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Abstract

This literature review explores the effectiveness of how a growth mindset can be instrumental to student's academic performance. Students who are able to persevere when given a difficult task are more likely to have success, than a student who feels intelligence is influenced by natural ability. Students with a fixed mindset are quick to give up when given a challenging task.

Growth mindset and grit are a direct reflection of each other. This literature review consists of a study that was done to measure factors that would predict high school graduation. Results from the study were associated with both grit and growth mindset. Students who persevere in the education setting when faced with challenges and adversity seem to have grit, which correlates with a growth mindset. The effectiveness of a growth mindset in the school culture requires teachers to be knowledgeable and supportive of strategies and expectations, to be able to implement a growth mindset into academic instruction.

Effectiveness of a Growth Mindset in Education

Growth mindset, or the belief that intelligence is something we can change, is becoming increasingly popular in the field of education today. The research of Carol Dweck (2008) suggests that having a growth mindset is associated with higher academic achievement. Success is not influenced by natural ability, but rather by mindset and desire to achieve to the highest potential and abilities. When individuals choose to quit and give up, others keep pushing and learning from experiences by adjusting work or mindset. Research claims there is more to academic success than intellectual abilities. A difference between a fixed mindset and a growth mindset is based on the inherent nature and the abilities to achieve based on actions. The findings of this literature review presents how a mindset affects the ability to learn and succeed.

Literature Review

Mindset is the way we think, filter our thoughts and make meaning of a circumstance. Stanford psychologist, Carol Dweck (2006) developed the term growth mindset after researching motivation, personality, and development. Dweck (2006) suggests that a growth mindset evolves from an attitude of hard work, learning, training, and perseverance. Growth mindset is learning, growing, and hard work despite setbacks. Students with a growth mindset view failures as potential chances for instructive feedback and are more likely to learn from mistakes (Dweck, 2006). A growth mindset is viewed as changeable and can be developed through work ethic and perseverance. Two traits that predict achievement within a growth mindset are grit and self-control. The mindset held in any domain has a great influence on how gritty an individual will be in the pursuit of accomplishments. Children today are faced with many challenges and pressures, as a society the understanding of rigor and hard work should be instilled in students as they progress through the education system.

With a fixed mindset, people believe basic qualities, like intelligence or talent, are simply fixed traits. The belief is an individual is either good or not good at something based on inherent nature. Fixed mindset individuals dread failure because it is a negative reflection of abilities. In a fixed mindset, students believe basic abilities, intelligence, and talents, are fixed traits and will not change regardless of work ethic (Dweck, 2012). Students with fixed mindsets believe intelligence is dependent on innate ability rather than effort. A fixed mindset makes the assumption that character is given and it cannot change in any meaningful way. Today individuals are striving for success and want to avoid failure at all costs to maintain a sense of being intelligent or skilled.

Growth and fixed mindsets, which we manifest from a very early age, springs a great deal of behavior and personality. Relationships can be difficult with success and failure, in both professional and personal contexts, and ultimately the capacity for happiness is based on the mindset that is built in each individual. In the world there are fixed traits, where success is proving intelligence or talent, or there is the world of changing qualities and stretching to learn something new. Today's culture is a mixture of the two traits; working together to create a world that is full of successful people. Everyday teachers are handed a mixture of these mindsets in the classroom. Between two students, one may have motivation to persevere, and one may refuse to try when an assignment looks hard. Research by Claro and Paunesku (2014) revealed that students who demonstrate a growth mindset performs better than students with a fixed mindset, significantly outscoring them in the areas of math and literacy. Students are more likely to recognize the importance of effort and academic success. Students will seek out challenging academic tasks to enhance learning and value critical feedback (Claro & Paunesku, 2014). A 2016 national study of over 600 teachers conducted by Education Week Research Center states

that 98% of teachers believe that integrating growth mindset will lead to improved student learning. Cultivating a growth mindset is about closing the achievement gap, not about making low-achieving students feel good in the moment, but not truly learning in the end (Dweck, 2008).

While the fixed mindset and growth mindset both are still commonly held among individuals, neuroscience research shows that the brain's architecture continually adapts as we learn, this concept indicates the belief in a growth mindset is scientifically accurate, whereas the belief in a fixed mindset is a misconception (OECD, 2007). Neuroscience methods could provide insights into neural substrates of growth mindset and intrinsic motivation. A learner's brain activity could be measured by neural responses to a specific task in relation to internal processes of motivation. The use of neuroscientific techniques enables a focus on the learning process rather than the learning outcomes. A study by Moser, Schroder, Heeter, Moran, and Lee (2011) suggested that individuals with a growth mindset are receptive to corrective feedback, exhibiting a higher error positivity response, which is correlated with a heightened awareness of attention to mistakes. The connection between neural responses and intrinsic motivation is minimal. Intrinsic motivation is an inherent, as it drives an individual's behavior and self-determination. Self-determination is important in the development of beings to become more effective and refined in the reflection of ongoing experiences (Ryan, 2008). Students who score higher, based on academic intrinsic motivation at a young age are more likely to perform better in school and challenge themselves more often to earn higher academic rewards and degrees. These students are more likely to be leaders and more self-confident. There is distinctive neuroscientific interplay between growth mindset and intrinsic motivation. The brain relates to mindset and motivation, as a whole. Through internalization, individuals will generate intrinsically motivated behaviors at work or school. Mangels, Picton, and Craik (2001) used

event related potentials (ERP's) to understand how individuals' beliefs and mindsets influence information processing skills during knowledge test. ERP's were used to outline the analytical process that happens when information is encoded into the episodic memory and to determine how these processes affected individual's attention. The test was given to twenty participants, 22 to 37 years of age. There were nine females, all participants were right handed, English speaking, and had no history of neurological disorders. Participants were given six lists with 45 words in each list, and they were asked to memorize each list of forty-five words for recall and recognition. There was not any guidance given or instructions on how to memorize the words. Individual participant's data were created by averaging the ERP, items not recalled, known items, or missed items. Interactions between attention and memory were investigated; the information gained was students who had a fixed mindset would become frustrated when not recalling the words in the list. The growth mindset students worked hard to remember and would take constructive criticism if the answer was unknown. The growth mindset learner paid greater attention when given negative feedback about mistakes, and were more likely to correct the mistakes on a retest. These students demonstrated greater overall gains in knowledge. Students with the fixed mindset directed attention to feedback about what was wrong, but did not process this information to learn from it. These group differences may explain why growth mindset individuals are able to bounce back from academic failure more effectively than other fixed mindset peers. The ERP's used in the present study provided covert measurement of how beliefs influenced attention on a moment-to-moment basis, providing support for a neurocognitive model of the mechanism underlying a relationship between beliefs about ability and achievement success (Mangels et al., 2001).

Students who have a fixed theory are mainly concerned with how intelligent they are and would prefer tasks that are easy to accomplish. Typically, these individuals will veer away from tasks in which a mistake may be made and where intelligence may not come easily. In comparison, students with a growth theory want to be challenged to increase abilities, even if failure comes first. Carol Dweck (2006) has completed a large amount of research about intelligence and motivation, and how they are influenced by fixed and growth mindsets. Dweck (2006) has attracted attention from teachers who are trying to help underperforming students, parents who are concerned with children not having success in a specific content area, and even sports coaches. Dweck's (1998) research showed students with a fixed mindset experienced a downward spiral in academic trends while the growth mindset students were spiraling ahead. These mindsets come from experimental studies with ethnically, racially, and economically diverse fifth grade students. Researchers Mueller and Dweck (1998) show how seemingly subtle aspects of praise can have dramatic effects on students' mindsets and resilience. Praising students for ability taught them a fixed mindset and created vulnerability, but praising them for the effort or the strategy they used taught them the growth mindset and fostered resilience (Mueller & Dweck, 1998). In this same research, after completing a moderately difficult set of problems from a non-verbal IQ test, students were praised for the good performance. The praise focused on intelligence or on effort, or it did not specify a cause of success. The research concluded that praising the student's intelligence did not create the greatest sense of efficacy. Students who were praised for ability and intelligence endorsed a fixed mindset and became mired in concerns about ability. Those students did not want to try challenging problems and tended to see failure on the harder problems as meaning a lack of ability. Studies show the learning effects of students with a growth mindset earned higher grades because of the value of

actually learning versus looking smart. Effort was a virtue, because effort helps to develop ability. Setbacks are seen as a chance to increase effort or to try new strategies.

Performance goals are goals that are directly correlated to an outcome. These goals are rather shallow in the way of thinking, and tend to undermine long-term performance. Once the goal is achieved, less motivation to continue towards excellence happens. Mastery goals are defined as an outcome that is set to be the best at a single task. Mastery goals are effective because satisfaction is not related to external indicators. Mastery goals make motivation easier to maintain and desire. Research indicates that fixed mindsets are correlated with performance goals, while growth mindsets are correlated with mastery goals (Ames & Archer, 1988). Students with mastery goals will be more intrinsically motivated, will admit to needing help and guidance, and will view mistakes as part of learning. Students who have performance goals will have less motivation, high anxiety levels, and avoid the challenges of learning. Research on achievement motivation focused on identifying the different goal orientations among students, and the motivation processes that are associated with the different goals. Task involved versus ego-involved goals were studied (Maehr, 1983; Maehr & Nicholls, 1980). Learning oriented versus performance oriented (Dweck, 1986, 1988; Dweck & Elliot 1984), and as mastery focused versus ability focused (Ames, 1984). The differences in the research were conceptual among ego, performance, and ability goals were convergent, these perspectives were then integrated and are now identified as mastery and performance goals (Ames & Archer, 1987). With a performance goal orientation, there is still concern with being judged able and one shows evidence of ability by being successful, by outperforming others, or by achieving success with little effort, these goals are linked to the student with a fixed mindset. With a mastery goal, importance is attached to developing new skills. The process of learning itself is valued, and an

attainment of mastery is seen as dependent on effort. Mastery goals would reflect the student with a growth mindset.

Several experimental studies also suggest that students may be more willing to pursue challenging tasks, have positive feelings toward the situation, and exhibit an adaptive attributional pattern when adopting a mastery orientation (Ames et al., 1987; Dweck 1986, 1988, Elliot & Dweck, 1988; Nicholls, Patashnick, & Nolen, 1985). Challenging tasks offer opportunities for learning, they also present the risk of failure, and thereby threatening students' sense of worth when failure is normatively defined (Covington, 1984). Consequently, challenging tasks may be less threatening or more attractive to students who view the situation as emphasizing the process of learning, encouraging effortful activity, and deemphasizing the negative consequences of making errors (Fry & Coe, 1980). When students perceived their class as emphasizing a mastery goal, there was more likelihood to report using effective learning strategies, prefer tasks that offer challenge, like what is being learned, and believe that effort and success are entwined. The relation between mastery and performance goals in the classroom is particularly interesting and could be instrumental in guiding a teacher's instruction. A teacher must allow students to continue to compete at a higher level and to strive for tasks.

Teachers build a culture in their classroom where students strive for success, an environment for learning is created, and students can be driven by motivation. Brainology is a curriculum developed by Carol Dweck and Lisa Blackwell (2007) at Mindset Works. This curriculum teaches both the foundations of a growth mindset and the learning strategies to support the growth. A study was done by Blackwell, Dweck, Trzesniewski (2007) with seventh graders. The students were divided into two groups. Both groups received an eight-session workshop full of great study skills, but the growth mindset group also received lessons in the

learning and understanding of a growth mindset. What does a growth mindset look like for a student and how can it be applied to school work? Students began to love the idea that brain growth was attainable. The engagement of this particular group of students began to change, many of them had seen school as a place where they performed and were judged, but now they understood that they had an active role to play in the development of their minds. As the study progressed and the semester ended the growth mindset group showed a significant increase in math grades. The control group, who had not received any growth mindset learning, showed no improvement and continued to decline. Even though study skill had been learned, there was not motivation to put into practice. Inspired by these positive findings, Dweck and Blackwell (2007) began to develop a computer-based program called Brainology. In six computer modules, students learn about the brain and how to make it work better. Students learn how to confront and solve schoolwork problems, and create study plans. Students visit a virtual brain lab, do brain experiments, and find out such things as how the brain changes with learning, and how it grows new connections every time students learn something new. Students are then able to transcribe this idea into the schoolwork by putting study skills to work to make themselves smarter (Dweck & Blackwell, 2007). Brainology teaches students that their brains are like a muscle that gets stronger with exercise. Students, who think they were given a gift, sit and expect everything to have success. When students with a fixed mindset are not successful, personality traits such as defensiveness and demoralization began to become more prominent. Then students often will opt out of the given situation. The research behind Brainology recognizes that students need to take any gift and find success. No matter what, no one succeeds without a large amount of dedication and effort. There is one thing that sets the great successes apart from their equally talented peers- and that is how hard someone has worked (Ericsson,

Charness, Feltovich, & Hoffman, 2006). The growth mindset is a strategy that can be implemented into a classroom for all students to begin to use as a growing technique. This curriculum is a guide for teachers to use in their classroom as the growth mindset begins to emerge in the classroom. The curriculum allows all students to be introduced to the growth mindset strategies. This gives all students an equal opportunity to understand the strategies, not just students who have support at home to be encouraged with the growth mindset.

Grit is the tendency to sustain interest in and effort toward very long-term goals (Duckworth, Peterson, Matthews, & Kelly 2007). Duckworth et al., (2007) defines grit as sticking with things over the very long term until mastered. Duckworth's et al., (2007) research suggests that when it comes to high achievement, grit may be as essential as intelligence. Intelligence is an easy trait to measure, but there are smart people who are not high achievers, and there are people who are high achievers that may not have the highest test scores. In one study, Duckworth et al., (2007) found that smarter students actually had less grit than others did who scored lower on an intelligence test. Duckworth and Quinn (2009) developed the Grit Scale, a self-reported questionnaire used to evaluate focused effort and interest (2009). Duckworth and Quinn (2009) studied 4,813 students at Chicago Public Schools to determine whether a student's grit measured during junior year of high school, predicted graduation the following year. Students in 98 Chicago public schools completed a survey that included the Grit Scale, as well as questions used to measure various factors known to predict high school graduation, such as school safety, teacher support, peer support, parental support, conscientiousness, and school motivation. The study found that 88% of students surveyed in the spring of junior year graduated one year later (Consortium on Chicago School Research, 2009). Grit was strongly correlated with both academic conscientiousness and school motivation

(Consortium on Chicago School Research, 2009). The work of Angela Duckworth et al. (2007) and Carol Dweck (2007) directly align with each other. Students who persevere in the education setting when faced with challenges and adversity seemed to have grit, which is the concept that leads to having a growth mindset. Teaching gritty behaviors may not be successful if students do not have the mindset, strategies, and supports the needed to motivate and sustain growth over a period of time. Research indicates grit is negatively correlated with neuroticism, anxiety, depression, and ruminative thoughts. Individuals with higher levels of grit may be less susceptible to negative emotions (Kirby, Morrow, & Yih, 2014). If students are processing emotions in negative ways, it will be more likely to break down or burn out in the pursuit of long-term goals. In contrast, if students have adaptive emotional parameter skills, there will be more resilient when the going gets tough, as working towards long-term goals. Therefore, effective emotional strategies may partly reinforce grit. Questions about grit and education continue to focus on the many different emotions of humans. How do teachers teach children to experience failure if they are also being taught to be gritty? Can youth be gritty and have emotional intelligence skills? Educators must realize grit is only part of the equation of learning and achieving with a growth mindset.

Embedding grit and growth mindset into a school culture requires teachers and administrators to be supportive of the strategies and expectations. Education Week Research Center (2016) created an original survey examining teachers' perspectives, professional development and training, and classroom practices as they relate to learning mindsets. The survey was administered to a national sample of more than 600 kindergarten-twelfth grade teachers in May 2016. Experts expressed concern about whether teachers might have critical misunderstandings related to growth mindset that could potentially undermine its success when

put into practice with students. The survey was conducted while policymakers were constructing the accountability system of Every Student Succeeds Act and as federalists began to debate the inclusion of growth mindset measures in education systems. The study was apparent on how teachers rate their own familiarity with growth mindset, the importance of growth mindset for student achievement, and its impact on instruction. The study found 98% of the teachers agree that using a growth mindset in the classroom will lead to improved student learning, 90% of the teachers believe growth mindset is associated with excitement about learning, persistence, high levels of effort, and participation in class (Education Research Center, 2016). The strong data also lead to substantial challenges. Only 20% of the teachers strongly believe they are good at fostering a growth mindset in their own students (Education Research Center, 2016). Educators have even less confidence in their fellow teachers and school administrators. Only 1 in 5 of the teachers surveyed has deeply integrated growth mindset into their teaching practice. Teachers need training that is more effective, 85% of teachers want more professional development related to growth mindset (Education Research Center, 2016). This data is significant when growth mindset is being put in the forefront of education. In order for teachers to instruct and create the growth mindset content, teachers must be well-informed and confident in their learning and instructing techniques. Therefore, schools must begin providing educators with sustainable professional development, which will guide teachers learning and teaching.

The purpose of this literature review was to view the effectiveness of a growth mindset in an educational environment, and to see how changing the way students perceive abilities can potentially alter performance. Praising students on intelligence does not make a student any smarter, but rather students should be praised on the process of learning. Including the effort put forth, strategies that were used, perseverance and improvements that were made. Students who

have a fixed mindset are potentially not gritty and will easily give up when the work gets tough. These are not the people we want in baring jobs in our society. Goals and motivation drive work for many people. Individuals with a growth mindset will ensure a mastery goal to get the result. Success is not influenced by natural ability, but rather the mindset and desire to achieve to the highest potential and abilities.

Further research is needed on what educational programs can be effectively placed into school curriculum, as part of the 21st century common core skills. To effectively foster the growth mindset, research should be completed from all types of schools to discover where students are in this framework. Dweck and Blackwell's (2007) computer based program is a beginning piece of curriculum that can be used. Brainology could initiate research in the capacity where students whom are home-schooled and using an online educational program, such as Brainology. This research could be compared to students who are in a school receiving core content with growth mindset strategies being implemented by the teacher, but not exclusively being taught.

Conclusion

It is critical for educators to have the knowledge and understanding of how to support a growth mindset and grit, and to ensure that all students are being given the same opportunities to learn the concepts, strategies, and expectations to reach full potential, not only as a student, but also as a citizen that will lead a successful and fulfilling life. In order to have positive outcomes, the mindset behind intelligence must be transformed to the idea that intelligence can be developed. Test scores and measures of achievement can tell where a student is, but it does not tell where a student could end up. Educators must cultivate a growth mindset and grit to effectively teach students the power of accomplishments. The power behind a growth mindset is

not that an individual won or lost at an attempt to achieve, but rather the student made the best effort.

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