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# Growth Mindset Pedagogy in the Classroom

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# GROWTH MINDSET PEDAGOGY IN THE CLASSROOM

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With enormous gratitude,

Thank you.

## Abstract

The purpose of this literature review is to investigate utilization of growth mindset pedagogy in the classroom and to determine how its use impacts student achievement. In order to determine these capabilities, a short historic timeline and evolution of the development of growth mindset is considered, growth mindset action research based on multiple age groups and its findings are examined, as well as specific growth mindset tools which can be used to improve students' beliefs and cognitive abilities. Just as some students will enter school and believe they are "bad at math," many also feel this way about performing well in an art class. An unfortunate characteristic of this belief is its ability to prevent students from making adequate effort in order to succeed in the classroom. Just like any other supposed talent-driven sphere of academia, students often enter the classroom with preconceived ideas regarding their own innate abilities and this can significantly inhibit their experience of learning. A primary barrier to students' success would then equate to a fixed mindset. The idea that students cannot perform tasks based on past experiences and/or the belief that they cannot or will not perform well in class can steer students in the wrong direction. A growth mindset takes away the belief of not being "smart enough" and transforms the perspective to a lens of seeing success through tenacity, grit and perseverance.

Table of Contents

# CHAPTER I: INTRODUCTION

Let's face it, most of us are just "winging it" much of the time. Even in adulthood, we wake up, we go to work, we make mistakes, and we learn from them; we get better and adapt, and then we fail and learn in a new way tomorrow. Albert Einstein, who is widely acknowledged to be one of the greatest and most influential theoretical physicists of all time once said, "It's not that I'm so smart, it's just that I stay with problems longer." Which begs the question: Are there certain aspects to our education system that could benefit from learning this aptitude for personal perseverance and won't quit, grit? (Laursen, 2015, p19).

As teachers, we want our students to believe in themselves and see the unlimited potential that we see within them. We know that challenging our students sets them up for success in life. Making things easier for students gives them less opportunities for growth. Setting higher standards offers a platform for expansive growth. Along with our support, students are better able to flourish through deeper learning. As students learn something new or are developing new skills, growth mindset tools can reframe choices to help students overcome obstacles and view mistakes as learning opportunities instead of evidence that they are incapable. In this extremely fast-paced and ever-changing world, the importance of dedication and determination becomes paramount. Sometimes we do not even realize how important it is to change the way we think in order to change the way we learn. According to psychologist and researcher Dr. Carol Dweck, and her book, *Mindset: The New Psychology of Success,* intelligence is malleable and with a growth mindset, learners "can learn just about anything" if they put forth the effort and believe that it is possible for them to do so (2016, p2).

As educators and parents, we frequently emphasize the importance of the result, or the letter grade the student receives, and we often pay little attention to the resolve required to

succeed in school. If students are struggling in a class or succeeding at very high levels, we commonly attribute the lower grades to either laziness or low IQ and higher grades to naturally innate intelligence levels. Little emphasis is placed on the hard work and dedication that it takes to succeed in any aspect of academics, and perhaps even more important, later in life as they enter the career world as adults. Many educators mistakenly make curriculum easier on students to help them succeed and gain confidence, but what are we really teaching students when they are not being challenged? How can a growth mindset help students to navigate through challenges and what exactly is a growth mindset anyway? As stated by Dweck (2019),

> Since the 1980s, my research has examined the beliefs people hold—their mindsets—and how these beliefs can affect their motivation, achievement, and well-being. The mindset my students and I have studied most involves beliefs about intelligence: the belief that intelligence is fixed and unchangeable (a fixed mindset) versus the belief that intelligence can be developed, for example, through effort, good strategies, and input and mentoring from others (a growth mindset). Research has shown that which belief students favor can make a difference (p21).

To gain insight into the development of growth mindset in students we will examine three key areas of growth mindset research. First, we will briefly learn about the history and foundations of growth mindset applications to deepen our understanding and help us expand on the tools available to teachers. A firm grasp on the theoretical ideation and key concepts will serve to develop and deepen students' potential. Second, we will look at real-world action research from which we will assess potential benefits and pitfalls for students at many different age levels and environments. It is important to examine possible challenges associated with a

study on belief and as well as conditions in which teachers can impact student engagement and achievement. To gain a broader perspective, we will examine research conducted within early childhood, adolescence, and high school/higher education. Third, we will explore growth mindset strategies and tools being used in classrooms and explore how they can be incorporated into any curriculum.

First, a little history on the evolution of education with an emphasis on growth mindset is in order. Why is it important to learn about history? Looking at history gives us methods to study and understand the problems from the past. This wider viewpoint allows us to observe patterns in education that we may have failed to see before and to notice upon further reflection whether these patterns still exist and for what reasons. This retrospective analysis offers understanding and helps us in solving current and future problems within our modern-day teaching and learning.

## History of Education and the Development of Growth Mindset

In the United States, public schools were not at all common during the 1600s and the early 1700s. Wealthy families hired private tutors to educate their children. “Early public schools in the United States did not focus on academics like math or reading. Instead, they taught the virtues of family, religion, and community” (Brueck, 2016, para, 3). As education has evolved, we have been able to make great progress toward a better understanding of children’s education. The aim of education has always been to create conditions for a moral and equitable modern society. As far back as the 1700’s, philosophers and educators have sought to understand and reform educational systems. Education creates a community and nation which holds a person accountable for their choices and actions. It gives development to society through social aims and upholds citizenry so we may all become useful productive members earning a livelihood for

our families in the process. While we strive to improve upon our predecessors' advancements, it is important to note that

> "Educational reformers viewed the school as providing the means for improving social conditions and fostering the moral progress of society. They were inspired by a variety of ideologies, such as the social Darwinism of the English philosopher Herbert Spencer (1820–1903), which emphasized free competition as the prime condition for social betterment. In this view, a proper education equipped children with the tools for self-improvement and success in modern society and would thereby help them lift themselves out of poverty. Other educational reformers were guided by the ideas of the French philosopher Jean-Jacques Rousseau (1712–1778) and the educationalists Johann Heinrich Pestalozzi (1746–1827), a Swiss, and Friedrich Wilhelm August Froebel (1782–1852), a German. These thinkers embraced romantic idealizations of childhood as an innocent and untainted period of life and wanted to re-create the educational system to provide a stimulating environment for free play and exploration" (Child Study, n.d.).

In the 1880's, G. Stanley Hall initiated the child study movement which was largely influenced by evolutionary theory put forward by naturalist Charles Darwin as well as many psychologists and educational theorists out of Germany during that time. Hall organized large scale studies collecting hundreds of different questionnaires and collected vast amounts of observations on children of all ages. Topics included in his studies included physical well-being (health, hygiene, fatigue, etc.), cognitive and moral development based on age, as well as attitude, imagination and religion. Hall was extremely influential with parents, teachers,

administrators and child welfare institutions; many studies and tests were created and influenced by his work (Goodchild, 2012, para, 4).

In 1904, the minister of public instruction in Paris asked a famous psychologist Alfred Binet and his colleague, Theodore Simon, to develop questions for schoolchildren which focused on areas not explicitly taught in the classroom. Binet searched “for ways to measure children's memory, imagery, attention, comprehension of sentences, moral judgments, and other complex mental functions.” (Miller, 1984, p5). Binet sought to understand why some people are smarter or more successful than others; this series of inquiries led to the invention of the intelligence quotient (IQ) test. The IQ test that Binet created has been used ever since to summarize children's intelligence and to develop new educational programs for students who did not do as well in school. Just as Binet “believed that education could bring about fundamental changes in a child’s intelligence,” this IQ test and theory sparked the entire basis for growth mindset principles we know and use today. (Dweck, 2016, p3).

The question as to why some children do exceptionally well in school, while others are frequently found struggling has been a question long sought after and includes numerous facets for us to examine. For example, many researchers have studied and found that a child’s socioeconomic background is one of the more powerful indicators toward what level of academic development a student will often accomplish. In Binet’s research, it was found that:

> Social class, as reflected in socioeconomic status (SES), has such a profound influence on all aspects of performance that it is perhaps the most powerful predictor of academic achievement. Intelligence quotient (IQ) tests in one form or another have been used for quantitative assessment of academic ability since Alfred Binet first developed the concept of IQ in 1904 to help identify slow learners for placement in special

> curricula. Yet, children of high SES families generally have higher IQ scores than low SES children. Therefore, obtaining fair assessments of academic ability in minority children, a disproportionate number of whom are socially disadvantaged, is wrought with difficulties. Much has been written to explain why more affluent school children do better than their disadvantaged peers. The most frequently cited factors are child rearing practices that focus on discipline and language. In general, however, research results have been confusing and sometimes contradictory (Sigmon, 1983, p1).

Education has led to much controversy as it has continued to evolve for hundreds of years. In 2001, the No Child Left Behind Act (NCLB) was signed into law by President George W. Bush. The goal of NCLB was to hold teachers and schools accountable and endeavored to close achievement gaps. While some positive advancements were provided for students with learning disabilities, the NCLB law also created some adverse effects for schools as well. As stated in National Education Association Today: “In its relentless focus on measuring outcomes with test scores, NCLB failed to provide the resources to ensure that every student had the opportunity to learn and excel. As a result, achievement goals were never reached and teachers, students and schools were pilloried by everyone and anyone looking for a scapegoat” (Walker, 2015, para, 6).

Thousands of theories, studies, and “new and improved" teaching practices have been painstakingly developed and carried out over time. Overall, most of the research based on intellectual capacities has revealed that critical thinking, problem solving, and grit are some of our students’ greatest tools for strength in academic success. Throughout the 21st century, studies on incremental theory, implicit theory and growth mindset have all carried significant weight on intelligence inquiry within educational research. Each of these theories views student

engagement through a multidimensional paradigm. Emotional, behavioral and cognitive factors work together to create a whole picture and interest, boredom, anxiety or motivation, strategic learning tools, and problem-solving work synergistically to create comprehensive data. For additional guidance, educational theorists Edward Lee Thorndike, Lewis M. Terman, Lawrence K. Frank, Helen Thompson Wooley, Jean Piaget, John Dewey, Maria Montessori, Benjamin Bloom, Howard Gardner, Lev Vygotsky, B.F. Skinner, Jerome Brunner and many more have also been massively influential in the development of educational theory and have worked exceptionally hard to advance modern solutions in order to build confidence and enhance learning in classrooms.

## Guiding Questions

Now we will seek to answer the following questions: How does using growth mindset pedagogy in the classroom impact student achievement and what growth mindset tools improve students' beliefs about their abilities? Through analysis of these guiding questions, we will investigate how to eliminate avoidance and build grit in classrooms. As noted earlier, learning the history helps us understand our own society, identities, builds citizenship, provides insight and clarity regarding modern issues. Looking back on where we have been helps us to better understand where we want to go. In this paper, we will focus primarily on the work of Carol Dweck, American psychologist who developed the theory of growth mindset and has carried out countless studies since the 1970’s and continues her pioneering work today. Like growth mindset, the word grit has become a buzzword for educationally based research taking place in the classroom. Like a growth mindset, grit points to the determination and perseverance students need to succeed in school and in life. Mindset and grit are interconnected because if students believe that failing is a result of fixed traits, then they will not believe in themselves enough to

try again. On the other hand, if students are showing up to challenges with a growth mindset, they are far more likely to display traits of resilience and grit. As teachers, we strive to teach students how to value struggles and challenges so that they can become tough enough to work through problems on their own. With these traits, students can more easily become creative thinkers and problem solvers who can think outside of the box. These are the people who change the world. “In an era of talent development and the pursuit of excellence, learners must be equipped with the perseverance that is essential to reaching high levels of success” (Sanguras, 2017, p91).

## Definition of Terms

**Content Theory.** A subset of motivational theories that try to define what motivates people. Content theories of motivation often describe a system of needs that motivate peoples' actions (Garofalo, 2016).

**Cognitive Evaluation Theory.** Innate need to direct our own lives, to learn and create new things, and to do better by ourselves and our world which relates to both extrinsic and intrinsic learning. It is typically intrinsic motivation that leads to deeper learning, whereas extrinsic motivation experiences are usually avoidance of negative outcomes or gains of perceived positive outcomes (Garofalo, 2016).

**Fixed mindset.** An individual's belief that abilities, intelligence, and learning is static and cannot be developed (Dweck, 2016).

**Growth mindset.** An individual's belief that abilities, intelligence, and learning can be developed through effort and commitment (Dweck, 2016).

**Grit.** Passion and perseverance for long-term goals (Duckworth, 2007).

**Hispanic or Latino.** The terms Hispanic and Latino refer to a person of Cuban, Mexican, Puerto Rican, South or Central American, or Spanish culture or origin, regardless of race (U.S. Census Bureau, 2012).

**Metacognition.** Awareness and control of thinking for learning (Stanton, J. D., Sebesta, A. J., & Dunlosky, J. (2021).

**Positive Psychology.** Study of strengths that enable individuals and communities to thrive and the belief that people want to lead meaningful and fulfilling lives to cultivate what is best within themselves, and to enhance their experiences of love, work, and play (Garofalo, 2016).

**Poverty.** The relationship between the incomes within a household with the categorized level of income that differs based on family size and economic inflation (Brito & Noble, 2014).

**Process Theory.** A system of ideas that explains how much effort is sustained over time toward a particular goal (Garofalo, 2016).

**Protective Factors.** Protective factors are the traits that help individuals from adverse conditions and assist in mitigating negative outcomes for students (Kitano & Lewis, 2005).

**Resiliency.** Resiliency entails making positive adjustments in the context of significant risk. Resilience is also used as a capacity to overcome adverse conditions and attain success even as all risk indicators suggest imminent educational failure (Masten, 2013).

**Self-determination Theory.** Suggests that people are motivated to grow and change by three innate and universal psychological needs. Theory suggests that people can become self-determined when their needs for competence, connection, and autonomy are fulfilled (Garofalo, 2016).

**Social Cognitive Theory.** Maintains that portions of an individual's knowledge acquired can be directly related to observing others within the context of social interactions, experiences, and outside media influences (Garofalo, 2016).

**Self-efficacy Theory.** What individuals believe they can achieve in any given situation (Garofalo, 2016).

**Socioeconomic status.** Refers to the accessibility of economic and social resources available to an individual, including benefits and social standing (Brito & Noble, 2014)

# CHAPTER II: LITERATURE REVIEW

## Literature Research Procedures

To obtain literature and information for this thesis, searches of Educational Journals, such as ERIC, Google Scholar, RefWorks, online Education websites and books were utilized to compile and analyze data. Key words used included “growth mindset,” “grit,” “perseverance,” “history of education,” “mindset strategies,” “metacognition,” “self-determination theory,” and “resiliency.” Each publication and educational resource used was published from 1983 to 2021.

## Early Childhood Study

According to Dweck (2016), growth mindset is an individual’s belief in their own abilities to accomplish a goal through effort and hard work. An individual with a fixed mindset believes intelligence and ability are set for life and cannot be changed (p10). Often a parent's mindset can also play a role in the success of a child’s development. Next, we examine a study where infants as young as ten months old participated in growth mindset research. In a study conducted by Rowe & Leach [abstract] (2019), SES or Socioeconomic backgrounds play a role in disparities in children's early vocabulary skills and can even “be traced back to disparities in gesture use at age one and are due, in part, to the quantity and quality of communication children are exposed to by parents. Further, parents' mindsets about intelligence contribute to their interactions with their children.”

Rowe & Leech analyzed 47 parents with 10-month-olds and implemented gesture intervention on parents with a growth mindset component to uncover whether this method would increase parents' use of the pointing gesture, and thereby affect the infants' use of pointing and affect vocabulary growth. When it comes to gestures in early childhood, primary gestures begin

to develop from infant actions and the responses of others. For example, infants quickly learn to shake their heads to communicate “no.” Infants reach for things they want and raise their arms when they want to be picked up. Adults can teach children to specify what they want by pointing, using simple sign language, like “more” and “all done” when eating or gesturing socially through waving, clapping and blowing kisses. Adults can also teach infants to use the “shhh” gesture, shrug, hold a hand up for “wait” and shake their heads up and down to indicate a “yes.” Early childhood gestures become more advanced and clearer as they interact with adults and begin to learn through observation.

The effects of intervention influenced parent gesture which resulted in increased children pointing to more than parents within the control group by age 12-months. The intervention also had a significant effect on child gesture use with parents. The outcome of the intervention on pointing was stronger for parents who had previously shown interest in fixed mindsets before the experiment began, and increased vocabulary in 10-18-month-old children of those parents who endorsed fixed mindsets at baseline. The conclusion of the experiment by researchers advocated that “incorporating growth mindset approaches into parenting interventions is encouraged” (Rowe & Leech, [abstract] 2019).

Growth mindset shows potential benefit beyond the scope of talking readiness as well. Though the communication with pre-language skills may present differently, capacities can be shown in children unable to speak in full sentences. We will highlight a portion of actual learning standards that correspond at this age level. First, we need to reiterate what this study helps to illustrate; not only does parent involvement matter in growth and development, but it also brings to light certain aspects of early childhood learning that we may have otherwise

overlooked. Gesturing, pointing, and conversation between parent and child without words is not only possible but incredibly important to an infant's development.

During early childhood, the National Association for the Education of Young Children (NAEYC) recognizes an extensive list of learning targets, language development goals and objectives for an average child aged 0 up to 36 months. A portion of learning targets for this age group include: Listens and responds with interest to verbal and nonverbal communication of others. Imitates and begins to understand and use consistent sounds, gestures, words, questions, and actions to express needs and wants and for a variety of purposes. Participates in simple two-way conversations.

Dramatic Play: Observes and imitates sounds, gestures, or behavior and uses objects in new ways or in pretend play. Uses imitation or pretend play to express creativity and imagination. Engages in behaviors that build relationships with familiar adults and responds differently to familiar and unfamiliar adults. Seeks ways to find comfort in new situations. Shows emotional connection and attachment to others. Shows interest in and awareness of other children. Begins to recognize and respond to other children's feelings and emotions. Learns and uses social skills, and eventually words, for expressing feelings, needs and wants. Uses imitation or pretend play to learn new roles and relationships. Self-Awareness: Expresses feelings and emotions through facial expressions, sounds or gestures. Develops awareness of self as separate from others, etc., (Copple, et. al., 2013).

The point is infants are far more capable than most adults realize. As an example, even at this young age parents and caregivers can already see patterns in children who easily give up when learning a new skill. An infant can attempt to grasp a bottle, accidentally drop it and become overly frustrated. Yes, a mindset is self-belief that may be either positive or negative and

can be recognized and analyzed in infants. The study did have its shortcomings. For instance, it was found that there was no main effect of the intervention on child vocabulary. The fact that implementation of increased gesturing was found to affect fixed mindset parents more than growth mindset parents from the baseline implies that the parents who were already regularly gesturing/pointing/signing with their 10-month-olds did not have as much of a dramatic effect as it did for parents who started with very little signing at baseline. Most importantly, this study demonstrated that the amount of perception an infant has toward a growth mindset is guided by the actions, reactions and behaviors of the adults around them especially when it comes to learning new skills. Moreover, the study supports that growth mindset improvements made in the parents corresponded to improvements in development and intelligence in the young learners.

This study is important for two reasons; one - it opens the door to researchers creating more interventions with younger children and encourages exploration into what is possible within the expanding world of grit and growth mindset research. Two, it reminds us of where we all began; we all have the capability of embracing mistakes and failures as we did when we were young without a care in the world, or as Angela Duckworth author of *Grit: The Power of Passion and Perseverance* (2016) states:

> "Learning from mistakes is something babies and toddlers don't mind at all. . .Watch a baby struggle to sit up, or a toddler learn to walk you'll see one error after another, failure after failure, a lot of challenges exceeding skill, a lot of concentration, a lot of feedback. . .Very young children don't seem tortured while they're trying to do things they can't yet do" (p141).

This reminder is also important because it implies that a fixed mindset is a learned behavior, which means we can unlearn a fear of mistakes and being hard on ourselves; and we can relearn

to view the process of learning as a journey that ebbs and flows beautifully and naturally. We cannot learn without our mistakes, which makes our mistakes our friends.

## Preschool Study

Pawlina and Stanford (2011) focused on building resilience and growth mindset strategies in preschoolers through their teacher preparation programs using specific critical thinking and problem-solving skills. This study also placed importance on the adults as primary promoters and facilitators for mindset growth within the children. Pawlina and Stanford began by asking the questions. How can teachers get students excited about learning even when they make mistakes and encounter challenges? They asked how they can create an environment where challenges are viewed as opportunities for learning and bloopers are seen as fun! The preschool teachers sought to reframe problems into potential positive outcomes by asking questions and making it a game. Pawlina and Stanford (2011) provide one such example:

> It is the end of the day. Seventeen preschoolers come into the classroom and sit in a circle on the rug for their closing ritual, which involves asking and answering a question. The question this afternoon is "What challenge did you work on today?" Juan begins by asking Jenny, the girl next to him, the question. He passes her the talking piece, a polished purple shell each child holds when it is his or her turn to speak.
>
> Jenny (who receives occupational therapy): I exercised my finger muscles with the tweezers and beads.
>
> Michael: I worked on swinging. I can go by myself now, but not really high yet.

> Quincy (who is on the autism spectrum): I'm working on not crowding Matilda and playing with a lot of friends.
>
> Stacey (referring to the visual timer): I worked on staying at one thing until all the red was gone (p30).

Exercises like these are used in NAEYC training all over the United States because they consistently yield positive results. The child who has been working hard to ride a bike without training wheels will feel more empowered when an adult comments and recalls where he or she was two weeks ago compared to progress he/she have made until now. This also connects children to previous learning and reframes what it looks like to learn something new. This type of strategy promotes self-efficacy, builds resilience and promotes the feeling of control over actions and consequences. Paulina and Stanford began by discussing the concepts of resilience in ways that small children can comprehend. "Flopping like a beanbag usually means we don't think we can help ourselves, so the problem doesn't get solved . . . our brains don't grow. But if we bounce like a ball, we usually think there are some things we can try to fix the problem. That feels good!" (2011, p31).

Pawlina and Stanford also place importance on omitting the words “hard” and “easy” from the conversation. Language that focuses on effort and not on being smart is also encouraged. Teachers must also model resilience and problem solving even if it must be intentional so students can emulate that behavior. For example, a teacher knows very well how to trace a circle. Perhaps a couple times the teacher botches the line and must try again in front of the students and models having fun making mistakes. This can set a wonderful example on

resiliency and problem solving for the students to see and learn from. Finally, the more questions we ask in the right direction, the better.

In teaching, we must highlight the importance of asking questions. Too often students become afraid to ask questions for fear of appearing less than smart. If the teachers can ask intentional questions and often, the more they are able to build knowledge and expand perspectives. Whether it is the teacher or the student, through questions we learn. Teachers can ask questions that they already know the answer to just to clarify for students in a group setting. Asking questions engages learners and gives them a chance to mull over the ideas. It is important to pause and allow students to integrate ideas. Multiple viewpoints can deepen learning as questions are asked and can stimulate spontaneous inspiring conversations and learning. Asking questions also communicates value, in that way we are showing students that their input matters to us and shows them that they are important. We can guide students through questions and set the example that asking questions is natural and encouraged, especially at the early stages of learning. By the end of kindergarten, students have already formulated a perception of themselves as learners. (Chapman et. al., 2000).

## Elementary School Research

There are plenty of growth mindset action research studies to choose from which primarily focus on math and for good reason. It is easier to gauge data on a subject that has hard edged facts and figures wherein the answers given by students are correct or incorrect than we are able to decipher with a creative discipline. For example, in a subject like art there are somewhat subjective analyses that take place and therefore it is more difficult to pigeonhole artistic development with numbers and statistics. Therefore, an elementary school study on

reading development and comprehension is a welcome addition to the growing mindset studies offered in education. One such study conducted by Rosemary Anne Miller (2019) was implemented during the four most influential years of reading development, involving eight kindergarten through third grade homeroom teachers and one reading specialist. It is primarily grades K-3 in which students are learning basic reading skills, phonemic awareness, decoding, and deepening comprehension competencies. As we learned from previous studies, a growth mindset works well when it addresses the emotional needs of learners and addresses self-perception through metacognition, i.e., the processes used to plan, monitor, and assess one's understanding and performance. Metacognition includes a critical awareness of one's thinking and learning.

In this study, teachers implemented The Mindset Kit which applies evidence-based strategies through lessons and programs created by Project for Education Research That Scales (PERTS) at Stanford, a lab with which Carol Dweck collaborates. They also utilized a monthly guidebook by Annie Brock and Heather Hundley (2016) called *The Mindset Coach.* Teachers engaged in weekly cycles of collaboration, discussion, observation, action and reflection to reimplement changes as needed. Transcripts, surveys, document analysis, and observation notes were coded and recorded to note any emerging patterns. The end goal of this action research study was for teachers to find ways to adapt the theory of growth mindset to early elementary readers while simultaneously addressing considerations of self-perception and anxiety among students.

Due to the nature of this action research study, key takeaways were imparted with words rather than numbers. During the process of goal setting with students, teachers reported that setting manageable, flexible, and specific goals whereby smaller specific steps could be taken

were noted as more transformational for students. Every child had a different objective based on their unique reading needs so the individual goals gave ownership to students and helped them hone skills in a concrete and accessible way. It was also noted that modifying growth mindset language, questioning and feedback gave students more ease when implemented in the classroom. Teachers also found that engaging in regular conversations with students applying the see, think, wonder method assisted students in understanding key observations, forming inferences, and generating essential questions. Overall, the study concluded that participating in the study

> had a profound impact on the way educators instruct and interact with students. This study also found that growth mindset practices formerly thought to be most successful with older students can be successfully adapted and applied with children as young as kindergarten age (Miller, [abstract] 2019).

Teachers reported that learning how to teach with growth mindset strategies gave them as educators an opportunity to slow down, reflect and decide on new strategies and listen more intently to the students' needs. The experiences of these nine teachers allowed for productive and valuable findings, however it was documented that reactivity may have played a significant role in the study. At times, researcher-pleasing behaviors were present and honest communication seemed to be lacking, where the study would have benefitted from actual teacher views on the subject. Researchers reported that often the reflective processes discussed during group observation and analysis for findings within the study did not always match with the growth mindset tools and verbiage being utilized within the classroom. Many teachers' subconscious fixed mindsets were also revealed throughout the process of conducting this study, it was noted.

Once again, the importance of mindset in the teachers was found to be an important factor in partnership with implementation of the mindset tools. If the teachers are not fully invested in the strategies, can their teaching still be effective? Since new training on educational strategies come and go so often, some teachers may have lost the enthusiasm to go all in. However, it was noted that the teachers who participated in the study unanimously supported the idea of school-wide growth mindset training moving forward. Perhaps this would encourage more teachers who are genuinely dedicated to helping students to embrace growth mindset tools in their classrooms.

## Middle School Research

According to researcher Austin Garofalo, another problem to be addressed with teacher mindset is the perception that student motivation has decreased over time, which, if true, requires that facilitating engagement in the learning process is crucial. The depersonalization of education through acts like NCLB and the preoccupation with high stakes standardized tests is again often pointed to for stifling creativity and imagination in the classroom. As education continues to evolve, the teaching of character competencies seems to be taking a front seat again as more research points to the importance of responsibility of a person towards society, moral and civic duties, mannerisms and behavioral patterns in creating strong-minded leaders. Therefore, self-supporting grit and growth mindset strategies are so important because they can drive achievement and success, independent of what talent and intelligence are able to provide.

Garofalo conducted a mixed qualitative and quantitative action research study that examined whether teaching character competencies such as growth mindset and grit to middle school students could increase motivation in the classroom. Qualitative data from teachers and

students was used to supplement quantitative data. Data was collected before, during and after delivery of lessons/interventions in which self-reports, surveys, journals, as well as quantitative data was measured with a t-test. The t-test used inferential statistics to determine if there was a significant difference between the means of two groups and how they were interrelated. Qualitative data was gathered from both teachers and students, while quantitative data was based solely on student self-assessment. The control group was given no training on grit or growth mindset yet asked to complete the same set of self-reporting. The experimental group was given each lesson on grit and growth mindset during advisory hour every month in the morning. Monthly interventions began with brain science and neuroplasticity lessons. Students started by learning about the ability of the brain to change its physical structure by developing new neural pathways as a result of learning. This is the technical function and science backed expression of a growth mindset. After students learned how to strengthen their brains like muscles through videos and discussion, the importance of making mistakes and growing through challenges was discussed. For motivation, focus on celebrity and famous personalities who have historically risen above obstacles, downfalls, and setbacks are used to demonstrate the effects of working hard and celebrating success through grit, perseverance and resilience.

As the lessons progressed throughout the year, utilization of content theory, process theory, cognitive evaluation theory, self-determination theory, social cognitive theory, self-efficacy theory and positive psychology were all used in conjunction with character building, growth mindset, grit, persistence, and various pedagogical strategies were employed through TED talks, exercises, discussions and multifarious learning and motivational videos. In October, students were asked to complete three short surveys, and write two brief descriptions to establish

a grit and mindset baseline. Each month the students were to journal at least three statements on their progress and more comprehensive final surveys were given in April.

As discussed earlier, the students pre and post test scores were administered via self-assessments were coded by themes: intrinsic motivation, extrinsic motivation, self-efficacy, and control over learning beliefs and were subdivided into groups with basic mindset concepts. For example:

Student 1 Pretest: “I try to be focused, but I still end up fooling around.”

Student 1 Posttest: “I just do my work and get it done.”

Student 2 Pretest: “I'm not serious about my work, and I don't strive as much to do my best.”

Student 2 Posttest: “I do not enjoy all subjects, but I've learned to try my hardest in my subjects.”

Student 3 Pretest: “I'm an average student that is nice to others.”

Student 3 Posttest: “I work hard, try my best, and never give up in school.”

Student 4 Pretest: “I don't do all of my work because I try to fit in.”

Student 4 Posttest: “I’m a motivated learner and help others even if they say I can't.”

Student 5 Pretest: “I am not always a hard-working student, but I try to get good grades.”

Student 5 Posttest: “I am the type of student that works hard in school. I don't really like it, but I know it'll pay off in the long run” (Garofalo, 2016, p71).

The researcher organized quotes from students and teachers to better analyze feedback based on themes, of which there were four. This method of data collection also allowed for the researcher to observe the way the growth mindset concepts were taught by the teachers so that direct lines could be drawn to student feedback. The quote themes were intrinsic motivation, extrinsic motivation, self-efficacy, and persistence. Again, the first part of the research simply looked to determine if growth mindset and grit can be taught. Garofalo summarized that the qualitative data based solely from the teachers demonstrated that there was some improvement in growth mindset in students throughout the study. Investing grit improvements was inferred through comparative analysis of the pre and posttest student feedback from students from a qualitative standpoint, however the quantitative data was reported to be 'not definitive'. Qualitative data suggests that growth mindset and grit can be taught but student learning is only evident upon inspection of descriptive statistics of pretest to posttest average mean scores, the increases over the time of the lessons/interventions, especially for growth mindset, also correlate.

However, when results from the t-tests are examined, only the teacher data for growth mindset from the control group and experimental group had statistical significance and at moderate and large effect sizes, respectively. Analysis of the multiple linear regression shows an effect on the variance in motivation, but unlike the data just mentioned from the t-tests, the effect of growth mindset is lacking compared to the results with grit, which is strong. This study may have yielded different results because all participants within the study were willing and therefore could have possibly already had elevated levels of growth mindset and grit motivations being taught prior to the study. Garofalo also recommends that researchers who use this study as a blueprint for future research should concentrate on one theme at a time instead of two, i.e., grit and growth mindset simultaneously. Other limitations cited by the researcher was the need for

more participants, and more frequent interventions than once a month would have provided additional benefit to students. Garofalo also noted that the duration of the study was too short, and the scale of the study was too small.

To compare with this analysis, we now examine a national study carried out by Yeager et. al. (2019). According to Yeager et. al. (2019), behavioral sciences have placed significant importance on priority toward developing cost-effective and accessible interventions to improve the academic results in adolescents, yet so far little research that can be applied to the larger population has been evaluated. In the United States, around 20% of students will not finish high school on time. Research shows in the US that many students tend to underperform during the transition from elementary to secondary school and are less likely to leave secondary school prepared for college or university.

Yeager, et.al. (2019) created a study which reports that a short online growth mindset intervention improved grades among lower-achieving students and increased overall enrollment to advanced mathematics courses in a nationally representative sample of students in secondary education in the United States. Preliminary growth mindset interventions for this study were taught by highly trained adults in multiple sessions using interactive workshops. However, it was later found that self-directed online growth mindset interventions were shorter and more effective at improving grades for the targeted group of students. Like previous interventions, the training was administered through encouraging students to view their own intellectual abilities as being accomplished through hard work.

Yeager, et. al. (2019) began the study by reporting the growth mindset intervention prompts through strategic indicators of high school success and analyzed poor performance rates.

As a reminder, this study evaluated a growth mindset program for students who were relatively lower-achieving relative to peers learning within the same school. Yeager et. al., found that the brief and low-cost growth mindset intervention could prevent 5.3% of students from being 'off track' for graduation. The study included 12,490 ninth-grade adolescents who were individually randomized to condition. The student sample reflected the diversity of young people in the United States, and only 29% of the students' mothers had a bachelor's degree or higher. To guarantee the study procedures were repeatable by third parties and scalable, two different professional research companies were contracted, one of which was blind to the treatment conditions of the students. Manpower Demonstration Research Corporation (MDRC) processed data merged by International Classification of Functioning (ICF) and produced an analytic grades file. The authors of the study analyzed the data following a pre-registered analysis plan and 139 schools were selected from a sampling frame of roughly 12,000 regular US public high schools.

The goal of this growth mindset intervention was conducted to reduce fixed-trait designations and performance avoidance goals that are documented causes of fixed mindsets in students. The intervention was designed to develop a growth mindset by taking on challenging work, improving learning strategies, and asking for appropriate help when needed. Like the previous study, inspirational content was presented to capture interest and anchor belief. The videos featured stories from older students, admired adults and interactive sections for students to discuss their own learning.

The intervention was delivered early in the school year in hopes that it would increase the chance of setting in motion a positive self-reinforcing cycle. Excellent participation was observed with 97% of students viewing screens and 96% of students responding to open-ended

questions. Self-report measures showed that most students had a fixed mindset, and the intervention was predicted to reduce these self-report measures. Schools provided grades for each student in each course for eighth and ninth grade students. Students' challenge-seeking norms were assessed through a behavioral measure called the make-a-math-worksheet task. The school norm was estimated by taking the average number of challenging math problems that adolescents in the control group chose to work on.

Further analysis focused on the outcome of GPAs in only mathematics and science and supported the conclusion that the growth mindset intervention seeks to correct mindsets across schools, but not GPAs. However, there was serious variability in the effect on GPAs among lower-achieving students across schools. Researchers expected that in schools that are unable to provide high-quality learning opportunities, students might not be able to sustain the desire to learn. However, the data indicated that students showed larger effects from the intervention in schools with higher achievement levels. Researchers then examined if students with a growth mindset were discouraged from challenging themselves in schools where peers were unsupportive of challenge-seeking.

It was found that in schools that had more supportive behavioral norms, students had higher core GPAs and were more likely to be in the top quarter of their class. Further, it was found that the growth mindset intervention increased the number of students taking rigorous mathematics courses. Even more impressive, students who took advanced mathematics in tenth grade increased by 3 percentage points in the intervention group compared to students not taking advanced mathematics in tenth grade. This increase was found strongest among students attending higher-achieving schools.

The National Study of Learning Mindsets study indicates that a low-cost growth mindset intervention can redirect critical academic outcomes without costly training for teachers, in a population-generalizable sample, and with data processed by a second independent research company. This study has important implications for future interventions of growth mindset on a large scale. It highlights the importance of beliefs in adolescents regarding behavior change, and the need for interdisciplinary research to understand the numerous influences on adolescents' developmental trajectories.

Blackwell, Trzesniewski and Dweck (2007) looked at action classroom research and involved the findings of two separate studies paired together in an exploration of the functions of fixed mindset versus growth mindset intelligence in adolescents' mathematics. The first study involved 373 seventh graders, who held the belief that intelligence is malleable (growth mindset) and displayed their trajectory in grades attained over two years of junior high school. The other group held a belief that intelligence was an unavoidable outcome (fixed mindset) which predicted a flat trajectory. The growth mindset teaching model included learning goals, positive attributions and strategies were established. The second study, an intervention teaching seventh graders, promoted positive change in classroom enthusiasm. At the same time, students in the fixed mindset control group “displayed a continuing downward trend while this decline was reversed for students in the experimental group” (p246).

This study highlights the positive influence that growth mindset can have on a middle school environment which accentuates social judgment and comparison. In this study, students were learning at an age of “heightened self-focus; it is associated with a decrease in decision making and choice at a time when the desire for control is growing; and it disrupts social networks and support when they are most needed” (p246). These additional obstacles can throw

student learning off and lead to learner disengagement. This study also recognized that many differences of intellectual growth are undeniable and play significant roles in learning based on individual background and experiences. In other words, every learner is a snowflake, and no two students will learn in the same way. In addition, while assessing differences is important, and varying starting points are unavoidable, continual focus on student potential has shown substantial benefits toward positive intellectual development in students' growth mindset.

## High School Study

According to education expert Christopher Swanson (2020), as one child comes home from school, another 7,200 students are dropping out daily. The national dropout rate has reached a tipping point and more than 32 million Americans over age 18 have yet to complete high school. The United States is losing millions of students from its educational systems every year, leading researchers to demand that reducing the dropout rate become the top priority for educators throughout the country. Hispanic and other minority students are leaving school at an even higher rate than the student population, in part because Hispanics are the fastest-growing minority group in the United States, and according to Hansen (2016),

> The data do not consider the number of Hispanics who are migrating to this country in search of employment and not education. Therefore, most of these immigrants are males seeking financial security for themselves or others in their care and as a result, drop out of school shortly after enrollment. Consequently, Hispanic dropout rates far exceeds those of the White and Black subgroups, in part because Whites and Blacks are not immigrating to the United States at the same rate as Hispanics. Although other minority groups are dropping out, Hispanics compose more than a third of the U.S. dropout

> population today. In 2013, the dropout rate for Hispanics was 12% – nearly two and half times the rate of Whites (5%), and almost twice the rate of Blacks (7%)" (p2).

Hispanics compose more than one third of the U.S. dropout population and are the lowest performing academically of all minority groups. In a competitive global economy employers seek students who will continue their education, and high school diplomas are often the minimum qualification for employment.

Sadly, high school dropouts are more apt to commit crimes, become pregnant in their teenage years, and depend upon government programs. High school dropouts hinder the growth and development of the U.S. economy by remaining unemployed, utilizing government assistance, or worse, rotating through the prison system. In addition, high school dropouts are less likely to stay employed and rely heavily on federal resources. The collective price of under-education is shocking; each year, high school dropouts cost the United States more than $260 billion in social services, unrealized financial gains and uncollected taxes. "The United States faces a dropout crisis that threatens the economic and educational future of the nation" (Hansen, 2016, p4).

Researchers have published various studies on factors contributing to the U.S. dropout epidemic. This next study focused on factors that most attribute to resiliency skill development, growth mindsets and grit in students who face multiple risk factors in their lives. At-risk students who show resolve and thrive academically, despite the multiple risk factors confronting them, are a source of inspiration for others facing similar circumstances. As discussed earlier, students with low SES often lack the learning prerequisites that place students in classes that produce superior academic results. Most research carried out on America's dropout crisis for Hispanics

and other minority at-risk students has focused on risk factors and their effects, rather than protective factors that promote resilience in young people.

In this next study, Hansen (2016) sought to examine the demographic, academic, and identified risk factors for a targeted sample of high school students who rank highest in their class despite facing at least two identified risk factors. Eight students from an economically disadvantaged high school were interviewed about their risk factors for academic failure and their mitigating protective factors. In order to identify relationships between risk factors and grit levels, a survey was given to a sample of 12th grade students and analyzed to provide insight into the adverse conditions that students face and the risk factors some students overcome while in high school. This study identifies key factors that lead to educational resilience in students who are faced with adverse conditions and works to assist local education agencies in developing a framework to help mitigate the high school dropout crisis. The methodology used for this intervention is a mixed methods study of quantitative and qualitative data. The study began with a quantitative survey and student interviews.

The study was conducted with high school students from three comprehensive high schools, one alternative high school, one community day school where expelled students are assigned, and one online high school in a low-socio economic district in southern California. Eight interviews were conducted with students from various backgrounds, who faced serious challenges while attending school, and who excelled academically, on track to graduate in the top ten percent of their senior class and were concurrently enrolled in community college earning post-secondary credits. Hansen interviewed the at-risk students over the course of two months to better understand the adversities they faced as well as the factors that contributed to overcoming them. The students provided insights on various challenges that they faced and provided tangible

strategies that could be implemented in the educational setting. A survey was conducted to identify strategies that foster resilience, grit, and perseverance. In addition, a quantitative study was conducted to determine the amount of grit they perceive themselves to have. The study utilized the Grit Scale and collected data on several variables including grade level, gender, socioeconomic status, and family configuration. The Grit Scale is a 12-step self-assessment tool developed by psychology professor Angela Duckworth which allows individuals to uncover how gritty they are, with questions that focus on setbacks, and whether they discourage or cause a person to lose focus easily.

Hansen (2016), explicates:

> For the scope of this study, seven protective factors were examined against six major risk factors to determine whether or not at-risk students were deemed contributing to their overall academic success. Academic success was defined by the grade point average (GPA), overall ordinal GPA status, and college course completion of each participant. The protective factors identified were parental involvement, parent and teacher expectations, student-teacher relationships, positive reinforcement, engaging instruction, interpersonal strategies, and targeted educational programs. Each of these protective factors were tested against the following risk factors: divorce or separation of parents, English as a second language, poverty as defined by the free lunch program, stress, experiencing a tragedy, and deficient brain development linked to poverty and stress. Some of these risk variables were selected based on the research that supports the negative effects they have on children's academic success. Others were chosen because each of the participants interviewed experienced two or more of the variables in their lives (p84).

According to Hansen's research (2016) these protective factors have been shown to play a critical role in a child's academic success. Students were asked to discuss each of these protective factors as critical mitigating measures against the adverse conditions that they faced. The quantitative data was collected through a survey that was designed on Qualtrics and given to high school students. The results were analyzed using SPSS software and the Pearson Correlation model. The correlation between risk factor variables and growth mindset attributes in at-risk students with high academic achievement was tested using Pearson's Correlation. The results indicated that grit was the most strongly correlated variable with risk factors, protective factors, growth mindset attributes, and cultural reproduction. Pearson testing found positive relationships between parental involvement and GPA, and negative relationships between socioeconomic status and parent education. There were also negative relationships between socioeconomic status and having English as a second language. Additional quantitative statistics demonstrated that there are significant correlations between various skills and mindsets attributed to grit or resiliency.

The study also found that 58% of the students surveyed responded that their primary language is something other than English, 64% had experienced a serious tragedy in their life, 74% received free lunch at school, and the level of education for mothers of students resulted in 30% negative correlation. The negative correlation signifies that the less education the mother has, the more likely the student will come from poverty. The research signifies that at-risk students benefit from high expectations and an environment that promotes experimentation. Each helps to make connections to deeply learned concepts. When teachers incorrectly place different levels of expectations on children based on their circumstances, they limit and at times reverse, the development of resilience in at-risk students. Hansen also noted that 87% of the students

surveyed had a GPA of 3.0 or higher. Due to limited parent-teacher or parent-school interactions through limited understanding of the curriculum, the research indicated a weak relationship between parental involvement and GPA. This was due to factors such as limited parent-teacher or parent-school interactions and limited understanding of the curricula. Many parents who do not speak English are not able to assist their children with their homework. Hansen also notes: "although the statistical relationship may be weak, parental involvement at some level contributes to fostering resilience toward academic achievement" (2016, p121).

In summary, students who participated in the survey showed that correlations existed among various traits that support resilience, grit, and growth mindsets. The data also showed that overcoming setbacks was a significant predictor of being a hard worker, which is an important component of student success. One surveyed student explains his views on resiliency, grit, and mindset; he states: "There are resources that can be put out there for at-risk kids, but ultimately, it's up to you. If you want to get out of the environment you are in right now, and you want to move forward and be better, then you are gonna have to put in the time, the work, and the effort, if you want to be where you want to be" (p146).

Educational programs like AVID and Upward Bound helped students focus on academics and achieve goals. At-risk students need coping strategies to overcome discouragement. These strategies can be taught in educational settings and can encourage students toward resiliency, grit, and growth mindset development. Advisory helps students prepare for college by giving them the extra push to be successful. The teachers help students find scholarships and programs that will help them in their education. At-risk students experience challenges while attending school that can create feelings of helplessness. When schools implement programs that support perseverance, persistence, and completion strategies, academic achievement among at-risk

students will increase as they become more resilient. This study supports the notion that high expectations and the learning environment created by the teacher plays a vital role in developing resilience and growth mindsets in at-risk students. Students are more engaged with learning when teachers are charismatic, positive, and understanding of their challenges. As high school students move into higher education and the rigor of academics increases, frustration can become all too common, and a growth mindset becomes ever more vital.

## Higher Education Research

According to researchers Sahagun, et al., (2021), professors can encourage college students to learn content and not just memorize it just before taking an exam by considering their mindset. In courses taught primarily by lecture-style instruction, students tend to memorize the material and easily forget it weeks later. To overcome this problem, Sahagun, et.al, developed a new pedagogy utilizing growth-mindset teaching and applied it in two undergraduate marketing courses.

A pretest-posttest control group design analysis was employed to study the effect of Growth Mindset Teaching (GMST) pedagogy on the growth-mindset and fixed-mindset beliefs among students. This study used a self-administered questionnaire to collect data from students in their usual class environment. Students who were taught using GMST pedagogy showed greater growth-mindset beliefs and less fixed-mindset beliefs than students who were taught using traditional lecture-style teaching. 1483 undergraduate students were selected from two courses to participate in the study. The courses had to be taught using GMST pedagogy and lecture-style teaching. All participants were in a growth-mindset learning environment, 59% were men and 41% were women, and 100% were full-time students.

The growth-mindset teaching (GMST) pedagogy integrated five elements to create a safe environment for students to learn, re-learn, and explore knowledge without the fear of being wrong. The first element of this teaching pedagogy was viewing the class as a training room for students, to foster a mindset of active striving to learn and progress. This was done to help students develop growth-mindset beliefs and encourage them to invest more energy into learning. To develop growth-mindset beliefs, students need to feel welcome and have a classroom culture that promotes risk-taking.

The GMST pedagogy required students to submit homework and assignments before class time. This decision was made to improve in-class participation, discussion, and comprehension, and enable professors to successfully utilize the class as a training room. Professors also provided quality feedback shortly after an assignment or exam to help students recall the graded experience in greater detail, which resulted in more positive and confident responses. Sahagun noted that professors must ensure their feedback is positive or at least neutral, and not discourage students with negative comments. Professors also used language that fosters growth-mindset beliefs and rewards the process of learning and not just the result.

Professors were also directed to allow students to experience some failure and help them reflect on their errors in order to better instill growth-mindset beliefs. Author of *Failure is an option: helping students learn from mistakes,* John Orlando states, “grading is often used to separate good students from the bad and encourages the adoption of fixed-mindset beliefs across a range of students” (2011, p4). To relieve this pressure, Sahagun et. al, decided professors should permit students to fail on occasion throughout the semester and without penalty.

Professors worked to foster an environment where students could focus on feedback, reflect on their weaknesses, and submit multiple attempts to improve their work. It was also noted that professors should not distribute final grades solely on exams and other one-time assignments as this promotes fixed-mindset beliefs and promotes memorization and cramming rather than active learning that remains over time. The same surveys were administered twice each semester, during the 2nd and 16th weeks of class.

The results indicated that GMST and survey type were the only two significant predictor variables. The first research question addressed the development of a teaching pedagogy that could help students develop and/or increase their growth-mindset beliefs. The results showed that the growth-mindset and fixed-mindset constructs were positively correlated. M.A. Sahagun et al., (2021)

> found that the teaching (GMST) pedagogy resulted in a statistically significant difference between the two teaching styles, and that the difference in the two surveys was only marginally significant…and results indicate that GMST helps develop or increases growth-mindset beliefs and reduces fixed-mindset beliefs among students compared to lecture-style teaching (p6).

Researchers discovered that the relationship between the GMST pedagogy and the sex of students is important. It was discovered that the increase in growth-mindset beliefs among female students exposed to the GMST pedagogy was 5.75 times greater than the increase in growth-mindset beliefs amongst male students. There is still some debate as to why the growth mindset tools produce a higher success rate among females than males. According to Schlender, Tan, & Wegmann (2020) there may be gender differences in academic mindsets due to their

different socialization processes. A cohort of urban New Jersey high school students was examined for gender differences in their social skills, sense of social identity, and academic mindsets. A preliminary analysis suggests that female students exhibit a marginally significant higher level of growth mindset than male students. Among female students, social skills are significantly correlated with social group identity. Mindset is significantly correlated with group identity. Only social skills are correlated with group identity for male students. The relationship between mindsets, social skills, and social identity is still being explored. These ideas shed some light on gender differences for educators to promote student growth mindsets. Professors can help students develop their growth-mindset beliefs and reduce their fixed-mindset beliefs by incorporating the following five elements in their teaching pedagogy:

1) using class as a training room

2) requiring students to submit homework and assignments prior to class start

3) providing weekly feedback on students' performance that includes suggestions on how to improve their performance

4) allowing students to occasionally fail without being penalized

5) providing students with multiple opportunities to improve their performance

(Sahagun, 2021, p3-4).

This study complements other research and highlights the fact that this GMST pedagogy offers a potential solution to the demand for efficient, low cost, and easy training. The study indicates that GMST may be an effective aid for growth-mindset development and diminishing

fixed-mindset beliefs among undergraduate students, but more studies are needed before recommending the best growth-mindset elements or interventions for GMST pedagogy for this and other student populations.

Researchers suggested that future studies should have the same professor teaching some class sections using GMST and some using lecture-style teaching and should also use random selection of participants within the class sections to improve results' general applicability. Applying statistical techniques to identify non-response bias and conducting longitudinal studies to determine if growth mindset beliefs continue improving after being re-exposed to GMST were also encouraged.

Angela Duckworth has become celebrated for her exploration of grit, which she defines as the ability to persist in the face of struggle. Grit includes the ideas of resilience, conscientiousness, self-control and perseverance, which have previously been argued to be central to academic success. The concept of grit is proposed to be an important characteristic required for students to succeed academically. However, conflicting evidence suggests that grit offers little in terms of predictive value for understanding academic outcomes. A cross sectional survey study was conducted with 395 Australian university students to explore the relationship between grit, engagement and academic productivity.

Findings suggest that there is no difference in grit between genders, although this cannot be concluded with certainty due to a large imbalance of male to female participants. It also appeared that being the first in the family to attend university was associated with an increased level of the grit factor ‘effort’. There was a positive relationship between grit,

> engagement and academic productivity. Further analysis revealed that engagement mediated the relationship between grit and productivity (Duckworth, [abstract] 2016).

Duckworth (2016) found that grit was a small but significant predictor of academic outcomes. Other researchers have found similar results, but grit alone only explains 1.4% to 6.3% of variance in academic outcomes. “In addition to cognitive ability, a list of attributes of high-achieving individuals would likely include creativity, vigor, emotional intelligence, charisma, self-confidence, emotional stability, physical attractiveness, and other positive qualities.” Duckworth believes grit may be as essential as IQ to high achievement, and twice as important as being talented. (p1089).

# CHAPTER III: DISCUSSION AND CONCLUSION

## Summary of Literature

Now that we've examined how growth mindset pedagogy impacts student achievement through a variety of age groups and subjects, we are better equipped to explore the specific tools at our disposal in order to successfully improve students' beliefs about their abilities. To reiterate, the goal of teaching growth mindset and grit strategies to students is to inspire greater comfort with taking risks and making mistakes. We want students confident in their abilities and continuously stretching their goals. We want to stimulate greater motivation and enhance brain development to tackle a wider range of tasks and lessen anxiety and stress. As students begin to mature and become adults, growth mindsets, grit and resilience also extends into personal and work relationships and lead to overall higher performance levels.

So, we now know that student engagement and student success go hand in hand, and for teachers to create buy-in for students, they need concrete tools to employ in the classroom. Robinson (2017) considered teaching students (first and foremost) the science behind growth mindset to be a necessary starting point:

> Teachers can help students develop growth mindsets by explicitly teaching about the brain and how it changes during learning. Neuroplasticity is the brain's ability to form and reform new neural connections in response to experiences and changes in the environment (p18).

Through practice and study, students can rewire their brains to become smarter, which creates more interest in learning.

Further, Robinson (2017) believes that learning procedures which focus on memory, elaboration, reflection, and idea generation are key to making the information "stick." Robinson (2017) agrees that it is important to normalize mistakes and failures as a natural part of the process of learning and growing. Reframing questions with positive language when communicating expectations and giving feedback as well as practicing positive self-talk are also important. The author suggests that teachers use data and reflection to set growth-focused goals and to include students in the tracking progress procedures. When setting goals, the more teachers include students in this process, the more they can strengthen learner engagement. As teachers utilize these action-oriented methods of instruction, the students can go from a "can't do" fixed mindset toward a "I can do this" growth mindset (pp 19-20).

Thornton and McEntee (1995) maintain that student mindsets are perceptions formed by past experiences, education, social conditioning, and language, and each can vary among people in the same group and even more so among differing social and cultural groups. Therefore, mindsets can have countless varying perceptions and reasonings of the world around them, and "all people are not necessarily led by the same evidence and to the same conclusions ... [and] assumptions held by one group are not matched by another" (p250). Therefore, student certainties and beliefs, and how they often engage with their teachers and cohorts are ever-changing and unique but even so, the interactions within the classroom can and will create a framework for each child's sense of self and place of understanding in the world. According to Thornton and McEntee (1995), students' "realities" can become deliberately improved through *learner-centered* concepts and experiences in the classroom.

This holistic initial viewpoint values the differences and unique experiences each student brings to the classroom and seeks to build upon and honor their growth from wherever they may

be. Thornton and McEntee (1995) focused on "who is the learner" (p255) and gave more credence to the idea of finding out what the student needs are and how to best address those unique needs. Learner-centered schools change the dichotomy of learning and take a "radical departure from the illusion of educating because it does not assume a single right way of doing things" (p256). The emphasis is on experiences for the student and does not seek to judge whether the experience of the learner is authentic but rather proposes that *all* learning experiences are genuine and worthwhile. Interdependent mindsets seek to nurture and cultivate a mindful and multicultural atmosphere that works "to create a synergistic response to the who-why-how questions of schooling" and "their qualities of authenticity and internal consistency are invitations not only to rethink the process of education, but also as points of departure in self-reflection on bigger questions that too often prove uncomfortable or tedious" (p256).

Tools like positive self-talk, reflections, reframing, setting goals and expectations, as well as teaching students the science behind neuroplasticity are all well worth our time as educators. The study by Altaleb (2021) revealed concrete evidence in support of utilization of growth mindset tools as working well and assisting adolescent teens while they learn and grow at an age where they tend to need it the most. Also, the growth mindset was reexamined and turned toward a more holistic viewpoint. Thornton and McEntee (1995) challenged educators to think about growth mindset and education a little differently. In their opinion, when educators stop and think about where each student is and where their potential lies, they must consider how different student learning could be. This might look like supporting students by emphasizing underlying concepts, eliminating fixed language structures, highlighting mistakes as a positive, asking open-ended questions, maintaining rigor, and reframing responses that align with a growth mindset. Teachers should highlight effort by stating "great job, I can tell you worked really hard on this,

and it shows" instead of "wow, look at that talent, do you get that from your mom or your dad?" This change in syntax and attention to perseverance and grit over natural-born talent can reframe the way students view their own learning and give them a feeling of control over their accomplishments and the power to change what it means to make mistakes and still succeed.

## Limitations of Research

As explained by Dweck, a growth mindset is not just about effort. Perhaps the most common misconception is simply equating the growth mindset with effort. "The growth mindset was intended to help close achievement gaps, not hide them. It is about telling the truth about a student's current achievement and then, together, doing something about it, helping him or her become smarter" (Dweck, 2015, para,7). Dweck warns of the dangers of praising intelligence as it puts children in a fixed mindset, and they will not want to be challenged because they will not want to look stupid or make a mistake. She goes on to explain,

> "Praising children's intelligence harms motivation and it harms performance…if parents want to give their children a gift, the best thing they can do is to teach their children to love challenges, be intrigued by mistakes, enjoy effort, and keep on learning. That way, their children don't have to be slaves of praise" (Dweck, 2016, p178).

In this way, they will be able to rebuild their own confidence for the remainder of their lives.

Ronkainen et. al. (2019) reminds us that the teacher's knowledge of how each student learns takes time and plenty of one-on-one interactions in order to support individual learning processes. Teachers must know students as individuals, give emotional support, build and establish trust, and only *then* will the teacher be able to help each student find suitable study methods and personalize goal setting. A teacher's mindset also plays a vital role in supporting and advancing students' learning processes, and Rissanen (2018a) also declared the topic of

teachers' mindsets merits careful examination. Teachers' pedagogical thinking processes determine how well growth mindset practices are put into play and high expectations must be consistent with ample opportunities for students to make mistakes and fail without penalty.

Rissanen (2018b) finds three critical points and possible pitfalls. For instance, a teacher's trait-focused interpretations for personalities and academic performance may differ. "A teacher's incremental beliefs and process-focused thinking can be stronger in the domain of academic learning and weaker in the domain of personality" (p144). A teacher could easily and unknowingly make more trait-based interpretations on students' psychological qualities and personality traits and adhere growth mindset to academics alone. A second critical point is when a teacher neglects to acknowledge and actively counter fixed mindset behavior. For example, a teacher may misinterpret a fixed mindset behavior as 'overconfidence' or a personality quality and therefore give less persistence and emotional support where it might be needed. A third critical point is when a teacher chooses to 'protect' an academically capable student from challenges if the teacher believes that it would cause the student emotional distress. Instead, it is better to show students the benefits of making errors and embracing challenges to 'learn to interpret mistakes as learning opportunities.' Teachers can actively work to praise students' mistakes and create a framework for process focused thinking. By giving honest and constructive feedback in the form of "not yet," students know that the teacher is not giving up on them and this conveys an understanding that abilities and motivations are malleable. Praising courage, strategies and effort creates a positive interpretation of failures and promotion of master orientation. Through each of these actions and practices, students know that the teacher will not allow them to slide by without stretching, growing and mastering concepts. "Looks like a very good beginning, but it is not yet ready" shows support, expectations and gives students an

opportunity to try again. Of course, a teacher should always take into consideration each student's strengths and weaknesses and individual needs, but we must also remember that whenever a teacher hears "I can't do this," what the child is really saying is "I am not going to do this because it is very hard and challenging." Intervention right away when a teacher notices fixed mindset behavior and critical feedback in the form of "not yet" maintains high expectations and persistence. Paying no attention to the actual mistake but praising the fact that the student recognized the mistake fosters process oriented thinking and giving praise immediately and concretely promotes mastery orientation.

Constructive life skills like persistence and patience can be learned and reinforced daily and critical feedback should be given only when necessary; also, we should never gloss over an experience where things "go badly." When that occurs, always acknowledge what we learned from the mistakes and display the kind of behavior which will earn them praise and recognition. According to Yeager & Dweck (2020), students who aspire to validate their own competence or care more about avoiding looking incompetent (a performance goal) tend to show more helpless responses in terms of (ability-focused) attributions and behavior, relative to students who have the goal of improving their ability. This is one explanation as to why students of equal ability show differing attributions and reactions to failure conditions. Therefore, mindset theories are situation-general and not isolated ideas for attributions and goals. "Growth mindset is not simply the idea that people can get higher scores if they try harder" (Yeager & Dweck, 2020, p11). Mindset deals with the potential for change through ability itself having the potential to be developed. Well-crafted interventions ask students to reflect on how they can develop skills as they engage in challenging work, seek out new learning strategies, or ask for advice when it is needed. We also know that growth mindset interventions are replicable, however notable effects

are stronger among people already facing struggles or obstacles. Further, there will always be various unexplained heterogeneity across cultures and within certain cultures as well. So yes, intellectual ability can be developed, interventions are replicable, but not always and for everyone.

Zeeb, Ostertag, and Renkl (2020) remind us that report effects of mindset training often showed no long-term benefits but short-term effects with growth mindset interventions are common. Zeeb et. al, theorizes that part of the reason behind this is interventions are somewhat isolated from regular lessons. Many growth mindset interventions tout how easy programs are to implement, standardize, scale and afford; however mixed findings indicate that their application in practice does not always succeed. Authors argue that an intervention embedded into the school environment may be more efficient. Leaving out the context in which students learn gives them an understanding of growth mindset concepts (explicit learning) but the training must include implicit components as well. A lesson may start with brainstorming and learning about how the brain is trainable. Texts such as "The Trainable Brain" or "You Can Grow Your Intelligence" were used. Once students learn the concepts, they create a fictitious student who has aims for what he or she will do with the information they take away from the class in the long term. These intentions become internalized when students compare their sentences with neighbors, justify their choices and agree on core messages. In the case of a physics class, students ended up with these core growth mindset beliefs: 1) everyone can learn physics 2) mistakes are valuable 3) questions are important. The teacher then explains each norm and pins them on a poster on the wall. A fictitious friend named "Ben" who believes that there is no point to learning physics, because no one in his family is any good at physics is presented and then students come up with suggestions to help Ben such as "practice a lot, choose more difficult tasks more often" etc. are

discussed as a class. Finally, students then write down helpful intentions for future physics lessons in their notebooks to themselves such as “I want to try solving difficult tasks, I want to ask more questions in the lessons, etc.” (Zeeb, 2020, p4).

Then teachers move into physics lessons and begin regular experiments, group discussion, partner work and individual work. Varied feedback is given, and it is reiterated that students are in an environment where mistakes are valued, and questions are really important. Let’s look at some specific feedback examples:

(i) *If a student struggles despite effort*: encourage the student to recognize the failure as an opportunity to learn, suggest new strategies to solve the problem, praise the student for investing so much effort, etc.

(ii) *If a student succeeds with* effort: praise the student’s effort and persistence, praise the student’s behavior (e.g., time management, strategies), point out how much progress the student has made, etc.

(iii) *If a student succeeds without much effort*: suggest a task that is more challenging, ask the student to help others with the task, look for another skill that the student can work on, etc.

(iv) *If a student does not succeed due to a lack of effort*: explore what barriers the student is facing and offer help to overcome them, talk about more attractive learning goals, suggest new strategies, etc.

(v) *If a student lacks specific skills to improve*: suggest new strategies, give further information, encourage the student to try and not to be afraid of mistakes, etc.

(vi) *If a student makes progress*: praise the student's strategies and hard work, remind the student of the difficulties at the beginning, point out how much progress the student has made, etc. (Zeeb, 2020, p4).

After working through the growth mindset training, lessons and giving ample student feedback, the teacher underlines key observations students reflected on what they had learned. Finally, every student is asked to write an anonymous letter to an imaginary student who is struggling in physics. The task is to motivate the student and give advice for future learning based on the idea that everybody can be good at physics. This "pen pal task" is based on Yeager & Walton (2011), who state that success of tasks is based on the "saying is believing effect" and by formulating a persuasive letter to another person, it often reinforces one's own persuasion (p270).

## Conclusion and Personal Experience

So, what have we learned about grit and growth mindset? To get started in your classroom, teach your students about neuroplasticity and explain how the brain's ability to learn grows and changes to form new neural pathways and connections in response to new information and experiences. Focus on active learning models which increase retention, elaboration and reflection. Tools like free recall where students spend ten minutes toward the end of class writing everything they can remember from the day's lesson on a blank piece of paper, and then using their notes to fill in what they've forgotten helps students summarize key learning targets. Beginning a new week by summarizing last week's main ideas with drawings and graphs helps students learn through specific tools and strategies as well. Normalize mistakes and create and reframe language. Putting a laminated growth mindset poster on your wall is all well and good,

but if you do not communicate high expectations and give regular feedback in the moment as students are actively struggling with a task, the tools will not be learned in a meaningful way.

Set specific goals, hold students accountable and commit to their success in a manner that makes giving up harder for them than thriving in your classroom. Inspire them! Tell stories, share your own ups and downs and create a classroom culture where failure can be openly acknowledged, accepted, and used as a learning tool. Professional basketball player, Michael Jordan, who is widely regarded as the greatest basketball player of all time, once said “I've missed more than 9000 shots in my career. I’ve lost almost 300 games. 26 times, I’ve been trusted to take the game winning shot and missed. I’ve failed over and over and over again in my life. And that is why I succeed” (Laursen, 2015, p20). Students love hearing stories of triumph and victory against all odds. Share in that journey together and do it with enthusiasm, because it is frightfully contagious in a classroom.

People with a growth mindset see talents as qualities to be developed through perseverance and determination. Of course, talent and IQ are wonderful starting points, but gritty individuals also tend to see education as training and practice at mastery. For students to become successful citizens of their local and global communities, schools are obligated to provide intentional experiences for students to “learn the knowledge and skills required for career and community participation such as collaboration, problem-solving, grit, perseverance, tenacity, and self-control” (Laursen, 2015, p20). Educational leaders and business experts have come to realize that the standards-based approach to learning has left our students ill prepared for the real world and the modern demands of the workforce. Angela Duckworth and Carol Dweck have been leading the pack on investigating developmental influences that lead to effective learning. Duckworth through her research on grit and perseverance, and Dweck alongside with her growth

and fixed mindset theories have been able to create predictive factors on successful outcomes in students and many invaluable tools with which to do so.

Personally, and professionally, I find the work of Duckworth and Dweck to be essential. When I began teaching preschool at the age of seventeen, I learned to value humor when dealing with frustrating circumstances. For example, if a student was ever upset and unwilling to practice writing a letter, we were working on together, I often used humor specific to that child to lighten the mood. As soon as the child smiled, laughed, and took a second to decompress, typically it was easy to get the student back on track. Another favorite tool of mine is failing on purpose. Another way to build perseverance in students is to share your experiences and mistakes with your classroom! When a student is on the verge of a meltdown because they are having a hard day, this is an excellent way to connect with him/her personally. My students love when I make mistakes and laugh at myself! When students realize teachers aren't perfect, this can make them feel comfortable taking risks and making errors in a safe and supportive environment.

Providing students with strategies to deal with missteps and regularly reminding them that challenges will inevitably arise is another way to create an atmosphere of growth mindset in the classroom. Giving concrete methods such as breaking a task into smaller parts, working through trial and error, drawing a diagram, discerning patterns or following resolutions that have worked for the student prior are some of the ways we can encourage grit. Again, modeling is a huge part of the puzzle; we want to talk them through a problem as needed but also encourage them to become self-sustained problem solvers when they are ready.

Too many students believe that making a mistake is the worst thing they can do, when in fact we should be offering them ample opportunities and scenarios to take risks and fail. The

"Marshmallow Challenge," created by Tom Wujec, is a team building exercise where students work together to build the tallest freestanding structure using just spaghetti, string, tape, and marshmallows (Al-Khalifa, H. S., 2017). I have also used this challenge with special needs students using newspaper and masking tape with excellent results. Starting the school year off with an activity that shows students that they will be placed in challenging situations in your classroom will teach them that failing is just a part of the process of learning something new and even doing the challenge more than once allows students to master their past errors and have a discussion as a class afterwards to discuss how we all learn from making mistakes (Ramponi, 2013).

One last important factor I believe helps to create a growth mindset in my classroom is giving students multiple opportunities to revise and resubmit their work. I know many teachers do not believe in this rule, but in my experience, it conveys to my students that I do not expect them to 'get it' right away. Effort and mastery of learning is more important to me than timelines. As an art educator, I know that all my students will enter my classroom with different experience levels and will most certainly work at different paces. If students are working hard and displaying consistent hard work and effort, removing the fear of failure and deadlines in a discipline that has varying levels of expressions, I am allowing my students to take risks and in fact celebrating the idea. A firm set of expectations is key to making this work. This allowance does not include an atmosphere where students are encouraged to 'cheat the system.' Yes, we want to squeeze every minute out of every class because our time is so limited, but connecting with one's own creativity doesn't always work like a math or social studies class and at times it demands a different set of standards and grading procedures.

Rewarding effort is huge in my classes and encouraging students to persevere through difficult tasks through purposeful lessons, thereby promoting critical thinking, is my way of supporting their own unique creative gifts. The power of yet is crucial as well, especially when they are young. If a student calls me over with a problem and says, “I can’t do this,” I make sure to reframe their initial statement to “I can’t do this...yet” before I help them. I find that it is more effective to reframe their perspective with the power of yet before I assist them, every time I hear a fixed mindset statement. We can promote positive self-talk and help students to realize we believe in them when we refuse to let them ‘off the hook.’ Setting specific, incremental individual goals and giving students the opportunity to track their own progress is an action plan toward self-growth and feelings of accomplishment. We want to empower our students to rethink, revise and reflect on their progress and ultimately give them the keys to their own success.

As stated earlier, even workplaces are joining in on the mindset research and seeing the benefits of emotional intelligence work. Emotional intelligence, also known as emotional quotient or EQ, is the capacity to comprehend, use, and control your own emotions in constructive ways to alleviate stress, and effectively communicate with others. EQ is also about how we empathize with people, overcome difficulties and resolve conflict in our environments. How much easier of a time would a child have growing up in the world if they were able to learn all these lessons long before adulthood? As growth mindset, grit and similar research expands, we need to be open as educators to learn new ways of teaching even in a line of work which can be viewed as overly saturated with ‘new and improved’ teaching strategies every year. It can be overwhelming and exhausting trying to keep up with it all. Hopefully, the research and reviews we have discussed today will allow you to step into your best self as an educator. The studies we

have explored and analyzed regarding the use of growth mindset pedagogy in the classroom does appear to indicate a significant impact on student achievement is possible. It is my sincere hope that you will consider implementing some of the previously mentioned growth mindset tools to improve your students' beliefs about their abilities in your classrooms.

Furthermore, as an educator teaching within a private Christian school environment, I aim to explore the extraordinary possibilities of expanding *spiritual* growth mindsets in my classroom. Intentional commitment toward nourishing the ever-changing and expansive spirit of the children I am blessed to work with is both an honor and a privilege. Living a soulfully, conscious Christian life frames each interaction toward uplifting beliefs through the lens of spiritually aligned behavior and mindful choices. As I aspire to support the naturally unlimited divine evolution of my students, I intend to teach creativity and innovation. Growth mindset in any focus, should be built on the process of discovery and exploration rather than a polished finished product. Once we reframe our own mindsets as educators, we can focus on how to solve interesting problems and teach students how to be a leader. My plan is always to teach the beauty of befriending fears and creating something without a map. We will embrace a collaborative atmosphere to create connections with other human beings that are meaningful. I encourage mistakes, experimentation and analytic thinking. Most importantly, I want to show students how they can connect with their own spirit and God through art. I cannot imagine anything more beautiful than that.

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