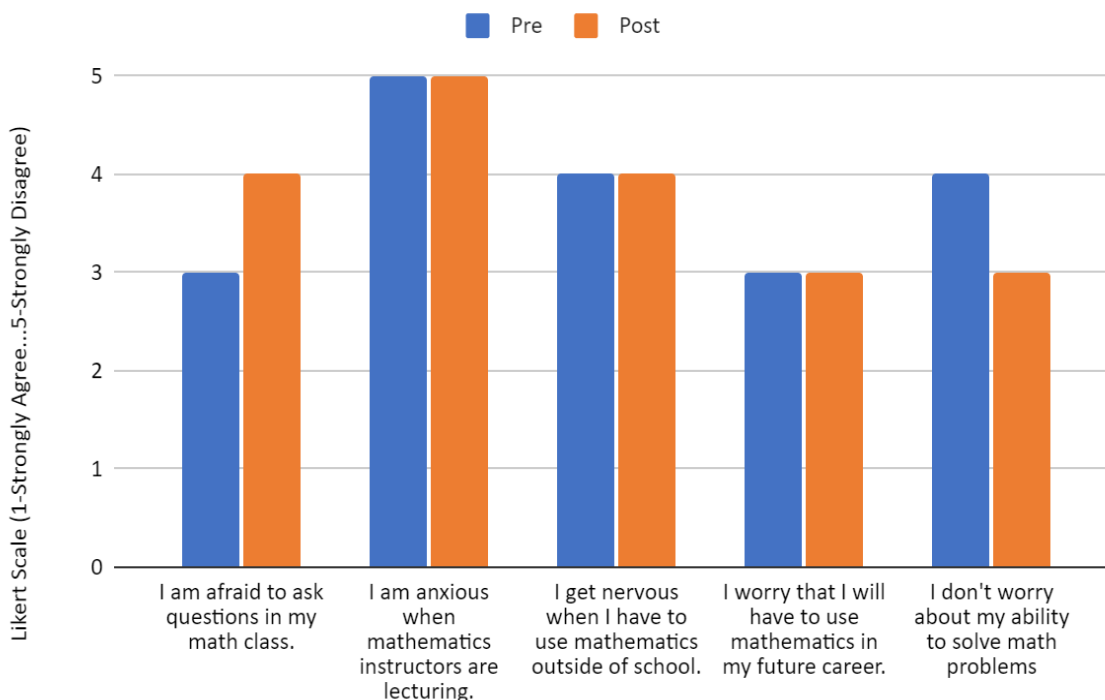
**Figure 6**

*Student Participant Anxiety – Mode Analysis*



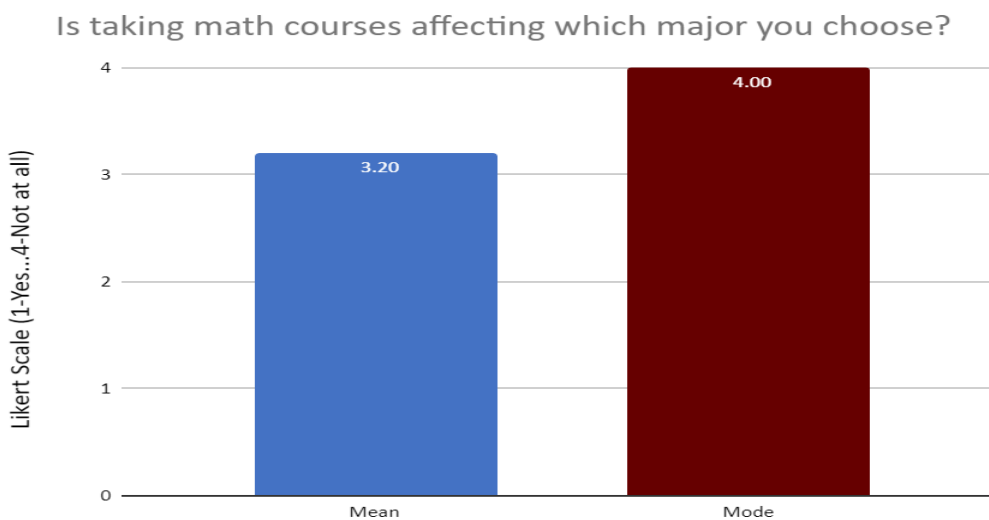
**Figure 7**

*Study Participant Anxiety Mode Analysis*



**Figure 8**

*Is Taking Math Courses Affecting Which Major You Choose?- Student Participant Analysis*

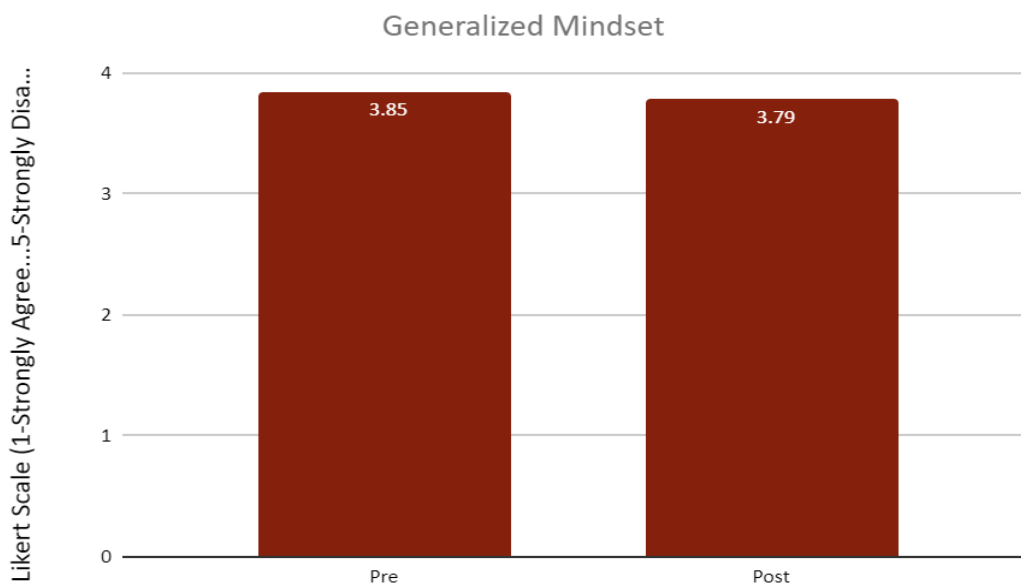




**Student Mathematical Mindset.** The second set of items assessed the students' mathematical mindset. Results showed that there was an insignificant decrease in growth mindset over the course of the semester. The researcher presumed this is because the student viewed Dr. Boaler's growth mindset introductory video prior to completing the survey. Figure 9 shows the generalized mindset score, which represents the overall anxiety levels of the student participants. The score was calculated by summing all the mindset results from the four mindset items and dividing them by the total number of mindset results (one score was omitted since the student accidentally did not answer the question in the pre-survey). Consistent with the previous mindset results, the generalized mindset score shows a slight decrease in the score, which corresponds to a slight decrease in the students' growth mindset. Table 3 represents the generalized mindset score of the four student participants. As exemplified with the class data, the participants' generalized anxiety score decreased slightly.

**Figure 9**

*Student Participant Generalized Mindset Analysis*



**Table 3***Participant Generalized Mindset Score*


---

Pre-Survey	3.9
Post-Survey	3.7

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To further elucidate the findings, the following five items were used to ascertain whether there was any change in the students' mindset:

1. I must NOT have a 'math' brain if I am in this class
2. Some students can never do well in math no matter how hard they try
3. I have a certain amount of intelligence, and I can't do much to change
4. I can learn new things, but I can NOT really change my basic intelligence
5. My intelligence is something about me that I can't change very much.

All items were answered using a 5-point Likert scale (1=strongly agree to 5= strongly disagree, 3 being neutral).

Item 1, "I must NOT have a 'math' brain if I am in this class", was only addressed in the pre-survey and the frequencies of the results from the class are displayed below. The Likert scale responses were as follows:

1. Strongly agree - the only reason I am in this class because I am terrible at math
2. Agree - If I was better at math I would not be in this class
3. Neither - I have no idea why I am in this class

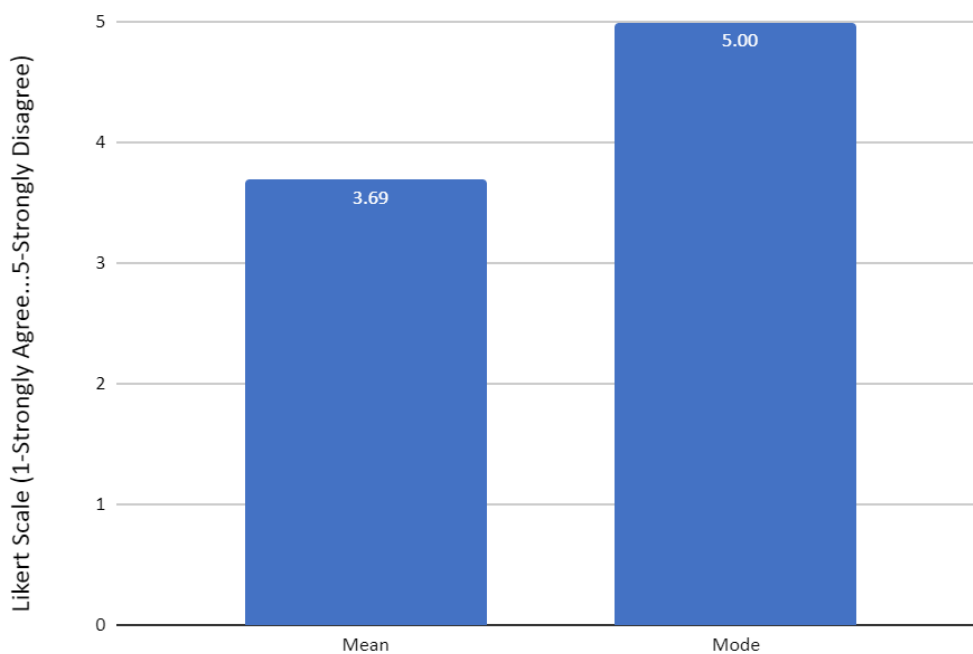
4. Disagree - I am in this class because I did not put forth effort before

5. Strongly Disagree - I can do fine in math, I just didn't have the proper tools or discipline until now to be successful

Figure 10 shows that most of the student participants disagreed with the statement, indicating that most students have a growth mindset. Additionally, the mean of the statement was approximately 3.7, which indicated, on average, the students disagreed with the statement. This was surprising; however, the researcher hypothesized this was due to the fact that the survey was placed right under Dr. Boaler's mathematical mindset video in the Canvas course and that most students watched the video and took the mindset quiz before they completed the survey.

### Figure 10

*Item #13: I must NOT have a 'math' brain if I am in this class, Mean and Mode - Student Participant Analysis*



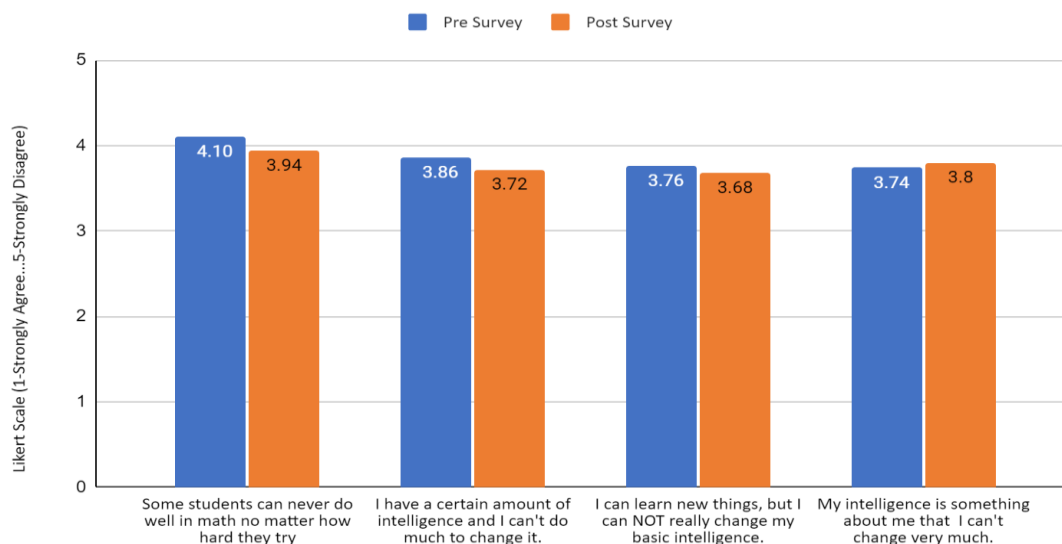
Among the four study participants, two stated they strongly disagreed (5), one disagreed (4) and the last responded strongly agreed (1). Student four, who stated she strongly agreed that she does NOT have a ‘math’ brain, was the student who scored the highest grade in the class.

Figure 11 is the graphical representation of the mean of each mindset item for the student participants. As shown in Figure 9, three of the four items show a decrease in the score, which correlates to a decrease in students' growth mindset. The results stayed relatively uniform, with a slight increase in three of the four items. As seen in Figure 12, study participant findings were similar to their classmates. Two of the four items surrounding students' mindset for the four participants stayed the same, and two of the items showed a decrease in score. This correlates to a decrease in the growth mindset of students. The researcher speculates this is due to the fact that most students completed the pre-survey after they watched the introductory mindset video, and then by the time they completed the post-survey, they would have been five weeks without any discussion around mindset.

**Figure 11**

*Student Participant Mean Mindset Analysis*

Mean of Class Mindset Analysis



**Figure 12***Study Participant Mindset Mean Analysis*

## Mean Analysis of Participant of Mindset Items

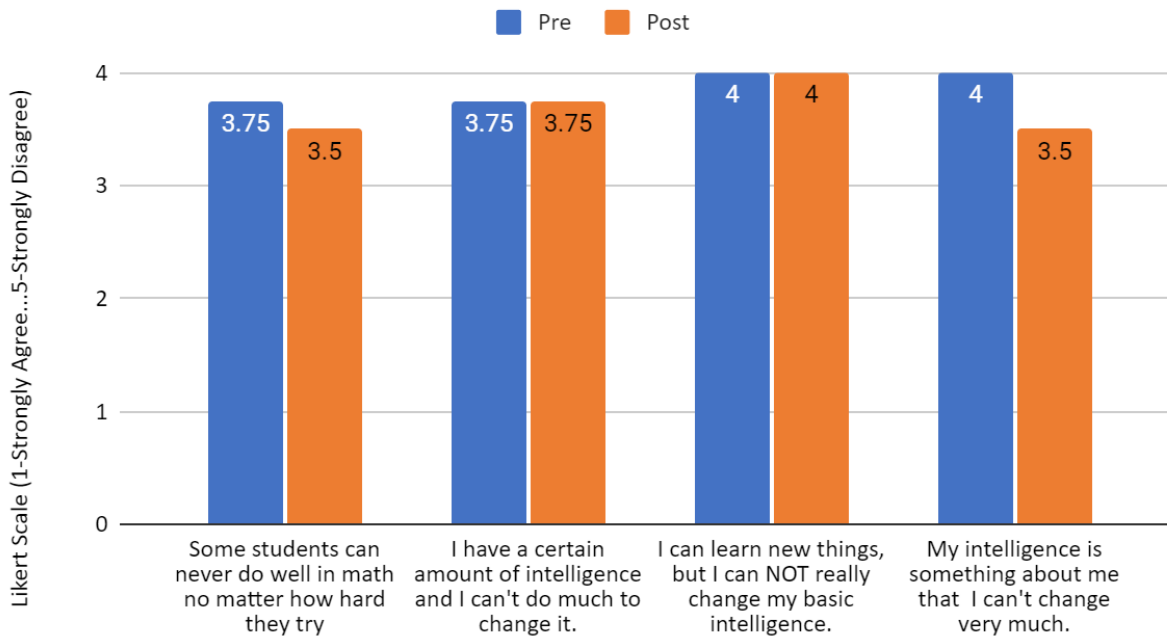
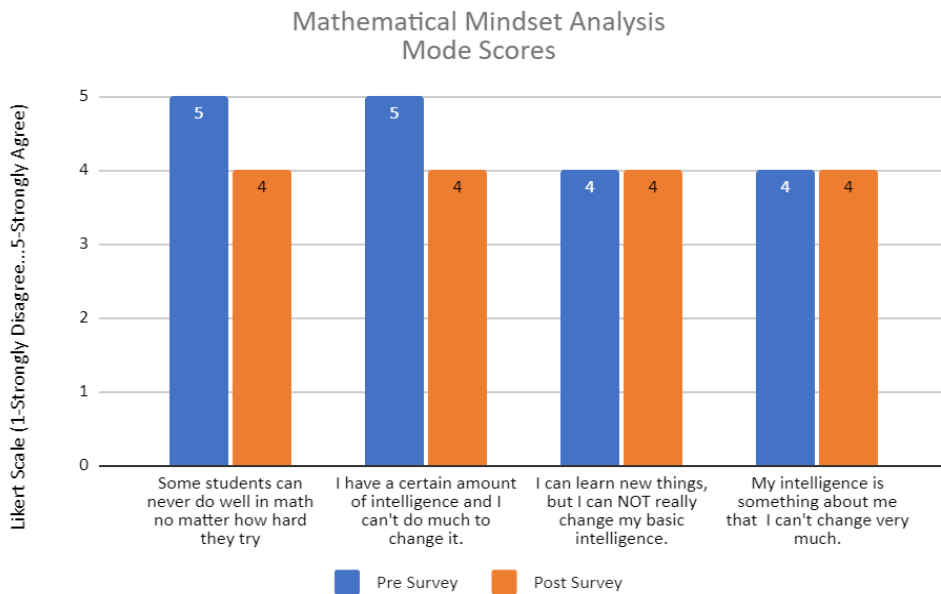


Figure 13, which shows the mode of each mindset item for the student participants, corroborates the findings of the mean score (Figure 11), where the student participant's mindset really did not change, actually, their growth mindset showed an insignificant decrease. Two of the four items surrounding the study participants' mindset stayed the same, and two showed a decrease in the score for both the mean and the mode analysis, which once again correlates to a decrease in students' growth mindset (Figure 12 and Figure 14). Once again, the researcher theorizes that this is due to the timing of the pre-survey and that it was completed right after students watched the introductory mindset video.

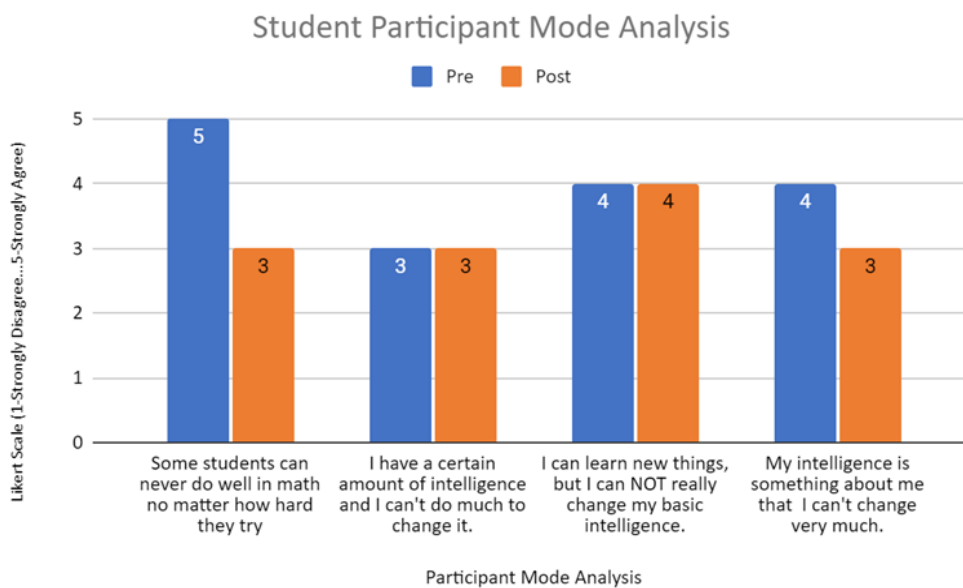
**Figure 13**

*Student Participants Mindset Mode Analysis*



**Figure 14**

*Study Participants Mindset Mode Analysis*



After triangulating the results from the pre- and post-survey anxiety items with focus group responses, the researcher concluded that the unSTUCK strategy had positively affected students' anxiety. Furthermore, students transferred the skills learned with the unSTUCK strategy to other areas of their lives, which further supports the strategy's usefulness. However, comparing results from pre- and post-survey mindset items showed a negligible increase in score, which corresponds to an insignificant change in student mindset. Additionally, the score that decreased changed from *strongly disagree* to *disagree*, and the pre-survey was completed by most students directly after the students completed the mindset summary video and quiz.

### **Research Question #2**

*Does changing a student's mindset and decreasing anxiety help students become more successful in their foundational math (FNMT) courses?* and the sub question *How does the use of the unSTUCK strategy affect pass rates and grades?* As discussed previously, students' anxiety levels decreased over the course of the semester, although their mindset did not show significant change. However, according to the results, both the pass-rates and average final exam scores improved in comparison to previous years. To answer the second research question, the researcher compared the pass rates, final exam scores, and course grades from the Fall 2020 Arithmetic courses to the average of all the researchers' arithmetic courses from Fall 2017 through Fall 2019. Pass rates were defined as students who earned a minimum of 50% on their final exam and earned a minimum of 70% as a final grade. The only results excluded in the analysis were the grades and pass-rate from the Spring 2020 semester due to the COVID-19 pandemic. Unlike all the other semesters, the final exam was not proctored during the Spring semester, whereas both the Fall 2020 semester finals and previous years' finals were proctored.

The Fall 2020 finals were proctored via Zoom, and in all previous semesters, the final exam was conducted face-to-face.

### ***Pass-Rates***

Table 4 shows the comparison of pass-rates of the Fall 2020 semester to the previous semesters. Of the 93 students (72%) who were registered in the course, 67 took the final exam. At the end of the semester, 54 out of the 67 students who took the final exam passed. This equated to an 81% course pass rate for the students who took the final exam. This is a 17% increase in students passing the course who took the final exam than in previous years. In previous semesters, an average of 69% of the students who took the final exam passed the course. Students who did not take the final exam were included in calculating the overall course pass rate. Students who do not take the final exam, receive a grade of a zero for the final exam and automatically fail the course. Pass rates for the course were 58% for the Fall 2020 semester, this is a 7% increase from previous years' course pass rates, which averaged a 54% pass-rate. Figure 15 is a graphical representation of the pass rates for the current semester and past semesters.

**Table 4**

#### *Pass Rates Comparison*

	2017-2019	Fall 2020
Percentage of students who did not take the final	22%	28%
Percent of students who took the final	78%	72%
Percentage of students who took the final and passed	69%	81%
Pass Rate (Percent of students who passed the course)	54%	58%

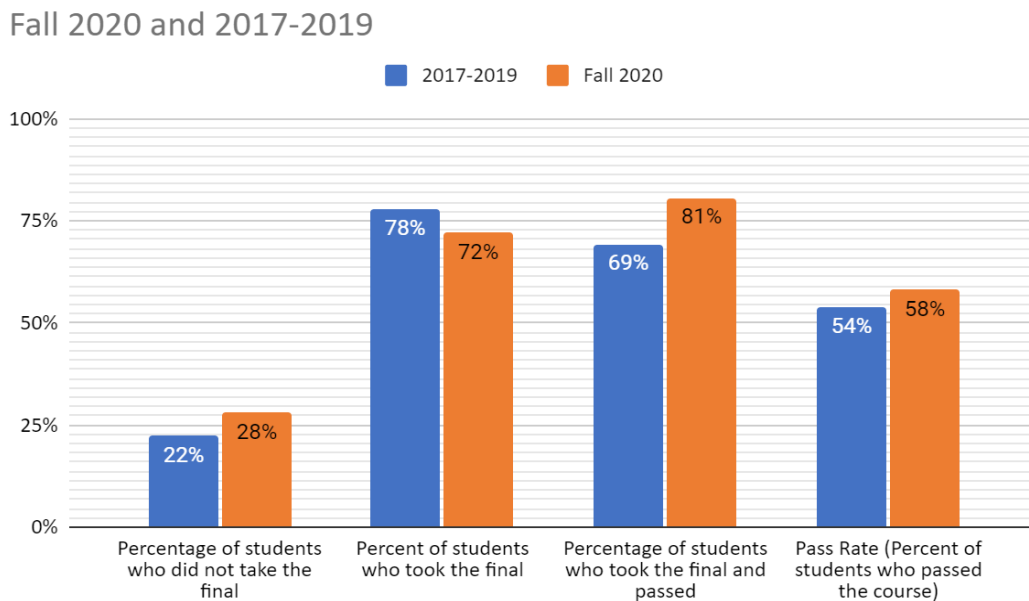
The mean of both the final exam scores and course grades increased for the Fall 2020 semester, as can be seen in Figure 16. Moreover, all 4 participants passed the course, and the mean of their final exam scores was 81%. The average final exam scores from previous years were



62%. During Fall 2020, the final exam rose to 69%, (a 7% point increase), which is an 11% increase overall. The average course grade from previous years was 75%, compared to 78% in the Fall 2020 semester, a 3% point increase. This indicates a 4% increase in course grade.

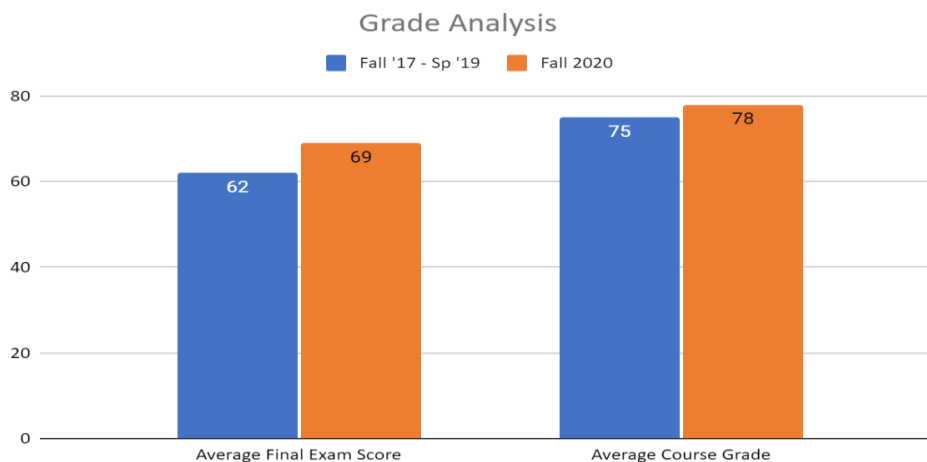
**Figure 15**

*Pass Rates Analysis - Class Participants*



**Figure 16**

*Final Exam Scores and Grade Analysis - Class Participants*



The analysis showed an increase in final exam scores, course grades, and pass rates for the Fall 2020 Arithmetic courses compared to the average of previous years, as anxiety levels decrease and without a notable change in their mindset.

### **Summary**

In summary, the researcher concludes that the unSTUCK strategy had a positive effect on students' academic performance, course grades, final exam scores, and pass-rates. The study showed that most students found it helpful and used the strategy in other areas of their lives. From the data, the researcher extrapolated that use of the unSTUCK strategy had a minor effect on students' anxiety and perhaps no effect on students' mindset. However, the researcher maintains that the timing of the pre-survey affected the results of the mindset items. The researcher feels that the increase in the percentage of students who passed the course and the increase in the mean of the final exam score also attest to the positive impact of the unSTUCK strategy.

## Ch 5 -Results

The purpose of this mixed-method study was to examine the effect of the unSTUCK strategy on foundational math students' anxiety levels and mathematical mindset and its effect on course outcomes and pass rates. To achieve this goal, the researcher first distributed quantitative surveys regarding students' anxiety levels and mindset to assess the overall change in students' anxiety levels and mindset. This was followed by a qualitative analysis via a small focus group, which helped illuminate the findings from the qualitative data. Additionally, the focus groups further expanded on the impact of the unSTUCK strategy on their course outcomes. Lastly, end course grades and final exam grades were analyzed quantitatively, to examine overall effects on students' success rates. Hence this was a nested, sequential explanatory study since the study used qualitative results to explain and enhance the quantitative findings (Creswell & Clark, 2011).

This section will summarize results, interpret research findings, discuss limitations, and make recommendations for future practice and research based on the results of the following research questions:

1. How does the unSTUCK strategy affect students' feelings of anxiety and their mindset about math? (survey and focus groups)
  - a. What are the students' perceptions of the unSTUCK strategy and its usefulness?
2. Does changing a student's mindset and decreasing anxiety help students become more successful in their foundational math (FNMT) courses?
  - a. How does the use of the unSTUCK strategy affect pass rates and grades?

### **Summary of Method**

The study was conducted at the MEZ Community College, located in an urban community within the Northeastern part of the country. The researcher compared results from the pre- and post-surveys to establish any change in students' anxiety levels and mindset, in addition to uncovering pertinent information regarding their feeling towards math. The researcher also examined the end-of-course unSTUCK survey, which helped elucidate students' perceptions and thoughts about the strategy itself. Next, the researcher conducted one semi-structured focus group due to the lack of participants. The focus group helped in solidifying the findings from the unSTUCK survey. Finally, the researcher compared previous years' final exam grades, course grades, and pass rates with those results from the study to determine if the strategy impacted academic outcomes.

### **Summary of Findings**

After analyzing both the quantitative and qualitative data, the researcher surmised that the unSTUCK strategy positively affected students' course outcomes. The findings showed that a majority of the students, 90%, found the unSTUCK strategy valuable and productive. Furthermore, students were able to apply the unSTUCK strategy to other subject areas and other areas of their lives. Results from the surveys indicated a minor change in anxiety, 4%, and an insignificant change in student mindset. These results were not supported by students' anecdotal responses, both during the course and in their open responses. Finally, the increase in pass-rates, final exam scores, and course grades gives credence to the strategy's overall positive effect.

## Context of Findings

The unSTUCK strategy is a tool inspired by the concept of mindfulness that incorporates an opportunity to take a mindful pause, following by opportunities to self-reflect, self-inquire, and consider hidden, unconscious thoughts as well as thoughts a person would otherwise choose to think on purpose in order to feel better, shift mindsets, or improve one's emotional health well-being. Previous research shows the positive effects of a growth mindset on academic outcomes (Aronson et al., 2002; Blackwell et al., 2007), as well as the positive effects of mindfulness on students well-being (Galante et al., 2018; Lomas et al., 2017), cognitive capacities (Zenner et al., 2014), stress and anxiety (Bamber, & Schneider, 2016; Borquist-Conlon et al., 2019; Regehr et al., 2013) and academic outcomes (Boo et al., 2019; Walters et al., 2015). Nonetheless, the researcher is unaware of any research that combines a mindfully-inspired tool, which encourages students to work through their stuck moments while including growth mindset concepts that add for them a new perspective.

The outcome regarding students' mindset, only one question showed a positive change in results. There was a 1.6% favorable shift in mindset for the item that stated, "*My intelligence is something about me that I can't change much about*". All other items indicated an insignificant unfavorable change. These results were unexpected since, anecdotally, students continued to articulate, not ever being good at math and not having a "math brain". Hence, no conclusion could be drawn to the change in students' mindset and the effect that might have had on course outcomes. Therefore, the researcher contends that no conclusions can be drawn surrounding the unSTUCK strategy and whether the mindset videos influenced students' mathematical mindset. The researcher contemplated whether the virtual nature of the course affected findings, as well as

if the surveys reflect students' conscious thought as compared to what they say when they are stuck in an emotional state of frustration or fear, and their unconscious beliefs take precedence.

Findings indicated that the unSTUCK strategy had a minor effect on reducing student anxiety and increasing student outcomes. The study showed a 4% decrease in general anxiety levels, a 7% increase in pass rates, a 11 % increase in final exam grades, and a 3% increase in final course grades compared to previous years. This further aligns with previous findings that state various mindfulness techniques help reduce stress and anxiety (Bamber, & Schneider, 2016; Borquist-Conlon et al., 2019; Regehr et al., 2013), as well as have a positive influence on course outcomes (Boo et al., 2019; Walters et al., 2015).

Most importantly, the study showed that the unSTUCK strategy had an overall positive impact on students. Students developed more positive feelings about math. Over 90% of the students found the unSTUCK strategy helpful, and more than 66% transferred the tools they learned with the strategy to other areas of their lives. An important fact to note, due to the Covid-19 pandemic, all classes were fully remote. This was inconsistent with previous years' courses that mainly were conducted face-to-face. Lastly, due to the nature of the course and students having access to the surveys within their Canvas course, some students completed the surveys multiple times, the researcher decided only to include the students' final entry and deleted the other items, this allows for added human error.

### **Limitations of Study (Internal & external validity issues, measurement & statistical issues)**

As with most studies, this dissertation is subject to several limitations that are important to note and understand, especially being a seminal study. The study's four main limitations include sample size, the researchers' bias, instrument validity, and lack of previous research. Furthermore, the small sample size (n=4) limited the overall conclusion that could be drawn

since all four participants did very well in the course.

Since the study was conducted at the researchers' place of employment, and the sample was not randomized, the sample is one of convenience; therefore, the findings' generalizability is limited due to the study's size and scope. The results may not be transferred to other disciplines, other institutions, or grade levels. Additional research needs to occur to confirm transferability.

Furthermore, since the study was conducted by the researcher, who was also the instructor of the course, potential research bias may exist. To mitigate the bias towards the success of the strategy and undue influence this may have over student responses, the researcher conducted a blind study, and the students were unaware of the research until after grades were posted and the course had ended. Additionally, the items were graded on completion and not on the responses given.

As indicated above, instrument validity and reliability is a limitation of the study. The surveys used in this study were researcher-created and were not tested for validity or reliability.

### **Future Research**

The researcher has been incorporating Dr. Boalers' mathematical mindset videos in her courses for the past four years. DR. Boaler hypothesized that adding the unSTUCK strategy would only enhance the positive feedback she received from her students regarding the impact of the videos had on their mindset and academics. Although there are numerous studies surrounding the positive effects of mindfulness-based interventions and the positive effects of a growth mindset on course outcomes, the researcher is unaware of any studies where students are given a specific mindfulness inspired tool that guides students through uncovering their thoughts and emotions, as well as helping them offer new considerations to their predicament. Being the first

study to examine the effects and perceptions of the unSTUCK strategy on Foundational math students, there are a few recommendations the researcher would like to discuss:

- Future research needs to be done to implement the strategy within a larger scale using a randomized control study to determine the strategies' effect on student performance & success
- Conduct the study again for all online classes and another for all face-to-face classes to determine if there is an effect on student performance and success. In addition to how the difference in the modality of instruction impacts grades, final exam grade, and pass rates
- Conduct a longitudinal mixed-methods study to determine if students continue to use the strategy and determine its perceived continued benefit
- Future research of the unSTUCK strategy should extend to college-level courses & other subjects besides math.
- Research of the unSTUCK strategy with students K-12
- Have a study that focuses on the effects of the mindset videos without including the unSTUCK component.
- Conduct a study that includes the unSTUCK component without the mindset discussions.

Recommended adjustments in future replication of study:

- Employ a system such that students can not complete the surveys more than once to decrease human contamination of the data.
- Conduct validity and reliability testing for the surveys.
- The pre-survey should be assigned prior to the mindset introductory video assignment to gain a more pure reflection of the student's mindset.



- Reverse the order of the Likert Scale for the mindset items. In this study, the responses were measured on a five-point Likert-scale from *strongly agree* (1) to *strongly disagree* (5), which made it more challenging to interpret the findings since they were counter-intuitive, that is, if the score increased, it was interpreted as the student growth mindset decrease, and visa versa. By reversing the Likert-scale, an increase in score would translate to an increase in mathematical mindset.
- Ask for consent to include discussion responses
- Include questions concerning the mindset videos and their perceived benefits.
- Give pre-survey prior to viewing video/receiving instruction regarding mindset

Direct replication of the study would have to include the discussions and videos used in the study, as well as the surveys.

## **Conclusion**

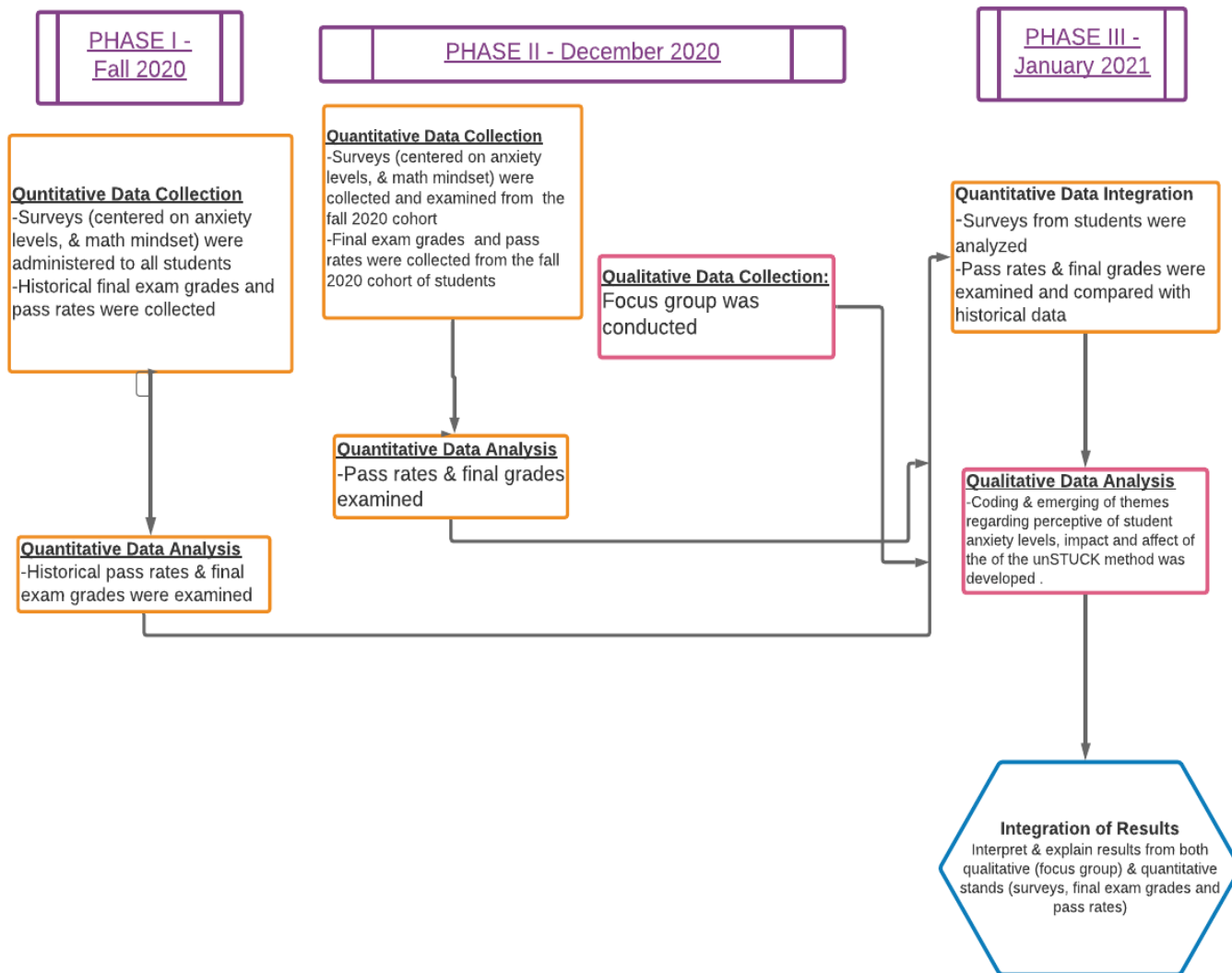
As previously discussed, there are numerous studies surrounding the benefits of mindfulness on academic outcomes, in addition to studies surrounding the positive effects of a growth mindset. This work appears to be seminal research on integrating the unSTUCK strategy in collegiate coursework. This study focused on combining both with its main emphasis on the unSTUCK strategy. Each week students participated in two weekly discussions, one centered on the unSTUCK strategy and the other on ideas intended to encourage a mathematical mindset. Findings showed incorporating the unSTUCK strategy within the course had a positive effect on pass rates and course outcomes. Final course grades, final exam scores, and pass rates all increased. Anxiety levels decreased, however, no conclusion can be formed regarding the students' change in mindset. More in-depth research is recommended. Finally, the study showed that the unSTUCK strategy had an overall positive impact on students. Students developed more

positive feelings about math. Students found the unSTUCK strategy helpful and were able to transfer the tools they learned with the strategy to other areas of their lives.

### Appendix A: Flow-Chart

#### Research Study Flow Chart

Edith Birnbaum



**Appendix B: Email Consent (Students)**

Name

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J number ( Example J12345)

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Dear Former Student:

As an Arcadia University doctoral student, I am conducting a research study titled “Effects and Perception of the unSTUCK Strategy (A Mindfulness-Inspired Intervention) on Foundational Math Students”. The focus of my research is to investigate the effects and perceptions of the unSTUCK strategy on student anxiety and mindset. This is a topic that is important to many undergraduate students, who struggle with math. By conducting this research I hope to be able to understand more deeply students' perspectives on this strategy.

I am writing to ask your permission to allow me to analyze the some of the course work you submitted this past semester for our FNMT 016-Arithmetic course (Tell Me About Yourself Survey, How are you Doing Now Survey, The unSTUCK Survey, your final exam grade, and your final course grade) I will be utilizing this material for my research study, surrounding the effects unSTUCK Method. Results from this research (including responses from your surveys without your name or any identifying information) may appear in my study, conference presentations, and other publications.

Additionally, I will be conducting focus groups regarding the unSTUCK Method. Focus groups will last approximately 20 minutes and will focus on enhancing my understanding of the usefulness of the unSTUCK strategy, the majority of the discussion will be focused on any benefits and perception of the strategy. Your name and any identifying information will be changed to fake names, or pseudonyms, so that your identity, the identity of the College, any other identifiable indicators will remain confidential.

For participating in the focus groups compensation will consist of a drawing of six \$25 Amazon gift cards. Chances to win are approximately 5%. After all focus groups have been conducted, all persons that participated in the focus groups will be compiled and 6 names will be randomly selected to receive a \$25 Amazon gift card.

As the researcher, I will keep all identifying information confidential. No names or any other identifying information will be used in the results of this study. Also, you can, at your discretion, withdraw from this study at any time. If you chose to withdraw, will not include your work in my analysis. There are minimal risks to participants as I will keep all student information confidential.

I will analyze course material to look for themes and insights from you to help me better understand students' perception of the unSTUCK Method. The primary risk for a participant is

the potential embarrassment about revealing their perception and feelings around the unSTUCK Method. Any quotes taken from analyzed materials that reveal students' perceptions will not include the participant's identity and will be done in such a manner as to keep their identity confidential. Your decision to participate or not will not affect your relationship with me or with the Community College of Philadelphia.

If you have any questions about the study you can email me at: [ebirnbaum@ccp.edu](mailto:ebirnbaum@ccp.edu) If you choose to withdraw from the study please contact me via email and your data will not be used. If you have any questions about the study you can email me at: [ebirnbaum@arcadia.edu](mailto:ebirnbaum@arcadia.edu) or you can send me a Remind text as you did throughout our semester together or you may call the faculty advisor of the project, Dr. Christina Ager at: [cager@ccp.edu](mailto:cager@ccp.edu) at 215-572-2115.

This study has been approved by the school district superintendent and Arcadia University Institutional Review Board (IRB). To ensure that this research continues to protect your rights and minimizes your risk, the IRB reserves the right to examine and evaluate the data and research protocols involved in this project. If you wish additional information regarding your rights in this study you may contact the Office for the Committee for the Protection of Research Subjects at (267) 620-4111. Thank you for considering participation in this study and helping future math students like yourself.

With gratitude,

Edite Birnbaum

I am 18 years old or older

- Yes (1)
- No, I am younger than 18 (2)

**Skip To: End of Survey If Q11 = No, I am younger than 18**

I understand how my information will be used in the study and I agree to have my work from my, FNMT 016 Fall 2020, course be used confidentially, without any identifying information, in this study.

- Yes, I agree to have my work from my, FNMT 016 Fall 2020, course be used confidentially, without any identifying information, in this study. (1)
- No, I do NOT agree to have my work from my, FNMT 016 Fall 2020, course be used confidentially, without any identifying information, in this study. (3)

**Skip To: End of Block If Q3 = No, I do NOT agree to have my work from my, FNMT 016 Fall 2020, course be used confidentially, without any identifying information, in this study. (SKIPS to Focus group consent)**

By checking off the boxes below I consent to allow Professor Birnbaum to use the following survey assignments for her research study surrounding the unSTUCK Method. My ...

(Please check all that apply)

- Tell Me About Yourself Survey (1)
- How are you Doing Now Survey (2)
- unSTUCK Reflection Survey (3)
- Final Exam Grade for my Fall 2020 FNMT 016 course (4)
- Final Course Grade for my Fall 2020 FNMT 016 course (5)

**Participation in focus groups.**

Your name and any identifying information will be changed to fake names, or pseudonyms, so that your identity, the identity of the College, any other identifiable indicators will remain confidential. The Zoom session will be recorded with your permission.

The goal of the focus group is to help me find out more about when and how you used the unSTUCK method as well as whether you thought was help during class or in other areas of your

life.

For participating in the focus groups compensation will consist of a drawing of six \$25 Amazon gift cards. Chances to win are approximately 5%. After all focus groups have been conducted, all persons that participated in the focus groups will be compiled and 6 names will be randomly selected to receive a \$25 Amazon gift card.

The process that will be used to determine the 6 recipients of the \$25 Amazon gift card will be as follows:

- At the end of the focus group before anyone leaves
- A random number generator, generate a random number (1-16)
- Zoom will randomly assign breakout rooms (each room will have up to 6 students)

The room of the number that was selected will contain the 6 students who win the \$25 Amazon gift card.

**Important information:**

- The focus group should run for approximately 20 minutes.
- The Zoom session will be recorded with your permission, the recording will be stored on my private, password-protected computer, in order to maintain confidentiality. By joining Zoom you are subject to the privacy and terms of Zoom.
- You will be asked to respond to several open-ended questions. You may choose not to answer any or all of the questions.
- By agreeing to be in the focus group, you are agreeing to be recorded so I can listen to this again later, to ensure I correctly represent your thoughts and responses.
- Your responses will be confidential and I will not be identifying anyone individually in my study. I ask that all of you please respect everyone's privacy and confidentiality, please do not discuss what was talked about here with other people. This will help us feel comfortable sharing our true thoughts and feelings.
- As part of this group meeting, you may be disclosing [personal] information to other participants in the focus group, which may make you slightly uncomfortable. Again, this is why we stress confidentiality.
- Please only use first names to address other members of the group.
- You may opt-out of the study now, or at any time during the discussion, if you feel uncomfortable with the topic, without penalty, by simply clicking "leave meeting". However, any information recorded prior to you leaving the discussion may be used.
- If you decide to participate you indicate that you understand these risks, and are willing to continue participation. Once again, at any time during the discussion, if you feel uncomfortable with the topic you may choose to remain quiet or to discontinue your participation.

Please indicate your willingness to participate in a focus group discussion regarding your thoughts and perception of the unSTUCK Method

If you chose to participate in the focus group

- An evite will follow within two weeks
- The focus group should last approximately 20min
- The focus group may require follow-up questions
  - I WOULD like to participate in a focus group discussion
  - I do NOT want to participate in any focus group discussions

Date

---

Please sign below

(use your finger on your phone app or your computer mouse to sign below)

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## Appendix C: Focus Group Protocol

### **Research Question:**

1. How does The unSTUCK Method affect students' feelings of anxiety and their mindset about math and course outcomes? (survey and focus group)
  - a. What are the students' perceptions of the unSTUCK strategy and its usefulness?
2. How do focus group responses help explain and enhance the understanding of the relationship between the unSTUCK strategy and students' performance?

Interview date:

Interview Time:

Interviewer: Edite Birnbaum

Place: Zoom Meeting

Interviewees: Former Fall 2020 student

### **Introduction**

Good afternoon, in addition to being your instructor this semester, I am currently a doctoral student at Arcadia University working on my dissertation study. I am researching the effects and perception of a mindfulness-inspired program, called The unSTUCK Method.

Thank you all so much for agreeing to participate in this focus group. The goal of this focus group is to help me find out more about your thought and perceptions surrounding this tool you learned about last semester. Your input is crucial to my study.

Before I continue I must ensure that everyone present is 18 years of age or older. If anyone is under 18 years of age, while I truly appreciate your willingness to join this focus group, I ask you to please leave the zoom meeting now.

Unfortunately, there are a few important items I must disclose and discuss with you first:

**Important information:**

- The focus group should run for approximately 20 minutes.
- The Zoom session will be recorded with your permission, the recording will be stored on my private, password-protected computer, in order to maintain confidentiality. By joining Zoom you are subject to the privacy and terms of Zoom.
- You will be asked to respond to several open-ended questions. You may choose not to answer any or all of the questions.
- By agreeing to be in the focus group, you are agreeing to be recorded so I can listen to this again later, to ensure I correctly represent your thoughts and responses
- Your responses will be confidential and I will not be identifying anyone individually in my study. I ask that all of you please respect everyone's privacy and confidentiality, please do not discuss what was talked about here with other people. This will help us feel comfortable sharing our true thoughts and feelings.
- As part of this group meeting, you may be disclosing [personal] information to other participants in the focus group, which may make you slightly uncomfortable. Again, this is why we stress confidentiality.
- Please only use first names to address other members of the group.
- You may opt-out of the study now, or at any time during the discussion, if you feel uncomfortable with the topic, without penalty, by simply clicking "leave meeting". However, any information recorded prior to you leaving the discussion may be used.
- If you decide to participate you indicate that you understand these risks, and are willing to continue participation. Once again, at any time during the discussion, if you feel uncomfortable with the topic you may choose to remain quiet or to discontinue your participation.

Do you have any questions for me before we begin?

Great, let's start

**General questions:**

1. Think about your stress and anxiety when you first started this class, and how you felt at the end of the class. Tell me about this.
2. What do you attribute this change to?

Let's talk a bit about the unSTUCK strategy and your math class:

What did you think? Was it effective? What was most useful?

Did you use the unSTUCK strategy in other areas of your life or in other courses?

1. Is there anything else you want me to know?

Closing: Thank you again for participating in the study. Once again, I appreciate you taking the time to participate in this focus group. Let me reaffirm your confidentiality will be honored. If you have any questions, feel free to contact me at [ebirnbaum@arcadia.edu](mailto:ebirnbaum@arcadia.edu) or you can text me through the remind app we used throughout the semester. Have a wonderful day and enjoy the rest of your winter break. Bye.

**Appendix D - Tell me about you – Pre-survey**

Please enter your J number \_\_\_\_\_

A. How do you feel about mathematics?

- A. I hate it with every fiber of my being!
- B. I don't like it because, I have struggled with math
- C. I'm indifferent towards math
- D. I like math
- E. I LOVE MATH!!!
- F. I'd rather not say

2. How long has it been since you have been in a math class?

- A. <1 year
- B. 1-2 years
- C. 3-5 years
- D. 5+ years
- E. I'd rather not say

3. What does your life look like in addition to taking this course?  
(please check all that apply)

- I am taking 1 other college course
- I am taking more than 1 other college course
- I have a job question
- I have a child or children
- I live far from campus
- I do not have computer/internet access at home
- I drive to campus
- I take public transit to campus
- I carpool or get driven to campus
- This course is my life and I have nothing other than this
- I'd rather not say

4. I am **afraid** to ask questions in math class.

- A. I Strongly Disagree - I love asking questions

- B. I Disagree - I ask every time I am uncertain of the answer
- C. I'm pretty neutral - Sometimes I ask and sometimes I don't
- D. I agree - I ask when I am 100% sure I have don't understand something
- E. I Strongly Agree - I am terrified to ask questions, what if I look like a fool

5. This is your first time taking this math course at CCP?

- True
- False

6. Some students can **never** do well in math no matter how hard they try

- A. I Strongly Agree - people can try but never be good at math
- B. Agree - some can try and yet may not get better at math
- C. Neutral - I believe, some students will get better and some will not
- D. Disagree - some student may try, may get better in math
- E. Strongly Disagree - students who try and put forth the effort can excel in math

7. I am anxious when mathematics instructors are lecturing.

- A. Strongly Agree - I can't even concentrate since I am trying to write down everything
- B. Agree - I get anxious because I get concerned that I won't understand what she/he is saying
- C. Neutral - sometimes I get anxious
- D. Disagree - I rarely feel anxious when my instructor is lecturing
- E. Strongly disagree - Why would I feel anxious when the instructor is lecturing

8. I have a certain amount of intelligence and I can't do much to change it.

- A. Strongly Disagree
- B. Disagree
- C. I don't know
- D. Agree
- E. Strongly Agree

9. I can learn new things, but I can NOT really change my basic intelligence.

- A. Strongly disagree
- B. Disagree
- C. I have no idea
- D. Agree
- E. Strongly Agree

10. I get nervous when I have to use mathematics outside of school.
- A. Strongly agree - even the thought of using math makes me sweat
  - B. Agree - I get anxious if I have to use math outside of class, I don't trust myself
  - C. Neutral - sometimes I get anxious
  - D. Disagree - I don't really think about it
  - E. Strongly Disagree - I don't think about math outside of school
11. I must **NOT** have a 'math' brain if I am in this class
- A. Strongly agree - the only reason I am in this class because I am terrible at math
  - B. Agree - If I was better at math I would not be in this class
  - C. Neither - I have no idea why I am in this class
  - D. Disagree - I am in this class because I did not put forth effort before
  - E. Strongly Disagree - I can do fine in math, I just didn't have the proper tools or discipline until now to be successful
12. I worry that I will have to use mathematics in my future career.
- A. Strongly agree -It really scares me that I may have to use math at my future employment
  - B. Agree - I get a little anxious when I think about using maths at work
  - C. Neutral - I really don't think about it
  - D. Disagree - I know I will feel more confident to use math at my job after I finish with my courses
  - E. Strongly Disagree - I get excited about the idea that I will be using math in my job
13. My intelligence is something about me that I can't change very much.
- A. Strongly disagree
  - B. Disagree
  - C. I don't know
  - D. Agree
  - E. Strongly Agree
14. I usually don't worry about my ability to solve math problems
- A. Strongly agree - I know once I understand the problem I can solve it
  - B. Agree - I usually can figure out how to solve math problems
  - C. Neither agree or disagree - Sometimes I can and sometimes I struggle to
  - D. Disagree - I am not confident with my ability to solve math problems
  - E. Strongly disagree - I am so bad at math, I rarely can solve anything

15. Is taking math courses affecting which major you choose?
- a. Yes, it did before but now I am considering changing my major
  - b. Yes it definitely did and still does
  - c. I never thought about it
  - d. Not at all

16. What else do you think is important for me to know about you?

(This is your chance to tell me anything you want... keep it clean, please.)

17. What questions, if any, do you have for me or Is there any question you think I should have asked? Thank you VERY much.

**Appendix E -How Are You Doing Now Post-survey**

Please enter your J number \_\_\_\_\_

**Questions**

1. How do you feel about mathematics?
  - G. I hate it with every fiber of my being!
  - H. I don't like it because, I have struggled with math
  - I. I'm indifferent towards math
  - J. I like math
  - K. I LOVE MATH!!!
  - L. I'd rather not say
  
2. I am **afraid** to ask questions in my math class.
  - A. I Strongly Disagree - I love going asking questions
  - B. I disagree - I ask every time I am uncertain of the answer
  - C. I'm pretty neutral - Sometimes I ask and sometimes I don't
  - D. I agree - I ask when I am 100% sure I have don't understand something
  - E. I Strongly Agree - I am terrified to ask questions, what if I look like a fool
  
3. Some students can **never** do well in math no matter how hard they try
  - A. I Strongly Agree - people can try but never be good at math
  - B. Agree - some can try and yet may not get better at math
  - C. Neutral - I believe, some students will get better and some will not
  - D. Disagree - some student may try, may get better in math
  - E. Strongly Disagree - students who try and put forth the effort can excel in math
  
4. I am anxious when mathematics instructors are lecturing.
  - A. Strongly Agree - I can't even concentrate since I am trying to write down everything
  - B. Agree - I get anxious because I get concerned that I won't understand what she/he is saying
  - C. Neutral - sometimes I get anxious
  - D. Disagree - I rarely feel anxious when my instructor is lecturing
  - E. Strongly disagree - Why would I feel anxious when the instructor is lecturing
  
5. I have a certain amount of intelligence and I can't do much to change it.



(That is, I believe people are born with a set level of intelligence and can not do anything about it to change it.)

- A. Strongly Disagree
  - B. Disagree
  - C. I don't know
  - D. Agree
  - E. Strongly Agree
6. I can learn new things, but I can NOT really change my basic intelligence.
- A. Strongly disagree
  - B. Disagree
  - C. I have no idea
  - D. Agree
  - E. Strongly Agree
7. I get nervous when I have to use mathematics outside of school.
- A. Strongly agree - even the thought of using math makes me sweat
  - B. Agree - I get anxious if I have to use math outside of class, I don't trust myself
  - C. Neutral - sometimes I get anxious
  - D. Disagree - I don't really think about it
  - E. Strongly Disagree - I don't think about math outside of school
8. I worry that I will have to use mathematics in my future career.
- A. Strongly agree -It really scares me that I may have to use math at my future employment
  - B. Agree - I get a little anxious when I think about using maths at work
  - C. Neutral - I really don't think about it
  - D. Disagree - I know I will feel more confident to use math at my job after I finish with my courses
  - E. Strongly Disagree - I get excited about the idea that I will be using math in my job
9. My intelligence is something about me that I can't change very much.
- A. Strongly disagree
  - B. Disagree
  - C. I don't know

- D. Agree
- E. Strongly Agree

10. I **don't** worry about my ability to solve math problems

- A. Strongly agree - I know once I understand the problem I can solve it
- B. Agree - I usually can figure out how to solve math problems
- C. Neither agree or disagree - Sometimes I can and sometimes I struggle
- D. Disagree - I am not confident with my ability to solve math problems
- E. Strongly disagree - I am so bad at math, I rarely can solve anything

11. If you were the instructor what would you do differently?

12. What questions, if any, do you have for me?

13. DO you have any comments? Thank you VERY much. <3

**Appendix F-unSTUCK Feedback Survey**

Please enter your J number \_\_\_\_\_

1. On average how many times a week would you guess used the unSTUCK strategy per week?
  - a. 3 or more times a week
  - b. Once or twice a week
  - c. Not at all
  
2. Did you feel the unSTUCK strategy was beneficial?
  - a. Yes, very much so
  - b. Yes a little
  - c. Somewhat
  - d. Not really
  - e. Not at all
  
3. Did you use the unSTUCK strategy in other areas of your life or in other courses?
  - a. Yes, It helped me through other classes
  - b. Yes, I used it to help me with personal issues
  - c. Only in my Math class
  - d. No, I did not use it at all
  
5. What step of the unSTUCK strategy (Stop, Tell, Uncover, Consider, Kindness) was the most helpful and why?
  
6. What step of the unSTUCK strategy (Stop, Tell, Uncover, Consider, Kindness) was least helpful and why?
  
7. What form(s) of 'STOP' did you use? (Choose all that apply)
  - a. Mindful breathing
  - b. Went through a body scan
  - c. Mindful listening
  - d. Other\_\_\_\_\_
  
8. Were the videos and audio recordings helpful
  - a. Yes, very much so
  - b. Yes, a little

- c. Not at all
- d. I didn't watch or listen to any

9. If you answered yes to question #8, then which videos/audio recordings did you find most helpful (check all that apply)

- a. The videos on mindset
- b. The Mindfulness, meditation-videos
- c. The videos explaining the unSTUCK strategy and its impact
- d. The unSTUCK audio recordings

10. Which did you prefer?

- a. FlipGrid
- b. unSTUCK Worksheet

11. Did you find the Worksheets or FlipGrid helpful?

- a. Yes, very much so
- b. Yes, a little
- c. Not at all
- d. I did not use the Worksheets or FlipGrid

12. How often do you feel anxious in your life?

- a. Many times a day
- b. Daily
- c. A few times a week
- d. Once a week
- e. Once a month
- f. Rarely

13. If you were the instructor what would you change about the unSTUCK strategy or mindset videos? Would you include the same discussions (mindset & unSTUCK) in your classes? Should I leave or change anything?

14. Do you feel less anxious now? Do you feel you learned to use tools to help you decrease your anxiety and stress in your Math class? Which tools did you find most helpful?

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